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MONASH UNIVERSITY
THESIS ACCEPTED IN SATISFACTION OF THE
REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

ON..... 3 May 2005.....

.....
Sec. Research Graduate School Committee

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ERRATA and ADDENDUM

- p 2: 2nd sentence: replace "enables" with "is designed to enable"
- p 6: para 1, 3rd line: replace "S3ection two outlines" with "Section two will outline"
- p 7: para: Predictive Validity, last line: insert "at the 0.005 level of significance." after "greater than 0.5"
- p 17: para 3, 1st line: replace "which," with "which, although small with less that 20 students per year,"
- p 18: para 1, 7th line: replace "three" with "four"
- p 23: para 1, 3rd line: insert "Monash University" before "medical students..."
- p 23: para 1, 4th line: insert "Australian" before "rural GPs..."
- p 24: para 2, 3rd sentence: insert references at end of sentence: {Kamien, 1996 #1707;DeWitt, 2001 #1644;Worley, 2000 #1311;Culhane, 1993 #1688}
- p 24: 2nd line: replace "it" with "such evaluation"
- p 24: para 2, 8th line: insert after "better experience": "than urban placements in some studies. Examples include: greater self-reported learning value from patient encounters {DeWitt, 2001 #1644}, greater exposure to medical conditions and procedures {Kamien, 1996 #1707} and improved class rankings relative to their urban counterparts {Worley, 2000 #1311}." Delete remainder of sentence including references.
- p 25: para 2, 6th line: replace "that could measure" with "based on the measurement of"
- p 31: para 2, 2nd line: replace "response, developed" with "response. They are developed"
- p 31: para 3, last sentence: replace with "Such resistance will be considered in the Discussion Chapter, Chapter 18."
- p 32: 1st sentence: replace with: "So, understanding one's belief structure may enable a prediction of attitudes, but the converse does not necessarily hold."
- p 38: para 3, 6th line: at end of sentence, insert reference: {Shapiro, 1988 #1432}
- p 39: 5th last line: replace "GP" with "doctor"
- p 40: 5th line: insert "is" after "rural origin"
- p 44: para 1, 5th line: After the second sentence insert "An example of a culture-specific (emic) belief variable might relate to the morality of contraception as seen by Italian Catholics, as opposed to the leadership of the Chinese Republic."
- p 46: last para, 1st sentence: Delete "The development of the belief" and replace "such" with "Such"
- p 47: 2nd para, 4th line: after "Lego blocks." insert "(Lego™ is a registered trademark of the Lego group.)"
- p 47: 3rd para, replace "analysis." and the sentence following, with "analysis, and is presented toward the end of this chapter."
- p 48: para 2, 1st sentence replace "Lego Model to aid in" with "a medieval castle-wall model, consisting of coloured plastic blocks similar to Lego™ blocks, as an aid to"
- p 215: section headed "Criterion related validity," 3rd line: replace "postdictive" with "'postdictive" {DeVellis RF, 1991 #591}."
- p 217: section headed "Discussion..." 4th line: delete "of" after "pages"
- p 313: In the heading: "Future research opportunities uncovered by this thesis", replace "uncovered by" with "based on"
- p 316 delete para 2
- p317 para 2, 2nd line: add after "'educational existential crises' ", the words: "as described by Webster {Webster RS, 2004 #1972},"
- p 317 para 2, 7th line: replace "caused by" with "associated with"
- p 317 para 3, last sentence: replace with "This will inform those changes in rural primary health care that will make a rural career more attractive to these students. This may lead to increased rural career choice among them, improving the sustainability of health care for rural communities."
- p 318 para 2, 2nd sentence, change "{Super, 1963 #1985}" to "{Super, 1963 #1985;Super, 1996 #1983}"
- p 342 Add the following references to the Bibliography:
DeWitt, D. E., M. Migeon, et al. (2001). "Insights from outstanding rural internal medicine residency rotations at the University of Washington." *Academic Medicine*, 76(3): 273-81.
Shapiro, M. C., J. S. Western, et al. (1988). "Career preferences and career outcomes of Australian medical students." *Medical Education*, 22(3): 214-21.

**AN APPROACH TO THE UNDERSTANDING AND
MEASUREMENT OF MEDICAL STUDENTS'
ATTITUDES TOWARD A RURAL CAREER**

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Abstract

An approach to the understanding and measurement of medical students' attitudes toward a rural career

Introduction

The undersupply of rural medical practitioners is an international problem. Despite the implementation of many programs over several decades, little improvement has occurred. Rural programs have focused on factors external to the individual and their effectiveness measured on observed outcomes based on recruitment and retention rates of rural practitioners many years later.

This PhD thesis looks at how influences on rural career choice have their effect. It explores the central importance and measurement of belief systems, self-concept and self-efficacy in career decision-making. It is grounded in proven behaviour theory and is supported by career development theory.

Methods

Standard principles of questionnaire design were followed to develop the Rural Intent Questionnaire (RIQ), an instrument to measure the belief systems that underpin attitudes toward a rural career. A long version (RIQ2001) (97 items) and an abbreviated version (RIQ2003) (34 items) were developed. Both versions consisted of four indices: stated intent, affect, perceived consequences and social drivers. The stated intent items formed three 'gold standards,' the Situational Expectation Score (SES), the Situational Intent Score (SIS) and the Rural Intent Score (RI score).

The psychometric properties of the RIQ2001 were tested on 197 replies from medical students. The RIQ2003 was tested on 530 replies from year 1, 2 and 4 students. The RIQ2003 was tested in a controlled crossover trial involving 215 second-year students. Each student attended either a rural- or an urban-based placement in first semester and the other in second semester. Surveys were distributed to all students, before and after each placement, with response rates ranging from 75% to 82%.

Results

The Cronbach coefficient alpha for the sub-indices ranged from .79 to .93 for the RIQ2001 and from .78 to .87 for the RIQ2003. Regression models were fitted with dependent variable (DV): SIS and the indices as independent variables (IVs). Both models explained about 72% of the variance in SIS. Validity analysis supported the validity of the instrument based on internationally accepted standards.

The controlled crossover trial revealed that most differences between rotations occurred during the second semester rotations. Students behaved differently according to their SES grouping, with the 'undecided' students showing the greatest changes. Analysis of the individual beliefs and sub-index changes provided plausible explanations for the changes observed in stated intention.

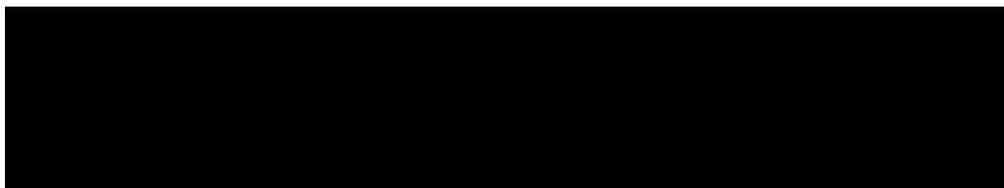
Discussion

This research unravels the "black box" that has obscured the process by which rural workforce programs affect recruitment and retention outcomes. It reveals that both intrinsic and extrinsic factors exert their influence on career choice through the belief system that underpins attitudes and self-concept. These beliefs are informed by new knowledge, and can be authenticated through the dialectic process of existential crisis.

The instrument developed and tested in this thesis can offer a timely, specific and sensitive evaluation of the programs that influence career choice and can inform the quality improvement cycle. This thesis not only offers the means to measure changes in intention but it also offers a structured, theory-based approach to understanding the mechanism of action of influences on rural career choice.

Declaration

This thesis contains no material that has been accepted for the award of any other degree or diploma in any university or other institution. To the best of my knowledge, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.



George T. Somers

24 August, 2004

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SECTION ONE

Introduction and background to the thesis

Chapter One

Introduction to an instrument to measure career aspiration

Introduction

This thesis presents the development and evaluation of an instrument that can measure the beliefs that guide career choice and decision-making. The instrument, the Rural Intent Questionnaire (RIQ) enables program designers and workforce policy makers to measure the effectiveness of programs designed to influence career choice. Specifically, this instrument focuses on the measurement of intention of medical students to work, after graduation and training, in a rural environment.

Chapter One forms the introduction to the thesis. It introduces the rationale for the thesis and lists the objectives and the hypotheses on which the research is based. Chapter One closes with a chapter-by-chapter outline of the remainder of the thesis.

The rural medical workforce shortage

Rural communities in Australia and in almost all other countries suffer poorer health outcomes than their urban counterparts (Clarke, 1989; Humphreys JS & Rolley F, 1991). In Australia, as elsewhere, this is due, in part, to a reduced access to medical services as a result of the undersupply of doctors in rural and regional areas (General Practice Strategy Review Group, 1998)¹. In its document, Policy on Rural Practice and Rural Health 2001, Wonca, the World Organisation of Family Doctors states,

Rural people represent the majority of the world's population and universally have poorer health status than urban people. Often the health status of special needs groups is worse in rural than metropolitan areas. These include the poor, the elderly, women and indigenous people. Despite this, rural health services command proportionally fewer resources and fewer staff than urban health services in almost every country in the world.

While the health of rural people is affected by social, cultural and economic factors, the major detriment comes from the lack of resources and poverty (Wonca Working Party on Rural Practice, 2001)². The Wonca policy document on training for rural general practice comments,

There continues to be a worldwide shortage of family doctors (general practitioners) in rural and remote areas...even in countries where there is an overall oversupply of doctors (WONCA, 1995)³

¹ General Practice Strategy Review Group 1998, p160

² Wonca 2001, Executive summary p6

³ Wonca 1995, Introduction p6

Analysis of the Australian Institute of Health and Welfare (AIHW) report, Australia's Health 2002, (Table 5.18) reveals that while 28.5% of the Australian population lives outside metropolitan areas, only 13% of primary care practitioners work there. Some analysts may include all hospital non-specialists, some of whom do provide primary care, as primary care practitioners. If all of these doctors are included, this percentage rises to 21% who have their main practice base outside metropolitan areas, well below the proportion expected for the rural population (AIHW, 2002). The former figure is similar to the estimate in the United States of America where 12% of physicians service the 25% of Americans living in rural areas (Feeley, 2003).

Despite a large injection of resources over the past few decades, the situation does not appear to be improving in Australia (Johnston & Wilkinson, 2001), the United States of America (United States General Accounting Office, 2003), England and Wales (Gravelle & Sutton, 2001) and in Canada (Coyte, Catz, & Stricker, 1997).

Evaluation of programs designed to influence career choice

A recent editorial in the Medical Journal of Australia when commenting on whether there is a need to wait for further prospective studies into the effectiveness of postgraduate programs designed to increase the rural medical workforce stated,

Should we wait another 5 or 10 years for the results of this research? No, Australians in rural and remote areas cannot wait. We now have sufficient evidence to be confident that rural and remote training has an impact on subsequent choice of rural practice, and we know what constitutes an effective training post (Wearne & Wakerman, 2004).

The debate over undergraduate and postgraduate rural placements in Australia has resulted in significant policy and funding changes. Almost all of the evidence supporting this expenditure however, is based on associations between programs and outcomes; there is little discussion on how the programs exert their effect and evidence for causality is scant. The effectiveness of programs designed to increase the rural workforce is often determined by measuring behavioural outcome, that is, how many doctors are actually working in rural areas some years after the program has been put in place.

Another method of evaluation in common usage involves asking rural doctors to think back to programs that have influenced their decision-making, the so-called introspective causal report (Pathman & Agnew, 1993). Such studies measure the net effect of the many influences that arise during and after the program in question and are subject to the biases associated with attribution process. In this process, issues identified as causes of a behaviour may be little more than a retrospective rationalisation for choices made.

The unraveling of the individual effects of multiple sequential influences is virtually impossible, especially with a time lag of many years. In any case, lengthy delays in evaluation limit the usefulness of such evaluations for program improvement. Indeed, the findings of these evaluations may not be available until after the program has been discontinued. In order to justify and better direct their considerable funding, governments are justified in their demand

that these programs be evaluated for their effectiveness, and indeed, their cost-effectiveness (Department of Finance, 1994).

Not only is there an imperative to appropriately allocate scarce financial budgets, the resources of universities may not be adequate to deliver the all the rural programs identified as 'useful'. An example is the current government target to offer 50% of undergraduate clinical training in rural areas for 25% of medical students. It would be useful to have an instrument capable of identifying which students might benefit more, and which students are unlikely to benefit from these placements, so that these scarce resources may be better directed.

Determinants of career choice

There is considerable evidence to support the association between undergraduate rural placements and career choice. (Pathman, 1996; Rabinowitz, Diamond, Hojat, & Hazelwood, 1999; Rabinowitz, Diamond, Markham, & Paynter, 2001; Rolfe, Pearson, O'Connell, & Dickinson, 1995). Some argue that those who have already chosen a rural career may not need such rural support in order to recruit them to the country. It has been shown, however, that a benefit for this group is that these programs can increase their retention in rural areas after graduation (Rabinowitz et al., 2001). However, forcing unwilling students or graduates to train in rural areas may increase their antagonism toward a rural career (Rolfe et al., 1995). The intermediate or undecided group of students, on the other hand, may benefit from these programs, and this is an avenue for increasing recruitment to rural areas. So, not only is the placement of the unwilling in rural areas of doubtful value, it may result in an inappropriate allocation of scarce rural educational resources, better reserved for other students.

Some research into medical career decision-making suggests that the influences on medical career choices can be intrinsic, relating to the make-up of the student or extrinsic, relating to external influences (Funkenstein, 1978). Funkenstein did include the "basic student characteristics at matriculation in medical school, values and lifestyle"⁴ as intrinsic factors. As extrinsic factors, he included "the medical school experience and societal factors, especially the economic feasibility of various careers."⁵

This approach has lead the authors of a recent review of the Australian and international literature on medical career development to conclude,

...what is evident from the literature is that there is a greater opportunity for governments, health authorities and the medical profession to make changes to the extrinsic determinants of career choice than to the intrinsic determinants (AMWAC, 2002)⁶.

Measurement of intrinsic determinants of career choice

Such a conclusion seems to support the current approach, which attempts to redress identified extrinsic barriers to a rural career. There are many possible reasons for there to be a "greater

⁴ Funkenstein 1978, p7

⁵ ibid, p10

⁶ AMWAC 2002, p1

opportunity" to make changes to the extrinsic factors. Certainly, these factors may be more readily studied and are better identified in the literature; however, their mechanisms of action are not clearly understood. Without understanding the mechanism of action of programs, it is not possible to evaluate their effectiveness, or to improve them. So this approach, based on the extrinsic factors, assumes that it is more difficult to measure or influence the intrinsic nature of students and graduates. This thesis seeks to investigate the intrinsic factors and the way that they influence career choice. It will argue that the extrinsic factors exert their influence, in great part, through the self-identity of the individual and the vocational identity ascribed by the individual to the career. The thesis will also offer an approach to influencing change in both the intrinsic and the extrinsic factors.

An instrument to measure career aspiration

This thesis describes the development and evaluation of an instrument based on behavioural theory and supported by locational career decision-making theory, which can measure the intention of medical students and graduates to work in a rural environment. This intention is based on the individual's beliefs relating to the vocation. The sum of such beliefs have been described as self-concept (intrinsic factors), and takes into account perceived extrinsic factors, called self-efficacy by Bandura (Albert Bandura, 1982). The alignment of this self-concept with a vocational identity determines career choice (D.E. Super, 1963). The discussion chapter will clarify the role of self-concept in career choice, and how self-concept can be influenced by extrinsic factors including role models, educators and self-efficacy.

The instrument also contains elements designed to determine which students are committed to a rural or an urban career, and which students are less certain of their future careers. This will inform the better targeting of scarce rural resources to the students most likely to benefit. Its application before and after rural programs, can provide an estimate of changes in intention/self-concept and even the level of commitment to a career path. Research designs that are possible with such a versatile instrument will allow for causation inferences. So, changes in these variables will inform the evaluation of programs and the results will be available in a sufficiently timely fashion to inform the quality improvement cycle and to be useful for policy makers.

Objectives, Hypotheses and Research Questions

An instrument capable of discriminating between levels of rural intent would be a valuable adjunct to the tools currently available to inform workforce planning. It would have a timeliness, specificity and sensitivity not currently available to policy makers. Such an instrument, applied before and immediately after programs such as undergraduate rural rotations, could measure the effect of these programs before other confounding experiences supervene.

The purpose of this thesis is to present the development and evaluation of an instrument that is capable of measuring changing situational intent. Section One will outline how the instrument is

grounded in established behavioural theory of Triandis and of Fishbein and Ajzen, who have shown that attitudes toward a behaviour can predict subsequent behaviour (Ajzen I & Fishbein M, 1980; H.C. Triandis, 1971). Section two outlines the development of the instrument. Section Three will present evidence that the RIQ estimates the intention to work in a rural environment by estimating attitudes toward such work through the measurement of the belief structure underpinning these attitudes.

Section Four of the thesis will show the utility of the instrument as an evaluative tool when applied immediately before and immediately after a program of interest. More than just predicting future behaviour, this instrument offers insight into how the program of interest influences intention and career choice, whether or not this was an objective of that program. It also lends itself to the evaluation of improvements to such programs. Section Five will discuss the claim that the same belief structure that informs intention also informs self-concept, which is a vital component in career decision-making.

Objectives

The objectives of the thesis are to:

1. design, develop and test for validity and reliability an instrument, based on the theories of interpersonal and planned behaviour of Triandis and Fishbein and Ajzen, capable of measuring the intention of medical students to work in a rural environment for a period of time after training is completed (Section Two and Three)
2. test the utility of this instrument in the evaluation of programs designed to increase rural intent, specifically in relation to the first two rural rotations undertaken by a cohort of medical students at Monash University, Australia (Section Four).
3. explore the relationship between the belief system underpinning attitudes and intention, and the belief system involved in the formation of self-concept and career decision-making. (Section Five).

Hypotheses

The following six hypotheses relate to the first objective. They describe the acceptable qualities of the Rural Intent Questionnaire. These are tested in Sections Two and Three.

Reliability - Internal consistency

Hypothesis 1:

That each of the indices will have good internal consistency.

Test:

The Cronbach's Alpha of each of the components of the index will exceed 0.7.

Although data suitable for testing the temporal stability of the RIQ2003 was available for only a few students, the results will be presented in Section Three.

Reliability – Temporal stability

Hypothesis 2:

That the instrument remains stable over a two-week period.

Test:

The average correlation coefficient between a response and its repeated response two weeks later will exceed 0.9

Validity

Construct Validity

Hypothesis 3:

That the variables, sub-indices and indices are structurally aligned with the expectations of the theoretical frameworks on which they are based.

Tests:

1. The variables will be factorially related according to the Triandis dimensions of affect, perceived consequences and social factors.
2. The Fishbein and Ajzen construct of subjective norm will make an independent contribution to the model.

Predictive Validity

Hypothesis 4:

That the index will predict which students are likely to have a higher stated intention to work in the country. Students with higher stated intent, as determined by the Situational Intent Score (SIS) will score higher on the components of the index than students with lower stated intent.

Test:

The strength of association between the index and the SIS will be high. The adjusted R^2 for a fitted regression model will be greater than 0.5.

Cultural distinctiveness

Hypothesis 5:

That there is a cultural distinctiveness evident in the questionnaire responses from the following groups of students: local-international, male/female, high, intermediate and low SES.

Test:

There will be different patterns of regression weights on the affect, perceived consequences and social drivers for the comparator groups.

Level of commitment

Hypothesis 6:

That the more 'committed' students with high or low Situational Expectation Scores (SES) will display a greater strength of association between their beliefs and stated intention (SIS) than the less 'decided' students with a neutral SES.

Test:

The Adjusted R² for regression models fitted for the high and low SES subgroups will be greater than that for models fitted for the neutral SES subgroup.

Research questions

The following list of research questions relate to the utility of the RIQ, and to the second objective of the thesis. They are dealt with in Section Four of the thesis.

1. Was there a global change in intention to work in the country over the whole year group during 2003?
2. Was there a measurable change in intention associated with the urban and rural rotations?
Using the effect of the urban rotation as a control, was there an effect of the rural rotation?
3. Did the order in which rotations were attended affect the effectiveness of the program?
4. Were certain sub-groups of students more likely to show change in intention than others?
5. Were there changes in the belief system, as measured by the Rural Intent Questionnaire (RIQ), associated with the rotations? Did the changes in beliefs offer a plausible explanation for the effects of rotations on intention?

Outline of the thesis

This thesis is divided into five sections and eighteen chapters:

Section One: Introduction and background to the thesis

Section Two: Development of the Rural Intent Questionnaire (RIQ)

Section Three: Gold standards and the properties of the instrument (RIQ2003)

Section Four: The utility of the instrument: a controlled crossover trial

Section Five: Discussion and conclusions

Each section has several chapters, and a brief outline of these follows:

SECTION ONE provides an introduction and presents the theoretical framework for the thesis.

Chapter One provides a brief overview of the need for an instrument that can inform the quality improvement cycle of programs designed to increase the likelihood that medical graduates will choose a rural career.

Chapter Two presents an overview of programs that have been implemented in Australia and overseas, how they are evaluated and limitations of some current methods of evaluating these programs, especially with regard to showing causation. This discussion shows the need for an instrument that allows research that is more timely, more sensitive and more specific than research based on behavioural outcomes or on introspective causal reports.

Chapter Three investigates the literature surrounding the theoretical framework on which this instrument is based. It looks at the relationship between intention to act and the belief structure underpinning attitudes toward the behaviour. It goes on to investigate the evidence supporting the use of intention as a predictor of behaviour, and some important limitations. A discussion follows, on the applicability of these theories to rural workforce recruitment and retention.

Chapter Four discusses methodological considerations of questionnaire design and evaluation. This includes a discussion on the steps necessary for the development of an instrument, issues relating to validity and reliability testing, and a brief overview of some of the statistical considerations important for the valid interpretation of results from instruments designed for use in the social sciences.

SECTION TWO describes the development of the Rural Intent Questionnaire (RIQ).

Chapter Five briefly outlines how the item list for the first version of the questionnaire was collected.

Chapter Six presents the development and the statistical evaluation of the first fully functional version of the instrument, the RIQ2000.

Chapter Seven describes the steps taken to gather evidence for the validity of this instrument.

Chapter Eight presents the refinement of the RIQ2000 based on the findings presented in Chapters Six and Seven. Chapter Eight then presents an evaluation of this longer version of the instrument, the RIQ2001.

Chapter Nine discusses how this long version of the instrument was reduced; first to the RIQ2002 and then to the briefer RIQ2003.

SECTION THREE describes the characteristics of the RIQ2003.

Chapter Ten describes the development of the gold standards against which to test the instrument. It describes the relationships between stated rural intent and four other predictors of a rural career. Three gold standards are developed: the Rural Intent Score (RI), the Situational Expectation Score (SES) and the Situational Expectation Score (SES)

Chapter Eleven presents an analysis of the internal structure and the function of the indices and sub-indices of the RIQ2003.

Chapter Twelve looks at the psychometric properties of the RIQ2003 when considered as a complete instrument.

Chapter Thirteen offers a structured argument in favour of the validity of the instrument.

SECTION FOUR presents the results of a crossover trial, using the instrument to test changes in beliefs, attitudes and intention toward a rural career.

Chapter Fourteen provides the introduction and methodology of the trial.

Chapter Fifteen presents the results and offers a discussion on the findings.

Chapter Sixteen describes how the RIQ2003 can detect changes in beliefs and attitudes toward a rural career, and how these changes can inform an understanding of the changes in intention presented in the previous two chapters.

SECTION FIVE Presents a summary, discussion and conclusion to the thesis.

Chapter Seventeen presents a summary of the results presented throughout the thesis and comments on its strengths and weaknesses. It outlines some potential future research directions, and how the RIQ may be useful in this research and ends with some concluding remarks.

Chapter Eighteen discusses the ramifications of the thesis. During this discussion, the link between self-direction, self-concept and vocational identity are explored, and the pivotal role of self-efficacy in career decision-making is outlined. This chapter outlines an approach to understanding the effects of programs designed to influence rural career choice. It discusses how this approach, grounded in proven theory and based on self-concept, can inform program evaluation using an instrument like the Rural Intent Questionnaire.

Chapter Two

The rural medical workforce crisis: programs and evaluation

Introduction

This chapter introduces the rural medical workforce shortage, its effects, and programs that have been put in place to increase the number of doctors working in rural areas. It discusses the evaluation of these programs, and highlights the difficulties caused by the lengthy time lag between the delivery of programs and their measurable outcomes based on the career moves of doctors. The chapter ends with a systematic approach to the evaluation of programs under the headings of appropriateness, effectiveness and efficiency.

An overview of the evaluation of programs

It is widely accepted that there is a critical shortage of rural General Practitioners (GPs) in Australia (General Practice Strategy Review Group, 1998). The Australian Commonwealth Government produced its Regional Health Strategy: More Doctors, Better Services in 2000, which would be a blueprint for a coordinated effort towards resolving the rural workforce problem (Anderson J & Wooldridge M, 2000). In the 2000/2001 budget it allocated some \$526 million to be spent over four years on the Commonwealth Regional Health Services Program (Anderson J, 31-10-2000; Commonwealth Dept. of Health and Aged Care, 2000; Wooldridge M, 2000).

The development of programs, such as those designed to address the rural medical workforce shortage may be described within the context of an Australian policy cycle as described by Bridgeman (Bridgeman P & Davis G, 2000). Stages in the cycle include:

- identifying emerging issues, such as the rural workforce problem;
- policy analysis, guided by political considerations such as marginal rural electorates, but informed by field research such as the seminal studies of the early 1990's. This leads to:
 - identification of appropriate policy instruments, that is, the programs under consideration;
 - consultation with other departments and agencies, to test and improve ideas and gather support. This could include departments such as higher education, health, the professional bodies and colleges, and universities;

- coordination between treasury and other government departments, sometimes requiring interdepartmental committees;
- decision making after consideration by cabinet informed by the accrued policy advice, funding (\$m526 over 4 years) included in the budget for the Commonwealth Regional Health Services Program;
- implementation of the programs; and
- evaluation so that government can assess the appropriateness, effectiveness and efficiency of programs, and the cycle starts over again.

The policy analysis stage is largely informed by retrospective studies, relying on rural general practitioners' recollections of influences, often many years earlier, on their career choices (Kamien M, 1987; South Australian Health Commission, Royal Australian College of General Practitioners (SA), & Australian Medical Association (SA), 1992; Strasser R, 1992). Programs were devised and implemented, based largely on the body of knowledge derived from these introspective causal reports (Pathman & Agnew, 1993), after consultation with some 200 representatives of the professional bodies, colleges and universities who attended meetings with the General Practice Strategy Review Group (General Practice Strategy Review Group, 1998). While these seminal works continue to inform policy many years after completion, they should not be accepted as an alternative to recurrent program evaluation. The Department of Finance (DoF) recommends that there should be annual evaluation of programs and a comprehensive evaluation every 3-5 years (Department of Finance, 1994). In the case of programs designed to increase the number of rural doctors, such evaluation is problematic as the outcome of interest is not seen for many years, well beyond the 3-5 year evaluation cycle recommended by the DoF.

Some researchers utilise introspective causal reports in a cross-sectional research design to gain an understanding of the influences on a rural career. They then use the inferences gained from these studies to support the on-going funding of programs that maximize positive influences and minimize negative influences. The actual effect of the programs cannot be measured, however, until the career choice is made, many years later. Other researchers use prospective studies comparing eventual career choice of cohorts who do or do not experience a range of programs and supports, usually delivered simultaneously (Rabinowitz HK, Diamond JJ, Veloski JJ, & JA., 2000; Verby, Newell, Andresen, & Swentko, 1991). Some of these researchers have followed students for several decades. While some of these studies have shown that the whole-of-program has an effect on recruitment and, indeed, retention (Rabinowitz et al., 2001), they have not been able to clearly identify the components of the program which were most effective. So the appropriateness, effectiveness and efficiency of individual programs is difficult to evaluate, even in well-constructed long-term quasi-experimental studies, when the outcome of interest is the eventual rural career choice.

An alternative approach to studying the process of decision making was developed by social psychologists in the 1970's. These include the Triandis model, the Fishbein and Ajzen Theory

of Reasoned Action (TRA) and Theory of Planned Behaviour (TpB) (Ajzen, 1991; Ajzen I & Fishbein M, 1980; Triandis H, 1977). This approach is based on the theory that intention to carry out an act is a strong predictor of the behaviour. If this is also true for rural career choice, intention to practise in a rural environment offers an estimate of the likelihood of the behaviour occurring well before the event. This estimate can be used as the outcome of interest, providing far more timely data and thereby, increased utility of the evaluation.

One's intention to carry out an act can change over time and intention is linked to a change in the likelihood of the behaviour occurring. Indeed, these influences on intention continue after the behaviour, and may then predict retention rates. Just as intention is an indicator of the likelihood of behaviour, change in intention can indicate a likely change in future behaviour. So intention, measured at two points in time, before and after the application of an intervention, can give an indication of the effect of that intervention on likely behavioural outcome.

All three models referred to above seek to measure intention. Triandis, in his model however, sought to go further than to merely predict behaviour. He proposed a model that takes into account the "subjective culture" of the individual, and sought to understand behaviour within the actor's entire socio-cultural milieu (H.C. Triandis, 1972). Funkenstein studied the medical career choice of Harvard graduates over a 28-year period. He found that there were five discernable 'eras' during which "the social responsibility, the expectations of society toward physicians, the assignment of priorities in medicine and the funding of careers changed (Funkenstein, 1978)⁷." He found that these social environments had an independent effect on career choice.

Basing an evaluative tool on the Triandis theory, rather than one which seeks merely to predict behaviour, allows not only for a measurement of the effect of the program, but also for an understanding of its mechanism of action, offering opportunities for the quality improvement cycle. In designing, implementing, evaluating and improving programs within a field as complex as medical rural career choice, this more inclusive approach has clear advantages.

What follows is an exploration of the usefulness of behaviour theory as a conceptual framework on which to base a comprehensive model for understanding the many forces involved in rural career choice. Having established the value of the theoretical framework, this chapter will investigate its utility in the development of an instrument to measure intention to choose a rural medical career. As discussed above, such an instrument, with proven validity and reliability, could enable a more sensitive, timely and specific evaluation of programs designed to increase rural recruitment and retention than studies based on introspective causal reports or global, long term, prospective studies.

⁷ Funkenstein 1978, p9

The workforce problem

Although there may be debate about the extent, there is no doubt that there is a shortage of rural General Practitioners (GPs), in Australia. In 1998, AMWAC developed a comprehensive list of indicators for workforce shortage. It went on to describe how all of these indicators applied to rural areas in Australia (AMWAC & AIHW, 1998). About 30 per cent of Australia's population lives outside the capital cities and metropolitan centres, yet only 13 per cent of GPs and 21% of primary care physicians work there (AIHW, 2002). There is one GP per 1043 people in Capital Cities, and only one GP per 1466 people in rural areas (General Practice Strategy Review Group, 1998). For many reasons, the specialist undersupply in the country is very much worse. As a result of this reduced access to specialists, and often, allied health support as well, rural general practice has much greater sub-specialisation, depth, and variety than most urban practices. It often includes a hospital workload uncommon in metropolitan centres. Rural people suffer more illness than urban people do. The young, the old, women, the poor and the Aborigines have special problems involved with country living (Humphreys, 2000). The problem is further compounded by the fact that rural areas have a higher proportion of elderly and Aboriginal people, and a higher level of fertility, placing greater demands on their GPs. As a result of all of these factors, Strasser estimates this 21% of GPs to provide for 35-40% of national GP need (Strasser R, Hays R, Kamien M, & Carson D, 1997).⁸

This diminished GP availability translates to decreased health service delivery, and possibly, health outcomes. The per capita Medicare rebate paid in smaller rural and remote areas is \$92 per year, versus \$145 in metropolitan areas (General Practice Strategy Review Group, 1998). In turn, it is accepted that "the health status of rural Australians is appreciably worse than their urban counterparts" (Humphreys JS & Rolley F, 1991), and that the rate of avoidable deaths is 40 per cent higher in rural areas (Strasser R, 1997). Although it is possible that the rural workforce shortage contributes to the diminished health of rural populations, Strasser warns, "While it would appear logical that increased availability of General Practitioner services would lead to improved health outcomes for the populations they service, there have not been significant studies to support or refute this claim." (Strasser R et al., 1997). So fixing the shortage may or may not improve rural health.

As the medical workforce continues to seek more reasonable working conditions, and as students and graduates continue to opt for a specialist career, this undersupply is predicted to worsen (AMWAC & AIHW, 1997). With the advent of the specialist colleges in the 1940's 1950's and 1960's, the number of graduates entering general practice from 1950's to 1970's was greatly reduced. The retirement of individuals from this important rural cohort has had a great impact, and is likely to continue to do so. The predicted attrition rate among the

⁸ Strasser et al. 1997, v1 s2 p10

predominantly middle-aged rural GPs is estimated at 5% or over 100 doctors per annum (Kamien M, 1998; Strasser R et al., 1997).

The number of training posts for all general practitioner trainees has been increased from 450 to 600 for the 2004 year. Of these, 263 positions have been set aside for rural areas. However, there were only 176 first-choice applications for these rural posts. Overall, there were only 616 applications for the 600 GP traineeships available, and it has been estimated that of these, perhaps 500 will be filled. Of the 616 applicants, 66% are overseas born, half of these from Asia, and 36% are overseas trained (Coote W, 2003). This highlights an impending generalist undersupply, not restricted to rural areas.

There were 1489 training posts for all specialties in Australia in 2003. If the extra 150 GP posts are in addition to this, there will be over 1600 trainees in 2004. Even if all 263 rural GP training posts are filled, this will amount to 16% of trainees from all specialties. The RUSC Report (1998) recommended that any solution to the rural doctor shortage would require 40 per cent of Australian medical graduates (in the short term) to take up a rural career (Rural Undergraduate Steering Committee, 1998b)⁹, over double the current rate. It is clear, then, that both under-recruitment and inadequate retention contribute to the ongoing rural medical workforce shortage, and that the solution must lie in a combined approach.

Current programs

Many schemes have been instigated over the past decade in an attempt to increase the number of rural General Practitioners. Most are not delivered in isolation and their targets are usually involved in several programs throughout their training and careers, often concurrently. These programs have a deep penetration, especially in the undergraduate years, and it is extremely unlikely that any Australian graduate will miss exposure to at least one of these schemes.

In Australia, the Regional Health Strategy, More Doctors, Better Services (2000) has incorporated many of the following programs into the Commonwealth Regional Health Services Program, (Anderson J & Wooldridge M, 2000). The Commonwealth Department of Health and Ageing has continued to build on this strategy (Wooldridge M, 2001) and has established the Health Workforce Unit to oversee many of these programs (Health Workforce Unit, 2002).

Programs designed to address the rural workforce shortage can be divided into five broad categories, four of which address phases of training and practice; the fifth involves international medical graduates (IMGs).

- **Programs which orient University admission policies to favour rural applicants:**

These include Rural Medical Undergraduate Scholarships (Portfolio Budget Statements 1999-2000, 1999), reducing the TER (University entry score) for rural students (AMWAC & AIHW, 1997; Neame, Powis, & Bristow, 1992), increasing awareness at a high school level (Basco, Buchbinder, Duggan, & Wilson, 1998, Gill D, 1996 #521; Gill & Tonks, 1996), over-selecting

⁹ Rural Undergraduate Steering Committee 1998, p13

urban students with an interest in rural practice (Fromm B, Konen JC, & Bosca RB, 1985; Hays RB et al., 1995; Rabinowitz, 1999), and providing bonded places, with or without a stipend, for applicants willing to commit themselves to several years of service in rural or underserved areas after graduation.

- **Programs seeking to increase positive rural experience within Universities:**

Rural mentors and role models (Blue et al., 1996; Fatovich, 1991), rural attachments (Colditz & Munro, 1980; Fromm B et al., 1985), John Flynn scholarships, rural clubs (M. Kamien, 1996b), and an emphasis on the qualities of rural practice (Fortune & Dimino, 1998; B. A. Kamien, Bassiri, & Kamien, 1999; Rabinowitz, 1988b, 1993; Rabinowitz, Diamond, Markham, & Hazelwood, 1999; Verby et al., 1991)

- **Postgraduate training programs which are rural-based:**

The Royal Australian College of General Practitioners (RACGP) has a separate 'rural stream' of post-graduate trainees (RACGP, 2000; Royal Australian College of General Practitioners, 1997). The number of GP trainee places nationally, was increased in 2004 from 400 to 600. There is now a learned College (Australian College of Rural and Remote Medicine - ACCRRM) which focuses solely on rural training (Doolan, 1997).

- **Incentives to recruit city doctors and to retain rural doctors:**

The General Practice Rural Incentives Program (GPRIP), which continues through the recently established State Based Organisations and the Rural Workforce Agencies, has five central elements:

- relocation grants,
- training grants,
- remote area grants,
- continuing medical education and locum grants, and
- rural undergraduate support grants (General Practice Strategy Review Group, 1998).

Other mechanisms of support include:

- local governments increased support services to attract GP,
- Divisions of General Practice (Todd R, Sibthorpe B, & Todd C, 1998),
- Rural Health Support, Education and Training (RHSET),
- Rural Health Training Units (RHTU), and
- Practice Incentives Program (PIP) (Practice Incentives Program, 1999).

Although advances have been made to programs aimed at addressing the disincentives to rural practice since the General Practice Strategy Review (1998), their comment, "Nothing presented to the Review Group suggests that the range of disincentives has changed substantially" (General Practice Strategy Review Group, 1998)¹⁰ is of concern. It suggests that the fundamental problems are not being addressed.

¹⁰ General Practice Strategy Review Group 1998, p170

- **International medical graduates (IMGs)**

There are also short-term programs in place to attract international medical graduates (IMGs). There were 1376 "Visitors for employment" (General Medical Practitioners) recorded in 1999-2000 according to AIHW (AIHW, 2002)¹¹. It is evident that not all of these were placed in primary care positions; however, this deployment of IMGs has served as a pressure valve for the crisis. Nevertheless, the ongoing supply of eligible candidates is not guaranteed and the ethical standing of this practice has recently been questioned. The 2002 Wonca World Rural Health Conference produced the Melbourne Manifesto, which urges developed nations to stop recruiting doctors from the third world, the source of most of the IMGs, and to "ensure that the number and distribution of undergraduate and postgraduate training posts available within the country are adequate to meet their own workforce needs" (WONCA, 2002). This reliance on IMGs, then, should not be seen as a part of the long-term solution to the workforce problem.

Although some of the programs listed above are designed to address either recruitment issues or retention issues, there is often an overlap of effect. More often, programs are multi-faceted, seeking to have an effect on several levels simultaneously. Three of these commenced in the 1970's in the United States of America, and a fourth in Australia in 1997. The WAMI (Washington, Alaska, Montana, Idaho) program of the University of Washington (now WWAMI with the inclusion of Wyoming) (Schwarz, 1979); the Physician Shortage Area Program (PSAP) of Jefferson Medical College (JMC), Pennsylvania, USA (Rabinowitz, Diamond, Markham et al., 1999); and the Rural Physicians Associate Program (RPAP) of Minnesota (Verby et al., 1991). In Australia, Flinders University piloted the Parallel Rural Community Curriculum (PRCC) in 1997, which offers the whole of the penultimate year of the undergraduate curriculum in a rural general practice setting (Worley, Silagy, Prideaux, Newble, & Jones, 2000).

An example of a multi-faceted program is the PSAP, which,

- recruits and selectively admits medical school applicants who have grown up in a rural area, and
- intend to practice in family medicine in rural and underserved areas...

PSAP students,

- have family physician faculty advisors,
- take a required third-year family medicine clerkship in a rural location,
- take their senior outpatient subinternship in family medicine...[usually rural],
- receive a small amount of additional financial aid, and
- are expected to complete a residency in family practice in a rural and underserved area...(Rabinowitz, Diamond, Markham et al., 1999)

¹¹ AIHW 2002, Table 5.23

Current evaluation

Problems with behaviour as the measurement outcome

Rabinowitz et al. have collected data over the past quarter of a century. They have shown that if such a raft of selection and support programs is put in place, graduates are 19 times more likely to work as family physicians in rural Pennsylvania than all graduates of other Pennsylvania universities or graduates of Jefferson Medical College who were not involved in the PSAP. Compared with non-PSAP graduates at JMC, they were 3 times as likely to practice in a rural area and 4 times as likely to practice family medicine (Rabinowitz, Diamond, Markham et al., 1999). The WAMI program attracted students from the three large rural states with small populations, and allowed a few students and their families, to undertake rural placements in small communities in those states (Schwarz, 1979). An intensive third year medical school program in Minnesota, USA (Rural Physicians Associate Program, RPAP) had similar benefits. Of the 284 RPAP graduates practising in Minnesota in 1991, 59% were in rural areas, as opposed to only 18 % of non-RPAP graduates (Verby et al., 1991).

There seems to be adequate empirical evidence to support the continuance of these programs. But does this analysis meet the requirements to show that the program has caused the increased numbers of rural doctors, or is this merely an association? Do these programs pre-select those who are likely to take up a rural career anyway, offer them a swag of supports, and then compare their outcome (in terms of rural occupation) with that of the cohort who had no initial intention to work in the country, and who were not supported in developing this intention? Perhaps more importantly, it is possible that students who were not selected for these programs were disadvantaged to the extent that any rural career choice was made more difficult.

Rabinowitz found that students with rural background and generalist intent who did not undergo the PSAP were 78% as likely to choose a rural primary care career and 75% as likely to stay there as those who were in the PSAP (Rabinowitz et al., 2001). This would question the value of the remaining parts of the program for students of rural origin and the generalist-intending students. It does leave open, however, the question of whether these programs should have been delivered to students who were not sure that they wanted a rural or generalist career at matriculation. Several studies have shown the importance of nurturing rural aspirations among urban students, and that the evaluation of this aspect requires further work (Davies, 1994; Hays RB et al., 1995).

Although such programs are likely to have an effect on rural career choice, it is not known how enduring such an effect is. Rabinowitz, after following his cohort for 22 years, admitted in 1999, "it is not known whether these programs will continue to maintain their successful outcomes as the healthcare system undergoes rapid change (Rabinowitz, Diamond, Markham et al., 1999)." This highlights the distinction between recruitment and retention. Indeed, while they found that rural origin was "overwhelmingly the most important independent predictor of rural practice

(Rabinowitz, Diamond, Hojat et al., 1999)" (recruitment), it was not an independent predictor of retention (Rabinowitz et al., 2001).

As recently as 1999 Don Pathman observed, "The rural recruitment effects of medical education have been the subject of many studies, but fully convincing evidence of their effectiveness is still lacking (Pathman, Steiner, Jones, & Konrad, 1999)." While it is intuitive that these programs should work, well-conducted evaluation showing this to be the case is not yet commonplace. The next section discusses limitations of current methods of evaluation in proving causation and the imperative for ongoing evaluation.

Obstacles to causation inference

Certainly, studies like the PSAP and the RPAP referred to in the previous section do indicate that when a range of interventions is applied, there is an associated increase in recruitment and retention of rural physicians. Rabinowitz et al. (PSAP) found that having a rural background, having plans to be a GP at entry to medical school, being male, being in the PSAP, having a bonded scholarship and taking an elective senior family practice rural rotation were associated with a rural primary care choice. When their effects were regressed together, only rural background and generalist intention were independent predictors for recruitment to a rural career (Rabinowitz, Diamond, Hojat et al., 1999). Interestingly, not even rural origin predicted a higher retention rate, with only those benefiting from the whole raft of PSAP supports showing a tendency to remain longer in rural areas (Rabinowitz et al., 2001).

Shadish, Cook and Campbell write,

A well known maxim in research is: Correlation does not prove causation. This is so because we may not know which variable came first nor whether alternative explanations for the presumed effect exist... That relationship may not be causal at all but rather due to a third variable (often called a confound)...(Shadish WR, Cook TD, & Campbell DT, 2002)¹²

It was possible that all the other factors in PSAP study mentioned above, had their effect through these two independent predictors (background and intention at entry). Rolfe et al suspected that the positive association between a late rural rotation and a rural career choice may reflect the desire by those who have already chosen on the rural career (possibly mediated by rural origin) to gain further appropriate experience late in their studies (Rolfe et al., 1995).

Causation is very difficult to prove in such longitudinal studies because they often lack adequate controls and/or they lack pre-test observations. Shadish et al. describe quasi-experiments as "experiments that lack random assignment of units to conditions but that otherwise have similar purposes and structural attributes to randomised experiments."¹³ They state:

A causal inference from any quasi-experiment must meet the basic requirements for all causal relationships: that cause precede effect, that cause covary with effect, and that alternative explanations for the causal relationship are implausible... Because quasi experiments do not use

¹² Shadish 2002, p7

¹³ Ibid, p104

random assignment, they rely on other principles to show that alternative explanations are implausible¹⁴.

They go on to describe three principles for reducing the plausibility of alternative causal explanations used in quasi-experimentation:

- identification and study of plausible threats to internal validity (including these threats in the study),
- primacy of control by design, (additional pre-test time points and extra controls) and
- coherent pattern matching (testing complex causal predictions that few alternative theories can match).

If these principles, or others like them, are followed, longitudinal studies on cohorts of non-randomised subjects can show causality. To date, few studies on the influences on rural career choice have achieved this. Part of the reason for this is that there has not been a suitable framework within which to tease out the effects of the many overlapping components of the various programs. The plausible threats have not been dealt with individually. Certainly, single-point cross-sectional design does not allow for pre-test samples, and remarkably few use adequate controls, seeking only the opinion of the rural doctors. Finally few studies are grounded in a proven theoretical framework, which would enable them to test complex causal predictions, as required by the third principle, above.

Meurer et al. summarised some of these weaknesses in their discussion on a literature analysis of all research on primary care specialty choice that was published between 1987 and 1993.

They commented that existing research:

...predominantly uses the weaker study designs and uses few instruments with known reliability and validity...employs inconsistent outcome variables and is often not guided by a theory or model that would strengthen the interpretation of the findings...[There is] a need to develop ways for studying possible influences such as mentors, role models, and students' career needs...very little research has been done on the decision-making process itself. (Meurer, Bland, & Maldonado, 1996).

Even the authors of some of the larger studies question current evaluative tools. An important work on 1373 rural and remote Australian general practitioners by Strasser et al. studied (inter alia) seven training and support programs currently in place in Australia. He found that these programs "attracted many negative comments", and that they needed to "more clearly identify their target markets and their needs." Further, he admits his research "does not provide any conclusions as to program effectiveness" (Strasser R et al., 1997)¹⁵. Of concern here is Strasser's comment:

Many recruitment and training packages are aimed at younger practitioners and medical students. There is no evidence from the results presented here that these programs have contributed to increased proportions of young people entering rural practice. It could even be that proportionately fewer young people are doing so (Strasser R et al., 1997)¹⁶.

¹⁴ Shadish 2002, p105

¹⁵ Strasser et al. 1997, Training and Support, p4

¹⁶ Strasser et al. 1997, Demography and Family Statistics, p9

Strasser's work suggests that there is an association between the accepted determinants of a rural career and rural/generalist career choice, but that studies to date have not been able to show a clear causal link. This is even more the case when it is the make-up of the medical schools that is the subject of the investigation, rather than individual students (Blue et al., 1996; R. C. Bowman & Penrod, 1998; Easterbrook et al., 1999; Fortuine & Dimino, 1998; Rabinowitz, 1988a, 1993; Rabinowitz, Diamond, Markham et al., 1999; Rolfe et al., 1995; Strasser R et al., 1997). So while schools with greater numbers of rural origin students are likely to have more graduates choosing a subsequent rural career, and a primary care career, the degree to which this is a causal association remains uncertain. Senf writes:

The correlation between the percentage of the class that is rural and the percentage of the class that enters family medicine does not mean that it is the rural students who are entering family medicine. These relationships provide direction for further research, but they need to be confirmed in studies on students themselves (Senf, Campos-Outcalt, Watkins, Bastacky, & Killian, 1997).

As discussed earlier, it is not possible to determine whether an elective program such as a rural rotation increases the likelihood of the student choosing a rural career, or whether, having chosen such a career, s/he would be more likely to choose the rural elective and, having a greater interest, benefit more than other students. As Kassebaum writes:

...the strong influences of elective experiences...may be the product, not the cause of those career interests (Kassebaum, Szenas, & Schuchert, 1996).

While some very large studies have been undertaken over the past decade or two, and associations have been demonstrated between many programs and student attributes, and a subsequent rural career choice, the evidence for causative relationships is weak.

Evaluation: a systematic approach

Introduction

Evaluation is the point in the [policy] cycle when the utility of the policy must be questioned, and a new cycle of analysis and adjustment, confirmation or abandonment begins (Bridgeman P & Davis G, 2000)¹⁷.

The Australian Government Department of Finance has mandated that programs and major parts of programs undergo in-depth evaluation every three to five years according to a schedule set out in each department's Portfolio Evaluation Plan (PEP) (Department of Finance, 1994). In its report on the performance audit of program evaluation in the then Department of Health and Family Services (among others), the Australian National Audit Office included some definitions useful for this discussion:

Program Evaluation (commonly referred to simply as 'evaluation') can be defined as the systematic and objective assessment of a government program, or parts of a program, to assist the Government and other decision-makers to:

- assess the continued relevance and priority of program objectives in the light of current circumstances, including government policy changes (that is, appropriateness of the program);
- test whether the program outcomes achieve stated objectives (that is, its effectiveness); and

¹⁷ Bridgeman 2000, p126

- ascertain whether there are better ways of achieving these objectives (that is, its efficiency).

The objectives of program evaluation are to:

- provide a better information base to assist managers in improving program performance;
- assist government decision making and setting priorities, particularly in the Budget process; and
- contribute to improved accountability to the Parliament and the public (Australian National Audit Office, 1997)¹⁸.

Appropriateness of programs

The seminal studies that informed this policy development were based largely on the attitudes of rural general practitioners during the 1980's. GPs were asked to recall the influences of their rural career choice. Such studies have been referred to as 'introspective causal reports' studies (Pathman & Agnew, 1993). They rely on the assumption that GPs are accurate in their assessment of what influenced them to take up a rural career. Pathman (1993) questions the validity of this assumption as he refers to the many biases associated with attribution theory.

These include:

- Salience bias, where more dramatic or recently evoked influences gain an artificial dominance.
- Actor-observer bias, where one's own behaviour is attributed to external forces, but other's behaviour is attributed to internal forces or personality traits. This bias may lead GPs to report their actions to be responses to external forces rather than their own inadequacies or unpreparedness for rural practice.
- Self-serving bias refers to a natural tendency to claim credit for success, and deny responsibility for failure; staying may reflect their altruism, and leaving is due to poor community support.
- Self-centred bias, where people tend to overemphasise their own role, and GPs may underestimate the influence, for example, of other family members in a decision to leave.
- False-consensus bias, where it is usual to assume others would respond as you do, so a GP may believe that others in a similar situation would share his reasons to stay or leave.

In addition, recall bias, where memories fade, and after-the-fact rationalization may occur, as well as confounding, when a perceived cause and effect may both be the result of a third factor, can further test the reliability of introspective causal reports. So there is a strong case for caution when interpreting retrospective attitude studies, such as those commonly used to inform rural workforce policy.

An alternative is to use statistical association methods, or quasi-experimentation, which usually requires a prospective research design, seeking to isolate and evaluate individual influences with a 'logical positivist' approach. In this way the attribution biases can be allowed for, stronger and

¹⁸ ANAO 1997, (Part 2, 1.1, 1.2)

more accurate associations can be identified, and with correct research planning, causation may be established.

Although the General Practice Strategy Review Group commented that the conditions in rural communities are unlikely to have changed a great deal, it is likely that the attitudes of current medical students (65% female and aged 18-24) toward these conditions differ from those of rural GPs (75% male, average age 49). Using data from the testing of an early version of my questionnaire, a paper comparing the issues considered important by first year medical students in 2000 and the rural general practitioners surveyed in a national study in 1996 (Strasser R et al., 1997) was published in a refereed journal (Somers, Young, & Strasser, 2001).

It showed a considerable difference in the two groups, but both male and female medical students were more closely aligned with female rural GPs than with their male counterparts. The paper concluded that there is a new culture among medical students, and that it affects males as well as females. This finding was confirmed by a Victorian statewide survey of rural doctors and trainees in 2002 (Rural Workforce Agency of Victoria, 2002). That study also found that 20% of Victorian rural doctors were over 55 years old. This highlights the need for constant re-evaluation of the appropriateness of programs, especially those informed by older studies based on the opinions and recollections of an ageing, predominantly male rural medical workforce.

Effectiveness of programs

The debate over the measured effectiveness of programs was introduced earlier, in the discussion on multi-faceted programs. That a clear indication of the effectiveness of individual programs has not been found does not necessarily mean that it does not exist. It is possible that current methods of evaluation are not sensitive, specific nor timely enough to detect and separate out the true effects of programs, in a timely enough fashion so as to inform policy. Two study designs are common in the evaluation of these programs. The first is a retrospective cross-sectional design, which asks rural doctors to recall the influences on their decision making, the so-called introspective causal reports design. The second follows cohorts of students with differing exposures to programs over several decades, and analyses differences in behavioural outcomes, the prospective longitudinal studies.

Limitations of the former are outlined in the previous section. The effectiveness of rural training, recruitment and retention programs is often assessed by measuring the increase in rural GP numbers, usually some many years after graduation. Graduates are allocated to cohorts according to whether they completed were included in the program of interest. Choosing behaviour as the outcome of interest limits the usefulness of the study for two reasons: a lack of timeliness and a lack of specificity. Firstly, program evaluation, based on behavioural outcome, is often not available for many years, and at times, not until after the completion of the program. Federal Government funding is allocated in three- to four-year cycles to coincide with the life of governments. There is a political imperative to show the effectiveness of programs within the lifetime of that government. As mentioned earlier, Australian Government Department of

Finance requires that program evaluation is carried out in three to five year cycles (Department of Finance, 1994). Secondly, the interpretation of such data is difficult, as it measures the effect of exposure to multiple programs over the intervening period and the effectiveness of individual programs within the package is rarely clear.

Efficiency of programs

The discussion, thus far in this thesis, has focused on rural career choice as the outcome of interest for programs. Clearly, rural placements, mentoring and the other programs have much broader objectives. Community based education, for example, has been shown to be an excellent teaching modality in the health professions for all students, whether they plan to work in rural or in urban areas. As more universities are teaching their students in general practices, finding enough placement sites for them has become an issue. If for nothing else, rural placements relieve some of the burden from urban general practices. Rural placements have been found to offer a better experience in some studies, so they at least match urban placements in this expanding health professions education modality (Culhane, Kamien, & Ward, 1993; M. Kamien, 1996a; Worley et al., 2000). Nevertheless, measurement of the efficiency of programs is an essential part of their evaluation.

Measurement of the efficiency of programs seeks to determine whether the program is being delivered for the optimal cost, or whether an improved program could be delivered for the same cost. These are also called cost-benefit or cost-effectiveness studies. It follows that the efficiency of a program is determined not only by the cost, but also by the benefit or effect that the program seeks to deliver. These benefits are usually pre-defined by the objectives of the program.

So it is difficult to compare programs with disparate objectives, especially if these are being met concurrently. However, many programs, as described earlier, do share the objective of addressing the rural workforce crisis. In addition, it is the intention of universities to deliver the same programs to different students, at different times at several different sites. Therefore, if changes in intention towards a rural career can be isolated, that aspect of programs can be compared between different programs and the same program repeated at different places or times. Indeed, the measurement of the efficiency of this aspect of various programs is imperative, as it is the primary objective of the Commonwealth Regional Health Services Program, and the Regional Health Strategy (Anderson J & Wooldridge M, 2000).

The need for an instrument to evaluate programs

The development of a valid and reliable measure of intention to work in a rural environment will facilitate the evaluation of programs for their appropriateness, effectiveness and efficiency. That some programs perform better on this key indicator will inform government decision making and priority setting. As these programs usually have multiple disparate objectives, program managers may lose sight of the importance of the workforce component, despite this

being a major funding imperative. The evaluation of such a key indicator can assist program managers with quality improvement, and improve their priority setting with regard to the structure of programs. Finally, the obligation to show accountability to Parliament and the public can better be met if there is a measure that can show the effectiveness of programs designed to ameliorate the rural medical workforce crisis.

Summary of Chapter Two

This chapter has presented a discussion on the necessity for increased numbers of medical practitioners in rural areas. It has outlined the array of programs that have commenced in an effort to deal with the issue. The evaluation of these programs has been problematic, in part due to the lengthy time delay between the interventions and their effects. Associated limitations of current evaluative methods to showing causation were highlighted. An approach was introduced that could measure the belief system that underpins intention to choose a rural career, a determinant of the behaviour. The theoretical framework for such a measure is presented in the following chapter. Chapter Eighteen discusses the link between the belief systems and career choice. This approach has the advantage of being more timely, specific and sensitive. Such a measure would be useful in trials designed to determine causative factors in medical locational career choice.

Chapter Three

The theoretical framework based on behaviour theory

Introduction to Chapter Three

In the preceding section, the need for a measure capable of predicting subsequent behaviour with respect to rural career choice was discussed. This chapter looks at an approach to the prediction of behaviour developed by behavioural psychologists during the second half of the twentieth century. It discusses the theoretical framework linking beliefs to intention and ultimately to behaviour. This approach lends itself to the development of instruments that are capable of predicting behaviour, and forms the basis for the development of the Rural Intent Questionnaire (RIQ). Such instruments estimate attitudes and intention toward the outcome behaviour through the measurement of the belief system associated with the behaviour in question. In this case, the behaviour is to work in a rural environment after medical training is complete.

Although the determinants of behaviour have been the subject of close scrutiny for many decades and some early work predates 1960, most of the seminal work was performed in the United States of America during the 1960's, the 1970's and the 1980's. Two attitude-behaviour theories with many similarities were developed contemporaneously, the Theory of Interpersonal Behaviour of Triandis (Triandis H, 1977) and the Theory of Reasoned Action (TRA) of Fishbein and Ajzen (Ajzen I & Fishbein M, 1980; Fishbein M & Ajzen I, 1975). Since the mid 1980's, Ajzen has adapted the TRA to incorporate elements of Self-efficacy Theory (Albert Bandura, 1982), renaming the expanded model the Theory of Planned Behaviour (TpB [sic]) (Ajzen, 1991; Ajzen, 2002).

While the predictive and explanatory power of such theories will determine their validity, their true value rests with their usefulness (Dawes RM, 1972)¹⁹ and their "capacity to change peoples' lives for the better (A Bandura, 1997)"²⁰. For our purposes, an instrument based on behavioural theory needs to be capable of more than merely predicting whether a doctor will work in a rural environment. It must add to the understanding of the factors influencing decision-making and the processes involved. Further, it must also be able to explain why the alternate choice was not made (Ajzen I & Fishbein M, 1980)²¹. Only then can research based on

¹⁹ Dawes 1972, p14

²⁰ Bandura 1997, p viii

²¹ Ajzen and Fishbein 1980, p54

such theory be useful in evaluating programs and informing the policy cycle of which they are a part.

So, rather than risk accepting a model which is parsimonious but not as powerful, or one which is highly predictive but too cumbersome to use, or worse still perhaps, one which predicts an outcome but offers no useful understanding of how this came about, a preliminary consideration of the literature surrounding behaviour theory is necessary. In the following section, the salient features of the models proposed by Triandis and by Fishbein and Ajzen will be discussed and outline some of the similarities and the essential differences will be outlined. Finally, an overview of how an instrument based on these theories can be applied to, and offer an understanding of, the rural medical workforce shortage will be presented.

The seminal works and subsequent supporting research for these theories have largely focused on relatively simple behaviours like exercising, using condoms, and donating blood. Career development has its own body of theory and research that raises issues that are not specifically addressed in the behavioural approach. The background, development, testing and analysis of an instrument based on behavioural theory will be presented in the first four sections of this thesis. Section Five discuss their strengths and limitations and provide an in-depth discussion on the theory supporting the application of the RIQ to the more complex field of career choice.

During the following discussion, I will explain and simplify the equations presented in Table 1 on page 28, which summarise the features of the models in algebraic form.

Table 1 Summary of the models underpinning the theoretical framework.

Triandis Model. Theory of Interpersonal Behaviour	
$P_a = (w_H H + w_I I) F + \epsilon_P$	Equation 1
$I = w_A A + w_C C + w_S S + \epsilon_I$	Equation 2
$A = \sum_{i=1}^n B_i a_i + \epsilon_A$	Equation 3
$C = w_c \sum_{i=1}^n B_i a_i + \epsilon_C$	Equation 4
$S = w_{RB} RB + w_{PNB} PNB + w_{NB} NB + w_{IPC} IPC + w_{SC} SC + \epsilon_S$	Equation 5
Fishbein and Ajzen Models	
$I = w_0 \sum_{i=1}^n B_i a_i + w_1 \left[\sum_{i=1}^n NB_i (Mc_i) \right] + \epsilon_I$	Equation 6 Theory of Reasoned Action (TRA)
$I = w_0 \sum_{i=1}^n B_i a_i + w_1 \left[\sum_{i=1}^n NB_i (Mc_i) \right] + w_2 \sum_{i=1}^n c_i p_i + \epsilon_I$	Equation 7 Theory of Planned Behaviour (TpB)
<p>Symbols used for the Triandis model</p> <p>P_a : the probability that the act will occur</p> <p>H : the habit component</p> <p>I : intention, or self-direction</p> <p>F : facilitating conditions</p> <p>M : motivating factors</p> <p>A : the affect component</p> <p>C : the perceived consequences component</p> <p>S : social factors</p> <p>B_i : the belief that a behaviour will result in a consequence i.</p> <p>a_i : the evaluation of outcome i.</p> <p>$B_i a_i$: "attitude" toward the behaviour</p> <p>RB : role belief</p> <p>PNB : personal normative belief</p> <p>NB : normative belief</p> <p>IPC : interpersonal contracts</p> <p>SC : self-concept</p>	<p>Symbols used for the Fishbein and Ajzen models</p> <p>B_i : the belief that a behaviour will result in a consequence i.</p> <p>a_i : the evaluation of outcome i.</p> <p>NB_i : the belief that referent person i thinks s/he should perform the act</p> <p>Mc_i : the motivation to comply with the wishes of referent person i.</p> <p>c_i : the control belief strength</p> <p>p_i : the control belief power</p> <p>$B_i a_i$: "attitude" toward the behaviour</p> <p>$NB_i Mc_i$: "subjective norm"</p> <p>$c_i p_i$: "perceived behavioural control"</p>
<p>$w_H, w_I, w_A, w_C, w_S, w_{RB}, w_{NB}, w_{PNB}, w_0, w_1,$ and w_2 refer to weights, as determined by multiple regression modelling, for each of the associated factors.</p> <p>$\epsilon_P, \epsilon_I, \epsilon_A, \epsilon_C, \epsilon_S$ refer to the measurement error associated with the equation.</p>	

The determinants of behaviour: Triandis, and Fishbein and Ajzen

Theoretical considerations

Both the Theory of Interpersonal Behaviour of Triandis and the Theory of Planned Behaviour of Ajzen and Fishbein (TpB) are supported by the early research of Ajzen and Fishbein, who showed that beliefs associated with, attitudes toward, and intention to perform an act, are strong predictors of that behaviour taking place (Ajzen & Fishbein, 1969; Ajzen & Fishbein, 1970; Ajzen & Fishbein, 1972, 1973). That research suggested that there is a hierarchical relationship between these constructs, in that behaviour is predicted by *intention* to perform the act, intention is predicted by *attitudes* toward the behaviour, and these attitudes can be estimated using an index of *beliefs* about the behaviour. Intention is said to be the proximate determinant of behaviour, attitudes, the intermediate determinants, and beliefs, the distal determinants of behaviour. This relationship can be represented diagrammatically as:

Beliefs → Attitudes → Intention → Behaviour

Triandis states:

The expectation is that the proximal variables will be the best to explain interaction. However, the distal variables will act through them and can be used to explain interaction – but they will not show as powerful relationships as proximal variables do (Triandis H, 1977)²²

Intention

Although there are differences in their understanding of the importance of past behaviour on future behaviour (see also: A comparison of the models on page 34), both groups of researchers hold that intention, as the proximate determinant of behaviour, is the strongest predictor of that behaviour (Triandis H, 1977)²³ (Ajzen I & Fishbein M, 1980)²⁴. While the prediction of behaviour, by simply seeking the actor's intention, may be easy and reasonably accurate, such an investigation will reveal little about the reasons for the behaviour. A greater understanding of the internal processes leading to the behaviour can be gained by investigating the determinants of intention, that is, the determinants of the self-direction to act.

The design of questions measuring intention requires great care. What one would like to happen, intends to do, or expects to happen, are three completely different constructs. The latter two are more easily confused, and will be discussed here. If the subject does not have any intention to act, s/he may substitute his/her expectation (Sheppard, Hartwick, & Warshaw, 1988; Warshaw & Davis, 1985b). *Behavioural Intention* (BI) and *Behavioural Expectation* (BE) are defined by Warshaw and Davis as:

BI: the degree to which one has formulated conscious plans to perform or not perform some specified future behaviour

²² Triandis 1977, p52

²³ Ibid, p199

²⁴ Ajzen and Fishbein 1980, p5

BE the individual's estimation of the likelihood that he or she will actually perform some specified future behaviour (Warshaw & Davis, 1985b).

While there may be considerable overlap, one does not always expect to do what one intends to do, and vice versa. The expectation construct is a *belief* about outcome, and does not reflect one's conscious plans to carry out an act. Behavioural expectation, is a slightly stronger predictor of the behaviour than behavioural intention (Warshaw & Davis, 1985b), and this may be because it includes elements of control over the behaviour that is, self-efficacy. As will be discussed when considering the models individually, Triandis and TpB both deal with control over the act as a separate construct, albeit in different ways.

Attitudes

Attitudes have long been held to be determinants of behaviour. As early as 1935 GW Allport defined attitudes in the following way:

An attitude is a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related...An attitude characteristically provokes behaviour that is...affirmative or negative toward the object...

This double polarity in the direction of attitudes is often regarded as their most distinctive feature...

Each person possesses many contradictory attitudes...Furthermore, attitudes often change... (Allport GW, 1935)²⁵

A short overview of the function of attitudes may aid a better understanding of the importance of attitudes in decision-making, particularly with respect to intention - the self-direction to perform the act. In his book *Attitude and Attitude Change*, Triandis draws on the "functional analysis of attitudes" to explain that attitudes enable an efficiency in interpreting and responding to a complex social world by classifying social objects into categories of attitude objects. (H.C. Triandis, 1972)²⁶. The individual then draws from an existing repertoire of responses to the category of attitude objects without needing to review each detail of individual social objects. This leads to a predictable response from "discriminably different stimuli". Triandis lists four reasons why people develop attitudes: Attitudes have a

knowledge function ...[to] help them understand the world around them, by organizing and simplifying a very complex input from their environment,

ego-defensive function ...[to] protect their self-esteem, by making it possible for them to avoid unpleasant truths about themselves,

adjustment function ...[to] help them adjust in a complex world...so as to maximize their rewards...and, a

value-expressive function ...[to] allow them to express their fundamental values (H.C. Triandis, 1971)²⁷.

²⁵ Allport (1935) (in Fishbein 1969), p8

²⁶ Triandis 1972, p11

²⁷ Triandis 1971, p4

He suggests that similar principles support a link between attitudes and personality and refers to the role of attitudes in the "economy of the personality (H.C. Triandis, 1971)²⁸." Fazio and Zanna wrote,

...there does exist a clear conceptual parallel [between personality and attitudes] in that both attitudes and traits are presumed to bear some relation to overt behaviour. Furthermore, we might even regard some traits as attitudes; when individuals attribute certain traits that have evaluative connotations to themselves, they are simply making an evaluative assessment of themselves rather than some external social object (Fazio RH & Zanna MP, 1981)²⁹.

Attitudes, then, are intermediate operatives between categories of individual social stimuli and/or beliefs and a behavioural response, developed by individuals to more efficiently process input from a dynamic and complex social world. Put very simplistically, an attitude may be considered a 'black box' linking a number of social stimuli to a common pathway toward a rational response.

Just as these functions of attitudes can provide some predictability in response by dampening the effect of new stimuli on the response set, they can have a homeostatic effect on personality by dampening the effect of new beliefs on attitudes. While it is clear that attitudes do change, these functions of attitudes may serve to provide a barrier to change. Such resistance will be considered in the Discussion Chapter, when considering attitudinal change toward a rural career choice, the importance of the "self" and the role of the existential crisis in this 'educational' process.

Beliefs and their measurement

While Allport acknowledged that attitudes:

...are measured more successfully than they are defined (Allport GW, 1935)³⁰

he goes on to state,³¹

Measurement can only deal with attitudes that are *common* [his italics], and there are relatively few attitudes that are common enough to be profitably scaled. In forcing attitudes into a scale form violence is necessarily done to the unique structure of man's mind.

While attitudes may be considered latent constructs, and by their nature, not easily defined or measured directly, both theories share the contention that attitudes can be estimated by measuring the beliefs that underpin them.

Unlike a measurement *scale*, which Dawes (1967) describes as requiring a two-way correspondence, between say, attitudes and beliefs, such a measure is referred to as an *index* measurement, because:

the thing being indexed [belief structure] determines a corresponding index [attitudes], but not vice versa (Dawes RM, 1972).³²

²⁸ Triandis 1971, p144

²⁹ Fazio 1981, p163

³⁰ Allport (1935) in Fishbein 1967, p9

³¹ *ibid* p11

³² Dawes 1972, p14

Understanding one's belief structure may enable a prediction of attitudes, but knowing one's attitude toward an object does not enable one to deduce the beliefs the individual has.

So, both models rely on the premise that a knowledge of the belief structure underpinning the individual's attitudes will give an insight into the decision making process, and possibly the nature of the individual. Further, the unidirectional nature of the relationship between beliefs and attitudes supports the contention that a change in the belief system predicts change in attitudes, intention and ultimately behaviour. The measurement of changes in the belief system may not only predict behavioural change, but may also explain this change.

Both theories acknowledge that in order to construct an index based on beliefs, it is not essential to measure all beliefs. Once an adequate 'picture' has been painted of an attitude, inclusion of additional indicators will merely result in more overlap without greater understanding. The most 'descriptive' beliefs are those that are readily accessible, that is, they come to mind readily. These may be determined individually, by obtaining a list of salient items from each subject, or more commonly, with a modal set of common beliefs, identified as being salient by a reference group. Individually derived beliefs have been found to be marginally stronger predictors of intention, but practical considerations usually outweigh such small gains. Provided the members of the reference group from which the modal set of beliefs is derived are similar to the subjects, the degree of overlap is usually high and the difference in predictive strength, low (Agnew CR, 1998).

Both models also demand that the descriptors of the behaviour to be predicted follow closely the descriptors of the behavioural intention being measured. Ajzen states that the behaviour must be specifically defined in terms of Target, Action, Context and Time (TACT). While the TACT terms are defined somewhat arbitrarily, they need to be clear enough to prevent ambiguity for the subject. The action needs to be relatively specific, the target generally refers to the instrument through which the action is performed, the context is the environment and a specific time frame is required to define the behaviour. There must be congruence between the behaviour, intention, attitudes and beliefs. As it is often not practically useful to study behaviours that are too narrow, Ajzen comments,

...it is possible to increase the generality of one or more element by means of *aggregation*.

While this allows the definition of behaviour and its antecedents to be broadened to include all relevant situations, and "at any level of generality (Ajzen I & Fishbein M, 1980)"³³, the definition must still be specific enough to prevent ambiguity, and the principle of compatibility must be adhered to (Ajzen I, 2002).

³³ Ajzen and Fishbein 1980, p246

Brief overview of the Theories

Theory of Interpersonal Behaviour (Triandis)

In the Theory of Interpersonal Behaviour, Triandis holds that the likelihood of an act being performed (P_a) is a function not only of intention (I), but also of the number of times the act has been performed in the past, or habit (H) (Triandis H, 1977). Both habit and intention are moderated by facilitating conditions, which may include the person's ability to perform the act, the level of arousal, or motivation, the difficulty of the act, whether the person has the knowledge required to perform the act, and other external factors that may facilitate or inhibit the act. Equation 1 (see Table 1 page 28) can be simplified to:

$$\text{Behaviour} = (\text{Intention} + \text{Habit}) \times \text{Facilitating Conditions}$$

Triandis believes that intention, in turn, is predicted by affective (A), cognitive (C) and social (S) factors. Equation 2 (see Table 1 page 28) can be simplified to:

$$\text{Intention} = \text{Affect} + \text{Perceived Consequences} + \text{Social Drivers}$$

Affective factors (A) are the sum of the emotions evoked by the thought of the behaviour. It is usually operationalised by adding the scores on a Likert-type scale to a series of possible emotive responses (Equation 3). The cognitive factors (C) are operationalised by adding the products of the belief that the behaviour will result in a particular outcome (B_i) and the value that the subject places on that outcome (a_i) (Equation 4). The sum of these expectancy-value products, then, reflects what the actor perceives as the consequences of the act, after taking the importance ascribed to each consequence into account. The social factors (S) (Equation 5), or social drivers include the role beliefs (the appropriateness of the behaviour for someone occupying the same social standing), personal normative beliefs (the degree to which s/he feels s/he should perform the behaviour) normative beliefs (what is expected of one in the subject's reference group), interpersonal contracts (agreements with others that s/he would perform the act) and self-concept (self-attribution related to the behaviour) (Triandis H, 1977)³⁴.

Theories of Reasoned Action and Planned Behaviour (Fishbein and Ajzen)

In the Fishbein and Ajzen models, behavioural outcomes are also predicted by behavioural intention. In the Theory of Reasoned Action (TRA), intention is predicted by Attitude towards the act and Subjective Norm (see Equation 6, Table 1 page 28). So Equation 6 can be represented more simply as:

$$\text{Intention} = \text{Attitude} + \text{Subjective Norm}$$

Attitude is operationalised by adding all the products of the salient beliefs (B_i) and their evaluated importance (a_i), and is equivalent to Triandis' perceived consequences. Subjective Norm may be considered the pressure from important others to act, and is operationalised by

³⁴ Triandis 1977, p8ff and p194ff

adding all the products of the beliefs about the expectations of the individual's referent groups (NB_i) (whether s/he believes important others would like him/her to carry out the act), and the motivation to comply with each of these expectations (Mc_i).

The TRA assumes that the action is under the volitional control of the individual, and that external variables influence intentions through beliefs, attitudes and subjective norms (Ajzen I & Fishbein M, 1980)³⁵. The TRA was expanded to the Theory of Planned Behaviour (TpB) to allow for situations in which the actor did not have control over being able to carry out the act. A third construct, namely *perceived behavioural control (PBC)*, was added to measure the influence of external factors on behavioural intention (Ajzen, 2002) (see Equation 7, Table 1 p28). Equation 7 can be simplified to:

$$\text{Intention} = \text{Attitude} + \text{Subjective Norm} + \text{Perceived Control}$$

where the Attitude and Subjective Norm constructs are identical to those in the TRA model. In a review comparing TRA and TpB for 10 behaviours, Madden et al ((Madden, Ellen, & Ajzen, 1992) found that PBC was most important in behaviours where there was less control.

Perceived behavioural control is operationalised by adding the products of *control belief strength (c)* and *control belief power (p)*. Control belief strength is the strength of belief that a certain facilitating/inhibiting factor that would make it easy/difficult to perform the act does exist. Control belief power is how much more easy/difficult the presence of such a factor would make the behaviour. When this perception is accurate, this construct can be considered a measure of actual control over the behaviour, and Ajzen believes that while *perceived behavioural control* exerts its effect through intention, *actual behavioural control* has a direct effect on behaviour. Actual behavioural control of the TpB has similarities with the 'facilitating conditions' construct in the Triandis model. In the TpB its relationship with behaviour is hierarchical, whereas Triandis treats it as a moderator of both intention and habit (see Equation 1). A more complete comparison of the theories, including a discussion on the features from each theory adopted into the working framework in the development of this instrument, will be made in the following sections.

Somers presented a paper to the Sixth National Rural Health Conference, Canberra, in 1999, outlining the essential features of the TRA and the Triandis model as they relate to the early versions of the Situational Intent Questionnaire (Somers GT, Young AE, & Strasser R, 2001).

A comparison of the models

There is a wealth of literature describing studies based on these models, particularly the Fishbein and Ajzen models and their ability to predict behaviour has been validated on many occasions (Ajzen, 2001; Armitage & Conner, 2001; Sheppard et al., 1988). Armitage, after analysing 185 independent studies, found that the TpB accounted for 27% of the variance in behaviour, and 39% of the variance in intention (Armitage & Conner, 2001). The intention

³⁵ Ajzen and Fishbein 1980, p9

constructs of these theories overlap considerably, and their respective abilities to predict behavioural outcome have been compared directly in relation to many behaviours, including participation in continuing professional education (Yang, Blunt, & Butler, 1994), exercise (Godin & Gionet, 1991; Valois, Desharnais, & Godin, 1988), and use health protection devices (condoms) (Boyd & Wandersman, 1991). In these studies, the Triandis model was found to have a greater predictive strength than the Fishbein and Ajzen TRA model.

This is not surprising, as Triandis suggests that the two models had different purposes. Fishbein sought to explain maximal variance with the fewest variables, adhering to the principle of parsimony. Some have argued that researchers should abandon the principle of parsimony altogether (Battig, 1962), and others argue that psychologists often do so:

The principle of parsimony indicates that when 2 theories account for the same facts, the one that is briefer, makes fewer assumptions and references to unobservables, and has the greater generality is to be preferred. It is argued that psychologists often violate this principle, particularly when attributing complex behaviour to cognitive processes... Parsimony is the rationale for early behaviourism, but it would imply that all behaviour can be accounted for by conditioning... (Epstein, 1984).

The risks of oversimplicity led Triandis to write:

...accounting for all variance is important because even a small amount of variance may be socially important if the phenomenon is a critical one (Triandis H, 1977)³⁶.

This thesis argues for balance, maximising explanation and generalisability whilst retaining simplicity and economy. Two versions of the Rural Intent Questionnaire will be presented; the more comprehensive RIQ2000 and the briefer RIQ2003. While Fishbein and Ajzen seemed more interested in the psychometrics of the behaviour/intention/attitudes complex from a psychological perspective, Triandis viewed the issue more from a sociological perspective and saw his model as a reflection of subjective culture.

Indeed, in 1935, Allport writes that sociologists even then considered attitudes as "the concrete representations of culture" (Allport GW, 1935).³⁷ Willis argues that,

The quest for a sociological understanding of a particular phenomenon involves exercising the four sensibilities that are historical, cultural, structural and critical (Willis E, 1995)³⁸.

Triandis placed his model within the subjective culture, based on historical, structural and cultural antecedents of behaviour. (H.C. Triandis, 1972)³⁹. Indeed, the Triandis model has been successfully applied to cross-cultural studies (Davidson AR, Jaccarand JJ, Triandis HC, Morales ML, & Diaz-Guerrero R, 1986).

Triandis identified three major differences between his model and the TRA of Fishbein and Ajzen:

Equation 1 of my model explicitly takes into account habits and facilitating conditions, while Fishbein simply writes that behaviour is approximately a function of behavioural intentions.

³⁶ Triandis 1977, p232

³⁷ Allport (1935), p7

³⁸ Willis 1995, p89

³⁹ Triandis 1972, p22

My model considers roles, self image and interpersonal agreements, none of which is considered in the Fishbein model. Fishbein assumes that the influence of such variables will be felt through the attitude toward the act and the normative component.

My model uses the affect toward the behaviour as a separate element. Fishbein argues that the affect toward the behaviour is usually the same as the sum of the perceived consequences times the value of the consequences (Triandis H, 1977)⁴⁰.

The first point is partly dealt with by the addition of perceived behavioural control (PBC) to the TRA, as PBC can be seen as facilitating conditions including self-efficacy and motivation.

The second difference concerns social drivers and relates to a difference in approach taken by the researchers. Triandis, with a more holistic-sociological approach, seeks to account for the subjective culture of the individual while the TRA/TpB model adopts a more mechanistic approach and assumes that systematic sampling of social compliance to a series of important others will adequately measure the social influences on decision-making. Godin et al. compared the three models (TRA, TpB and Triandis' model) in 1996 in a cross-cultural setting, and concluded that role beliefs and moral norm should be added to the TpB to increase its predictive and explanatory value (Godin, Maticka Tyndale, Adrien, Manson Singer, & et al., 1996), and Manstead found that moral norms and anticipated regret "significantly" improved the predictive value of the TpB (Manstead A S, 1995)⁴¹.

Ajzen and Fishbein⁴² justify the omission of personal normative belief, claiming that it was little more than an alternative measure of intention. This could easily be the case if care is not taken with the wording of the item. An item such as:

I personally feel that I should complete year 12 (McInerney, 1990)

may well be interpreted by the respondent as a measure of self direction, that is, the imperative bears no moral overtones. Personal normative belief, on the other hand, is a measure of the sense of personal or moral obligation to carry out the behaviour, and requires a more sensitive approach to be measured accurately. A better example is:

Do you feel you have a moral obligation to have a child during the next two years? That is, do you think it is something you ought to do or something you should not do? (Davidson AR et al., 1986).

With regard to the third point, Manstead also found affect to be only moderately correlated with Ajzen's construct of attitudes (evaluated consequences), and questioned

...when and why one of these two aspects of attitudes to behaviour [affect, consequences] will be dominant in determining intentions and behaviour (Manstead A S, 1995)⁴³

This supports the Triandis view that affect measures a different aspect of interpersonal behaviour to perceived consequences, and that, in certain circumstances one or the other is more influential. This is further discussed below in the section entitled 'The determinants of intention

⁴⁰ Triandis 1977 p231

⁴¹ Manstead 1995, p92

⁴² Ajzen and Fishbein 1980, p247 (footnote)

⁴³ Manstead 1995, p92

according to the Triandis model'. After a major review of the literature on attitude theory and research between 1996 and 1999, and citing 237 references, Ajzen recently concluded:

...the debate over the cognitive versus affective basis of attitudes has yet to be completely resolved.

In the same paper he wrote,

Research has shown that a distinction can be drawn between perceived controllability and perceived difficulty of performing a behavior (self-efficacy) and that the latter may be a more important antecedent of intentions and actions; that the relative contributions of attitudes and subjective norms vary across behaviors and subject populations; that other predictors may have to be added to the theory; and that behavior may contain automatic, habitual aspects not accounted for in models of reasoned action (Ajzen, 2001).

These comments can be seen to relate directly to the differences between the two theories identified by Triandis in 1977.

This analysis of the Triandis model and the TpB suggests that the Triandis model is both theoretically and empirically stronger than the TRA (Boyd & Wandersman, 1991; Godin & Gionet, 1991; Godin et al., 1996; Valois et al., 1988; Yang et al., 1994), and that the additional features in the TpB around control have already been considered by Triandis. The next section of this thesis will discuss the operationalisation of these theories in greater detail and their applicability to the current understanding of medical rural career choice.

The determinants of behaviour according to the Triandis Model

Intention and habit as predictors of behaviour

In essence, the model developed by Triandis states that the likelihood of a behaviour ensuing (P_a) is a function of intention, the self-direction to perform the act (I), and habit, the automatic tendency to perform the act (H). This is moderated by facilitating conditions (F), such as the ability to carry out the act, arousal, or motivation, and the person's knowledge. This relationship can be expressed as:

$$P_a = (w_H H + w_I I) F + \varepsilon_{P_a}$$

Equation 1

Behaviour

The unit of behaviour, P_a , represents the probability to act and has a possible range of 0-1. A value of one indicates a certainty it will occur and zero indicates a certainty it will not. A value of 0.5 indicates a 50-50 chance it will occur. If the sum of intention plus habit is zero, the behaviour will not occur. However, if either or both are high, the behaviour is likely to ensue, provided the facilitating conditions (F) are sufficient to support the action, i.e., neither approaches zero. The symbol ε_{P_a} refers to measurement error.

Intention

Triandis⁴⁴ states, "The best measure for behaviour prediction is behavioural intention." There is a large body of evidence supporting intention as a predictor for behaviour. At least three meta-analyses confirm that intention is a good predictor for behaviour (Armitage & Conner, 2001; Randall & Wolff, 1994; Sheppard et al., 1988). Randall found that "the average I-B correlation coefficient remains strong over a prediction interval of as long as 15 years (Randall & Wolff, 1994)."

Two studies have shown that doctors' intention to continue to work in a rural environment are adequate predictors of rural retention. Kamien (1998) showed that over a ten year period 76% of those who said they would remain in a rural practice did so, and 51% of those who said they would leave, did so (Kamien M, 1998). In a similar study over 5-6 years by Pathman (2003) in the United States of America (responses = 384), 78.9% stayed as predicted and 67.6% left as predicted (Pathman, Konrad, & Agnew, 2003).

It stands to reason, however, that if intention itself is not stable over the interval between testing and the behaviour, then the I-B relationship can not remain strong. It has long been known that many students change their career aspirations throughout the medical course. A study comprising almost 50% of Australia's 1967-entry medical students found generalist intention to fluctuate during the medical course between 25% on entry, 30% at mid course and 42% at the end. Meanwhile, specialist intention fluctuated from 30%, to 35%, to 24%. While it is likely the intentions of some students are fixed from before entering medical school, others change their career preference. Indeed, many of the programs referred to in the Current Programs section above, are designed to influence this intention.

The more informed and intense the intention, the more stable it is likely to be. As intention is based on the belief system that relates to the behaviour under consideration, intention becomes more stable as the beliefs are challenged by new information and become better informed. Webster (Webster RS, 2004 1972) who claims that educators play a vital role in enabling students to re-evaluate their belief systems, has suggested that this process of authentication leads to "true" and more stable beliefs. Graduates entering rural practice with a false set of beliefs and expectations are less likely to stay than those who decided to do so based on reality. When the former find that their expectations cannot be met, they are more likely to leave than if their expectations were well-based. The processes of belief authentication and career development are discussed in detail in Section Five in the discussion on the results of this thesis and future directions.

Evaluation of the Physician Shortage Area Program (PSAP) of Jefferson Medical College, described above (see Chapter Two: Current programs) found that 72% of students who had a stated intention to work in a rural or underserved area at entry to medical school, actually did so

⁴⁴ Triandis 1977, p199

on graduation. Ninety-six percent (96%) of these were still there 5-10 years later (Rabinowitz, Diamond, Markham et al., 1999). Rabinowitz believes that his program stabilizes this intention. It may be, then, that exposure to the realities of a rural career enabled these students to authenticate their belief system, and those who chose a rural career did so based on sound evidence. This theory is discussed at length in Chapter Eighteen.

If intention is an important predictor of behavioural outcome, what is the usefulness of observing intermediate behaviour, that is, completion of steps toward the outcome behaviour? While it may seem reasonable to assume that those entering the generalist training scheme would become generalists, one study on 2548 medical graduates in the United States of America found that of those entering the first year of generalist training, 48% went on to sub-specialise. On the other hand, 89% of those who did not sub-specialise, that is, who remained generalists, had had a stated intention at graduation to become a generalist. (Rabinowitz et al., 2000). This may represent a change in intention during the program but it is possible that many of them may never have intended to do so. They may simply have used the program as a stepping-stone (intermediate behaviour) toward a different outcome, i.e., getting into a specialist-training program.

This highlights the importance of gauging intention rather than assuming that interval behaviours, albeit associated with the outcome behaviour, are adequate predictors of that outcome behaviour. The same caution that applies to the assumption that entry to generalist training predicts a generalist outcome may be applicable to the assumption that rural origin predicts a rural outcome. There is clearly an association, but the knowledge of intention strengthens the prediction.

Habit

Students with a rural background may have a strong 'natural tendency' (H) to return to a rural area, and to not see a rural choice as so much of a risk. Triandis comments, "the w_H value [weight of the habit component – see Equation 1] is also a function of the social situation and may reflect individual differences. The more the social situation resembles situations in which the act has occurred in the past, the larger the w_H ."⁴⁵

Two recent Australian studies confirmed the importance of rural origin of the doctor and, more so of the doctor's spouse (Laven, Beilby, Wilkinson, & McElroy, 2003; Wilkinson et al., 2000). One would expect that the decision to work in a rural area is made jointly between the GP and the partner. It is not surprising then, that the likelihood of this choice increases when both have a rural background. In the Triandis model, at least part of this is under the influence of habit as a familiar 'social situation' increases the weight of the habit component. The psycho-social make-up, or 'subjective culture' of the rural origin medical graduate who chooses a rural partner, and

⁴⁵ Triandis 1977, p12

of the partner for that matter, may have an additional effect that Triandis refers to as 'individual differences'.

Habit is likely to be an important influence on situational career choice. It is not possible to measure it directly, so rural origin is used as an indicator of habit throughout this thesis. The influence of rural origin unlikely to be restricted to the habit construct, and the influence of rural origin will be discussed further in subsequent sections.

The relative importance of intention and habit.

Both intention and habit are predictive for rural career choice. If rural origin is an indicator of habit, changing intention represents the socialisation and developmental processes. While rural origin is known to predict eventual rural career choice, it is likely that adding the power of the stated intention to do so can increase this predictive strength. The fact that some rural origin medical students have absolutely no intention to return to work in the country is sometimes overlooked. So, how is the relative importance of habit and intention operationalised in the current theory?

w_H and w_I are weights of the habit and intention components, and can be determined using multiple regression analysis, as their values depend on the correlations between P_a , H, and I (see Equation 1). The footnote explains mathematically how a strong H or I component will be seen to have a greater influence on P_a , the likely outcome⁴⁶.

For example, it is likely that a rural origin student who plans to return to the country is heavily influenced by the habit component, whereas, the rural student planning to work in the city is very much influenced by self-direction. Triandis⁴⁷ suggests that when the behaviour in question is "new, untried or unlearned", the sole determinant of its likelihood to occur is intention because the habit component is weak. On the other hand, behaviours like having another chocolate, or a cigarette, require little self-direction, and are largely the function of habit. He

⁴⁶ This relationship can be expressed algebraically as:

$$w_H = (r_{PH} - r_{PI}) \cdot (r_{HI} / (1 - r_{HI}^2))$$

$$w_I = (r_{PI} - r_{PH}) \cdot (r_{HI} / (1 - r_{HI}^2))$$

The convention that r_{PH} represents the Pearson correlation coefficient describing the association between P_a and H is followed. The moderator, $(r_{HI} / (1 - r_{HI}^2))$, is the same for both equations, so the degree of correlation between H and I (r_{HI}) will affect the weights (w_H and w_I) equally. So, the weights w_H and w_I depend on $(r_{PH} - r_{PI})$ and $(r_{PI} - r_{PH})$ respectively. It can be seen that if the correlation between P_a and H (r_{PH}) is greater than the correlation between P_a and I (r_{PI}), then the weighting of intention, w_I , will be greater than that of habit, w_H , and *vice versa*. However, the greater the correlation between H and I, the greater will be the value of $r_{HI} / (1 - r_{HI}^2)$, accentuating the effect of the difference between r_{PI} and r_{PH} on the weights w_H and w_I .

⁴⁷ Triandis 1977, p205

also states⁴⁸ "when the person is highly emotionally aroused, habit rather than intention controls behaviour." Choosing a rural career can be seen as involving risk and evoking strong emotions among urban medical students. The perception of risk has been identified in studies of students, trainees and GPs with 73% of final year students in one study identifying the difficulty in getting back into a teaching hospital for specialist training as a risk of taking up a junior rural training post (Silagy & Piterman, 1991). Unless this fear can be mitigated, urban students are likely to "fall back" to the security of an urban career choice under the influence of habit. This, added to a self-direction to keep their options open early in their career, would be likely to reinforce an urban career choice. So urban-origin students with lower scores on both of these counts are more likely to self-direct a rural career.

Facilitating conditions and Motivation

Triandis postulates that intention (I) and habit (H) are not the only factors affecting behavioural outcome. Intention and habit are both modified by facilitating conditions (F). The relationships have been expressed algebraically in Equation 1 on page 28.

Facilitating Conditions: These are factors that alter the person's ability to perform the act. Triandis lists the ability to perform the act, the difficulty of the act, the knowledge required to perform the act and the state of arousal towards the act.⁴⁹ These may, in the rural workforce context, include the many programs of the General Practice Rural Incentives Program (Review of General Practice Training, 1998) designed to make it easier to take up a rural career, such as relocation grants, training grants, family support grants, and the associated advertising programs. Facilitating conditions may also play a negative role, such as hospital closures, uncertainty of practice viability, and even worsening public transport.

They have been operationalised as: *Self efficacy:* confidence in one's ability, *Perceived control:* degree of personal control over the behaviour, *Perceived knowledge:* degree to which one feels knowledgeable about ways to reduce the risks and *Motivation:* arousal, or the driving force to perform the act lest the consequences of not performing the act ensue. This last is described by Boyd as *perceived susceptibility*, and in his study, perceived susceptibility to catching HIV/AIDS and to becoming pregnant were found to significantly increase the predictive power of intention to use condoms (Boyd & Wandersman, 1991). Negative consequences associated with failing to spend part of a medical career in the country, especially during training, may include missed opportunities to broaden career experience and/or to develop hands-on practical skills, or may relate to family ties.

The Triandis model holds that facilitating conditions are effect modifiers, and increase or decrease the effect of both intention and habit equally. That is, if the person has a natural tendency (H) to the behaviour, and/or has decided to do something (I), F can increase or reduce

⁴⁸ Triandis 1977, p205

⁴⁹ Ibid, p195

the likelihood of the act ensuing. As F has a multiplicative relationship with (I + H), if F approaches zero then P, the likelihood of the behaviour happening, also approaches zero. In the rural career context, motivation may be related to morale. Hays describes a 'dynamic balance' between opposing pressures, and that in time the doctor may become susceptible to 'triggers' to leave (Hays, Veitch, Cheers, & Crossland, 1997). Kamien talks of dissatisfied rural doctors reaching a 'critical phase' after which they may leave (Kamien M, 1998). As a 'critical phase' approaches, the imbalance of disincentives and incentives demoralises the doctor, who then requires even greater incentives to justify continuing in practice. Eventually, the facilitating conditions/motivation-to-stay construct approaches zero and the likelihood of staying in a rural post approaches zero. Pathman (2003) found in his study on retention that 30% of those who left within 5 years had intended to stay for over 15 years (Pathman et al., 2003). One can only presume that a critical trigger to leave had arisen for these doctors. So, even with the strongest intention and/or habit, the likelihood of taking up or remaining in a rural career approaches zero if motivation or the ability to do so approaches zero. The TpB of Ajzen attributes an additive rather than multiplicative role to perceived behavioural control. While this approach makes regression modelling easier, it does not fit well with the rural career model.

The determinants of intention according to the Triandis model

Intention and habit are the proximate determinants of behaviour. In risk taking behaviour, intention to perform the act is predominant (Triandis H, 1977).⁵⁰ The proximate determinants of intention are affect (A), perceived consequences of the behaviour (C), and social factors (S). This relationship may be expressed algebraically as follows:

$$I = w_A A + w_C C + w_S S$$

Equation 8

and can be expanded to the following equation:

$$I = w_A A + w_C \sum_{i=1}^n B_{iA} + (w_{RB} R B + w_{PNB} P N B + w_{NB} N B + w_{IPC} I P C + w_{SC} S C)$$

Equation 9

Affect: This is the emotion one feels toward the act (e.g. good-bad, pleasant-unpleasant). Badmouthing, as occurs when specialists denigrate the work of rural GPs, or vice versa, has an effect on this (AMWAC & AIHW, 1997; Fromm B et al., 1985) In one study, 21% of participating students reported an influence of badmouthing on their career choice (B. A. Kamien et al., 1999). The Review of General Practice Training (1998) confirmed this, and recommended re-establishing the role of the generalist in the hospital (General Practice Strategy Review Group, 1998). It was hoped that providing more generalist role models would increase the positive feeling toward a generalist career, and reduce negative affect.

⁵⁰ Triandis 1977, p205

Studies on self reported mood have indicated that positive and negative affect are not merely end points on a single dimension, but form two distinct dimensions (Watson D, Clark LA, & Tellegen A, 1988). A Positive and Negative Affect Schedule scale has been developed by Watson, and items from this scale were incorporated into this work and will be discussed later in Chapter Six under the heading: Improvements to the affect index for 2001 version of RIQ.

Perceived Consequences: The perceived effects of the act, and the importance ascribed to these are the perceived consequences. Many of the disincentives to a rural career fall into this category. Very few (if any) studies have attempted to measure the level of importance ascribed to each item as well as the perceived likelihood that it will occur, so their power has rarely been measured in an expectancy-value model (Strasser R et al., 1997).

Social Factors: This is really the socio-cultural make-up of the student. Such pressures a family, professional, social and peer pressure fall into this component. Role modelling influences self-concept and self-efficacy also exerts its influence on Social Factors⁵¹. These include:

- Normative Beliefs (NB) or beliefs held regarding important others' encouragement or discouragement to 'go rural,' multiplied by the motivation to comply with that persons wishes,
- Personal Normative Beliefs (PNB) one's sense of obligation to take up a rural career,
- Role Belief (RB) the appropriateness for someone of that socio-cultural group to do so,
- Interpersonal Contracts (IPC), an agreement with someone to work in the country,
- Self-Concept (SC) or the sort of person one considers oneself to be.

Makkai (Makkai T, 1995) found the students who chose medicine to serve the community, and those who were older when they chose to take up medicine, were more likely to be in a non capital city practice. Other researchers found similar results (Grayson, Newton, & Whitley, 1996; Kassebaum et al., 1996; Schieberl, Covell, Berry, & Anderson, 1996).

This may be because the older intake has more vocational maturity, which means that they have some understanding of their own abilities and interests, possess information about a variety of aspects of the world of work, and know how to integrate these factors in making well-informed decisions (Lokan & Biggs, 1982). The older students are likely to have greater vocational maturity, and a more authenticated belief system⁵².

The weights (w_s , w_A , and w_C) are the regression coefficients, and may vary according to the individual, the situation and the behaviour. Triandis⁵³ considers that

$$w_s + w_A + w_C = 1.00$$

so that if an individual has a low score on one, or two, the others are commensurately increased. For example, some individuals will be more influenced by the affect (A) component than the

⁵¹ Role modelling and self-efficacy are discussed in detail in Section Five of the thesis.

⁵² See Section Five for a detailed discussion on career decision making

⁵³ Triandis 1977, p197

cognitive (C) component, and it may be that gender will have an effect on this. Some cultures place more emphasis on, for example, the social (S) component than the affect (A) component. In some situations, such as when one believes one is being watched, the normative component (S) may be higher. Some behaviours (such as smoking in a restaurant) evoke more social stigma, and others (such as cuddling a child) may be more affective.

Affect, perceived consequences and social factors, are universal, or cross-cultural ('etic') constructs, although they may have different weightings depending on the culture to which the individual belongs (Davidson AR et al., 1986). Culture-specific (or 'emic') belief variables are important to consider when developing measures as they allow for a more culture-specific measurement of the precursors of intention (Harry C. Triandis, 1994). These belief items then, which make up the indices for A, S or C, need to be tailored for the culture of the subjects being sampled. What is taboo in one culture may be smiled upon in another and totally irrelevant in another. For example, when asked if they *intend to practise in the country* after graduation, local students will usually consider the rural implications of this, whereas international students may believe this to be about whether they will remain in Australia after they graduate.

Cultural distinction as predicted by the Triandis model

Central to the Triandis theory of interpersonal behaviour is the concept that individuals of differing cultural backgrounds will have distinct response patterns to instruments based on that theory. It is expected that 'cultural distinction' will be evident in different loadings on the weights of the affect, social and cognitive constructs (see above).

Approximately thirty percent of the medical students at Monash University are full fee-paying international students. These international students all come from outside Australia, almost all from Malaysia, and are expected to leave Australia after graduation. They are predominantly Muslim, and culturally different to the local cohort of students. It would be expected that cultural distinction could be tested by comparing such a student population with the local cohort. It is possible that 'cultural' differences specific to 'rural intent', that is, an intention to work in the country after graduation, rural/urban origin and gender may also be identified and measured using an instrument based on the Triandis theory.

Advances afforded by the use of intention

Two of the more accepted predictors of taking up a rural career are the rural origin of the medical student (Easterbrook et al., 1999; Rabinowitz et al., 2001) and positive exposure to rural practice during training (R. C. Bowman & Penrod, 1998; Fromm B et al., 1985; Neill & Taylor, 2002; Pathman et al., 1999; Rolfe et al., 1995; Rucker, Morgan, Ward, & Bell, 1991; Somers GT & Strasser R, 2002). Empirical evidence to support this contention however, is inconsistent and often confounded.

For example, Rabinowitz, in his 22-year prospective study of rural origin students found that rural origin students who attended his program were more likely to become family physicians

than were those who undertook the standard medical course. In addition, rural origin students were more willing to work, and indeed stay, in rural and under-serviced areas (Rabinowitz, 1988b, 1993; Rabinowitz, Diamond, Markham et al., 1999). However, while these results support the rural origin hypothesis, it should be noted that Rabinowitz facilitated his rural origin students with a raft of supports similar to those recommended under the RUSC program (Rural Undergraduate Steering Committee, 1998a). The comparison group were neither of rural origin, nor exposed to the raft of supports.

In one paper, Pathman suggests that randomised longitudinal studies do not show rural rotations to influence career choice (Pathman, 1996), although in another, he reports his own work which shows a positive effect if the program improves the ability to *live* in a rural community (Pathman et al., 1999). Rolfe found a negative effect from a third-year rural rotation, and a positive effect from a final year rotation. Indeed, by offering support only to the rural origin students, Rabinowitz may have left the others (i.e. urban students) without the support needed to 'convert' them to a rural career (Fromm B et al., 1985; Hays RB et al., 1995; Neill & Taylor, 2002; Somers GT & Strasser R, 2002).

Davies, in a survey of 211 Royal Australian College of General Practitioners trainees, found that about half of the rural trainees had an urban origin (Davies, 1994). In yet a later paper, Rabinowitz reported that rural origin was not an independent predictor of rural *retention*, and that

...non-PSAP graduates with 2 key selection characteristics of PSAP students (having grown up in a rural area and freshman-year plans for family practice) were 78% as likely as PSAP graduates to be rural primary care physicians, and 75% as likely to remain, suggesting that the admissions component of the PSAP is the most important reason for its success (Rabinowitz et al., 2001).

Other workers have suggested that

the career choices of their graduates are better explained by the program's selection than by the curricula (Pathman et al., 1999),

That is, the reason for joining the program may be more important than the effect of the program itself. So it can be seen from the above that the interaction between rural origin, selection to join a rural rotation program, the program itself, and rural career intention all confound the picture. Such a series of often mixed associations limits the demonstration of causation.

Understanding the influence of rural origin: a Triandis perspective

These apparent inconsistencies may be more readily understood when considered within the framework of a model of reasoned behaviour, such as that of Triandis. The impact of originating from a rural area is likely to affect several of the determinants of behaviour. Both the habit and the intention constructs are involved, as are facilitating conditions including motivation and self-efficacy. The antecedents of intention are likely to be influenced by rural origin. For example, in relation to returning to work in a rural setting, country students are more likely to: have positive memories of living or working in a rural setting (increased positive affect);

have more of their referents (for example, family and friends) supporting a rural career choice;
have a better understanding of rural needs (facilitating authenticated normative beliefs);
feel a sense of obligation to return there (personal normative beliefs) and to see positive
perceived consequences (returning to networks of family and friends, and a preferred
environment)
have a proven ability to survive in a small community, which has been found to be a vital
facilitating condition for rural retention (Pathman et al., 1999).

While urban students may have these attributes, it is more likely that they do not. However, if these urban origin students are not yet committed to an urban career, programs designed to increase the number of rural doctors may facilitate the development of these attributes (Fromm B et al., 1985; Neill & Taylor, 2002). The Triandis model suggests that their success can be evaluated through the measurement of changes in the belief structure underpinning attitudinal change, and ultimately, change in intention and behaviour. This is the process of belief authentication that is, the reappraisal of one's belief system after new information is discovered, and is discussed in detail in Section Five.

Thus, the Triandis model assists in understanding how it is that rural origin students may be more likely to return to a rural setting. It also highlights the importance of looking beyond the proximate determinants of behaviour and at the determinants of intention. While it is true that rural origin students may possess features that should make them more likely to return to a rural setting, for a variety of reasons, individual rural students may have no intention to do so. Through the aid of the Triandis model, a more accurate understanding of medical students' intention to take up a rural career may be obtained. The purpose of this thesis is to present an instrument based on this theoretical framework that will enable this understanding.

Summary of Chapter Three

This chapter presented the theoretical framework supporting a proposed instrument that would be useful in the evaluation of programs designed to influence rural medical career choices. This framework was based predominantly on the work of Harry Triandis, but also borrowed heavily from the work of Icek Ajzen and Martin Fishbein.

The development of the belief such an instrument would be based upon the measurement of the belief system that underpins attitudes toward the career choice that is, working in a rural environment. As will be discussed in Section Five, these beliefs are closely related to those that determine self-concept, a determinant of the individual's ideal vocational role. Therefore, an instrument that measures the beliefs underpinning the intention to choose a career will also measure the self-concept that determines the ideal career for the individual. The place of self-efficacy in this process was introduced in this chapter, but its role in the application of this instrument will be elaborated upon in the discussion chapter in Section Five.

Chapter Four

Methodological principles and models

Introduction

This chapter presents some of the theory underpinning the design and evaluation of an instrument designed to measure the characteristics of individuals. As discussed in preceding chapters, the instrument under consideration in this thesis measures the belief system underpinning career decision-making. The processes for showing reliability and validity described in this chapter broadly follow the recommendations of the American Educational Research Association, the American Psychological Association and the National Council on Measurement in Education, as set out in the guide: Standards for Educational and Psychological Testing (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999).

In addition to grounded theory on questionnaire design and evaluation, this chapter presents two models designed by the author for the purpose of clarifying concepts that have been presented. The first of these is a model to assist in the understanding of the instrument. This is based on a three-dimensional model of a medieval castle wall built of red and white Lego blocks. The blocks represent beliefs, and the entire castle-wall represents intention. The model represents the influence of changing the beliefs on the appearance of the entire model, that is, intention.

The second model designed by the author seeks to explain the multi-dimensional approach of factor analysis. This model consists of a greeting card, and is presented toward the end of this chapter.

A model to aid in the understanding of the antecedents of behaviour

Introduction

Intention is the self-direction to perform a particular behaviour. This self-direction is determined by the attitudes one has toward the behaviour. Attitudes are difficult to define and difficult to measure (Allport GW, 1935). They are the structure through which intention is determined. In order for a change to occur in intention, it is probable that there will first be a change in several of the attitudes predicting that intention. Further, it is likely that even attitudinal change demands more than a single event or life experience to be measurable; that attitudinal change occurs gradually over time. The antecedents of attitudes are the beliefs that form the belief system underpinning the attitude. These beliefs are more concrete and finite, and as such, are more readily measurable and they are also susceptible to more rapid change.

As will be discussed in depth in Chapter Eighteen, the beliefs that determine attitudes toward a career choice, also define self-concept as it relates to the vocational role. Therefore, a measure of these beliefs serves a dual purpose, to measure intention to take up such a career, and the alignment of the individual's self-concept with the vocational identity. The model presented in the following pages represents both the self-direction to choose a certain career and self-concept. It has been designed by the author to facilitate an understanding of the relationship between beliefs, attitudes and intention

The castle wall model for intention

This section will introduce a Lego Model to aid in the understanding of the measurement of intention based on the Triandis theory. The colour of a Lego model of the walls of a medieval castle represents the individual's intention. A red castle represents an intention to work in the country, and a white castle represents an intention to work only in the city. The colour of the castle is determined by the colour of the individual Lego blocks. These individual blocks may be red or white, and represent the 'universe' of individual beliefs that the individual holds. Although in reality, beliefs are not usually dichotomous, in this model, they are represented as either pro-rural (red) or pro-urban (white). That is, they represent the effect of the belief on locational career choice.

Following the Triandis framework, there are three main structures in the medieval castle model of intention, say, the drawbridge/main entry section, the ramparts, and the walls. These represent the three attitudinal antecedents of intention as described by Triandis, namely affect, perceived consequences and social drivers. These structures form the framework for the castle model, just as attitudes form the framework for Triandis' intention. They represent the indices in Equation 8. These structures may be reduced to smaller components such as windows, representing the sub-indices in Equation 9. The colour of these indices and sub-indices is determined by the net colour-effect of the blocks representing the beliefs. So, although the whole castle wall model (intention) may be considered red or white, structures within it (attitudes) may individually appear more 'red' or 'white'. This in turn depends on the relative number of red or white bricks (beliefs) within the structure. Naturally, the more the structures (attitudes) and bricks (beliefs) are red, the more the overall structure will appear red; the more the intention or self-direction will be pro-rural; the more the self-concept of the individual will support that needed to choose a rural career.

Now, attitudes and intention are rarely ever completely pro-urban or pro-rural or they could be measured directly. Similarly, the castle wall and its structures do not appear either 'red' or 'white'. Their colour is determined by the overall effect of the relative number of red and white 'belief' bricks. So, from a distance, the castle wall is a hue of pink, being closer to red or white depending on the overall concentration and distribution of the belief blocks. While the overall castle wall may appear red, the colour of individual components, say the ramparts, may appear less so. There need not be homogeneity in the colour of the model, as there may not be

congruity in the attitudes of the individual. The more this is so, however, the more 'authenticated' the model/intention.

Measurement of changing attitudes and intention

This model is predicated on the regular turnover and replacement of the Lego blocks as the individual reappraises his/her beliefs (Ausubel, 1954). As the castle is exposed to certain events, individual red blocks may be replaced by other red blocks, or with white blocks, and likewise, the white blocks are continuously under review. With regard to intention and beliefs, this means that with increasing information and maturity, individual beliefs may be strengthened or change from being pro-rural to pro-urban. As the 'belief blocks' are replaced, the new blocks are better shaped and more 'polished.' Therefore, they both fit the castle wall better (increased validity) and can be measured with greater reliability. This represents the process of authentication (Webster RS, 2004)⁵⁴.

While this is unlikely to have an immediate effect either on the attitudinal structures or on intention as a whole, a gradual change will take place if there is an ongoing or systematic change. Gradually, a roughly hewn rampart becomes more clearly such a structure, and the colour of the individual blocks and the overall structure also increases in clarity. Meanwhile, a structure that appeared more red for example, may become more pink and eventually may even seem white as the colour of these new blocks is changed.

Generalisability theory suggests that measurement of such a change does not require that the colour of every brick in the castle (the 'universe' of bricks) be counted. If a representative sample is counted from each of the important structures, the overall structure and colour of the castle can be determined. Similarly, an instrument that measures representative beliefs can estimate attitudes, and predict intention.

Advantages of the theoretical framework as presented by this model

This model explains the advantages of measuring intentional change through a measurement of attitudinal change and the underlying belief structure. Change in the number of red or white blocks (beliefs) is evident earlier than a perceived change in the colour of the whole model (intention) or of structures within the model (attitudes). Hence, measuring individual beliefs is more sensitive.

Further, as only red and white blocks are being monitored, such measurement is more objective; not relying on the observer's preconception of the shades of pink that describe the colour of the whole castle wall. Such a measure then has less scope for error, and is more reliable. It is also possible for set criteria to be agreed upon for the proportion of red and white blocks before a colour change is declared.

⁵⁴ See also Section Five

The validity of the instrument can be tested if there is a 'gold standard' available. Three such gold standards are described in Chapter Ten. In the case of rural career choice, the gold standard might be the stated situational intention, or the RI score. This is a derived score based on the individual's self-reported intention to work in a rural environment. While such a score is subject to several biases, it is an indication of the 'overall colour' of that individual's intention or castle wall (see Chapters Seven, Eight and Thirteen for further discussion on the validity of the RIQ). If the instrument has precisely measured, an adequate sample of belief blocks from each of the three attitudinal domains (structures) described in the Triandis theory, the universe of beliefs will be adequately represented; it will have adequate reliability. The 'colour' determined by the instrument should approximate the 'colour' declared by the individual (gold standard). Regression modelling techniques can be used to determine the strength of association between the gold standard and the instrument (castle wall) with regard to their colour (predictive validity) and structure (construct validity). This model will be referred to again in other parts of this thesis.

Questionnaire design, development and evaluation

This section presents an outline of the currently accepted methods of designing psychological instruments. It is generally accepted that there are four phases in the development of tests:

1. delineation of the purpose(s) of the test and the scope of the construct or the extent of the domain to be measured;
2. development and evaluation of the test specifications;
3. development, field testing, evaluation and selection of the items and scoring guides and procedures; and
4. assembly and evaluation of the test for operational use (American Educational Research Association et al., 1999).

In the following pages, each of these phases will be discussed in relation to the development of the RIQ.

Delineation of purposes, and scope of the constructs to be measured

Chapter Two discussed the need for an instrument capable of measuring the effectiveness of programs designed to increase the likelihood that participants would choose a rural career in the future. The limited utility and onerous demands of evaluation based on eventual career choice, that is, on the target behaviour, were discussed. An instrument based on intention to practice in the country was proposed. Such an instrument may predict future behaviour through the estimation of intention to work in a rural environment.

It is not possible to measure the strength of association between intention to work in the country and the target behaviour within the time limits of this research. Indeed, that is one of the imperatives driving the research. This research relies of the strength of the consensus among

experts in this field that such a relationship not only exists, but also is strong (Ferguson, 1996; Randall & Wolff, 1994; Yang et al., 1994). Having accepted this assumption, a change in intention will predict a change in the likelihood of the target behaviour. A valid measure of intention can offer a timely, specific and sensitive indicator of the effectiveness of programs that have been designed to influence future behaviour.

Individual beliefs can change when the information on which they are based is upgraded. These beliefs are, therefore, not fixed and changes in them are measurable. Stated intention can also be considered a declaration of a belief; the belief that one intends to behave in a certain way. So, as it is not buffered by the more stable attitudinal constructs, stated situational intention is likely to be less stable than true intention. It is more likely to fluctuate throughout training and the medical career as the student increases understanding in the issues and gains vocational maturity. In that respect, a belief in the sort of medical practice one is likely to choose is one of the beliefs that make up self-concept. True intention, more closely related to self-concept itself, is not totally immune to these influences, but unlike a belief, it is buffered by attitudes and a large array of beliefs, and therefore changes more gradually. Similarly, changes in 'true' intention and self-concept are less easily reversed, as the reappraised beliefs on which they are based are more authentic than the earlier-held beliefs.

This true intention, then, is the target of the estimates outlined in the theoretical frameworks described in Chapter Three. In this research, however, the stated situational intent is used as the benchmark in the evaluation of the instrument. As will be described in Chapter Ten, this benchmark was expanded into the Situational Intent Score (SIS), with the addition of two other variables to stated situational intent (RI score), namely, the intention to seek additional undergraduate rural experience (UG), and the perceived global ease of living and working in the country (Ease). This expanded index will be shown to be more reliable than the RI score, but as data on intention to seek additional undergraduate experience (UG) were not available for all surveys, it was not used in the crossover trial.

So long as this measured change in intention predicts a significant change in the likelihood of the behaviour, repeated measurement of intention is a valid method of evaluating programs that seek to influence the likelihood of the target behaviour. This is not invalidated by the fluctuating nature of intention, as the sum of all of these fluctuations determines the eventual likelihood of the behaviour. Any program may influence this procession of adjustments to intention. When evaluating a program for its influence on rural career choice, it is that influence that is of interest. That subsequent events may have a greater effect is largely irrelevant to the evaluation of the program under scrutiny, unless this program also sensitises students to the effect of future events.

There are no universally accepted definitions of 'rural' and 'urban,' (Ricketts C, Johnson-Webb KD, & Taylor P, 1998), so the simplest possible definition was chosen for this research. Urban was defined as the capital city of the state and its metropolitan suburbs, and rural was

everything else, including large regional centres. There were several iterations in the process of this choice, and they are described in Section Two.

The definition of 'for some time' was also the subject of several attempts at refinement. While early versions used a percentage of career-life, the simple 'six months at any time' was eventually accepted. These definitions set a minimalist scope for the intention construct, as intention was defined by any meaningful period of time, anywhere outside the capital cities.

While the operation of the instrument relies heavily on quantitative research methodologies, the list of items chosen to develop the indices of affect, perceived consequences and social drivers result from qualitative research. A report on this work is presented in Chapter Five. As these indices are estimates of the attitudinal constructs, and the constructs are not directly measurable, the scope of their measurement will be determined through validity and reliability testing and through factor analytic methods. The statistical basis for these methods is described in this chapter and the analyses are presented in Sections Two and Three.

The purpose of the instrument, therefore, is to measure intention to work in a rural environment, so that repeated applications may detect alterations in the likelihood of a rural career produced by the program under evaluation. Ten to fifteen years of follow-up would be required to measure the predictive validity of the instrument on eventual career choice. This is not the purpose of this study, nor is predicting the eventual location of practice of the individual respondents the purpose of the RIQ. It is a tool to evaluate the effect of individual programs.

Development and evaluation of the test specifications

Both Triandis (Davidson AR et al., 1986; Triandis H, 1977) and Fishbein and Ajzen (Ajzen I, 2002; Ajzen I & Fishbein M, 1980) have published suggested item formats, and the formats of the two research groups overlap considerably. The evaluated-belief, or expectancy-value format for perceived consequences adopted by both groups of researchers was also used for that index in this research. Early versions of the instrument attempted to use this format for the affect index and the influence of salient others. Later versions reverted to Triandis' semantic differential format for affect and this was also the format chosen for social drivers. Considerable changes were made to the format from year to year, and these are described in Section Two.

Almost all scales in the 2003 version were 10-point Likert scales. There is some debate about the validity of using data collected on likert scales with finite divisions as interval (continuous) scales.

The legitimate performance of multivariate analysis on data from surveys assumes (among other things) that each response item is a continuous variable; that the scales have interval qualities.

Nunnally writes, however that he,

...strongly believes that it is permissible to treat most of the measurement methods in psychology and other behavioural sciences as leading to interval scales (Nunnally JC, 1978).

De Vellis supports him when he writes,

Although, strictly speaking, items using likert or semantic differential response formats may be ordinal, a wealth of accumulated experience supports applying interval-based analytic methods to the scales they yield (DeVellis RF, 1991).

Taking this potential limitation into account, the 2000 version of the questionnaire extended the 5-point scale of the 1999 version to a 7-point response format to offer a more 'continuous' response option. This was extended further from the 2001 version to 10- and 11-point scales presented along a solid line, in an attempt to imitate some features of a visual analogue response format. Interpreting data from a true visual analogue scale would be impractical, so respondents were asked to circle the number placed along the unmarked line, closest to their response.

So, this format was chosen to approximate visual analogue scales and the numbers were necessary to facilitate data entry. Although such a large number of response options (ten) reduces the ability of the respondent to separate out the difference in meaning of adjacent points, this too is the case for visual analogue scales. It is, in part, the purpose of using this format; such a scale approximates a continuum of response options.

Each of the three attitudinal constructs, affect, perceived consequences and social drivers, is represented by an index in the final version of the RIQ. Each of these indices is further divided into two sub-indices, and consists of several factors (see Chapters Eleven and Twelve). Each sub-index ideally consists of 5-8 items in order to achieve a satisfactory reliability. The number of items required per sub-index is a balance between a higher number required to minimise the measurement error and the principle of parsimony, urging against unnecessary items. Classical test theory suggests that items that correlate well with each other also correlate strongly with the latent variable (for example, affect, consequences, or social factors) (DeVellis RF, 1991)⁵⁵. So, although these attitudes cannot be measured directly, items that correlate strongly with each other within the sub-index are more likely reliable indicators of the construct being measured. This is most commonly measured by the Cronbach's coefficient Alpha. For this instrument, an Alpha greater than .6, but preferably greater than .7 was sought for each of the five sub-indices consisting of more than one item (see Reliability testing, below, for a further discussion on this point).

This instrument is designed to be completed either in a classroom setting or at home after a mail-out. Differences in response patterns due to the setting are described in Chapter Seven. In order to maximize response rates, it was designed so as to require not more than 20 minutes to complete. As with all self-response questionnaires, the order in which questions are answered cannot be ensured, however, the format seeks to lead the respondent through the questionnaire sequentially. The questionnaire is also designed to be used repeatedly on the same cohort, in order to track attitudinal changes throughout the medical training and career. Its stability and response characteristics after repeated use are discussed in Chapter Seventeen.

⁵⁵ De Vellis 1991, p28

Development, field testing, evaluation and selection of the items

This work followed the advice of several key authors on questionnaire design, but relies most heavily on DeVellis (DeVellis RF, 1991), De Vaus (De Vaus DA, 1995), Converse and Presser (Converse J & Presser S, 1986), Nunnally (Nunnally JC, 1970, 1978), Oppenheim (Oppenheim AN, 2000) and Streiner and Norman (Streiner DL & Norman GR, 1995).

The stages followed were:

- a) Generation of an item pool
- b) Choice of response formats
- c) Format test of questionnaire on a small expert group
- d) Review of the items by an expert panel
- e) Pilot test on a small but representative cohort of students
- f) Review of the responses for validity and reliability
- g) Refinement of the questionnaire

Questionnaire design is an iterative process, and significant improvements to the Rural Intent Questionnaire (RIQ) were made annually. Section Two of this thesis will describe the development of the instrument over the five years from 1999 and 2003. The instrument is referred to as the RIQ with a four-digit suffix representing the year of the version referred to. For example, the final version is termed the RIQ2003. Copies of the questionnaires are presented in Appendices One to Four. Section Two will focus on the development of the instrument over five years. Section Three will then report on the testing of the 2003 version of the instrument for its psychometric properties. These include its factor structure, reliability and validity. The statistical basis of these concepts will be frequently referred to during the presentation of the iterations of instrument development throughout Section Two and the evaluation of the instrument in Sections Three and Four. Therefore, a brief outline of the issues surrounding these three important characteristics of survey instruments is appropriate here.

A statistical approach to validity and reliability testing and factor analysis (principal components analysis).

Introduction

The characteristics of an instrument can be described in terms of its validity, that is, how closely the construct that it measures aligns with the construct that it purports to measure, and its reliability, that is, how consistent it is in measuring what it is that it does measure. Reliability is concerned with how free it is of measurement error. Both criteria must be filled if an instrument is to be useful.

A Lego castle wall model of the RIQ instrument was introduced at the beginning of this chapter. Red and white Lego blocks represented pro-rural or pro-urban beliefs respectively. The wall of a medieval castle was constructed of these blocks, and represented the construct of situational

intention. This castle wall had structural components, such as ramparts and the drawbridge/main gate section, representing the attitudinal determinants of intention.

The colour of the wall represented the strength of intention; the more 'red' it appeared, due to a greater proportion of red 'belief' blocks, the more pro-rural was the intention. This redness was to be measured by comparing the number of red and white blocks, using an instrument that sampled only a portion of the total 'universe' of belief blocks making up the castle wall. It was stated that the sample chosen for the instrument must be adequate to enable a picture to be drawn of the castle wall, including its essential components.

The validity of the instrument is the extent to which it achieves this. Reliability relates to the precision with which the 'redness' or 'whiteness' of the model is measured. These concepts are not independent of each other. While an instrument can be highly reliable without validity, adequate reliability is a precondition for validity (Oppenheim AN, 2000)⁵⁶.

So, the instrument may be reliable but not valid, in that it discerns red blocks from white blocks with precision. This may be the case even if it is the heap of leftover blocks, and not the castle wall, that it is assaying. Clearly, in that case, despite being reliable, it lacks validity, because it is not the heap of discarded blocks that is of interest. On the other hand, if the sample of belief-blocks that are chosen does represent the castle wall and its structural components well, the instrument is of little use if it is not able to discern a red block from a white one with precision.

Section Three of this thesis describes the Rural Intent Questionnaire in terms of its validity and its reliability, and investigates the structure of its components through factor analytic methods, namely principal components analysis. This part of Chapter Four presents some theoretical and statistical considerations of validity, reliability and factor analysis.

Validity testing

Attitude scales are good examples of scales that are devised to measure constructs that are not directly measurable, or latent variables.⁵⁷ They generally consist of a series of inter-related items (beliefs) each of which represents an aspect of the latent variable (attitude). These items overlap in meaning, and therefore correlate with each other as well as with the latent variable. If together, the items adequately delineate the latent construct, one can infer that the resulting scale is a good measure of the attitude. In terms of the castle wall model, the selection of belief blocks must adequately represent the structural components (attitudes) of the castle wall, and collectively these 'attitudes' must represent the castle wall itself.

Shadish, Cook and Campbell write,

We use the term validity to refer to the approximate truth of an inference (Shadish WR et al., 2002)⁵⁸

⁵⁶ Oppenheim 2000, p159

⁵⁷ See also Chapter Three: The theoretical framework

⁵⁸ Shadish 2002, p34

Validity, then, relates to the extent to which the latent variable that the scale measures is the construct that it claims to measure. What is being evaluated is the interpretation of the test scores in the context of the application, not the reliability of the test itself.

The traditional method of handling validity is to discuss various separate types of validity, such as content validity, construct validity or criterion validity. (DeVellis RF, 1991; Oppenheim AN, 2000). This approach holds that validity is,

inferred from the manner in which a scale was constructed, its ability to predict specific events, or its relationship to measures of other constructs (DeVellis RF, 1991)⁵⁹.

Another validity typology includes four types of validity:

- statistical conclusion validity, which relates to the appropriate use of statistical tests;
- internal validity, which relates to the causal relationship between the dependent variable and independent variables;
- construct validity, which relates to the generalisation from the operations (for example, the items in a questionnaire) to the underlying constructs; and
- external validity, which relates to generalisability of inferences to other groups, settings, treatments and measurement variables (Shadish WR. et al., 2002)⁶⁰.

On the other hand, the Standards for Educational and Psychological Testing (American Educational Research Association et al., 1999) takes the view that,

Validity is a unitary concept. It is the degree to which all the accumulated evidence supports the intended interpretation of test scores for the proposed purpose (American Educational Research Association et al., 1999)⁶¹.

Instead of different types of validity, they discuss the process of validation as one in which evidence of validity is sought from different sources and assembled to argue the case for validity.

Validation can be viewed as developing a scientifically sound validity argument to support the intended interpretation of test scores and their relevance to the proposed use (American Educational Research Association et al., 1999)⁶².

While the difference in the two approaches may be seen as largely semantic, the approach of the Standards encapsulates the view that the validity of an instrument is global, and that this is determined by a consideration of all the evidence available. In the case of the castle wall model, an instrument that portrays a rampart and a drawbridge may have some evidence in support of its validity; however, may it represent the ruins of a disused castle. Validity is not present just because some of the evidence, say, in relation to content, supports it, but rather only when the balance of the evidence supporting the proposed interpretation of the results is favourable, within the context of its proposed uses (American Educational Research Association et al., 1999).

⁵⁹ DeVellis 1991, p43

⁶⁰ Shadish 2002, p38

⁶¹ The Standards 1999, p11

⁶² Ditto

Overview of validity arguments relating to the RIQ

Evidence for the validity of the RIQ, based on test content are presented in the Section Two and Section Three (see especially, Chapters Seven, Eight and Thirteen). The steps taken in the development of the instrument follow the guidelines set by several authors (Converse J & Presser S, 1986; DeVellis RF, 1991; Oppenheim AN, 2000). The items for the instrument were collected from students, experts in the field and the literature. They were pre-tested on a small group of workers in the field and pilot tested initially on a small group, but then on larger cohorts of students. Finally, large-scale field-tests were carried out during 2003 on a cohort of 530 students.

Three methods of testing for validity based on content are reported in Chapter Seven:

1. For many items, the evaluated response format asked directly for an evaluation of the importance of items.
2. Focus groups provided feedback on the structure and content of the instrument.
3. Open-ended questions included within early versions of the survey asked students to identify items that may have been omitted, and for feedback on the structure, wording and content of the instrument.

Feedback was obtained from a broad cross-section of students from all subgroups within the cohorts. As well as informing the selection of items, additional components such as cultural needs, general practice intent and undergraduate intent were added to the questionnaire as a result of this feedback. Despite a large number of comments on the quality of the questionnaire, these were almost all positive. This general concurrence on the adequacy of the content was evidence in support of the validity of the instrument.

Criterion-related validity requires an instrument to have an empirical association with a 'gold standard' (DeVellis RF, 1991)⁶³. The Chapter Ten describes the development of three scales, Rural Intent (RI), the Situational Expectation Score (SES) and the Situational Intent Score (SIS). The strong relationship of the RIQ, its indices and its sub-indices to these gold standards was a source of validity evidence based on its relationship with other variables. All data for these analyses were collected at the same time, and therefore provided concurrent evidence of the test-criterion relationship.

Construct validity is said to be present when the instrument 'behaves' as it is theoretically expected it should. Its relationship with other constructs should be as expected. For instance, it is expected that rural origin students would have a stronger positive affect toward the country, and that social drivers for them would be more positive toward a rural career than for urban origin students. A comparison of rural and urban students on these scores, reported in Chapter Twelve, did support this. This type of evidence is often called convergent, whereas if two

⁶³ DeVellis 1991, p44

constructs were expected to be unrelated, evidence of a poor relationship in test scores is discriminant evidence.

Evidence of validity may also be sought from the internal structure of the instrument (American Educational Research Association et al., 1999)⁶⁴. The PANAS schedule is a validated scale that holds that the interpretation of the meaning of the positive and negative affect constructs should be orthogonal; factor analysis should show them to be unrelated. In the RIQ, the affect index, consisting of positive and negative affect sub-indices was indeed found not to be one-dimensional, with separate positive and negative components.

This can be simplified using the castle wall model. If all of the theory on designing castle walls supports the need for two chains to support the drawbridge, rather than one central chain, and the instrument described the latter configuration, this would be evidence based on the internal structure of the instrument questioning its validity. Evidence of validity can also be sought through an experimental process⁶⁵. An increase in rural intention, as reflected in the sub-indices of the RIQ, would be expected after a rural rotation, designed in part to increase the students' interest in a rural career. A survey performed before and after a rotation could provide evidence of validity, based on differences in scores for those who did and those who did not attend the rural rotation. Such an 'experiment' is described in Section Four.

Reliability testing

The principle of aggregation holds that when multiple observations are made, as is the case in a scale or index, the random error associated with each observation is cancelled out. The extent to which these multiple observations inter-correlate, determines the extent to which the measurement error is cancelled out, and this attribute is referred to as the reliability of the scale/index.

Scale reliability is the proportion of variance attributable to the true score of the latent variable (DeVellis RF, 1991).

Reliability can also be considered as the consistency of the measurements when the instrument is repeated on a population of respondents (American Educational Research Association et al., 1999)⁶⁶. The reliability of an instrument, then, does not give an insight into *what* the instrument measures, but indicates how well it measures whatever it is that it is measuring. This is reflected in how much measurement error the scale or index has. So, regardless of the validity of the meaning of the latent variable that is actually being measured, a reliable instrument will measure that construct with little measurement error. Reverting to the model, a reliable instrument will differentiate a red block from a white block no matter what structure these blocks form part of.

⁶⁴ The Standards 1999, p 13

⁶⁵ Ibid, p14

⁶⁶ Ibid, p25

Measurement error should not be confused with systematic error. Systematic errors may also affect the performance of individuals or sub-groups on a survey instrument. Unlike measurement error, which is unpredictable and random, systematic error has a consistent influence on the data, producing a bias. Systematic errors are not, therefore, a source of unreliability, but are a source of construct-irrelevant variance. The presence of variance that is due to a construct that has a meaning other than that of the construct being measured detracts from validity, not reliability.⁶⁷

In the castle wall model, this could relate to the effect of a red dust storm. If a coating of red dust settled over the castle, there would be an increased appearance of redness. This is not due to the colour of the bricks, but of the dust. The increased redness is due to a loss of validity, because although the colour determination is precise (reliability), what is being measured (dust) is not what it purports to measure (brick colour).

The classical measurement model, or classical test theory, assumes that individual items measure the underlying construct to an equivalent degree, that all items are comparable measures (DeVellis RF, 1991)⁶⁸. All items are correlated with the underlying construct, and therefore, also with each other. The theory holds that the degree to which all variables in a scale interrelate is a reflection of how well they measure the underlying construct.

The variance in the responses to a scale can be divided into two components, one that is the true score on the latent variable (called by DeVellis the 'signal'), and one that measures everything else (the 'noise' or measurement error). Internal consistency is the proportion of total variation that is 'signal' (DeVellis RF, 1991). Generalizability theory and item response theory (IRT) are two approaches to measurement theory that utilise similar concepts. The true score in generalizability theory is the universe score, obtained when all possible items relating to the construct are measured. In IRT the true score for the respondent is considered as the ability or trait parameter. In all three theories, the measurement error is

the hypothetical difference between an examinee's observed score on any particular measurement and the examinee's true or universe score...(American Educational Research Association et al., 1999)⁶⁹

Estimation of measurement error

There are two related measures of reliability, which are commonly used; internal consistency, and temporal stability. The former relates to the degree of consistency between the variables within an instrument. The latter relates to how consistent the instrument is when applied repeatedly, and when the same response is expected. Both measures compare two responses to the instrument; one compares presumed equivalent parts of an instrument and the other compares results from two sittings of the same instrument.

⁶⁷ The Standards 1999, p 26

⁶⁸ DeVellis 1991, p12

⁶⁹ The Standards, 1999, p 25

Internal consistency

Two sets of items that measure a latent variable equally are called parallel forms of the scale. If the same cohort completes both alternate forms, the correlation coefficient between the scores on the two forms is the alternate forms reliability coefficient. However, it is rare to find two scales that are truly parallel, so an alternative approach is to utilise a single scale, but to split it into two halves. The correlation between the scores on the two halves is called the split half coefficient.

The most commonly used measure of internal consistency however, is the Cronbach's coefficient alpha, or the 'Alpha'⁷⁰. This measures the "proportion of test variance attributable to common factors among the items" and is a mean of all possible split half coefficients (Cronbach LJ, 1951).

It is important to note that a high Alpha does not indicate that the scale is unidimensional (DeVellis RF, 1991)⁷¹. It may have sub-factors within it and, although Cronbach advises that such tests should be divided into sub-tests, he claims that Alpha can still be used to determine the common-factor concentration in such a multi-dimensional scale (Cronbach LJ, 1951).

Temporal stability

Another measure of 'reliability' concerns the amount of error associated with the repeated application of an instrument to the same cohort. This is called test-retest reliability by some, but the term temporal stability is less confusing. This is a measure of the correlation between the responses of the same test re-applied to the same individuals after a time interval. While the split-half reliability is the correlation between two halves of a questionnaire answered at the same time, the test-retest reliability is the correlation of the questionnaire with itself taken at two different times.

The duration of this interval is important, as it must not be so short that respondents remember their earlier responses, nor should it be so long that the latent variable being measured actually changes. As discussed in Chapter Three, the individual beliefs underpinning the intention to choose a rural career may change over relatively short periods, depending on intervening experiences and it is often difficult to find a suitable time interval for this test. For this reason, the Cronbach's coefficient Alpha is the most commonly used measure of reliability and is used in this research.

Factor analysis

The general factor model describes a relationship between items in a scale and the latent variable in which the covariation among the items may be caused by several latent variables, or

⁷⁰ DeVellis 1991, p26

⁷¹ Ibid, p92

factors (DeVellis RF, 1991)⁷². In such a case, there is likely to be more background 'noise' and the Cronbach's Alpha is likely not to be as strong. As recommended by Cronbach, the several latent variables should be sought and each should be assessed in individual 'sub-tests' (Cronbach LJ, 1951). Factor analysis is a tool that enables the quantification, separation and identification of such factors. This will allow the development of more reliable single-factor subscales, and enable their meanings to be identified. Such plausible meanings add evidence for the validity of the instrument based on its structure.

The number of factors in a scale can be identified in an 'unrotated solution' by retaining only factors with a Kaiser's Eigenvalue greater than 1.0, and/or by analysis of the 'scree plot' (counting the number of factors before the curve flattens). An Eigenvalue of 1.0 represents the variance explained, on average, by one item in the scale. Factors that explain less variance than this are not an improvement on the item alone and should be discarded unless they have special meaning (DeVellis RF, 1991)⁷³.

If the heavy arrow in Figure 1 represents a single latent variable and the lighter arrows represent two (equal-length) items in an unrotated factor solution, the arrow with the higher 'loading score' on it (greater length along the heavy arrow) will have a closer meaning (more similar in direction) to that of the factor or latent variable. As stated earlier, classical test theory assumes that all items are comparable measures of the latent variable, and therefore, that the lighter arrows are of equal length. The meaning of the factor can sometimes be gleaned from studying the 'index' variable that is, the variable that loads most strongly on the factor. In Figure 1, as the stronger item, Item b will be closer in meaning to that of the latent variable than Item a.

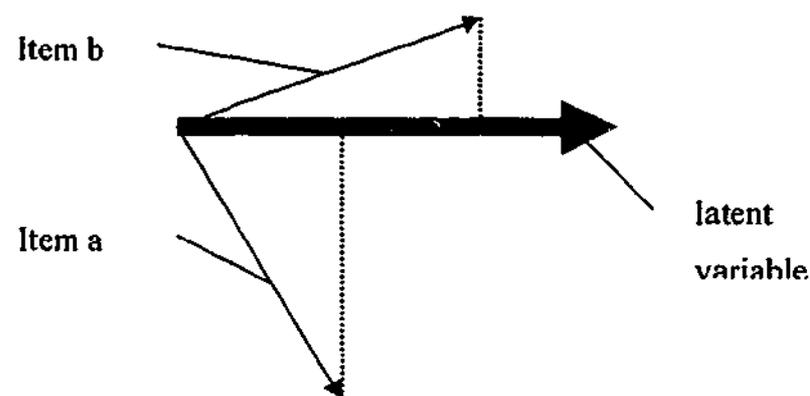


Figure 1 Schematic diagram of a latent variable (heavy arrow) and two items (light arrows) in a factor analysis solution.

A greeting card model of factor analysis

If, however, the covariance matrix consists of, say, two factors, this simple diagram gains a third dimension. The following discussion presents a model designed by the author to aid in the understanding of the multidimensional nature of exploratory factor analysis.

⁷² Ibid, p91

⁷³ DeVellis 1991, p 97

The two factors may each be represented as in Figure 1, each with its own plane. A model to represent this concept could be a folded greeting card. Each of the two leaves of the card represents the plane on which lies one of the factors. Each factor can be represented on its page as a heavy vector line as in Figure 1. The items (represented as fine vector lines) in the three dimensional model rarely lie exactly on either plane, but rather are spatially dispersed between the planes.

If one considers a view of the open greeting card from directly above (Figure 2), the two factors (Factor A and Factor B) lie along the two planes of the card, and the items are dispersed in the space between the card. Two representative items from a scale are included (Item a, and Item b) and happen to fall between the two planes. While both items load on both factors, Item b loads more strongly on Factor B than on Factor A, and is closer in meaning to the meaning of that Factor. Similarly, Item a loads more strongly on Factor A.

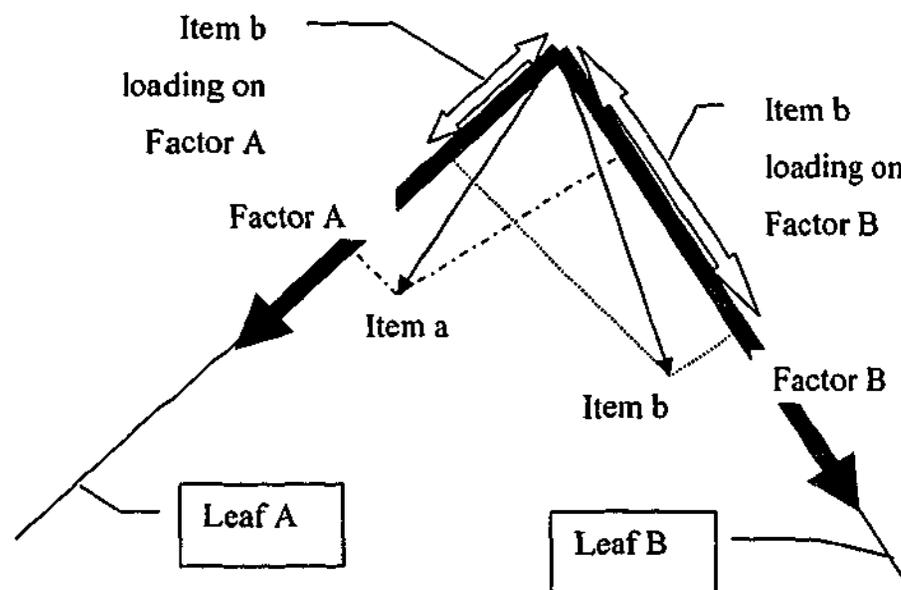


Figure 2 Greeting card model for items loading on two factors

A real scale would have many items, and if these were dispersed according to their correlations with each other, they would tend to form clusters of items (Figure 3). Continuing with the greeting card model, factor rotation involves choosing how much to open the card in order to find the best fit for the factors and the resulting factors will convey the meaning of the cluster of inter-related items. In the model, the leaves of the card would probably come closer together. In this situation, the two factors correlate with each other, and some items may load on both factors. In order to obtain a clearer view of the structure of the covariance matrix, it is ideal to approximate 'simple structure' (DeVellis RF, 1991)⁷⁴ where each of the items loads on to only one of the factors. Factor rotation helps to achieve this. One method of factor rotation keeps the leaves of the greeting card at 90 degrees to each other, so that the factors do not correlate with each other. In order to better understand this, it may help to reconsider Figure 1. As well as the

⁷⁴ DeVellis 1991, p. 100

'horizontal' dispersion modeled in Figure 2 and Figure 3, the vertical dispersion could be utilized to manipulate the greeting card so that this 90 degree or 'orthogonal' relationship could be achieved. This manipulation is most commonly achieved statistically through a 'varimax' rotation. Sometimes, a more precise 'view' of the meaning of the factors does not require this orthogonal rotation, as the factors may indeed be related to each other. Fitting factors into such a model is referred to as 'oblique' rotation, achieved most commonly through statistical manipulations such as the 'direct oblimin' method.

Most scales will have a covariance matrix that can be divided into many factors. As described above, usually it is only the larger factors, with an Eigenvalue greater than 1.0 that have a value in reducing the information from many items to a few meaningful latent variables. Each additional latent variable requires an additional 'leaf' in the greeting card model, and these would need to be arranged spatially following the principles outlined above. Whilst not achievable in the physical greeting card model, factor analysis does allow this to be achieved statistically.

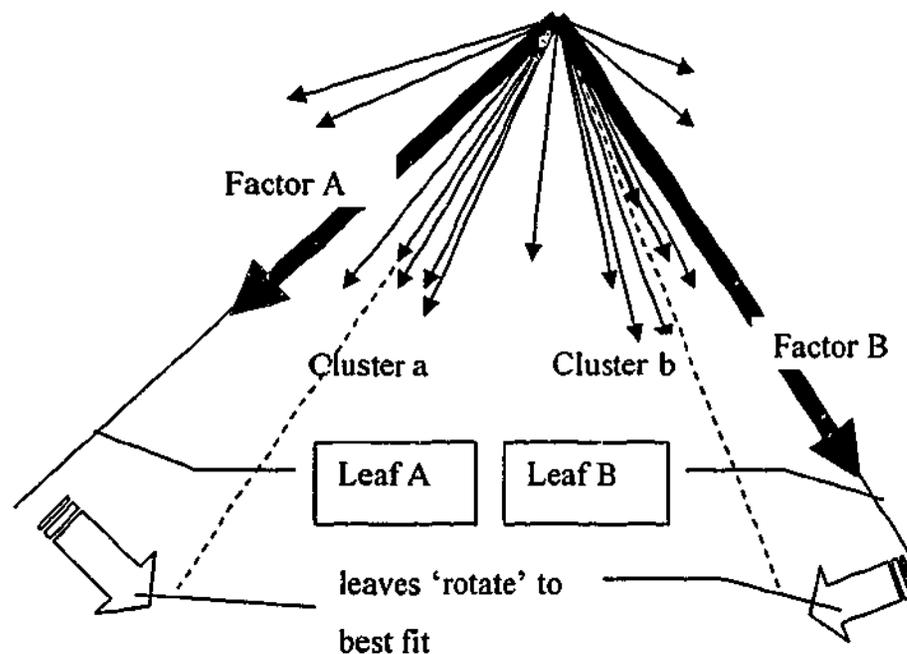


Figure 3 Greeting card model for factor analysis: Factor rotation

Summary of Section One

This Section of the thesis has presented an introduction to the development of an instrument that measures the beliefs underpinning rural career choice. It explains how the geographical maldistribution of medical practitioners has contributed to an undersupply of doctors in rural areas. Causes for this, and steps taken to remedy it have been discussed. The evaluation of these programs has been problematic for several reasons, and these issues have been presented.

One reason for this difficulty is that the mechanism of action of the rural programs is poorly understood, and research into their effectiveness has not been theory-based. While the RIQ instrument is based on decision-making theory, the beliefs it measures in order to predict

intention also determine career choice. An extensive discussion of the theory supporting this statement is presented in Section Five. The RIQ is not only predictive; it also explains changes in career choice. Therefore, it is well placed to assist in the evaluation of programs designed to influence career choice.

The following three sections of this thesis present the development, characteristics and utility of an instrument based on the theoretical frameworks discussed in Section One. Section Two of this thesis will present the development of the Rural Intent Questionnaire (RIQ), including the reliability and validity of its longer early versions. Section Three will present the reliability and validity of the briefer RIQ2003 and Section Four will study its usefulness in a controlled trial. Section Five will present a summary of the findings and will tie these findings in to a discussion on career development theory affirming the appropriateness of the RIQ as an instrument to evaluate programs that affect rural career choice.

SECTION TWO

Development of the Rural Intent Questionnaire (RIQ)

Introduction to Section Two

The attitudes toward a rural career choice of medical students at Monash University, Australia, were sought on an annual basis over a five-year period from 1999 to 2003 inclusive. The instrument used to estimate these attitudes, the Rural Intent Questionnaire (RIQ), was revised at least annually, and it is the subject of this thesis. Section Two of this thesis presents the iterative process involved in the development and refinement of the RIQ. In this Section, each annual version will be discussed in terms of its development, performance and the refinements made to its chief components namely,

- Intention
- Affect
- Perceived Consequences
- Social Drivers and
- Demographics

The previous section of this chapter discussed the principles of questionnaire design, development and evaluation, including the principles of validity and reliability testing using the Cronbach coefficient alpha, regression modelling and factor analysis. This chapter will outline the development of the RIQ. The chapters in this section describe the iterations of its development, following the instrument through its annual transformations to the comprehensive RIQ2001 and to the final briefer version, the RIQ2003.

The main stages in the development of the instrument described in the following chapters include:

4. Assembly of the item pool and a pilot study using the 1999 version of the RIQ
 - the collection of the initial item list from a small group of medical students.
 - the development of the initial instrument
 - the pilot test of the initial instrument on a cohort of 37 medical students in 1999
 - the analysis of the data and how this informed the development of the 2000 version.
5. A field-test on 160 first year medical students in 2000 including
 - a description of and rationale for major changes from the 1999 version
 - the analysis of the data and how this informed the development of the 2001 version.
 - an outline of steps taken to test and strengthen the face and content validity of the instrument
6. A field-test on 133 second and 66 final year medical students in 2001 including
 - a description of and rationale for major changes from the 2000 version
 - the analysis of the data and how this informed the development of the 2002 version.
7. Final adjustments to the instrument at the end of 2002 and during 2003.

An outline of the timing of the surveys is presented in Figure 4. The data from these surveys were used to provide evidence for the reliability and validity of the instrument and to inform improvements to it.

Cohort (intake year)	Year of study					
	2000	2001	2002		2003	
1996		single				
2000	single	single	pre (mixed rotations)	post	single	
2002			pre (rural rotation)	post	pre (Intervention I)	post
2003					single	
surveys taken	↑	↑	↑	↑	↑	↑

Figure 4 Outline of surveys used in the development of the RIQ, and whether cohorts were subjected to single surveys, or pre-post pairs of surveys. Arrows represent the timing of the surveys. (1999 pilot-test not included).

So, Section Two presents the development of the Rural Intent Questionnaire. Chapter Five outlines the search for the issues that were salient to early-year medical students when considering a rural career. Chapter Six presents the development and evaluation of the RIQ2000, a lengthy version of the instrument, and Chapter Seven outlines the search for evidence supporting the validity of this instrument. Chapter Eight considers the strengths and weaknesses of the RIQ2000 and outlines the changes made in order to produce the final comprehensive version of the instrument, the RIQ2001. Chapter Eight goes on to provide an evaluation of this instrument. The final chapter in Section Two, Chapter Nine, describes the reduction of the RIQ2001 over two years to the more parsimonious RIQ2003. The final testing of the RIQ was performed on data from a cross-sectional study using the RIQ2003 version of the instrument and this is presented in Section Three.

Chapter Five

The preliminary development of the RIQ

Introduction to Chapter Five: the pilot study (1999).

An overview of the work that preceded this doctoral research is presented in this chapter.⁷⁵ This chapter does not include the details of the work prepared for that graduate diploma, but reports on its findings. It is included here to enable an understanding of the processes followed to assemble the item pool, how that pool was pre-tested and refined, and how an instrument was developed and pilot tested on a non-random sample of 37 medical students. This will provide evidence of the validity of the instrument based on its content and the processes followed to develop it.

This section of the thesis includes a brief discussion of the results of the 1999 pilot study, and explains the changes made to it in preparation of the version that was tested in the following year as part of the doctoral research. Ethics approval for this component of the work was granted through Newcastle University, as this was a component of the coursework subject toward the GradDipClinEpid.

Assembly of the item pool

Introduction

The 'etic-emic dilemma' was discussed in detail in Chapter Three under the heading: *The determinants of intention according to the Triandis Model*. The dilemma revolves around the issue of item salience, which can be lost if the items of a questionnaire are not relevant to some respondents. Worse still, if their meaning is different for culturally distinct subgroups of respondents, combined data becomes meaningless. Rather than impose researcher-generated items upon medical students, which may not have significance for them, a pool of items was sought from the students. This is consistent with the advice of Weller and Romney (1988) when they state,

The overall success of any study depends in part on giving careful attention to the definition of the domains as the first step of the research. Generally, the domain should be identified by the

⁷⁵ The concept and first prototype were produced as part of the requirements of a subject (Health Social Science 1 (CCEB621)) of the Graduate Diploma in Clinical Epidemiology at Newcastle University, New South Wales, Australia, in 1999. Written permission to include this report was sought and obtained from the Monash Research Graduate School

informants, in their language, and not by the investigator... Usually, however, the investigator does not know the boundaries of the domain and needs some sort of elicitation procedure to ensure that the investigator's definition of the domain corresponds to that of the informants (Weller & Romney, 1988)⁷⁶.

In order to ensure that the item pool had emic validity, that is, so that all respondents would understand and interpret the meaning of the items in a similar way, the group of informants generating the items included representatives from all target cultures. These included urban, rural, male, female, local and international students. Triandis states that it is likely but acceptable that such a 'hybrid' questionnaire would comprise of:

a set of items that is not particularly appropriate to any culture but is acceptable to all (H.C. Triandis, 1972)⁷⁷

A semi-structured format was designed for use in either an interview or a written response format designed to evoke a free-listing exercise. Responses from nine medical students were received and 240 items were returned. Respondents were mainly of European extraction but included three Malaysian students. These latter were Chinese however, and may not have been representative of the Muslim Malaysians who dominate the international cohort of the later years of this study and whose input was gained from student feedback to subsequent versions of the RIQ.

The items most frequently mentioned (modal responses) and those with greater meaning as determined initially by the researcher, were selected for inclusion into the draft questionnaire. Most items in the questionnaire were scored on a Likert-type scale with five or six points, depending on whether a neutral mid point was considered preferable. These items were format-tested on a small group of experts. This feedback resulted in several changes and the production of the 1999 version, which was then prepared for distribution.

Intention

As there is very little consistency in the definition of what is rural in Australia, a construct for 'rural' was developed and tested. Although the RRMA classification had been in use in Australia since 1994 (Department of Primary Industries and Energy & Department of Human Services and Health, 1994), students were unlikely to be familiar with it. Eleven descriptors formed a multidimensional construct for 'rurality' utilizing a grid approach similar to that of Reid and Solomon (Reid M & Solomon S, 1992), based on the following parameters:

- distance from a capital city (close, distant, remote),
- size of Town (each with an assigned approximate level of services: large, small, remote), and
- presence or not of a hospital.

⁷⁶ Weller 1988, p10

⁷⁷ Triandis 1972, p56

Two additional descriptors (central capital city and peripheral major city/large urban area) aimed to represent the city and metropolitan areas. Each descriptor was accompanied by the names of two or three localities that exemplified the descriptors. Students were asked to indicate the likelihood that they would 'ever work for some period of time' in these eleven locations on a five-point Likert-type scale ranging from extremely unlikely to extremely likely.

Affect

The students had generated twenty affect items. Most items had an opposing item within the group (for example, both happy and sad were listed) and these were arranged into ten five-point bipolar scales with the opposing descriptors at the extremes. It is of interest to note the similarity between this group of student-generated items and the PANAS schedule used in later versions (see particularly the RIQ2002 in Appendix Three) (Watson D et al., 1988).

Perceived Consequences

Thirty-four consequences items were produced based on the semi-structured responses. Students were asked to consider how likely it would be that each consequence would result from a rural rather than an urban career choice. Positive and negative items were interspersed, and were coded appropriately. The response format was a 5-point Likert scale, ranging from very unlikely to very likely. This format was chosen to allow a neutral position. Scores would be coded -2 to +2 with neutral scoring zero, and summed. This version did not utilise the evaluated response format.

Social Drivers

In accordance with the principles set out by Triandis, ten items were designed to measure normative beliefs, personal normative beliefs and role beliefs. This section used a 5-point likert scale (strongly disagree - strongly agree) with an additional 'not relevant' option.

Demographics

These included items relating to rural origin, undergraduate experience, involvement in rural clubs, intention to specialise and rural intent. Open-ended questions on 'facilitators' and 'barriers' to a rural career were included to test face and content validity of the instrument. Four items on barriers, identical to those in Strasser's 1992 questionnaire (Strasser R, 1992) were included, with permission, to allow for a direct comparison of the beliefs of medical students and existing rural GPs.

Chapter Six

Development and analysis of the RIQ2000

Introduction

The 2000 version of the RIQ was assembled toward the end of the 2000 academic year (see Appendix One for a copy of the RIQ2000). Ethics approval was sought and obtained on 3 October 2000⁷⁸.

The questionnaire was developed based on the 1999 version discussed in Chapter Five with content and format advice from academics within the Faculty of Medicine. It was set out and printed by 4 October. Time was granted at the end of a lecture on 9 October for the application of the questionnaire. Of 189 first year medical students, about 115 attended the lecture and 111 replies were collected. Eight students volunteered for focus groups to evaluate the instrument at a later date. Two focus groups were run, one each on 11 and 13 October by experienced colleagues. One focus group contained rural students (n=5), the other, urban students (n=3).

Before commencing the focus groups, these eight volunteers again completed the questionnaire resulting in 7 test/retest paired first year responses - one of the rural students had not been at the lecture so this was his first response. Each focus group spent 45-60 minutes discussing the questionnaire. This was taped and the leaders took notes of their interpretations of events. The tapes were transcribed for further analysis. Analysis is presented later in this section (see Focus groups on page 98).

It was apparent that the number of responses (albeit over 95% of those present), would be insufficient for this longitudinal study. A mail out to each of the students from whom a response had not been obtained was sent on 11 October. A postcard reminder was sent to those not responding within 10 days. The examination period commenced on 13 October. The development and administration of the 2000 version of the questionnaire had proceeded over a period of 6 weeks.

Analysis of the 1999 version revealed that there was a strong association between the three domains and intention/expectation. These overlapped considerably, displaying multi-collinearity, and affect played the dominant role. The 2000 version was therefore designed to show more distinction between the three domains. Care was taken to prevent contamination with items from other domains. These changes are discussed in this section.

⁷⁸ Monash University Standing Committee on Ethics in Research Approval: Project No 2000/427

Explanatory Statement

The 1999 explanatory statement followed the general guidelines provided through the distance education notes for the subject: Health Social Sciences I (CCEB621) toward the degree of GradDipClinEpid (Newcastle University, NSW, Australia). Unlike some later versions of the RIQ, the 1999 explanatory statement did not provide definitions of 'rural' nor of 'some time' as these were described in detail in the Intention section.

Following advice from the Ethics Committee, the explanatory statement for the 2000 version included sample questions, so that students could better understand what they were agreeing to complete. As the Intention section of the RIQ2000 contained items relating to the specifics of time and place, these were not defined in the RIQ2000 explanatory statement.

Intention

In the 1999 version, the self-reported likelihood of working in one of a progressively more rural series of scenarios was measured. Two weaknesses were identified with that approach. The first was that the theoretical framework for the instrument was based on behavioural intention rather than behavioural expectation. Studies have shown that much of the research based on the Triandis and the Fishbein and Ajzen models have in fact measured behavioural expectation and not intention. The validity of such instruments, however, was found not to be threatened by this (F. D. Davis & Warshaw, 1992). Indeed, expectation was found to be a stronger predictor of self-reported behaviour than intention in behaviours that were unreasoned (that is, if habit plays a larger role), goal-directed, or when a change in intention was to be expected (Warshaw & Davis, 1985b). It was possible that the last two of these criteria fitted career choice. Nevertheless, because the instrument under development sought to predict behaviour through self-direction, and because the attitude indices predict intention and not expectation, the wording of all items was amended to be consistent with intention.

The second weakness related to the progression of the rural-scenarios. It was difficult to devise a valid linear continuum between capital city and extreme remote. The construct developed in 1999 attempted to achieve this using distance, size and access to hospitals as grid markers. Some respondents, however, considered that the size of the community was more important than distance from a city, while others felt that the opposite was the case. What was more 'rural' for some, was less so for others. In addition, the conceptual spacing between consecutive scenarios was unlikely to be equal for all respondents.

Choice of 'capital city' and 'elsewhere' as descriptors of urban and rural

Analysis of the responses in 1999 revealed correlations between three groups of descriptors in the 'continuum'. These groupings were;

- the two 'capital city with large hospital access' descriptors,

- the 'major (not capital) city/close-large rural centre/close non-hospital (fringe metro)', and
- the remaining nine rural descriptors.

By far the strongest differences were seen between the two 'capital city with large hospital access' descriptors on the one hand and the remaining nine descriptors on the other. The Cronbach coefficient Alpha for the nine rural descriptors was 0.95, suggesting that these formed a reliable scale, and that a reduction in the number of items was appropriate (DeVellis RF, 1991). Although a high alpha does not indicate a unitary scale, a shorter scale for rural intention would be far simpler (and quicker) to answer, and in keeping with the principle of parsimony.

Predictive validity for this approach was supported by analysis of the 1999 data. The dependent variable (DV) was used that represented the furthest that the respondent declared that he/she would be likely to practice from a capital city. Affect, Perceived Consequences, and Social Factors were entered as independent variables (IV) in simple regression modelling. All three IVs had significant R² values (0.38, 0.16 and 0.40 respectively). In a multiple regression model including all three IVs, the R² was significant at 0.44.

Analysis of the 1999 data supported the discriminant validity of this approach. This showed that students who declared that they would not work outside a capital city had significantly different scores on each of the three attitude domains than the students who were willing to do so (Table 2)⁷⁹.

Table 2 Domain means of students with capital city intent and rural intent (from 1999 pilot-test)

Domain	mean capital city intent (95% CI) n=17	mean rural intent (95% CI) n=18	mean difference	significance (t-test)
Total Affect	21.5 (19,24)	29 (27,32)	-8	p<0.0005
Perceived Consequences	67.5 (63,72)	78 (75,82)	-11	p<0.0005
Social Factors	68.5 (64,73)	85.5 (79,92)	-17	p<0.0005

Capital city intent: students declaring no likelihood of working outside capital cities

Rural intent: students declaring likelihood to work outside capital cities

95% CI: the 95% confidence interval

These findings supported a 'capital city/all other areas' approach to the rural/non rural intention constructs adopted in later versions of the instrument on the basis of validity and reliability studies. This approach was supported by Dempsey et al. who wrote,

Which system of classifying rurality can be recommended? The capital city versus the rest of the state system is simple, intuitive and seems to provide robust results, in this setting. This approach may therefore have some value in states such as South Australia where the capital city dominates and the regional centres are much smaller (Dempsey, Wilson, Taylor, & Wilkinson, 2003).

⁷⁹ The sample for the pilot test was not random; half of the subjects self-selected as being rural, the other half were chosen by these rural students as being representative of their urban colleagues

In the 2000 version, a single item measuring agreement to the statement addressed the first weakness referred to above:

It is my intention to work in a rural setting following the completion of my studies.

There were three response options, true, false and undecided. This approach was specific to intention, and allowed for uncertainty. In effect, it produced a dichotomous response pattern, which limited its usefulness in subsequent regression modelling as 60% of students chose the 'undecided' option. While this information was useful, it left small numbers who could be categorised as having either rural or urban intent. The remainder of the intention section in the 2000 version was an attempt to disassemble the components of the progressive scenario approach used in 1999, and subsequently proved to be more useful.

Affect

Analysis of the RIQ1999 data revealed that affect was the strongest of the three theoretical domains predicting intention (or expectation) with an Adjusted R^2 of 0.63 (linear regression). The Cronbach alpha was 0.90, so a reduction of the affect index was undertaken for the RIQ2000. Items all performed well, so the selection of items for exclusion was based on the student feedback.

Students reported that excitement and apprehension were not opposites. The isolated/supported and success/failure items may well have measured a consequence rather than affect. Shame/honour and cheated/privileged did not perform as well as the other variables and were also removed. In retrospect, however, these last items may have been more important for the international students, but did not gain significance because of the low numbers of international students in this cohort.

Perceived Consequences

This section was long and unstructured in the RIQ1999. Some items were buried in the affect section, others among the social factors, and others were placed in the demographics section.

Simple regression modelling with intention as the dependent variable (DV) and the perceived consequences index as the independent variable (IV) produced a respectable adjusted R^2 of 0.34, suggesting that there was a strong association between these variables. However, a multiple regression model fitted with affect, social drivers and consequences as IVs did not support an independent contribution from consequences after the contributions of affect or social factors were allowed for. This suggested that the contribution that consequences made to the prediction of intention in the RIQ1999 was mediated through affect and social drivers.

Item format: an estimate of perceived consequences

It was possible that the semantic differential format used in this section may have contributed to this relative weakness in association. During a small focus group conducted after the questionnaire, students admitted to losing sight of the purpose of the questionnaire while answering this section. They said that they sometimes forgot the stem question and recorded the

likelihood of a consequence in the place that they expected to work, rather than in the country. They felt that the items required more structure and direction.

Therefore, a format was designed for the 2000 version, which more closely reflected that described by Sperber, Fishbein and Ajzen in their chapter on predicting women's occupational orientations (Ajzen I & Fishbein M, 1980)⁸⁰. This format asked first for the level of importance the respondent ascribed to an item. Separate components then asked how likely it would be that the issue would be available in the city, or the country. These last two components would be subtracted and the difference multiplied by the evaluative (importance) component to obtain a differential attitudinal belief score for each item. The sum of these scores provided an estimate of perceived consequences.

Responses to the evaluative (importance) component were separately studied as a form of feedback on the content validity of this section of the RIQ. This report is presented below under the heading, Stated importance of items on page 95.

Item salience

The failure of perceived consequences to perform as an independent predictor for intention/expectation may also have been due to a lack of item salience for the students. This may have been the case although accepted item pool generation techniques were followed.

A review of the literature was undertaken to ascertain whether the list of items from the 1999 version could be improved upon. Thirty papers were studied and the influences reported in these papers are summarised in Appendix Five. This study confirmed the list of consequences in use, and the few changes made as a consequence were mainly in the wording of the items.

Of particular note was an extensive work looking at Australian rural general practitioners by Strasser et al. This report identified 28 items that influenced rural career choice in general practitioners. Fifteen of these related to practice issues and 13 to personal issues. Where these matched the current list of items, the wording of the RIQ was changed in the 2000 version to match that of Strasser (with permission), so that a study comparing the attitudes found in his study of GP attitudes and this survey of first year medical students could be made. This study was subsequently published in the Australian Journal of Rural Health, (Somers et al., 2001).

While the perceived consequences section of the 2000 version was still long, the forty-four items were presented under seven headings to give this section a better structure and to offer it a sense of direction for the respondents. It was hoped that the improved format and some improvement of item content would lead to the improved performance of this domain.

An additional item relating to overall ease of working in a rural environment sought to provide a global measure of perceived consequences. Its response format was that of a seven-point Likert scale with very easy and very difficult at the extremes. This item was subsequently seen to be an estimate of self-efficacy.

⁸⁰ Ajzen 1980, p120

Social Drivers

When the social drivers index was regressed against stated rural intention using the RIQ1999 data, the adjusted R^2 was highly significant, and 0.41. While this remained strong when perceived consequences alone was added as an additional IV in a multiple regression model, its contribution to the prediction of intention became insignificant when affect was also added as an independent variable. So while social factors do predict intention, this is largely through items that share variance with the affective component. The strength of the social drivers index was increased by improving the format and the item content.

It was not usual for research based on the Triandis model to include an item directly tapping into the influence of important others (referents) (Davidson AR et al., 1986; McInerney, 1990, 1991). This Fishbein and Ajzen approach to subjective norm was added to the Triandis construct of social factors in the 2000 version of the questionnaire, to test whether the Triandis version alone could adequately measure all social influences. Several rural workforce researchers have commented on the effect of badmouthing on career choice, that is, the verbal denigration of rural doctors by urban based specialists, and vice versa, (Fromm B et al., 1985; Hickner, 1991; B. A. Kamien et al., 1999; R. J. Pan, Clark-Chiarelli, Peters, & Block, 1999). It was postulated that a mode of action of badmouthing was through subjective norms. While the 1999 version had some items relating to the referent group, these were not complete, evaluated, nor structured.

A sub-index of social drivers was developed, based on the Fishbein and Ajzen model of subjective norms (Ajzen I & Fishbein M, 1980)⁸¹. This was tested for redundancy in the 2000 version.

So one item was designed to estimate overall subjective norm, along the lines suggested by Fishbein and Ajzen (Ajzen I & Fishbein M, 1980)⁸²:

Most people who are important to me think I should work for some period of time in the country.

This was rated on a seven-point Likert scale with disagree strongly and agree strongly as the reference points.

This was followed by a sub-index consisting of a series of nine evaluated items, measuring the beliefs about each of nine 'important others'. Similar to the global item above, the first part measured the belief that the referent would like the respondent to work in the country. The second part measured the motivation to comply with the wishes of that referent on a four point scale ranging from "not at all" to "strongly." The former would be coded -3 to +3, and the latter from 0 to +3. These scores would be multiplied, so if the score for either part was zero, the score for that referent would be zero, and that individual would not be deemed an important

⁸¹ Ajzen 1980, p120

⁸² Ibid, p57

referent. The sum of the referent scores in the sub-index would then be an estimate of the subjective norm.

Role belief, personal normative beliefs, interpersonal contracts and self concept items were composed. These formed a measure of the Triandis construct of social factors.

Demographic background of respondents

This section was similar to that of the 1999 version. Some features included:

- Age at, and reasons for choosing to become a doctor.

This was added because some researchers found that older and more altruistic students may have more rural intent (Makkai T, 1995), although Rolfe et al. found age at entry and prior degree to have no effect (Rolfe et al., 1995).

- Several questions concerning language spoken at home remained.

These were an effort to measure cultural origins without asking directly whether they were international students. These proved not to be useful and were replaced with a direct question asking whether the student was a full-fee paying international student in later versions.

- Membership of a rural club and rural attachment and their influence.

While Rolfe found an early rural rotation to have a negative effect, and a late rotation a positive effect (Rolfe et al., 1995), Pathman found undergraduate rotations to have no effect whereas postgraduate rotations did (Pathman et al., 1999).

- Open-ended feedback question

Also included was the following question and several blank lines for responses,

Are there factors that we have not asked you about that you believe have or will influence your intention to undertake a career in a rural area? If so, please provide details.

The report of an analysis of responses to this question is presented on page 97, under the heading, Open-ended questions seeking feedback.

Analysis of responses to the RIQ2000 to inform the development of the RIQ2001

Introduction

This section outlines the statistical analysis of the data from responses to the 2000 version of the RIQ. This analysis informed the development of the 2001 version.

Of the 189 students in first year of the medical course, 161 responded to the first (2000) questionnaire, and 160 provided usable data (one answered less than 1/3 of the questions). Of these, 126 (plus one incomplete response) were local and 34 were international full-fee paying students. Although the fee-paying status was not requested on the 2000 survey, it was obtained from the medical faculty office and this information was sought from respondents in subsequent versions.

Explanatory Statement

The RIQ2000 explanatory statement did not define time and place, as these definitions were imbedded in the intention items. This was not the case for the 2001 version. The 2000 version did not emphasise that it was the respondents' current intention that we were interested in, so this was stated expressly in the 2001 version. This was done to clarify that it was 'intention' and not 'expectation' that was of interest.

The 2001 explanatory statement asked respondents to provide their 'first thoughts' and not to 'deliberate over questions'. For the first time, the city was defined as "a capital city and its metropolitan suburbs." Country was defined as "the rest of the nation in which you will work." Respondents were asked to consider the phrases 'a period of time' and 'some time' as referring to "a total period of at least 6 months at any time in your career after completing your training." The 2001 RIQ was to be tested on second-year students and final year students. The wording of the explanatory statement was adapted slightly for the final year students, but the wording of the items of the questionnaire was the same for the two cohorts.

Intention: the RI2000 score

A measure of self-reported rural intention was required to provide a 'gold standard', which could be used as a dependent variable against which to gauge the construct and predictive validity of the instrument.

Available measures

Four questions comprised the rural intention component of the 2000 version. The first was a direct measure of stated situational intent, named 'intent':

- 1 It is my intention to work in a rural setting following the completion of my studies.

Response	Coding
True	+1
False	-1
Undecided	0

60.9% of students were unsure (coded 0), 20.5% replied true (coded +1) and 18.6% replied false (coded -1). Such a result was not unexpected of the first year medical students. The ordinal scale (with three levels) is not sufficient for regression modeling, where a normally distributed continuous variable is required. There were too many 'undecided' responses to use a logistic regression model.

It was necessary to develop a composite variable to define self-reported rural intention. Question 2 was based on the gold standard chosen for the analysis of the 1999 version. In that analysis the best available indicator of rural intention was found to be the most distant of the situational scenarios offered that was chosen by the respondent as a likely place of practice.

As Question 3 was the converse of Question 4, only the latter was used in the composite. So the second question related to distance willing to travel, and was named 'distance':

2 I currently think that, after university and postgraduate training, the furthest I will ever work from the CBD of a Capital City is:

Suburbs of Capital City:

in an inner suburb (<10Km)	1
in an outer suburb (10-30Km)	2
in a fringe suburb (>30 Km)	3

Rural areas:

close (<50 km)	4
intermediate(50-100km)	5
distant (101-200 km)	6
remote (201-350 km)	7
very remote (>350km)	8

Question 4 sought to measure the amount of time the respondent was willing to work in a rural environment, and was named 'time'.

4 I believe that, after university and postgraduate training, I will work in the country

almost all of my career	90-100%	5
most of my career	60-90%	4
about half of my career	40-60%	3
part of my career	10-40%	2
almost none of my career	0-10%	1

Data cleaning

Missing values and transformations

There was only one missing value in the three intent variables. That was in 'time'. This subject replied that s/he would spend 40-60% of his/her career in the city, so it was reasonable to assume that the correct response for 'time' would also be 40-60%. Whilst 'distance' was reasonably normally distributed, 'time' was skewed to the left as most respondents were less likely to spend long periods in the country. This was only marginally improved by a square root transformation, so the original 'time' variable was retained.

A variable was computed which included all three of the primary intention variables (intent, time, and distance). The response range for distance was 1-8 and for time was 1-5. In order to allow a similar strength of effect for intent (coded -1, 0, +1) this variable was recoded: -3, 0, +3, resulting in a range of 6. The sum of these three variables was chosen as the RI2000 score.

Distribution

For the international, local and for the whole-year groups, the RI2000 score was reasonably normally distributed (Figure 5).

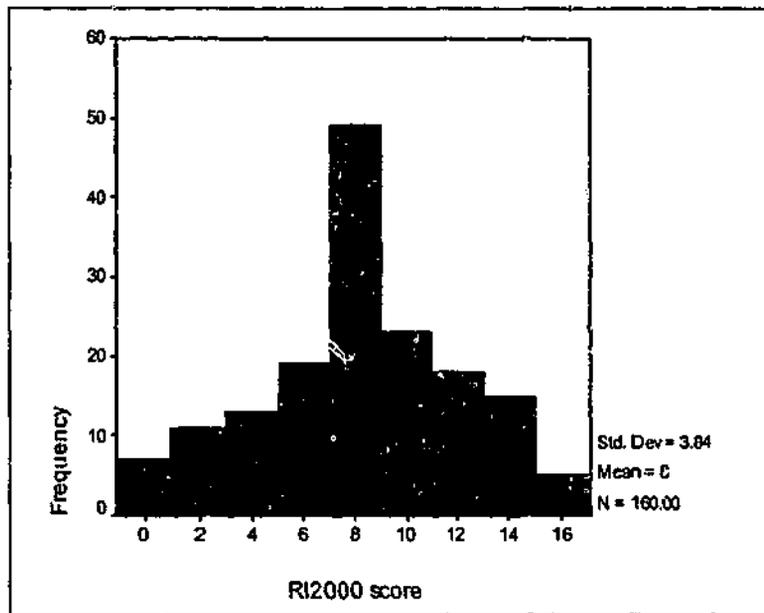


Figure 5 Distribution of the composite intent variable: RI2000 score (whole cohort)

Internal consistency of component variables.

For local students, Pearson Correlation Coefficients between the three primary variables ranged from 0.52 to 0.64 and were significant at the .01 level. The Cronbach's alpha was 0.69, and the standardised item alpha was 0.80, suggesting a low level of item error variance. The correlations between RI score and its individual components ranged from 0.78 to 0.89 ($P < 0.01$).

For the international students, the correlations between the three primary variables were far weaker (0.21 – 0.46), with only time and intent gaining statistical significance ($P < 0.01$). The Cronbach's alpha was 0.46, and the standardised item alpha was 0.58, suggesting a relatively high level of item error variance. This was primarily the result of poor correlation between distance and the other two primary intention variables. Some international students did not understand the acronym 'CBD' and for others (for example, those from Hong Kong) distance was not a relevant determinant.

The Cronbach coefficient alpha for the two variables, time and intent was a more acceptable 0.61. Correlations between RI2000 score and its components ranged from 0.63 to 0.84 ($P < 0.01$).

Statistical considerations.

Regression modelling was chosen to test the strength of association between self-reported rural intention and the remaining components of the instrument (that is, the construct validity). The dependent variable (DV) would be the composite variable, RI2000 score. Tabachnick endorses the combination of variables stating,

Additivity is also relevant, because if one set of variables is to be predicted by a set of other variables, the effects of the variables within the set are additive in the prediction equation. The second variable in the set adds predictability to the first one, the third adds to the first two, and so on. (Tabachnick BG, 2001 #596)⁸³

⁸³ Tabachnick and Fidell 2001 p 901

For this reason, the RI2000 score was chosen as the dependent variable for both cohorts to evaluate validity of the instrument, through General Linear Modelling techniques. Due to the small numbers, caution was needed when interpreting results from the international cohort.

Improvements to the RI score for the RIQ2001

The manipulations described in the previous section were necessary to produce an intention variable that would make sense and would display appropriate statistical properties. The resultant variable did perform well, as described below, but a more easily interpreted model was sought for the 2001 questionnaire.

As a large number of first year students were unsure of their rural intention in 2000, a scale was devised to allow for this, with some of the properties of a visual analogue or a 'thermometer' scale⁸⁴. Students were first given the opportunity to declare whether they had any intention to 'work for any time in the country after all your formal training.' They were then asked to respond to 'How strong is your intention to do so?' on a heavy vertical bar, marked from 1-10, with the descriptors minimal and maximal at the extremes. The bar extended below 1 (minimal) to emphasise that 'minimal' was not equivalent to zero. Two additional similar scales were developed to test intention to apply for any extra undergraduate, or any extra postgraduate rural experience. These were arranged in a logical temporal sequence. An open-ended question was included to ask those who answered 'definitely not' to any of the three questions whether there was a specific reason for this.

It was intended that this wording and the numbered visual analogue scale would encourage respondents to score along a theoretical continuum. This would replace the ordinal: yes, no, unsure, response and obviate the need for a composite dependent variable for intention. Furthermore, the theoretical need to return to a scale of behavioural intention rather than behavioural expectation was met.

Affect

Introduction

The Triandis Model for predicting intention (the RI2000 score) included an index that measures affect towards the act. Triandis measured this using a bipolar semantic scale with opposing emotions at either end. Some descriptors he has used are: 'delightful-disgusting'; 'dull-exciting'; enjoyable-nauseating (Triandis H, 1977).⁸⁵ He did not go on to evaluate how important such emotions were for his subjects in a similar way to which he evaluated perceived consequences. This section looks at the potential benefits of an evaluative component. During the development of the item list, medical students were asked,

⁸⁴ See Appendix Two for a copy of the RIQ2001

⁸⁵ Triandis 1977, p19

Please list all the feelings/emotions you may have in association with a career as 'a doctor in rural Australia'. What is it about working in the country that makes you feel each of these?

The most common answers were used to form the bipolar semantic differential scale presented.

These were selected as the modal affect items for the students, and were:

- calm-anxious;
- happy-sad;
- confident-insecure;
- negative-positive; and
- supported-alone.

The format of the items was:

Working in a rural community would make me feel:

1	Calm	1	2	3	4	5	6	7	Anxious
---	------	---	---	---	---	---	---	---	---------

In choosing a career setting, this is:

unimportant	1	2	3	4	5	6	7	important
-------------	---	---	---	---	---	---	---	-----------

The first component measured the strength of the affect, and the second, the evaluative component, measured its importance with respect to the behaviour.

Data cleaning

Missing values, recoding, outliers and transformations: strength items

In order to avoid response set bias, four of the affect items were worded with the positive emotion first and the negative-positive item was not. This item was recoded during the analysis phase. There was only one missing value in the strength responses and it was replaced by the value determined by EM regression, Missing Value Analysis (SPSS, 2002; Tabachnick BG & Fidell LS, 2001). The strength variables all appeared to be reasonably normally distributed.

Missing values, recoding, outliers and transformations: importance items

There were seven missing values in the importance items. These were all replaced using the EM regression method. The importance items were all skewed to the left. Transformations using the square root of the score, or the log of the score resulted in only marginally better distributions, so these items were left untransformed.

Affect Product items

Variables were computed consisting of the products of strength and importance for each affect. The evaluated affect variables appeared reasonably normally distributed supporting the decision not to transform the importance items.

Principal Components Analysis

Principal Components Analysis of the affect strength items produced very similar results to the analysis of the evaluated affect items. The KMO and Bartlett's tests were adequate. In both

cases, a single factor was found on the scree plot analysis, explaining 52% of the total variance. The index variable in both cases was the happy-sad variable.

Internal consistency

The Cronbach coefficient alpha for the scale consisting of the five affect strength variables was .76, and for the evaluated affect variables was .75.

The similarity of the two scales is likely to be due to the skewness of the distribution of the importance variable, meaning that the evaluated affect in about 80% of cases is the product of the affect strength and either 5 or 6. Therefore using evaluated affect scores did not result in a meaningful improvement over the affect strength values. This supports the development of the affect index based on the non-evaluated rate items alone, as was described by Triandis.

Predictive validity

Regression models fitted with RI2000 score as the DV and using evaluated and non-evaluated variables as IVs were also similar. Only the data from models fitted using the non-evaluated affect strength variables are presented in Table 3 and Table 4. One case was excluded as a multivariate outlier.

While the model explained 32% of the variance in the RI2000 score, only the happy-sad and positive-negative variables made an independent contribution to the model.

Table 3 Characteristics of regression model fitted with DV: RI2000;, IVs: affect strength variables.

R	R Square	Adjusted R Square	F	df	Sig.
0.59	0.34	0.32	16.16	5, 154	0.001

Table 4 Correlation coefficients of regression model fitted with DV: RI2000;, IVs: affect strength variables.

Independent Var.	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	5.85	0.43		13.67	0.001
calm-anxious	0.14	0.25	0.05	0.56	0.576
happy-sad	1.35	0.26	0.44	5.12	0.001
confident-insecure	0.14	0.24	0.05	0.61	0.545
positive-negative	0.46	0.23	0.15	2.02	0.045
supported-alone	0.03	0.19	0.01	0.17	0.868

Improvements to the affect index for 2001 version of RIQ

The 2000 version of the affect scale had two major weaknesses. The first is described on page 95 under the heading, Stated importance of items. Three of the five items were rated by students as having a low level of importance for them (Table 12). The second weakness of this index lay in its dominance by a single variable, happy-sad. The only other variable that contributed toward the variance in intention was positive-negative. There was a considerable conceptual overlap of these variables. If one is happy, one has a positive affect, and if sad, a negative affect.

The Pearson correlation coefficient between these variables was moderately high .38 ($p < .001$). So, the 2000 affect index seemed to be dominated by the positive-negative construct.

Analysis of the literature found evidence that positive and negative affect are not extremes of the same scale, but rather, that these constructs form two independent scales (Watson D et al., 1988). Watson's work on the Positive And Negative Affect Schedule (PANAS) related to the measurement of mood states, and developed a 10 item positive and a 10 item negative sub-scale. She suggested that the positive sub-scale related to depression, in that a low score on the positive sub-scale revealed a depressed state. She suggested that a high score on the negative sub-scale revealed an anxiety state. Further, while short-term measures indicated mood states, she suggested that long-term measures may have revealed personality traits⁸⁶.

The 2001 affect scale required a new approach. While the purpose of the PANAS was different to that of the affect construct in this instrument, the affect section of the 2000 RIQ was dominated by the positive-negative construct. It was hypothesised, however, that a positive affect sub-index measures the level of positive morale in relation to a rural career, and a negative affect sub-index measures anxiety toward a rural career. The characteristics of the PANAS descriptors and their suitability for this instrument would be tested in the 2001 iteration.

Perceived Consequences

Instruments based on both the Triandis theory and on the Fishbein and Ajzen theory all use an evaluated consequences scale (see Equation 4 in Chapter Three). Feedback from students who completed the 1999 version was that the consequences section was unstructured and required better directions. The 2000 version improved these aspects, and these changes are described earlier in Chapter Six.

Data cleaning

Analysis was performed on variables derived by subtracting the urban from the rural likelihood, and multiplying the difference by the importance ascribed to that item. There were 160 cases. There were up to three missing values for 42 variables. One variable had five missing values and another seven. These missing values were not replaced. Each variable had a reasonable spread of values and a reasonably normal distribution. No transformations were required.

Principal Components Analysis

Principal Components Analysis (PCA) was performed on the data. The number of cases was low for the number of variables (160 cases for 44 variables) but more than the 150 cases recommended by Tabachnik and Fidell as sufficient to make the analysis worthwhile⁸⁷.

The screeplot identified two main components (Figure 6). Varimax rotation was carried out, limiting the number of components to two. Item 1 ('an attractive environment') loaded on both

⁸⁶ See also Chapter Three, Theoretical considerations: attitudes

⁸⁷ Tabachnick and Fidell (2001) p588

components. Otherwise, when scores with a correlation less than .3 were suppressed, 'simple structure' was found. (Table 5). The two-component solution explained 31.5% of the variance, and the components could be generalised as personal issues and professional issues. This is in keeping with the findings reported in the literature (Strasser R et al., 1997).

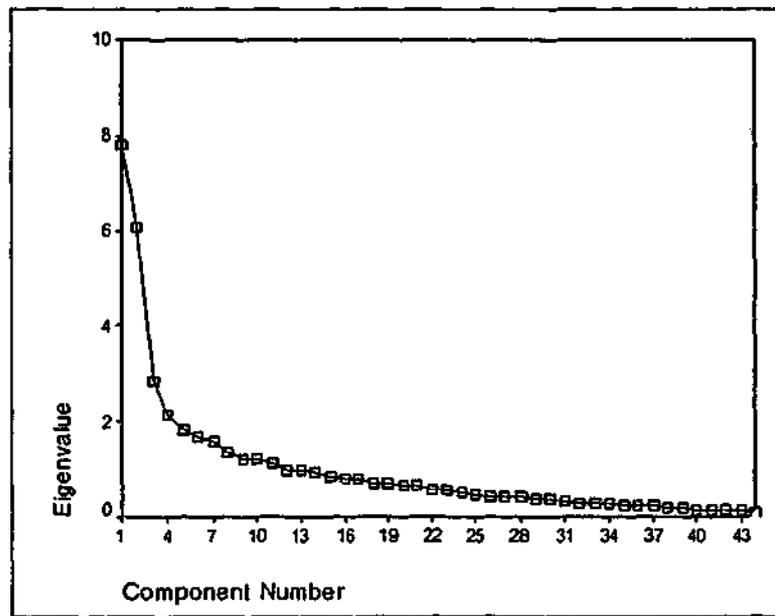


Figure 6 Screeplot of PCA including all 44 consequences variables.

Table 5 Rotation component matrix (personal consequences). Variable numbers refer to item numbers in the personal consequences section of the 2000 RIQ. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization

Variable	Component 1		Variable	Component 2	
	personal	professional		personal	professional
3	0.72		23		0.69
12	0.72		21		0.69
4	0.70		24		0.68
38	0.69		22		0.65
37	0.67		35		0.62
11	0.65	0.34	27		0.62
36	0.63		31		0.60
19	0.61		34		0.58
20	0.61		33		0.53
18	0.61		14		0.50
17	0.61		7		0.48
2	0.59		1	0.38	0.48
10	0.59		26		0.48
16	0.54		39		0.48
40	0.53		13		0.46
32	0.51		41		0.40
9	0.50		43		0.36
42	0.46		25		0.35
44	0.35		5		0.35
15			28		0.35
8			6		0.34
			29		
			30		

Such a two-component solution provided limited information on the meaning of the components. The screeplot also supported an eight-component solution, each with an Eigenvalue greater than

1.8. In order to better inform the ongoing development of the instrument; an eight-component solution was sought. This explained 57.5% of the total variance.

Two of these eight components consisted of Items 41 and 43, and 42 and 44 respectively. While important, they were concerned with the influence of rural and urban educators respectively. As they more properly fitted into the section related to social drivers, they were excluded from the analysis.

A six-component solution was sought of the remaining 40 items, and is presented in Table 6 (see Appendix One for a full copy of the questionnaire and the wording of the items). Each component had an Eigenvalue greater than 2.3 and the solution explained 53% of the total variance. Useful meanings could be ascribed to each of the components. These were, support networks, community style practice, isolation, generalist practice, healthy environment and intrusive work practices.

Most of the items in the professional component from the two-component solution were in the support networks component of the six-component solution; however, the six-component solution had much more meaning than the two-component solution did. The components labelled "isolation," "healthy environment" and "intrusive work practices" relate to personal issues and "community style practice" and "generalist practice" relate to the community context of practice. These relationships were also seen in the analysis of the RIQ2001, presented in Chapter Eight, and are again discussed in Section Five under the heading of Experiential place integration.

For all PCA solutions presented, the KMO was adequate and the Bartlett's test was highly significant, supporting factorability of the data.

Internal consistency

The Cronbach coefficient alpha for a scale including all 40 of the items that loaded on the two components in Table 5 was .86. There were several items with negative item-total correlations, so the internal consistency of the personal and professional sub-scales was determined. The personal sub-scale had an alpha of .91, with the item-total correlation ranging from .4 to .8. The professional subscale had a lower alpha of .83, with the item-total correlation range from .2 to .6. All of these results suggest very strong internal consistency. In fact, it has been argued that such strong scales may have too many items, and that the principle of parsimony may be at risk. That the measurement error is low, as indicated by the high alpha values, does not mean that each sub-group represents a single component, and PCA accepting up to 12 components did divide the items into sub-groups with sensible meanings. A six-component solution was presented above.

Predictive validity

The sums of the scores of the items comprising each of the six components described in the previous section formed estimates of the six components. A linear regression model was fitted

Table 6 Principal components analysis of 40 consequences items with a six-factor solution.

Item number*	suggested meaning of components					
	professional and personal support networks	community style practice	isolation	generalist practice	healthy environment	intrusive work practices
Item 37	0.76					
Item 36	0.76					
Item 19	0.71					
Item 38	0.69					
Item 12	0.68					
Item 3	0.66					
Item 20	0.62					
Item 11	0.61				0.49	
Item 40	0.61					
Item 4	0.60					
Item 17	0.59					
Item 10	0.50					
Item 2	0.47					
Item 9						
Item 23		0.83				
Item 21		0.79				
Item 24		0.71				
Item 22		0.67				
Item 27		0.48	0.47			
Item 5		0.47				
Item 35			0.69			
Item 8			0.57			
Item 34			0.56			
Item 39			0.53			
Item 33			0.50			
Item 13			0.50	0.46		
Item 31			0.47			
Item 6						
Item 29				0.80		
Item 28				0.79		
Item 30				0.58		
Item 26				0.48		
Item 14					0.60	
Item 15				-0.46	0.56	
Item 1					0.50	
Item 7					0.47	
Item 16						0.62
Item 18						0.61
Item 25						-0.50
Item 32						0.45

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

* see Appendix One for the text of these items

with RI2000 as the dependent variable (DV) and the estimates of the six components as the independent variables. This model explained 19% of the variance in the Rural Intent score (2000).

Table 7 Characteristics of regression model DV: RI2000, IVs: all six PCA components

R	R Square	Adjusted R Square	df	F	Sig.
0.47	0.22	0.19	6, 131	6.27	0.001

Only two of the estimates made a significant independent contribution to the model when the contributions of all six estimates had been allowed for. These two were 'healthy environment' and 'professional and personal support networks.' The first concerns personal issues and the second is a mixture of personal and professional networks. The community component had a moderate but statistically non-significant standardised beta value. These three components are discussed further in Chapter Eight and in Chapter Eighteen. This predominance of personal issues over professional issues is an important finding, and will be further discussed in Section Three and Section Four.

Table 8 Correlation coefficients of regression model DV: RI2000, IVs: all six PCA components

Components	Unstandardised Coefficients		Standardised Coefficients			Correlations Zero-order
	B	Std. Error	Beta	t	Sig.	
(Constant)	8.98	0.70		12.75	0.00	
supports	0.01	0.00	0.23	2.13	0.04	0.37
community	0.01	0.01	0.13	1.38	0.17	0.24
isolation	-0.01	0.01	-0.11	-1.20	0.23	0.07
generalist	0.01	0.01	0.06	0.75	0.46	0.07
environs	0.02	0.01	0.27	2.63	0.01	0.42
intrusion	0.00	0.01	-0.04	-0.36	0.72	0.14

Improvements to the perceived consequences index for 2001 version of RIQ

Wording

Each of the 44 items used in the 2000 version of the RIQ were separately analysed for its wording, its ability to separate respondents into pro-rural and pro-urban groups, and whether it falls cleanly into only one of the PCA components. Some of these changes were made as a result of the feedback from students as outlined in Chapter Seven. Most items, therefore, had wording changes made to them.

All the changes will not be listed here, but an example will be included. Item 1, 'an attractive living environment,' was found to load on both of the components in the two-component solution. 'Attractive' was seen as too generic a term so was replaced with 'my preferred' in the 2001 version. Other items may have had a skewed response rate, so the wording was either relaxed or tightened up in order to evoke a broader response.

The four items relating to 'being respected' by colleagues or educators were retained and broadened although they may have related more to the social drivers.

Format

A frequent criticism of the early versions of the RIQ was that it was too long. As it was still a prototype and each question was considered necessary, ease of response was increased through changes in format rather than the exclusion of items.

The boxed format of the 2000 version was cluttered and added to the perceived complexity of the survey. In addition, such boxes were less valid than a straight line when attempting to approximate an interval scale. The boxes were therefore replaced with a numbered straight line format, with extremes descriptors at either end. A single item with unlikely and likely as descriptors replaced the double 'city-country' likelihood response format. An attempt was made to adopt a uniform response format throughout the survey.

The order of the importance/likelihood components was reversed as suggested by one of the participants of the focus groups⁸⁸.

Social Drivers

There were two components to the social drivers section of the RIQ 2000. One measured the Fishbein and Ajzen 'subjective norms' and the other the Triandis 'social factors.'

Subjective norms (Fishbein and Ajzen)

Nine variables measured influences of individuals or groups of individuals (referents), and one item measured an estimate of subjective norm.

Each of the nine referents variables had two parts, compliance and influence. The scores on the two components were multiplied to obtain a score for each referent.

Data cleaning

There were 10 to 20 non-responses to the compliance component of most questions, although the strength of preference was well-answered. Many respondents scored mid point for compliance, that is, that they did not know whether the referent wanted them to work in the country, then did not reply to the second component. In those cases, a zero was entered for that 'referent' score, reducing the number of missing values.

From all responses, there were 15 values that were multivariate outliers. These fifteen responses were adjusted to a value adjacent to the closest non-outlier value. This had little effect on the outcome of the subsequent analyses, but improved the normality of the distributions so that the assumptions underlying the statistical analyses were better met.

As there were a large number of non-salient referents (zero scores), the mean score from all salient referents was determined. This was an estimate of the referent sub-index, as distinct from the single-item estimate of the subjective norm described above.

⁸⁸ See Chapter Seven, Focus groups, format

Principal Components Analysis

Three components were identified, Family and friends, spouse and family, and educators. Mother and father loaded onto both of the first two components and the last included no family members. The total variance explained was 68% with the three components contributing similar amounts of variance. KMO was adequate and the Bartlett's test was highly significant supporting the factorability of the data.

Internal consistency

The Cronbach coefficient alpha for a scale including all nine referent items was .81, and exclusion of no item would lead to a significant improvement.

Construct validity

The Pearson correlation coefficient between the RI2000 score and the estimate of Subjective Norm was .57 ($p < .001$). This translates to an adjusted R^2 of .32. The Pearson correlation coefficient between the RI2000 score and the mean referent score was .55 ($p < .001$). This translates to an adjusted R^2 of .29. The Pearson correlation coefficient between the estimate of the subjective norm and the mean referent score was .70 ($p < .001$). This translates to an adjusted R^2 of .49.

This suggests that there are very strong correlations between the three values and that the single-item estimate of subjective norm was as strong a predictor of intent as the longer sub-index. It raised the question of the need for the longer scale as a measure of subjective norm. The longer scale was refined and again included in the 2001 version, to test whether this improvement would strengthen the need for such a scale.

Social factors (Triandis)

The Triandis sub-index of the social drivers index consisted of nine variables. These measure components of the Triandis model. They were (with number of items): normative beliefs (2), personal normative beliefs (2), interpersonal contract (2) and self concept (3). The interpersonal contract variables each consisted of two items, one measuring whether an agreement existed, the other, how strongly bound the respondent felt by the agreement.

Data cleaning

Thirteen individual scores were found to be multivariate outliers and were adjusted to the extreme of the normal range. Just as was the case for the subjective norms items, many respondents to the interpersonal contract items answered "no" to one part leaving the second part unanswered. In these cases the missing value was also replaced with a zero, thereby reducing the missing values.

Principal components analysis

When principal components analysis (PCA) with varimax rotation was performed on all eleven items three components with an Eigenvalue greater than 1.0 were identified (Table 9). These explained 62% of the variance in the structure.

The index variable for the urban driver component was 'I am the sort of person who needs the things that only a large city can provide.' This reflects self-concept as an urban person. The second component was a measure of a sense of obligation (PNB) to work in the country. The third component consisted of the two normative belief items.

It was interesting that the stronger the sense of having an agreement to work only in the city, the less students felt bound to this agreement (Pearson Coefficient = $-.5$ ($p < .001$)). On the other hand, the more they felt they had an agreement to work in the country, the stronger was the sense of being bound to this agreement (Pearson Coefficient = $.5$ ($p < .001$)).

Table 9 Principal Components Analysis (Rotated) of all eleven Triandis items. Scores less than .4 suppressed

Item	Component		
	urban self concept	PNB rural	normative belief
Can only live in city	0.79		
Happy working in rural	-0.78		
Fit comfortably in rural	-0.78		
Bound to work all city	-0.62	0.51	
Obligation to work all city	0.51		
Agreed to work all city	0.57	-0.46	
Agreed to work some rural		0.78	
Bound to work some rural		0.77	
Obligation to work some rural		0.57	
Med students believe work some rural			0.84
You believe work some rural			0.80

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Internal consistency

An index was formed consisting of the nine items in Table 9 that relate directly to social drivers, that is, excluding the two items relating to how bound they felt toward an interpersonal agreement. The Cronbach coefficient alpha for this 9-item index was .70. A minor improvement (to .72) resulted from exclusion of the role belief item relating to the general medical student role belief.

Construct validity

A regression model was fitted with RI2000 as the DV and the sub-indices formed by combinations of the items. The two role belief items were summed to form a role belief sub-index, the two personal normative belief items were subtracted to form a PNB sub-index and the three self concept items were summed to form a self-concept sub-index. The rural IPC items were multiplied to provide an IPC rural sub-index, but as the urban IPC items were negatively

correlated, these were entered as separate IVs. The model explained 42% of the variance in the DV (Table 10).

Table 10 Characteristics of regression model fitted with DV: RI2000, and IVs as listed in Table 11, using data from 2000 survey.

R	R Square	Adjusted R Square	F	df	Sig.
0.66	0.44	0.42	20.13	6, 153	0.00

The item measuring how bound respondents felt they were to an IPC to work only in the city did not make a significant independent contribution to the model. The role belief sub-index did not make a unique contribution, even if the two items were added to the model separately, that is, not as a sub-index.

Table 11 Correlation coefficients for regression model with DV: RI2000, using data from 2000 survey.

	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	0.27	0.93		0.29	0.769
role beliefs	-0.02	0.10	-0.01	-0.20	0.845
PNB	0.21	0.11	0.13	1.85	0.067
IPC rural	0.11	0.05	0.16	2.34	0.020
self concept	0.48	0.06	0.54	7.56	0.001
Agreed to work all city	-0.34	0.18	-0.14	-1.87	0.063
Bound to work all city	-0.19	0.16	-0.09	-1.24	0.218

When the single-item estimate of the Fishbein and Ajzen subjective norms construct was added to the model, the adjusted R^2 increased to .47, but all sub-indices except self-concept and possibly PNB ceased to make independent contributions to the model. This is consistent with Fishbein and Ajzen claim that all 'external variables' such as those described in the Triandis model are measured through their subjective norm (Ajzen I & Fishbein M, 1980)⁸⁹. Self-concept is a component of the perceived behavioural control construct which appears in the later version of the Fishbein and Ajzen model, the theory of planned behaviour (Ajzen I, 2002).

Improvements to the social drivers indices for 2001 version of RIQ

Fishbein and Ajzen

The single-item estimate of subjective norm had been shown from the RIQ2000 data to have a similar predictive power to the sub-scale comprising 18 items. In the 2001 instrument, this finding was tested by strengthening the sub-index, to see if it would then outperform the estimate.

There were a great many neutral responses to the approval items in the 2000 version, so efforts were made to 'force' a response other than neutral. The format was altered from a seven-point scale to a 10-point scale, and to include arrows over the two 'mid points' of the scale, annotated 'just disapprove' and 'just approve.' This was to make it clear that there was not an option for a

⁸⁹ Fishbein and Ajzen 1980, p84

neutral position. There were options, however, to allow for 'no idea' and 'N/A' or not applicable.

The four items from the consequences section that were seen to measure social drivers (items 41 to 44) were incorporated into the sub-scale as 'my rural medical educators and colleagues,' and 'my urban medical educators and colleagues.'

Triandis

The sub-indices, as suggested by Triandis fell into three factors, rural, urban and normative beliefs. Normative beliefs did not make an independent contribution to the regression model that was fitted with stated rural intent as the DV, while the each of the other items contributed.

When the components derived from the two theories were added into the same model, the Fishbein and Ajzen subjective norm replaced all of the Triandis components except the self-concept construct. This may have been because the Fishbein and Ajzen model really does measure the same thing, or it may be because the RIQ 2000 instrument was weak in its measurement of the Triandis constructs.

In the 2001 version, the Triandis items were strengthened, to test this. The normative belief sub-index was broadened to seven items. One of the additional items was recommended by an expert on issues related to gender and the rural workforce⁹⁰. A government taskforce was set up to study the concern that the increasing number of females in the rural workforce would effectively reduce the number full-time equivalent practitioners (AMWAC & AIHW, 1998). This item was worded in a provocative way to test whether medical students shared this belief, and how such a belief impacted on their intention to choose a rural career. The second new item sought to measure the degree to which medical students believed rural people should come to the city for their medical services.

The PNB items were reworded to minimise the emphasis on the word 'obligation,' which seemed to evoke an emotional ('construct-irrelevant') response from students (American Educational Research Association et al., 1999)⁹¹. As the evaluative components of the IPC questions in the 2000 version had opposite relationships with the strength components, the IPC questions sought to measure a 'feeling' of having made an agreement, and were reduced to single Likert scales delimited by 'agree strongly' and 'disagree strongly.' The self-concept sub-index was expanded to include an item testing for self-concept as a potential 'really good rural doctor.'

⁹⁰ Personal communication: Jo Wainer

⁹¹ The Standards 1999, p10

Demographics

The 2000 RIQ demographics section contained a number of largely irrelevant items that were included for reasons of comparison with other instruments, or for interest. These items were not central to the measurement of situational intention and were deleted from the 2001 RIQ.

For the first time, the 2001 RIQ directly asked whether the student was a fee paying international student, and for their country of origin. This section did retain the questions that related to rural undergraduate influences on situational intent, including undergraduate rural clubs, GP mentors and rural attachments.

There was also a global question seeking self-perceived change in intention over the previous 12 months. This replaced two items that were criticised in the focus groups for being too centred on rural GPs.

Summary of Chapter Six

This chapter has outlined the development of the RIQ 2000 and its subsequent statistical evaluation. Proposed changes to the sub-indices for the RIQ2001 were outlined. While the RIQ2000 was a lengthy document, it was a marked improvement on the pilot test model. There were clearly weaknesses in the affect component, and the structure of stated rural intent (Rural Intent (RI)) was poorly developed. Nevertheless, the instrument performed reasonably well with respect to the internal consistency of the sub-indices, and its construct validity as determined by regression modelling and principal components analysis.

The work done to establish the validity of the instrument based on the RIQ2000 data is presented in the following chapter, Chapter Seven. This is followed in Chapter Eight by a discussion on the improvements made to strengthen the RIQ2000 and to develop the comprehensive version of the Rural Intent Questionnaire, the RIQ2001. The remainder of Chapter Eight presents the evaluation of this final long version of the instrument.

The final chapter of this Section on the development of the RIQ, Chapter Nine, presents the rationale for and detail of changes to reduce the RIQ2001 to a more convenient shorter version, the RIQ2003.

Chapter Seven

Validity of the 2000 RIQ

Introduction to Chapter Seven

Several different methods were employed at this early stage of the development of the RIQ to validate the item pool, format and layout and response modalities. The brief literature search for influences on rural/generalist career choice has already been referred to and is presented in Appendix Five.

This chapter presents three additional approaches to the validation of the instrument based on its content and one on its response mode. Two have been referred to in the preceding description of the RIQ2000; the analysis of the evaluative (importance) items, and the responses to the open-ended feedback question. The third is a report on the two focus groups conducted following the application of the RIQ2000.

The instrument was designed to be a pencil-and-paper self-report questionnaire, completed in the classroom or at home. In order to test the consistency of responses to these two response modes, a comparison of classroom responses and mail-out responses was made. This is reported on page 103 under the heading, Classroom versus mail out responses.

Stated importance of items

Introduction

All five affect and 44 perceived consequences items had an evaluative component. This asked respondents to rate how important that emotion or that issue was for them. A scale of 1 to 7 was used with unimportant and important as the extremes descriptors for the affect items, and with totally unimportant and vitally important as the extremes descriptors for the perceived consequences items. Analysis of these responses informed on the relevance of the items for the students.

It was considered possible that the international students were underrepresented in the groups of informants who helped develop the item pool. This could be a threat to the emic validity of the instrument, that is, whether the items had equal salience for both the local and the international cohorts. This analysis includes a comparison of the level of importance ascribed to these items by the local and international cohorts, respectively.

Methods

Analysis was performed on the 160 complete responses; 126 were locals and 34 were internationals. Local and international students were analysed separately. Both the mean

response and the 25th centile response were calculated. The 25th centile score was the score above which three quarters of students scored the importance of the item. Although such a score was still well above the mid-way point (3.5) between the extremes descriptors, a cut-off point of 4.5 was arbitrarily chosen to identify 'weaker' items.

Results

Only six of the 49 items, three affect items and three consequences items, had a mean score lower than 4.5 for either the local or the international cohort. All had a mean response of 3.5 or greater. Three of these items were common to both cohorts. The data are presented in Table 12.

The mean scores for the 'weak' affect items were only marginally below 4.5 and 75% of respondents rated the importance of two of these (calm/anxious for both groups and confident/insecure for the local group) at 3.8 out of seven or higher. The third affect item (negative/positive for international students) scored only slightly lower than this.

Both cohorts identified the risk of boarding school and being a solo practitioner as less important items, and the local cohort did not see being a leader in the community as being so important.

Table 12 Items identified by local and international students as being less important to them.

index	item	Mean (range: 1-7)	25th centile
affect	local students		
	calm/anxious	4.3	4.0
	confident/insecure	4.4	4.0
perceived consequences	need to send my children to boarding school	3.5	1.0
	being a solo practitioner	3.8	2.5
	leading role in my community	4.1	3.0
affect	international students		
	calm/anxious	4.4	3.8
	negative/positive	4.4	3.0
perceived consequences	need to send my children to boarding school	3.9	2.0
	being a solo practitioner	4.4	3.0

Discussion

Of the 49 evaluated items, only six had a mean score less than 4.5. Three quarters of students on both cohorts scored the importance to them of the remaining 43 items at 5, 6 or 7 out of a possible 7. This may be a more appropriate level of salience for items in an instrument such as the RIQ.

Three of the five affect items did not reach this standard. This suggested that this section required a new approach for the next version of the instrument.

Only three of the 44 perceived consequences items failed to reach the standard. Two of these, and one of the affect items, were common to both cohorts. Only three items, then, were identified as less important for one or other cohort, suggesting a strong degree of concurrence

between them. These findings provided evidence based on content in support of the emic validity of the instrument across the two cultural cohorts.

Medical student responses to the perceived consequences evaluative items were compared with similar data from a study of general practitioner attitudes. These results were presented at a national refereed conference, and was subsequently published in a refereed journal (Somers et al., 2001). (See Appendix Six)

Open-ended questions seeking feedback.

Introduction

An important component of instrument development is the feedback sought and received from respondents on the content and the format of the instrument. Evidence such as this, based on instrument content, can confirm the relationship between the content of the instrument and the construct it is intended to measure.

Methods

Students were asked in Section 10:

Are there factors that we have not asked you about that you believe have or will influence your intention to undertake a career in a rural area? If so, please provide details.

Results

Fifty-seven of the 162 respondents chose to make a comment. The most commonly cited 'omission' related to rural background and this was mentioned by nine respondents.

Other issues raised frequently were family and schooling (8), experience, understanding and training in rural health (8), and the importance of duration and distance from cities (7). Money (4) religious and cultural issues (3) and support from other doctors (3) were the next most frequently mentioned issues. Each of the following were mentioned twice: acceptance by the community, accommodation issues, environment and recreation, and that the choice should be freely made. Only one mentioned workload, and one, the availability of medical equipment.

Two international students said it depended on work visas, suggesting that they misinterpreted the word 'country' to mean nation rather than rural. One student commented that the questionnaire seemed to focus only on GPs.

Discussion

In the literature, rural origin is considered to be one of the most important influences on rural career choice. The items relating to this issue were in the demographics section, which followed the open-ended question. So, at the time they had the opportunity to comment, students had not seen that it was included in the questionnaire. Although more students raised this as a missed issue than any other issue (nine times), it was perhaps surprising that more did not do so. It is possible that some had scanned ahead and seen the question in the next section, or it may be that this was not a salient issue, especially for the urban majority.

Family and schooling had been covered in some detail in the questionnaire, and its frequent mention in this section reinforces its importance. It is possible that students do not currently find these salient, but know that they will be later. The issues raised by the students that are not included in the questionnaire were experience of and training for rural work, religious and cultural issues, acceptance by the community and accommodation.

Attempts have been made to incorporate these issues into the RIQ2001 and the RIQ2003, which include the first as: undergraduate training, and self-concept: understanding. Religious and cultural needs, being appreciated by the community and affordable lifestyle were added to the perceived consequences items. While these items do not necessarily address all the issues directly, in keeping with the principle of parsimony, they do cover the themes.

Focus groups

Introduction

In addition to the open-ended feed-back question, which was discussed on page 97, two focus groups of medical students were set up to discuss their impressions of the questionnaire.

Methods

At the end of the classroom survey, volunteers were sought for a focus group to discuss the questionnaire about 10 days later. Eight students agreed to join this exercise. Three students considered themselves of urban origin and intent, and five were rural.

The students were divided according to rural and urban background, in order to facilitate discussion of issues particular to each group. Two rural lecturers, not involved with the questionnaire but experienced in running focus groups, agreed to manage the focus groups. The researcher did not attend either group, in order to maximise free discussion.

The students were given an explanatory statement before the commencement of the groups. Although consent was implied from the voluntary nature of the exercise, and the fact that the students attended the group ten days after agreeing to do so, consent forms were circulated. Prior to commencement of the discussion, students were asked to repeat the questionnaire. This served to refresh their memory of the instrument, and provided data for subsequent test-retest reliability analysis. One of the eight students had not completed the instrument previously.

The focus groups lasted for 60 minutes (rural) and 45 minutes (urban). They were not structured, although the facilitator for the rural group had prepared a skeleton outline for her session. They were taped and subsequently transcribed. Individual speakers were not identified in the sessions or on the transcription. The tapes and the transcriptions were analysed manually by this researcher for content and format themes and recommendations for the improvement of the instrument. The focus group facilitators also provided a brief summary.

Results

Comments made by members of the two groups were remarkably similar, although the facilitators had not discussed their approaches beforehand. Overall the comments were very positive. The five students in the rural group rated it (out of 10) at 7, 7.5, 8, 7.5, and 5, and comments included, 'It's a very professional looking survey.'

Relevance

Students in both groups were asked whether they felt the questionnaire was relevant, and whether they felt their contribution was valuable. One comment was,

Yes, I think George did that well, and I think he made us feel good for filling it in. Just the whole topic thing; I mean that really does get people to fill it in, and respect the survey more.

Asked whether this relevance may have been more so for rural students, one of the rural students replied,

Yes. I think that's because we all come from the country. They think that...there would have been a stigma between the rural students and the city students, a little bit. Yes, definitely. Like we didn't go up-market.

When the urban students were asked, the following discussion followed,

I don't think I...well, there were some specific rural questions, but a lot of them were just in general. What sort of...which direction you want to go...

I'm sort of the same. I can't envisage myself living in the country and being a rural doctor, but...

When prompted by the facilitator,

So you don't mind being forced to think about the..?

the urban student replied,

No, it was good...Rural kids are more enthusiastic about discussing it, and getting on to it. That's probably true.

Content

There was consensus that the instrument was comprehensive. An urban student said,

It's very detailed and lots of specific questions, good questions, and I like the style of evaluating the importance of the response.

And another commented,

I think, in general, he covered pretty much everything.

Finally, another commented about the open-ended item seeking feedback,

Where you had to write your spiel there wasn't really much to write.

This was confirmed by the responses to that item, discussed in the previous section on page 97.

Length

Both groups commented on the length of the 2000 version of the RIQ, but they were appreciative that almost all questions only required a circle or a tick.

Like, people are going to be more likely to do those sort of things rather than like long printed out things.

However, one of the rural students commented,

But also like when you are just circling boxes or ticking boxes and it's long like this, sometimes you just go, 'I can't be bothered doing the rest' and go tick, tick, tick, tick.

and another,

Like I was sitting next to someone that just said, 'Oh, they'll all be 'S's.' sort of thing.

The urban group discussed possible solutions to the problem, and suggested that a better time may be before the lecture,

...they're not going to be able to leave after it anyway, so there's no point in rushing it. So they might do it properly.

They also felt a mail-out process might provide more meaningful responses,

There would be more meaningful results, because the people who do it, want to do it.

Towards the end, people will just start filling in whatever. So, if you send it in the mail, we'd get less results back, but perhaps get a better reflection of what they actually think....Because it does take a fair while.

Format

The structure of the questionnaire was complex. Most items had two components, and the perceived consequences items had three components.

One student commented,

...content itself is very complicated.

The structure of the perceived consequences section, in particular, caused some students difficulty,

These ones here, the unimportant – unlikely. Took me ages to figure them out

Students found it confusing when the order of the agree-disagree descriptors were reversed. This related to the placement of the term 'agree strongly' to the right in the social referents section (Section 5), but to the left in the following normative beliefs section (Section 6).

A couple of times I got tricked. Just with the format. Like in respect...where you sort of reversed, instead of having a positive statement you had a negative statement, and then I had to go, 'Oops, I have to go back and redo that.'... All the strongly agrees are on that side. Beforehand, on the page before, they were swapped. So I was confused. It's a format thing.

In the perceived consequences section, most issues were worded positively, like 'Access to latest technology'. Several of these were deliberately worded negatively, in order to avoid response set bias. Three of these items were identified as confusing,

- Separation from my family and friends
- The need to send my children to boarding school
- Intrusion of work into my social/private life

One student felt that the order of the social referents questions was not optimal. He felt that it would be more logical to identify an influence (compliance) and then measure its direction (approval).

Both groups discussed the need for a 'not applicable' option for the social referents section and for some of the perceived consequences items, especially those that required looking into the future. This lack of salience caused by a time gap irritated one older rural student in particular. He could not relate back to teachers or his parents' influence, although he did have children.

Another student commented,

I can't imagine having kids... My parents influenced me a lot, so...

The urban group discussed this but came to a more philosophical conclusion,

Well, that's like the professional...professional acceptance, ... that won't happen until you graduate. And we're not sure how we feel about that.

and,

I think I would have said I'm not sure this is what I felt...that it was looking at our preconceived ideas about rural...and our impressions of it. So in that way, I take some of those questions, the futuristic ones...and sort of, they're appropriate, because the whole thing is speculation anyway, so in that way, they sort of are. They do fit in.

A specific comment was that it was unclear whether both boxes in item 2 of Section 1 (furthest distance likely to work, away from the CBD) required a response. These boxes were divided according to the capital city/other definition of rural, so it was interesting that this student felt they were mutually exclusive.

Missing topics

A few issues were identified as either not being fully covered, or being inappropriately covered.

Rural definition

Both groups commented on the difficulty of defining what rural means. This version attempted to define rural in a grid format, however both groups commented that a small town nearer the capital city may be more 'rural' than a larger, more distant regional centre. One student suggested that a functional definition would be more appropriate,

I would personally classify rural...I mean besides distance and all that...don't have access to specialist...that's what I consider rural...

General practice focus

One male rural student, who intended to become a rural surgeon, complained that the questionnaire seemed too heavily focused on GPs,

He's taken us on board, but I felt like, if you don't want to be a GP we don't want you in the country...that's how I interpreted that. It was a bit offensive and off-putting...but we really need specialists as well. You don't want to chase [away] those who do want to practise in that area.

Further rural information

One student felt that there was an issue of having and wanting adequate information to make the decision to take on a rural career. This issue was discussed by Triandis in relation to an understanding of the issues as an element of self-concept (Triandis H, 1977), and by Bandura as an element of self-efficacy (A Bandura, 1997).

...whether we feel as students whether we are getting enough information about working in rural areas and stuff. Whether we would like to get more information or have more opportunities for more information.

Another missed issue of interest was,

whether we think people ...should be made to work in rural areas...

Discussion

International students

A limitation of the focus group exercise was that international students were not represented. A separate focus group consisting of international students would have provided valuable cross-cultural information. During 2000, the international responses were collected for comparative purposes. At that stage, it was not considered possible to develop a universal instrument.

The cross-cultural application of the instrument has subsequently been supported by this doctoral research. The use of larger cohorts, containing larger numbers of international students, enabled testing of subsequent versions of the instrument, which had been developed with input from international students. In keeping with the recommendations of the Standards for educational and psychological testing, such an international application is likely to require further specific validation work (American Educational Research Association et al., 1999)⁹².

GP focus

The identification of this major irritant was invaluable. Subsequent versions of the instrument were designed to be more sensitive to the majority of graduates who would specialise, and who would choose urban careers. As both the specialists in the city and those in rural areas are vital for sustained rural medical practice, their attitudes should be measured. Future versions of the instrument were also to be worded in less 'rural-centric' terms. As one student commented, students intending to work in cities also needed to be "taken on board."

Length and complexity

This version of the instrument was an over-inclusive prototype, seeking to identify superfluous items and sections. It was also set up to test the structure recommended by the authors of the theoretical framework. It was, therefore, longer and more complex than expected for a final version. Comments received on these counts were not unexpected and were essential to guide further development of the instrument.

The challenge was to continue to develop a comprehensive instrument, which followed the guidelines set down by Triandis and by Fishbein and Ajzen, but which would not be limited in its application by its length and complexity.

Reversal of format and meaning

While there are theoretical imperatives to avoid response set bias by reversing the order of item meanings and formats, these techniques resulted in more stress than benefits. Future versions would seek to avoid response set bias with better design, rather than 'tricky' questions.

⁹² The Standards 1999, p15

Not applicable option

The discussion in both groups around the 'not applicable' response option highlighted a lack of clarity in the instructions and explanation. The focus group participants did discuss the meaning of response option number '4' (the mid point out of the scale of 7) as meaning neutral, they could not recognise this as also meaning 'not applicable.' Subsequent versions could make this more clear by showing the scoring code (say -5, neutral +5) on the response sheet, rather than a flat scale from 1 to 10. For the 2001 version, however, 'no idea' and 'not applicable' options were introduced into the social referents section.

Classroom versus mail out responses

Introduction

Of the 161 responses received from the first year medical students in 2000, 112 were completed immediately after a lecture. Time had been allowed for this. The remaining 77 students in the year-group were sent a copy of the questionnaire and explanatory statement by mail. Two subsequent reminders were sent to non responders over the next six weeks. There were 50 responses received by mail.

Methods

T-test analysis of differences in means of the classroom responders and the mail responders were performed on each item of the questionnaire. As many tests were being performed, the risk of a Type I error was considered. The significance level was set at a still generous .01 level, so that even small differences would be identified. All sub-indices and indices were also tested.

Results

Students who responded to the mail-out and those who responded at the classroom differed in the strength of their beliefs on only two issues; the likelihood that they would be separated from their family and friends, and the importance of having access to the latest technology. None of the intention, affect or social drivers items, nor any of the intention or attitude indices or sub-indices differed significantly between the two groups.

Students who responded by mail believed that the likelihood of separation in the country was greater ($p < .01$), and in the city was less ($p < .005$), relative to the responses obtained from the classroom cohort (Table 13). In both cases, the size of the difference of the means was 0.9 units on the 7-point Likert scale. When the derived variable, country minus city, which estimated the difference in the perceived likelihood of separation between city and country was tested, this difference between the response cohorts was accentuated ($p < .001$).

Another difference between these groups was the importance of access to technology, where this was more important to the classroom group. While the t-test statistic reached a significance of .008, the effect size was not great, at 0.4 Likert units.

When data were restricted to that from the local students, there was a large (1.2 Likert units) and significant ($p < .005$) difference in the importance rating for the need to send children to boarding school. Analysis of a bar graph of the distribution of the responses to this item suggested that the classroom responders (37%) were more likely to answer totally unimportant than the mail out group (22%). Both groups were reasonably evenly distributed over the remaining response options.

Discussion

When the whole group was considered, only two significant differences between classroom responders and mail out responders were identified. These were the risk of separation from family and friends, and the importance of technology. This latter difference was small. Local students also showed a difference in the perceived need for a boarding school. In all three cases, the mail out respondents found the risk greater in the country than did the classroom respondents. None of the differences translated to a measurable difference in the intention items, nor in the consequences sub-indices. The two groups were almost identical in age, sex, sense of rural background, and years lived in rural areas during childhood.

Many analyses were performed and the risk of a Type I error was high. It was possible that the differences observed occurred by chance. It is of interest, however, that both the boarding school and the separation items were identified in the focus group discussions as being difficult to answer. The focus groups suggested that students who responded from home were likely to have more time and less distraction than the group responding at the end of a lecture (see focus group discussion, page 98, above). Respondents to the mail-out may have been willing and able to put greater thought into their responses.

Overall, however, these findings suggested that the classroom response process was not systematically different to the mail-out process. These findings support the validity of the instrument based on the response process (see also Chapter Thirteen).

Table 13 Variable with significant differences ($p < .01$) between classroom and mail-out responses

Variable	location	group	number of responses	mean response	standard deviation	SEM	Sig.
Separation from my family and friends (likelihood)	city	class	109	3.6	2.1	0.2	0.007
		mail	48	2.7	1.9	0.3	
	country	class	109	5.0	1.8	0.2	0.002
		mail	48	5.9	1.4	0.2	
	country minus city	class	109	1.4	3.2	0.3	0.001
		mail	48	3.2	3.9	0.4	
Access to the latest technology (importance)		class	109	5.9	0.9	0.1	0.008
		mail	47	5.5	0.9	0.2	
The need to send my children to boarding school*		class	83	3.1	2.1	0.2	0.004
		mail	41	4.3	2.2	0.4	

* local students only

Summary of Chapter Seven

This chapter presented the argument supporting the validity of the RIQ2000 based on four separate analyses. The first looked at the self-reported level of importance of the issues included in the questionnaire. The content was further tested through the analysis of responses to questions asking whether any important issues were left out. Focus groups were conducted, and the report on these was also presented. Finally, an analysis of the differences between classroom responses and mail-out responses tested for differences due to format and delivery method. The instrument performed well on all counts.

Chapter Eight presents the RIQ2001 and its testing for reliability and validity.

Chapter Eight

Analysis of responses to the RIQ2001 and validity tests

Introduction to Chapter Eight

The content and format of the RIQ2000 was improved to produce the RIQ2001, following statistical analysis and suggestions from the students as described in Chapters Six and Seven⁹³.

This instrument was again tested on medical students in order to evaluate the effectiveness of the changes made, and to determine the psychometric properties of the RIQ2001, the comprehensive version of the RIQ. This Chapter presents the analysis of data gathered following the application of the RIQ2001.

The first-year students who were approached to complete the RIQ2000 were again asked to complete the RIQ2001 in their second year. There were 130 responses from this cohort. Two tests of validity were carried out using the 2001 data. In order to assess the generalisability of the questionnaire to later-year medical students, a mail-out survey of final year students was also carried out. There were 66 responses from this cohort.

So that the influence on the order of the items within the RIQ could be assessed, two versions of the 2001 RIQ were prepared. They contained identical stem questions and wording of items; however, the order of the items within the three sections was different for the two versions. Copies of the two versions were mixed and distributed randomly to the second-year students. Of the second-year students, 79 responded in Format A and 51 responded in Format B. The final-year students all responded to Format A.

This Chapter presents an analysis of the data, initially under the headings used in previous chapters:

- Explanatory Statement
- Intention,
- Affect,
- Perceived Consequences,
- Social Drivers, and
- Demographics.

Data collected under the three indices are discussed in terms of:

- Data cleaning,
- Principal components analysis,
- Internal consistency,

⁹³ See Appendix One for a copy of the RIQ2000 and the RIQ2001

- Construct validity, and
- Improvements.

Three analyses are made on the validity of the RIQ2001 instrument as a whole. These include a study of the test-criterion relationships, a comparison of results seen from the second-year students with results from sixth year students, and a test to determine if there was an effect due to the order in which items were presented.

Explanatory Statement

Feedback about the 2001 explanatory statement resulted in an addition to the definition of 'some time' in the RIQ2001. This was to clarify that the six months rural work need not be continuous.

For the first time, the 2002 RIQ was to be used before and after an intervention. Appropriate explanatory statements were designed for the first and the second surveys.

Intention

Intention was measured on three numbered 'visual analogue-type' scales, UG, or intention to seek additional undergraduate rural experience, PG, or intention to seek additional postgraduate rural experience, and RI2001, or intent to work in a rural area after training. There was one additional item for each of these scales, which each gave respondents the opportunity to respond 'definitely not' to that item. The analogue scale was scored from 1 to 10. If that was unanswered, and the respondent marked definitely not, a score of zero was allotted. The range for the three intention items was 0 to 10. The RIQ2001 also included an item measuring global perceived ease of working in a rural environment⁹⁴.

Chapter Ten includes a discussion on the development and testing of the Situational Intent Score (SIS). The SIS was an index of situational intent derived from the addition of the UG, RI and 'perceived ease' and was found to be a reliable indicator of situational intent. It was inappropriate to ask students at the end of their final year whether they intended to seek additional undergraduate rural training; however, for this sixth-year cohort, similar information could be derived from the PG item. Therefore, the SIS2001 used data from the UG item for the second year students and from the PG item from the sixth year students. Differences in SIS2001 between second-year and final-year students was sought to validate this decision.

Table 14 presents the means of the RI2001 score and the SIS2001. Independent t-test analysis of the means revealed no difference in the means between the three cohorts for either variable. Linear regression modelling was performed to determine the relationship between the RI2001 and its components, Ease and UG (for the year 2 cohorts) and Ease and PG (for the year 6 cohort). The results are presented in Table 15. The strength of association was similar for the two year 2 cohorts, but was greater for the year six cohort than either of the year 2 cohorts. This

⁹⁴ See Section 10 of the RIQ2001

may be because SIS for the year six group was based on postgraduate intent (PG), which may have been more closely aligned with rural intent. It may also be because these more senior students had a greater career maturity and a more authenticated belief system. In that case, there would be a greater consistency between RI, PG and Ease, resulting in a closer fit and greater strength of association.

Table 14 Distribution statistics for scores on stated rural intent (RI2001) and the Situational Intent Score (SIS2001) for RIQ2001

Variable	Year/Format	N	Mean	Std. Deviation	Std. Error
<u>Rural Intent (RI)</u>	2nd Year format A	79	6.3	2.6	0.3
	2nd Year format B	51	6.3	2.7	0.4
	Final year	64	5.9	2.8	0.4
	Total	194	6.1	2.7	0.2
<u>SIS2001</u>	2nd Year format A	64	18.0	5.1	0.6
	2nd Year format B	46	18.6	5.6	0.8
	Final year	58	17.7	5.8	0.8
	Total	168	18.1	5.5	0.4

The Cronbach coefficient alpha for a scale consisting of the three variables ranged from 0.63 for year 2, 0.75 for year 6, and was 0.68 for the whole group. Principal components analysis performed on the three variables revealed a single component accounting for 61% of the variance with RI2001 as the index variable. This suggested that the scale had acceptable measurement error and that it was an estimate of rural intent. Therefore, the SIS2001 was used as the estimate of rural intention for the remainder of this chapter.

Table 15 Characteristics of a linear regression model with DV: RI2001 and IV: Ease+UG (Year 2), or Ease+PG (Year 6)

Year/Format	R	R Square	Adjusted R Square	F	df	Sig.
2nd Year format A*	0.48	0.23	0.21	18.12	1, 62	0.001
2nd Year format B*	0.51	0.26	0.24	15.57	1, 44	0.001
Final year**	0.72	0.51	0.51	59.42	1, 56	0.001

DV: RI2001

* IV: Ease + Undergraduate Intention (UG)

** IV: Ease + Postgraduate Intention (PG)

Affect

As discussed on page 83 under the heading, Improvements to the affect index for 2001 version of RIQ, the twenty PANAS affect descriptors were utilised for the 2001 version of the affect index. Ten of these were positive and ten were negative. The two formats presented these items in different orders.

Principal Components Analysis

Four components with an Eigenvalue greater than one were identified when the 20 affect descriptors were entered into a principal components analysis (PCA) using data from the 197

respondents from all three cohorts. The four components explained 65.9% of the variance among the items. KMO and Bartlett's test were adequate. The solution is presented in Table 16. The ten positive affect variables all fell into the first component, and the negative affect variables fell into three components, which could be labelled, anxious, angry, and guilty.

Table 16 PCA for affect index, with four components

	positive	negative components		
		anxious	angry	guilty
determined	0.82			
active	0.81			
inspired	0.80			
attentive	0.79			
proud	0.79			
enthusiastic	0.77			
excited	0.76			
alert	0.73			
strong	0.70			
interested	0.70			
scared		0.84		
afraid		0.82		
nervous		0.82		
jittery		0.72		
upset			0.83	
distressed			0.73	
irritable			0.71	
hostile			0.55	0.45
guilty				0.82
ashamed				0.75

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

The PANAS scale was said to have two components, positive and negative ((Watson D et al., 1988)). When the affect items were 'forced' into a two component solution, and all loadings less than .3 were suppressed, simple structure was found with a positive and a negative component (Table 17). The two components explained 51.6 of the variance. Only 'nervous' loaded onto both factors (albeit with a differential loading of .27). This result was plausible as even if one is positive toward a rural career, one could also be nervous about it.

Internal Consistency

When all data from the three cohorts were entered together, the Cronbach coefficient alpha for the positive sub-index was .93, and for the negative sub-index was .82. When data were analysed separately for the three groups little variation was seen between cohorts (Table 18). While these results suggested that there was low measurement error, it is not appropriate to conclude that each sub-index was unidimensional. Indeed, the negative sub-index had more meaning when the three components identified were taken into account. The results did suggest, however, that the positive sub-index had more items in it than were necessary, and that a reduction in their number for the 2002 version was appropriate.

Table 17 PCA for affect variables in a two-component solution

PANAS descriptor	positive	negative
determined	0.85	
enthusiastic	0.83	
excited	0.82	
inspired	0.81	
active	0.77	
interested	0.77	
attentive	0.76	
proud	0.74	
strong	0.68	
alert	0.67	
afraid		0.74
scared		0.72
upset		0.68
distressed		0.67
irritable		0.58
nervous	0.31	0.58
jittery		0.58
ashamed		0.58
guilty		0.53
hostile		0.51

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Table 18 Cronbach alphas for the positive and negative sub-indices with data split by cohort.

	sub-index	
	positive	negative
Yr2 Format A	0.90	0.83
Yr2 Format B	0.94	0.82
Yr6 Format A	0.94	0.81

Construct validity

A regression model was fitted with the SIS2001 as the dependent variable (DV) and the two affect sub-indices as the independent variables (IV). The sample size of the cohorts was inadequate to validly support models based on data from individual cohorts, however, exploratory analysis of such models suggested that they were all similar to the whole-of-data model. The adjusted R^2 for the model was highly significant and showed that almost 60% of the variance in SIS2001 was explained by the model (Table 19).

Table 19 Characteristics of a regression model with DV: SIS2001, IVs: positive affect and negative affect sub-indices

R	R Square	Adjusted R Square	F	df	Sig.
0.77	0.60	0.59	120.83	2, 164	0.001

The sub-indices both made highly significant contributions to the model. Positive affect had a beta value about twice the size of negative affect (Table 20). This suggested that morale was a more important determinant of rural career choice than was anxiety.

Table 20 Correlation coefficients of a regression model with DV: SIS2001, IVs: positive affect and negative affect sub-indices

Variable	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	9.28	1.44		6.44	0.001
positive	0.48	0.03	0.70	14.00	0.001
negative	-0.37	0.07	-0.29	-5.74	0.001

A model was also fitted with the same IVs and with RI as the DV. The adjusted R^2 for this model was highly significant and .49. Both affect sub-indices made highly significant independent contributions to the model, similar to that fitted with the DV, SIS2001. This supported the validity of the SIS2001 as a gold standard for stated rural intent based on convergent data.

Improvements to the affect index for the 2002 RIQ

The findings presented here confirmed the appropriateness of the affect descriptors suggested in the PANAS scale, although the application in this instrument was quite different to that originally proposed.

The 20-item affect index was unnecessarily long. The positive affect component was reduced to three items, excited, determined and proud. Although they were not the items that loaded most heavily on the positive component, these items were chosen as not having too much overlap in meaning. The descriptor 'interested' was avoided as it may have been an alternative measure of intention.

The negative sub-index required more items, as it was weaker, and consisted of three subsets of items. Six of the descriptors that were less likely to overlap in meaning were chosen. These included examples from all three components. The descriptors afraid and scared were very similar in meaning but were clearly important. Discussion with some international students suggested that a more appropriate term for them (without loss of face) was apprehensive. Although it was not one of the PANAS descriptors, apprehensive was used instead of afraid. The remaining negative affect descriptors were scared, guilty, ashamed, irritable and jittery.

It was unexpected that 'jittery' performed so well. It did not seem to be a term that would be stronger than 'nervous.' Nervous loaded on both the positive and the negative components so someone can be positive about a rural career, but also be nervous about it (Table 17). The term jittery connotes only the negative aspects of nervous, and therefore was more discriminatory.

A regression model fitted with SIS2001 as the DV and the nine affect descriptors as IVs, explained 56.2% of the variance in the DV ($R^2 = .562$, $p < .0005$), supporting the validity of this reduced affect index.

Perceived Consequences

Forty-seven variables subdivided under five headings formed the perceived consequences section of the 2001 RIQ. Each had two components, both measured on a 10-point Likert scale.

They were likelihood (unlikely-likely) and importance (unimportant-important). There were 197 responses to this version of the instrument, so while the sample was large enough to compare the three format sub-groups on small indices, this was not the case for an index with 47 variables. The effect of the order of the responses within the questionnaire was tested with t-test analysis, and is described at the end of this chapter on the 2001 instrument.

Data cleaning

When scores on these components were multiplied, the values obtained were not normally distributed. A reason for this was that the graduation between adjoining low multipliers (such as $2 \times 2 = 4$, to $3 \times 3 = 9$) was not equivalent to that between high multipliers (such as $8 \times 8 = 64$, $9 \times 9 = 81$). Where a unitary increase in the former resulted in an increase of 5 units, that in the latter resulted in an increase of 17 units. A square root transformation served to correct this, and resultant transformed values formed the individual perceived consequence scores.

Principal Components Analysis

PCA (Varimax rotation with Kaiser normalisation) of all 47 variables produced a 3-component solution with simple structure when loadings less than .4 were suppressed (Table 21). The KMO index was adequate (.848) and Bartlett's test for sphericity was highly significant. Although some authors recommend a large sample size for PCA, a sample size of 150 should be sufficient if several marker (index) variables load at $>.80$ (Tabachnick BG & Fidell LS, 2001)⁹⁵ As the loadings are high for many variables, the sample size of 197 should be sufficient.

Table 21 PCA solution for 47 variables of the perceived consequences index. Items loading $< .4$ were suppressed. (see Appendix Two for the wording of questions)

community respect		professional networks		family and social	
Item number	loading	Item number	loading	Item number	loading
44	0.78	39	0.72	8	0.67
45	0.77	43	0.70	10	0.66
29	0.72	42	0.69	12	0.63
46	0.65	41	0.65	1	0.63
24	0.64	19	0.64	14	0.63
34	0.61	38	0.63	9	0.61
25	0.59	17	0.59	13	0.58
28	0.57	40	0.57	6	0.56
31	0.55	20	0.54	16	0.53
47	0.50	2	0.48	11	0.46
27	0.48	15	0.47	5	0.40
37	0.47	18	0.47		
26	0.47	7	0.47		
30	0.47	22	0.42		
23	0.43				
35	0.41				
33	0.41				

⁹⁵ Tabachnick and Fidell, p588

The three components explained 38.6% of the total variance and had Eigenvalues of 6.6, 6.0 and 5.4 respectively. Their meanings were logical and consistent. The first component included 17 items, and these clearly related to 'being respected in a community context.' The index variable was 'respect from your patients', and the next three items were, respect from the community generally,' 'understanding your patients in the context of their community,' and 'respect from other health professionals.

The second component contained 14 items, and had a meaning, 'adequate resources and support networks,' with an index variable, 'a range of specialist colleagues nearby.' This component included most items from the 'work conditions' and the professional and peer support' sections. The third component related to 'social issues,' with 'access to family and friends' as the index variable. Only five of the 47 items did not load onto one of these three components at greater than .4. Similar results were found with the Perceived Consequences index of the RIQ2000 (see Perceived Consequences on page 84).

These three domains match those identified by Cutchin (1997) as the "domains of integration," namely, local community-at-large, local medical community and the physician's self. These domains, and Cutchin's work on "experiential place integration" are further developed in Chapter Eighteen, Section Five (Malcolm P. Cutchin, 1997; M. P. Cutchin, 1997).

Internal consistency

The Cronbach coefficient alpha for the three sub-indices were .88, .87 and .86 respectively. There were no items, in any of the sub-indices, removal of which would have significantly improved the internal consistency of that sub-index. This suggests good internal consistency of the three sub-indices.

Construct validity

Sub-indices were formed based on the three components identified in the PCA. These sub-indices were developed through a linear combination of the items in that component. They were added to, or subtracted from the sub-index according to the sign of their beta-value in a regression model that included all 47 variables as IVs, and the SIS as the DV.

A regression model fitted with the DV, SIS and with the three perceived consequences sub-indices as the IVs, explained 31.3% of the variance in SIS (Table 22). Two of the three sub-indices made unique contributions to the model, and they were 'community respect', and 'family and social' (Table 23). 'Professional networks' did make a significant unique contribution ($p < .02$) to a regression model that included only that IV and 'family and social,' but this was not the case for the model with the three IVs. The influence of 'professional networks' was therefore found to be mediated through 'community respect,' a component that included items relating to respect from the health professional community.

Table 22 Regression model characteristics. DV SIS, IVs three consequences sub-indices

R	R Square	Adjusted R Square	df	F	Sig.
0.57	0.32	0.31	3, 176	28.19	0.001

Dependent Variable: SIS (Situational Intent Score)

Table 23 Correlation coefficients, regression model: DV SIS, IVs three consequences sub-indices

IVs	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.88	2.22		0.85	0.397
family and social	0.36	0.07	0.33	5.34	0.001
professional networks	-0.04	0.06	-0.05	-0.73	0.463
community respect	0.49	0.07	0.44	6.89	0.001

Dependent Variable: SIS (Situational Intent Score)

When a regression model was fitted for the DV, RI and the three sub-indices formed the IVs, the model had an adjusted R^2 of .274 (Table 24), and 'professional networks' did make a weak contribution to that model ($p < .05$). It was much weaker than the other two IVs, and the beta value was negative. Therefore, while family and community issues had a strong positive association with SIS and RI, professional networks had a weak negative association with them (Table 25)⁹⁶.

Table 24 Regression model characteristics. DV RI, IVs three consequences sub-indices

R	R Square	Adjusted R Square	df	F	Sig.
0.54	0.29	0.27	3, 176	23.54	0.001

Dependent Variable: RI (rural intention)

Table 25 Correlation coefficients, regression model: DV RI, IVs three consequences sub-indices

IVs	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-0.43	0.98		-0.44	0.659
family and social	0.16	0.03	0.34	5.31	0.001
professional networks	-0.05	0.03	-0.14	-2.05	0.042
community respect	0.17	0.03	0.36	5.48	0.001

Dependent Variable: RI (rural intention)

Social Drivers

As was the case with the 2000 version, the social drivers index was divided into the Fishbein and Ajzen component and the Triandis component and these were dealt with separately before their relative strengths were considered. The Fishbein and Ajzen component was similar to that in the RIQ2000, only that a few referents had been changed. The purpose of this analysis is to test whether the multi-item evaluated response format is sufficiently stronger than the single item estimate of subjective norm (EstSN) to justify its inclusion. The Triandis components were strengthened based on the analysis of the RIQ2000 responses.

⁹⁶ See Chapter Twelve: The role of professional consequences for a further discussion on the professional networks component

Subjective norms (Fishbein and Ajzen)

Ten referents were selected following the analysis of the RIQ2000. These were measured on a 10-point evaluated scale as described under the heading, Improvements to the social drivers indices for 2001 version of RIQ on page 92.

Data cleaning

The ten evaluated referent scores were derived from the product of the approval score and the strength score component. All missing values, 'not applicable' responses and 'no idea' responses were replaced with zero. The effect of this was to render that evaluated referent score, zero. This effectively rated such referents as having no salience for that respondent.

The distributions of these referent scores were reasonably normal except for medical mentor with mode = 0 (98 cases) number of negative scores = 5, and spiritual mentor with mode = 0 (139 cases) number of negative scores = 4. The remaining scores were positive. So although these referents had a predominantly positive influence, they did serve a discriminatory function as they had a positive influence on some students but not on others. These two variables were therefore retained in the analysis.

Principal Components Analysis

The screeplot of the PCA solution with all ten referent scores included suggested one main component. When a two component solution was sought, the first component contained all family and friend referents, and the second component contained the four mentor/colleague referents. This latter solution explained 52.6% of the variance. Despite limitations in the distributions of two of the variables, the KMO index and Bartlett's test were adequate.

Internal consistency

The Cronbach coefficient alpha for an index including all 10 referents was .80. This improved only marginally to .81 without the two mentor referents, and to .81 without either the mentors or the colleagues. This supported retention of a single component PCA solution.

Construct validity

A regression model was fitted to test the strength of association between the estimate of subjective norm (EstSN) and the ten-referent index. The single-item estimate of subjective norm (EstSN) was the DV, and all ten referent scores were the IVs. The adjusted R^2 was .662, suggesting that the sub-index explained two thirds of the variance in the single item estimate, and that the Pearson correlation coefficient between the single item estimate and the sub-index was .83. Five referents were significant independent contributors to the model. These were, mother, father, future spouse, friends and medical mentor.

A regression model fitted with the SIS as the DV and the ten referents as IVs had an adjusted R^2 = .389 (Pearson's R = .65). The two highly significant contributors were future spouse and medical mentors. Two other referents had standardised beta values that approached significance

at the .05 level, and these were mother and father. So, while mother and father were strong influences in the subjective norm sub-index, they were less so when predicting the SIS.

Simple regression of the single-item subjective norm estimate (IV) against the SIS (DV) produced an adjusted $R^2 = .415$ (Pearson's $R = .65$). Although the EstSN and the 10-referent index were closely related, the EstSN was the stronger predictor of SIS2001.

Improvements to the estimate of subjective norm for the RIQ2002

As was the conclusion after analysis of the RIQ2001 subjective norm sub-index, these results support the replacement of the lengthier subjective norm sub-index with the single item subjective norm estimate. Nevertheless, the subjective norm sub-index was a valid and reliable instrument, and may be of value when parsimony ought to be sacrificed for a better understanding of the influence of individual referents.

Social factors (Triandis)

These were divided into a 7-item role beliefs (RB), 2-item personal normative belief (PNB), 2-item interpersonal contract (IPC) and a 4-item self-concept (SC) variables. Development of these after analysis of the RIQ2000 were discussed earlier (see Triandis on page 93).

Data cleaning

The second (medical profession), sixth (patients move) and seventh (women's role) RB items were negatively worded, so they were negatively recoded, and the seven scores were summed to form the NB score. The PNB and the IPC items were recoded so that they had pro-rural meanings, and could be added to form the PNB and the IPC scores respectively. The second SC item (city needs) was negatively worded so it was negatively recoded, and the four items were summed to form the SC score.

Both of the new items, that relating to female rural doctors, and that relating to rural people coming to the city for services, had overwhelmingly negative responses. That is, students felt females were equally as capable of being rural doctors, and that they believed rural people should not need to travel to the city for their services. Further, these items were considered unlikely to contribute to the meaning of the RIQ, and were removed from the index. Data gained may be useful for specific analyses later.

Principal Components Analysis

A two-component solution with simple structure was achieved when all 15 Triandis social factors were entered into a principal components analysis with a Varimax rotation after all loadings below 3.3 were suppressed. The screeplot supported a two-component solution and these explained 43% of the variance. The components could be ascribed the meanings self-efficacy and normative beliefs (Table 26). This finding was not inconsistent with that of the 2000 data presented in Table 9.

Table 26 PCA solution of all 15 social factors variables (loadings <.33 suppressed) See Appendix Two for the wording of items.

variable	Component	
	self efficacy	normative
SC happy	0.84	
SC enjoy	0.80	
SC rural doc	0.76	
SC city needs	0.67	
PNB urban	0.65	
IPC urban	0.58	
RB women	0.44	
RB patients move	0.35	
RB docs move		0.76
RB med studs owe		0.65
RB skills		0.64
PNB rural		0.61
IPC rural		0.60
RB med grads should		0.59
RB med profess		0.40

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

When the four sub-index scores (RB, PNB, IPC and SC) were subjected to PCA (varimax rotation), two components explained 72% of the variance. The first had the SC component as its index variable followed by IPC and PNB, and the second had RB as its index variable. PNB loaded onto both components. In both analyses, KMO and Bartlett's test were adequate.

Internal consistency

The Cronbach coefficient alpha for the sub-index including all 15 variables was .79, which could not be significantly improved by removal of any variable. This does not suggest that there is only one construct measured by the sub-index, but that the sub-index is adequately free of measurement error.

Construct validity

Urban PNB was found to be positively related to SIS. This meant that the more the respondents felt an obligation to work solely in the city, the stronger the intention to work for some time in the country. A similar finding, in relation to the item measuring how bound they felt to an agreement to work solely in the city was found with the 2000 data (see Table 9). For this reason, when the PNB score was derived by adding rather than subtracting the PNB rural and the PNB urban, this score contributed better to regression models with SIS as the DV. As will be shown, even this version of PNB did not make a significant independent contribution to the model after the other three variables had been allowed for.

A regression model was fitted with SIS as the DV and the four social factor scores as IVs. The model explained 48% of the variance in the DV.

Table 27 Characteristics of regression model, DV: SIS, IVs social factors (PNB was the sum of the two item scores)

R	R Square	Adjusted R Square	df	F	Sig.
0.70	0.49	0.48	4, 184	44.94	0.001

Self concept (SC) contributed most to the model, while the contribution made by PNB did not reach statistical significance. This was not improved when the two PNB components were entered individually. IPC and RB made equivalent independent contributions to the model, as shown by the similarity of their standardised beta values.

Table 28 Correlation coefficients for regression model, DV: SIS, IVs social factors (PNB was the sum of the two item scores)

	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.33	1.40		0.96	0.34
IPC	0.27	0.12	0.14	2.27	0.02
SC	0.41	0.05	0.55	8.32	0.001
RB	0.09	0.03	0.15	2.62	0.01
PNB	0.09	0.09	0.05	0.98	0.33

Dependent Variable: SIS

Hierarchical regression modelling was performed using SIS as the DV. The first block was SF, the sum of the four social factor scores referred to above. The second block entered included the four separate social factor scores. This tested whether the addition of individual social factor scores, as presented in Table 27 and Table 28, was a more powerful method of estimating the Triandis construct than a summation of the scores (SF) alone.

The adjusted R^2 of the model with SF alone as the IV was .33 (Table 29). When the second block was added, there was a significant change in R^2 of .14 ($F(3,183) = 16.0, p < .0005$). This value is not greater than that described in Table 27, suggesting that the total variance is likely to be the same. These findings support continued adherence to the methodology used by several authors, whereby the Triandis social factors are dealt with as separate sub-indices rather than as an aggregate score (Davidson AR et al., 1986; McInerney, 1990, 1991).

Predictive validity of Triandis and Fishbein and Ajzen constructs.

Regression models were fitted with SIS as the DV and the three aggregated social drivers sub-indices as independent variables as listed in Table 29. This allowed for a comparison of the predictive strengths of the three sub-indices.

The strongest model consisted of the Triandis SF sub-index, and the single-item estimate of subjective norm (estSN). Hierarchical multiple regression modelling showed that estSN caused a highly significant R^2 change of .20 to the model with SF as the IV ($F(2, 159) = 66.4, p < .0005$).

These findings support the earlier conclusions that the single-item estSN is as powerful as the SN sub-index, and that its addition to the model makes a large and significant contribution additional that made by the Triandis constructs, when the latter are treated as an aggregate score.

Table 29 Adjusted R² and Pearson's coefficients for regression models fitted with DV: SIS.

Independent Variables (IVs)	Adjusted R ²	Pearson's R
SF (sum of Triandis social factors)	0.33	0.58
SN (sum of referents)	0.38	0.62
estSN (estimate of subjective norm)	0.42	0.65
SF, SN	0.48	0.70
SF, estSN	0.52	0.73

Indeed, when the four SF variables are entered as the first block of an hierarchical regression model, and the estSN as the second block, the increase in R² is large and significant. Change in R² = .17, (F (4, 156) = 16.6, (p < .0005). The characteristics and correlation coefficients of the second model are presented in Table 30 and Table 31. Again, the PNB score did not make an independent contribution to the model, while all other IVs did do so. This final model, based on the social drivers of the two theories, explained 58% of the variance in SIS, even without a contribution by the affect or the perceived consequences indices.

Table 30 Characteristics of regression model, DV: SIS, IVs: the four Triandis Social Factors and Fishbein and Ajzen estimate of Subjective Norm (EstSN)

R	R Square	Adjusted R Square	df	F	Sig.
0.77	0.59	0.58	5, 156	45.35	0.001

Table 31 Correlation coefficients for regression model, DV: SIS, IVs Triandis Social Factors and Fishbein and Ajzen estimate of Subjective Norm (EstSN)

IVs	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	5.28	1.44		3.65	0.001
estSN	0.99	0.15	0.41	6.76	0.001
PNB	-0.01	0.08	-0.01	-0.13	0.899
RB	0.08	0.03	0.14	2.45	0.015
IPC	0.24	0.11	0.12	2.10	0.037
SC	0.42	0.07	0.35	5.88	0.001

Dependent Variable: SIS

Demographics

The demographics section of the RIQ2001 included two components that were included for purposes other than to define the demographic profile of the sample groups. The first was a series of items concerning the influence of the rural undergraduate student club, rural mentors and rural attachments on intention to work in the country. These items were analysed and the report was presented as a peer reviewed paper at the 2002 Annual Scientific Convention of the Australian College of Rural and Remote Medicine (ACRRM). (Somers GT & Strasser R, 2002). The second component was a single item asking whether the respondent had changed his/her intention to work in the country over the previous 12 months. Data from this item were used to compare actual and perceived changes in intention. This data was also used to identify the sub-group of respondents who were more likely to exhibit changes in intent. This analysis is not presented in this thesis.

Validity of the RIQ2001.

Test-criterion relationships for the RIQ2001

A regression model was fitted with the Dependent Variable (DV): Situational Intent Score (SIS), and Independent Variables (IVs): the positive and negative affect sub-indices, the family and friends, professional networks and community respect perceived consequences sub-indices, and the four Triandis and one Fishbein and Ajzen social driver sub-indices. This model explained 72% of the variance in SIS (Table 37). All sub-indices except personal normative beliefs (PNB), role beliefs (RB) and interpersonal contracts (IPC) made an independent contribution to the model, that is, they had a semi-partial correlation coefficient $> .05$. The 'community respect' perceived consequences did so only with a significance level: $p = .083$. There was not a problem with collinearity as no scores in the Tolerance column approached zero.

This suggests that the RIQ2001 was a very powerful predictor of SIS, and that almost all of the sub-indices described in this part of the thesis made a significant independent contribution to the instrument.

The instrument was difficult to complete, and lengthy. It lacked parsimony and the 2002 version of the RIQ was designed to test the potential for scale reduction, whilst retaining its strong statistical characteristics. Despite this, the statistical properties of this instrument were similar to those of the RIQ2003, and Section Three discusses the validity and reliability of that instrument.

Generalizability of the RIQ to the final-year cohort.

Introduction

Prior to the 2001 version, RIQ had been tested only on early-year medical students. Sixth-year medical students as well as second-year students completed the RIQ2001. There had been a review of the medical curriculum during the previous six years, so the sixth year cohort had completed a different curriculum to that completed by the second-year students. It was decided to test whether the RIQ2001 was valid for both of these cohorts, different in age, vocational maturity, and medical course attended.

Methods

The data collected during 2001 came from 130 second-year students and 66 sixth-year students. Two methods were used to test for validity generalisation; factor analysis was used to provide evidence based on internal structure, and regression modelling was used to provide evidence based on the test-criterion relationships.

While the sample size was adequate when the whole-group data were analysed, it was borderline for the second-year group, and less than ideal for the final-year group. Nevertheless, analyses were performed as the low sample size resulted in reduced power, that is, there was more a risk of a Type II error than of a Type I error; a negative result was more likely than a

positive result. If, despite this, the groups were found to be similar, evidence in support of validity generalisation across year-groups will have been seen to have been provided.

Results

Principal components analysis (PCA) with varimax rotation and Kaiser normalisation was conducted on the whole-group RIQ2001 data and on the data split by year-groups. The KMO index for all three data sets were adequate, supporting adequacy of the sample, and the Bartlett's tests were all highly significant ($p < .0005$), supporting the sphericity of the data.

The screeplots suggested single factor solutions for all three data sets, however, all three solutions contained three components with an Eigenvalue greater than 1.0. The three component solutions explained 59.1%, 58.2% and 63.5% of the variance in the respective data sets. These are described here to show similarities in the three data sets. The three varimax rotated PCA solutions are presented in Table 32, Table 33 and

Table 34. The three components had the same meaning for all three data sets, and had the same internal structure.

Table 32 PCA (varimax rotation) solution for whole-group data entering all sub-indices identified in the RIQ2001. Loadings $< .3$ suppressed.

sub-indices	positive	respect	family
positive affect	0.82		
PNB	0.72		
IPC	0.71		
SC	0.69		
estSN	0.65		
RB	0.57		
negative affect		-0.92	
respect	0.42	0.55	-0.31
family			0.76
networks			0.67

Table 33 PCA (varimax rotation) solution for year two student data entering all sub-indices identified in the RIQ2001, Loadings $< .4$ suppressed.

sub-indices	positive	respect	family
positive affect	0.80		
PNB	0.78		
IPC	0.72		
SC	0.65		
estSN	0.59		
RB	0.49		
negative affect		-0.89	
respect	0.48	0.53	
family			0.78
networks		-0.42	0.61

Table 34 PCA (varimax rotation) solution for year six student data entering all sub-indices identified in the RIQ2001. Loadings < .4 suppressed

sub-indices	positive	respect	family
positive affect	0.84		
estSN	0.77		
SC	0.77		
IPC	0.71		
PNB	0.64		
RB	0.57	0.47	
negative affect		-0.92	
respect	0.41	0.61	
family			0.76
networks			0.61

Regression models were fitted with SIS as the DV and the sub-indices as the IVs for the three data sets, whole group (n=143), year-two sub-group (n=101) and year-six sub-group (n=41). The model fitted using the whole-group data set was presented in Table 37 and Table 38 on page 126. Apart from the self-concept (SC) component, the Triandis social factors failed to make a significant independent contribution to the model. For statistical reasons (low sample size), it was preferable to minimise the number of IVs, so only SC was entered into the models fitted to the year-two and the year-six data sets. The characteristics of the models and their correlation coefficients are presented in tables Table 35 and Table 36.

The two models had almost identical R and R² values, and these were similar to that of the whole-group model presented in Table 37. This suggests that the three models had similar predictive strength, despite the reduced power resulting from the small sample size in the year-six group.

Table 35 Characteristics of regression models for data split by year group. DV: Situational Intent Score (SIS), IVs: positive and negative affect sub-indices, family and friends, professional networks and community respect perceived consequences sub-indices, the Fishbein and Ajzen estimate of subjective norm and the Triandis self concept sub-index

year group	R	R Square	Adjusted R Square	df	F	Sig.
2	0.86	0.75	0.73	7, 94	39.46	0.001
6	0.87	0.75	0.70	7, 34	14.76	0.001

The sub-indices each made a similar independent contribution in both models, with the exception of professional networks, which was more important for the year-six sub-group, and self concept as a rural doctor and person, which was more important for the second-year students. Both of these differences are plausible. When students have not had a great deal of exposure to rural environments they need to rely more on their global self-concept as a rural person. As students approach graduation, the specific needs of a successful rural life have been better identified and these networks and supports become more important.

Discussion

Internal structure and test-criterion relationships were found to be similar and valid for the two cohorts of students. Validity generalisation does not require the internal structure to perform in an identical fashion for different sub-groups of respondents. Indeed, if it did, the validity of the instrument would be rightly questioned. That differences are plausible, and that similarities are also as expected, supports the validity generalisability of the instrument (Shadish WR et al., 2002)⁹⁷. Such divergence and convergence supports the analysis of the validity of the instrument using the multitrait-multimethod matrix recommended by Campbell and Fiske (Campbell D T & Fiske D W, 1959).

Table 36 Correlation coefficients for the regression models described in Table 35.

Year	IVs	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Year 2	(Constant)	6.86	2.50		2.75	0.007
	affect					
	positive	0.30	0.05	0.43	6.29	0.001
	negative	-0.21	0.07	-0.16	-2.78	0.006
	consequences					
	family	0.14	0.06	0.12	2.13	0.036
	network	0.09	0.05	0.10	1.76	0.082
	respect	0.09	0.07	0.08	1.26	0.213
	social drivers					
	estSN	0.71	0.15	0.30	4.87	0.001
SC	0.25	0.08	0.20	3.11	0.003	
Dependent Variable: SIS						
Year 6	(Constant)	13.78	4.95		2.78	0.009
	affect					
	positive	0.34	0.09	0.51	3.64	0.001
	negative	-0.28	0.13	-0.21	-2.11	0.043
	consequences					
	family	0.09	0.09	0.09	0.93	0.357
	network	0.24	0.10	0.25	2.49	0.018
	respect	0.08	0.14	0.06	0.53	0.597
	social drivers					
	estSN	0.79	0.36	0.31	2.19	0.036
SC	0.15	0.15	0.13	0.98	0.332	
Dependent Variable: SIS						

Although the year-six sample size was technically inadequate to perform rigorous factor analysis or to fit regression models, the consistency of the results presented with both the second year results, and those of the whole group, where sample size was adequate, is reassuring. It would be reasonable to expect that the RIQ 2001 was valid for all Monash medical students.

Validity generalisation of the RIQ in relation to local and international students is discussed in Chapter Thirteen. That discussion supports the validity of the RIQ2003 to international as well as to Australian students. As there is a considerable degree of homogeneity among Australian

⁹⁷ Shadish et al. 2002, p349

medical students produced by overlap in selection criteria, the RIQ is likely to be validly applicable to all Australian medical students.

Comparison of mean scores based on the order in which items were presented.

Introduction

It was possible that items presented earlier in the questionnaire might influence responses to the later items. For example, if positive affect items preceded the negative items, the 'mood' of the respondent may be affected, influencing all other questions, at least in that section. An 'experiment' was set up to investigate the effect of the order of the variables on responses to subsequent variables. This was expanded to also investigate whether there were significant differences in scores according to which year-group students belonged.

One would expect some differences between year groups in scores on items, and in demographics. In this way, convergent and divergent validity could be tested. An earlier analysis of mail-out and class-room responses failed to show differences according to this methodology (see Classroom versus mail out responses on page 103).

Methods

Two versions of the 2001 RIQ had been distributed to the second year students during class. They were identical in formatting and content, except that the questions were presented in a different order within the indices for the two versions. The order of the indices was the same in both formats. There were 79 responses in Format A, and 51 in Format B. Some students returned them at the end of the class, and some over the following two weeks.

The final-year students had all received their surveys by mail, and returned them by mail. They had all completed the same version of the questionnaire. There were 66 responses from the final-year students.

One-way between-groups analysis of variance (ANOVA) was performed to investigate the impact of the order of the questions and the influence of year-group membership on scores. The three groups were: year-two Format A (n=79), year-two Format B (n=51) and year-six Format A (n=66).

Every item in the indices and the demographics section (n=167) was analysed separately. The risk of a Type I error from such a large number of analyses was very high. In order to reduce this risk the statistical significance alpha for the ANOVA was set at .003, a value that was still likely to result in some Type I error. This was preferable to missing any real differences.

Results

Only thirteen of the 167 items were found to be significantly different according to group membership, at the .003 level. These are listed in Table 39. Of these, only three differences were due to differences in Format A and Format B responses by year-two students (numbers 1-

3). In the first of these items, 'consequences likelihood 04', year-two responses to Format A were different to year 6 responses to Format A, while the year-six responses were not significantly different to the year-two Format B group. This was also the case for the fourth item, 'referent importance 07.'

The remaining nine differences according to group membership detected by this ANOVA were in items in which all year-two students (Format A and Format B) scored differently to the year-six group, but not differently to each other.

Discussion

Although the alpha was set at a high value for an ANOVA with this number of tests, only three items were found to be different when they could have been expected to be the same, had not the order of items played a part. Nine items were not differently scored by format type, although they were different according to year-group. In the last three of these, 'age', 'membership of rural club', and 'have GP mentor', these differences were expected. The year-six students should be four years older than the year-two students, and this difference was found in both year-two groups. They also had had greater access to GP mentors and to the rural club than the second-year students had. These results support the generalisability of the RIQ2001 based on convergent and discriminant evidence.

Summary of Chapter Eight

This chapter presented the analysis of the reliability, and the structure and construct validity of each of the sub-indices in the RIQ2001. It affirmed the value of the PANAS descriptors in the Affect index, and identified the strongest of these. Similar to the RIQ2000, the personal consequences index had three components, personal, professional networks and community. This chapter also included a comparison of the Triandis social factors and the Fishbein and Ajzen subjective norm. This analysis concluded that it was useful to include a single item estimate of subjective norm in the instrument in addition to the Triandis social factor constructs. The validity of the instrument was again tested. The construct validity of the instrument was again good. The indices explained 72% of the variance of a regression model fitted with SIS2001 as the DV, and the indices as IVs.

A comparison of results from sixth-year students who underwent a different curriculum and results from second-year students found the instrument to be equally valid for the two groups. The order of the items in the questionnaire was varied for a part of the cohort (including both year-groups). The mean scores for the items in the two formats were found to be substantially the same. The RIQ2001 was found to be long and cumbersome by many of the respondent, so a shorter version was desirable. Chapter Nine of this thesis outlines the reduction of the instrument from one with 165 items to one consisting of 29 items, the RIQ2003. Section Three will present the evaluation of that briefer instrument.

Table 37 Characteristics of regression model fitted with DV: Situational Intent Score (SIS) and IVs: positive and negative affect sub-indices, family and friends, professional networks and community respect perceived consequences sub-indices, and the four Triandis and one Fishbein and Ajzen social driver sub-indices.

R	R Square	Adjusted R Square	df	F	Sig.
0.86	0.74	0.72	10, 133	37.12	0.001

Table 38 Correlation coefficients for regression model described in Table 37.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients			Zero-order R	Correlations			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.		Partial R	Semi-partial R	Tolerance	VIF	
(Constant)	8.04	2.40		3.35	0.001						
affect											
positive	0.28	0.04	0.41	6.45	0.001	0.72	0.49	0.29	0.49	2.03	
negative	-0.22	0.07	-0.17	-3.28	0.001	-0.34	-0.27	-0.15	0.77	1.30	
consequences											
family	0.12	0.05	0.11	2.26	0.025	0.34	0.19	0.10	0.83	1.21	
network	0.13	0.05	0.14	2.82	0.006	-0.12	0.24	0.13	0.83	1.21	
respect	0.11	0.06	0.10	1.75	0.083	0.46	0.15	0.08	0.62	1.61	
social drivers											
PNB	0.00	0.07	0.00	-0.03	0.977	-0.01	0.00	0.00	0.92	1.08	
RB	0.01	0.03	0.02	0.31	0.758	0.42	0.03	0.01	0.71	1.41	
IPC	0.05	0.10	0.03	0.50	0.620	0.47	0.04	0.02	0.70	1.43	
SC	0.22	0.07	0.18	3.10	0.002	0.61	0.26	0.14	0.58	1.72	
estSN	0.71	0.14	0.29	5.19	0.001	0.65	0.41	0.23	0.62	1.61	

Dependent Variable: SIS

Table 39 One-way between-groups analysis of variance to determine the influence of format/year group membership

number	item description (Format A)	F	df	p	format 1	format 2	diff (2-1)	Std Error	p
1	consequences likelihood 04	10.2	2, 193	0.001	A	B	-1.03	0.25	0.001
					A	3	-0.77	0.23	0.003
2	consequences likelihood 12	5.9	2, 194	0.003	A	B	-1.30	0.38	0.002
3	consequences likelihood 30	6.5	2, 193	0.002	A	B	-0.99	0.29	0.002
4	referent importance 07	6.4	2, 194	0.002	A	3	1.88	0.52	0.001
5	consequences likelihood 18	10.0	2, 193	0.001	A	3	-1.39	0.39	0.001
					B	3	-1.75	0.43	0.001
6	consequences likelihood 29	6.2	2, 193	0.002	A	3	-0.80	0.27	0.011
					B	3	-0.78	0.25	0.005
7	consequences likelihood 35	8.5	2, 192	0.001	A	3	-1.00	0.32	0.006
					B	3	-1.36	0.35	0.001
8	consequences importance 19	8.4	2, 193	0.001	A	3	-0.90	0.29	0.006
					B	3	-1.25	0.32	0.001
9	referent importance 04	7.1	2, 194	0.001	A	3	1.88	0.63	0.009
					B	3	2.42	0.70	0.002
10	role belief 04	10.4	2, 193	0.001	A	3	2.00	0.50	0.001
					B	3	2.10	0.55	0.001
11	age	76.0	2, 190	0.001	A	3	-4.55	0.39	0.001
					B	3	-3.78	0.43	0.001
12	membership rural club	26.8	2, 190	0.001	A	3	-0.42	0.07	0.001
					B	3	-0.56	0.08	0.001
13	have GP mentor	8.9	2, 189	0.001	A	3	-0.22	0.08	0.016
					B	3	-0.36	0.09	0.001

Chapter Nine

Development of the final instrument (RIQ2003)

Introduction to Chapter Nine

The previous chapters in this section have described the characteristics of the 2001 RIQ. It was shown to be a very powerful predictor of the Situational Intent Score (SIS), explaining over 70% of the variance in that score. The indices and sub-indices were found to be meaningful and to contribute to the prediction of rural intention.

The 2001 version of the questionnaire contained 166 items, excluding those relating to the SIS. This caused some resistance from respondents and this reluctance would be multiplied when repeated measurement was required. It was therefore necessary to reduce the size of the instrument, and this was achieved by choosing the items that functioned best in the RIQ2001. The 2002 version was changed little to form the 2003 version, and six items of the first version of the RIQ2003 were changed after the first survey in 2003.

The structure of the instrument remained the same, with indices seeking to estimate affect, consequences and social drivers. The scale design had been shown to be effective, so this did not require refinement, although the strength of the terms used as end-points for scales were adjusted according to the direction of any skewed responses. All measures were converted to ten-point Likert-type scales. While open-ended feedback items were included in the 2002 version, these were excluded from the 2003 version.

The RIQ2002

Introduction

In 2002, the then first-year students completed the questionnaire before and after a rural rotation (see Section Four), and third-year students were asked to complete it at the same two times for comparison. This section describes the selection of items for the 2002 version.

Intention

Students described some confusion with the response format of the intention section of the 2001 RIQ. An attempt was made to simplify this, and to concentrate purely on rural intent as the gold standard. In the process, the items measuring intention to seek additional undergraduate or postgraduate training were deleted. Although the availability of undergraduate intent for the second-years, and post-graduate intent for the final-years in the 2001 RIQ enabled the SIS to be used in the analysis of the 2001 RIQ, it was not until 2003 that the importance of an index to estimate a gold standard was fully appreciated (see Chapter Ten).

Therefore, a pure rural intent item was devised for the 2002 RIQ. It acknowledged the fact that some students had no intent to work in the country, and sought to measure the strength of this intention, as well as that of the pro-rural students. It was planned that the former would indicate no intention to work in the country, and would go on to respond to a question seeking to measure the strength of this. The students with some rural intent would answer an alternative question measuring their strength of intention. These two scales could be joined to form a composite variable for intention including all students. That is, pro-urban students would be allocated negative values for their scores, and pro-rural students would be allocated positive scores.

What was not expected was that about one-third of the students completed both scales in the first survey (pre-rotation) and over half did so post-rotation. Subsequently, a group of students was asked to complete a questionnaire relating to this, and most replied that they felt that the two items were not mutually exclusive. Analysis of the 2002 data became problematic without a clear gold-standard.

The wording of the 2003 RIQ rural intent items was strengthened, and no effort was made to make them mutually exclusive. Instead of asking about intention to work in the country, the two questions, to be answered by all students, asked about the intention to work in the country and the intention to work only in the city. This approach was supported by Fishbein and Ajzen who wrote,

...in a situation that involves a choice between two alternatives, better predictions can be obtained by measuring the difference between intentions concerning each of the two alternatives than by considering either alternative individually (Ajzen I & Fishbein M, 1980)⁹⁸

An item was included in the 2003 version to test whether the meanings of the rural intent questions in the RIQ2003 were 'equal and opposite versions of the same question,' and 2/3 of students responded that they were not. This supported the retention of both items in the instrument.

Additional items were included to enable the development of an intent index. These included questions about intention to generalise, and to seek additional undergraduate rural experience. As is discussed in Chapter Ten, three gold standards were developed using these three items as well as years spent in the country as a child, and perceived ease of living and working in the country.

Affect

The 20 affect items suggested by the PANAS scale were very powerful, and displayed strong internal consistency. The best-performing items from the 2001 data were selected to form an index consisting of three positive and six negative items. One item, 'alert' was changed to 'apprehensive' as this was more likely to reflect its true meaning in this application⁹⁹.

⁹⁸ Ajzen 1980, p 118

⁹⁹ See Improvements to the affect index for the 2002 RIQ on page 111

Perceived consequences

Hierarchical regression and repeated internal consistency analyses informed the selection of the best performing consequences items. These did cover a broad range of topics, and represented all of the components identified in the PCA solution of the 2001 data.

Several students suggested the need for a 'cultural needs' item, and this was included. The 'preferred environment' item appeared to dominate. It may have measured too broad a construct, so it was reduced to 'physical' environment. Items were aggregated to enable reduction in the numbers of items yet retention of maximum issue coverage. In this process, special care was taken to avoid double-barrelled questions.

Social drivers

Analysis of both the RIQ2000 and the RIQ2001 showed the Fishbein and Ajzen single-item estimate of subjective norm (EstSN) to be as powerful as an index based on a series of individual referents. The 2002 and 2003 versions did not contain the evaluated referents sub-index. They did, however, seek to strengthen the estimate of subjective norm by adding an evaluative component to this single-item, testing how much influence referents had on decision-making. This evaluative component of the estimate of subjective norm was subsequently not found to add value to the instrument (see Chapter Eight).

Demographics

The demographics section was further reduced to the core questions. The global perceived ease of living and working in the country (self-efficacy) item was placed here, at the end of the questionnaire. It was desirable that all of the issues raised in the RIQ should have been considered prior to answering this question. The 2002 version contained the item seeking a self assessment of changed intent over the previous year, but this was removed from the 2003 version, as it had not contributed in analyses of earlier versions.

The RIQ2003

Introduction

The development of the instrument was an iterative process, and in order to develop the best possible instrument, changes were necessary. Although an effort was made not to change the instrument unnecessarily during this longitudinal study, it was, at times, necessary to sacrifice some of the consistency between versions for the sake of the improvement of the instrument.

The two versions of the instrument used in 2002 (Surveys 1a and 1b) were identical (see Chapter Fourteen). A significant revision of the instrument was undertaken at the end of 2002 (between Surveys 1b and 2a). Several relatively minor changes were made after first of the four 2003 surveys (between Surveys 2a and 2b). Apart from the inclusion in Survey 2d of the question, "Which Rotation did you just complete? Urban/Rural," the last three of the 2003 surveys (Surveys 2b, 2c and 2d) were identical to each other.

The major revision after Survey 1b

There was a major revision of the survey at the end of 2002. Whereas many of the questions in the 2002 surveys asked purely about attitudes toward a rural career or lifestyle, there was a fundamental change to most items in the 2003 version. The 2003 versions asked respondents to compare a rural outcome with the urban alternative. In order to maintain consistency between the behaviour, behavioural intent, the attitudes and the beliefs (Ajzen I & Fishbein M, 1980),¹⁰⁰ changes to both the Situational Intent questions and the belief items were necessary to reflect this alternative-choice approach.

Intention

- The 2002 version asked respondents to declare whether they intended an 'urban-only' career or whether their intention was 'possibly rural'. It then went on to seek the strength of intention for this urban-only group on an urban intention item, and the strength of intention of the possibly-rural group, on its own rural intention item. This limited the number of valid responses, and prevented the production of a scale incorporating both items. The rural intent items were reworded in 2003, so that each item would be validly answered by all students, and that a combination variable would be valid. In order to achieve this, the changes to the rural intention item were not as great as changes to the urban intention item.
- Q3 was included to gauge whether the two rural intent items were seen by respondents to belong to the same domain or not.
- Q4 was included to measure GP intent.
- Q5 (Surveys 2b, 2c, 2d only) was included to measure intention to seek extra undergraduate rural exposure.
- Ease (Section 5 Q11) changed from "how difficult would...be" to "how easy..."

Affect

- Instead of merely measuring affect toward working in the country, the stem sentence was altered to include "rather than in the city"

Perceived consequences

- Apart from Q9 (cultural needs) all of the 'likelihood' items were changed to reflect differences between urban and rural, rather than just the likelihood of finding such a consequence in the country.
- All of the 'importance' items were changed to emphasise "in your decision-making."
- A new item was included to measure the perceived consequence, 'autonomy.'

¹⁰⁰ Ajzen 1980, p58

Social drivers

- The items were re-ordered so that the powerful 'social referents' item (B9) was no longer the first item in this section, as it may then have influenced responses to subsequent items.
- Two new items (B3: self-concept, liking a challenge, and B4: understanding the issues) were introduced.
- The interpersonal agreement item (B5) was more strongly worded
- The personal normative belief items (B6, B7) were less strongly worded

The minor revision after Survey 2a

The changes made to the instrument between Survey 2a and Survey 2b were not likely to have influenced the results of this study, but are listed here for completeness:

- The Urban/Rural Rotation item was included in Surveys 2b and 2d to identify which rotation the student had just completed.
- Q5, the Undergraduate Intention item, was introduced (2b, 2c, 2d only).
- The first page of the questionnaire was reformatted slightly to allow these inclusions.
- Section 4 Question B9 (referent approval) had two changes:
 - As the scale had "disapprove strongly" on the left and "approve strongly" on the right, the wording of the question was changed from "approve/disapprove" to "disapprove/approve" in order to reduce the risk of response error.
 - The mid-point of the scale (between the arrows marking "just approve" and "just disapprove") was accidentally shifted from 5.5 to 6 during printing.
- Section 5 Question Y11 (ease) had the extremes reversed with "extremely easy" on the right, consistent with the rewording of the question carried out after Survey 1b, in order to minimise the risk of response error.

Apart from the changes to Question B9, these changes were considered unlikely to influence the consistency of the surveys.

Summary of Section Two

Section Two of the thesis discussed the development and evaluation of an instrument designed to measure attitudinal change through the analysis of a changing belief system. It presented the development of the instrument from the collection of items through to the evaluation of a long version (RIQ2001). As the RIQ was to be used repeatedly on the same students over several years, a 'user-friendly' version was required. While such a version would be more easily completed, and hence aid the return rate, it should retain the strong construct and predictive qualities found in the RIQ2001.

The next section of the thesis presents the evaluation of the final (short) version of the instrument, the RIQ2003. The development of the Situational Expectation Score (SES) and the SIS will be discussed in the next chapter.

SECTION THREE

Characteristics of the Rural Intent Questionnaire

Introduction to Section Three

The four chapters in the third section of this thesis present the characteristics of the instrument using data collected from 530 of the 604 medical students (88% response rate) in the early years of the medical course at Monash University in 2003. The development of the instrument was described in Section Two.

Chapter Ten: outlines the development and evaluation of a 'gold standard' against which the Rural Intent Questionnaire (RIQ2003) can be tested. This gold standard, the Situational Expectation Score (SES) was found to be a strong predictor for stated rural intent. It was considered to be less subject to social desirability bias than stated rural intent.

Chapter Eleven: examines the internal characteristics of the three indices that comprise the RIQ2003: affect, perceived consequences and social drivers, and their strength of association with this gold standard, the SES.

Chapter Twelve: tests a series of hypotheses that question the reliability and validity of the RIQ2003 instrument as a whole. It also looks at the interrelationships between the component sub-indices of the instrument.

Chapter Thirteen: offers a detailed discussion on the validity of the RIQ2003 presented according to the guidelines recommended in the Standards for Educational and Psychological Testing (American Educational Research Association et al., 1999). This chapter also discusses the relationship between the variables proposed by Fishbein and Ajzen, and those proposed by Triandis.

Chapter Ten

Gold standards – SES and SIS

Introduction to Chapter Ten

The instrument presented in this thesis was designed to aid the identification of students likely to work in a rural environment and to monitor career development with respect to choosing a rural career. As has been outlined in Chapter Three, it is based on intention. It is possible to simply ask for a respondent's intention. Two such items form the Rural Intent score (RI) and have been included in the Rural Intent Questionnaire (RIQ). It is likely, however, that responses to these items may be unreliable, especially if there are advantages to the students to overstate their intention. One such advantage is access to medical school places reserved for candidates with rural intent¹⁰¹.

A reliable gold standard for 'intention to work in a rural environment,' against which the RIQ instrument could be tested was required. This chapter presents the development of such a gold standard. In addition to RI, four variables associated with rural career choice in the literature were studied. These were:

- the intention to become a generalist (GP) (Rabinowitz, Diamond, Hojat et al., 1999),
- intention to seek additional rural undergraduate placements (UG), (Rolfe et al., 1995),
- perceived ease (Ease) with which such a choice could be carried out, a measure of efficacy and perceived behavioural control (Ajzen, 2002; A Bandura, 1997),
- years of rural upbringing (YR) (Rabinowitz, Diamond, Hojat et al., 1999).

Items were devised to measure these variables, and these four measures were combined to form the 'gucy' score, a name based for convenience on the acronym of the four variables. A fifth item, rural intent (RI) was a direct measure of stated rural intention. The gucy score was tested against this direct measure with a view to forming an estimate of rural career likelihood, the Situational Expectation Score (SES), which would then comprise the five variables, including RI.

As years of rural upbringing and to a lesser extent, intention to generalise are relatively constant over the medium term, a second scale, the Situational Intent Score (SIS) was tested. This consisted only of stated rural intent, intention to seek additional undergraduate rural experience, and perceived ease of rural living. The SIS was considered to be a better estimate of intention to choose a rural career, and therefore a better gold standard against which to test the RIQ2003.

¹⁰¹ The Australian Government has recently funded 234 such medical school places.

This chapter of the thesis examines these two scales and the characteristics of the variables that comprise them.

Predictors of a rural career choice

Currently, the most widely accepted predictor of becoming a rural doctor after stated intention, is rural origin; that is, having been brought up in the country. Definitions of rural origin vary in what are considered acceptable duration and timing. Other definitions accept the subjective 'sense of rural background.'

A third influence on a future rural career is the intention to generalise or specialise. The vast majority of rural doctors in Australia are general practitioners, albeit that 24% do have a specialist procedural skill such as obstetrics, anaesthetics or surgery¹⁰². As specialists tend to treat less common conditions, their practices usually depend upon large population bases, precluding rural practice. So an intention to specialise is likely to make a rural career less likely. A fourth factor is the interest students show in training in a rural environment. This experience is often more 'hands-on', or experiential, with more 'one-on-one' instruction, often with a more personalised clinical mentoring. Patients are more accessible, as there are less students vying for their attention. As there is a recognised desire on the part of both rural preceptors and rural patients to nurture the return of the student after graduation, students are usually made to feel more valued in a rural setting. For these reasons, undergraduate and postgraduate training in a rural setting has been popular among students with urban intent as well as among those an interest in returning to the country. So, while it may seem most appropriate for students with rural intent to undertake rural training, the opportunities described above lead to a broader appeal of such training. An intention to undertake rural training of itself then, may not reflect an intention to eventually practise in a rural environment.

Finally, a fifth factor if interest is self-efficacy or the perceived ease of living and working in a rural environment. Decision making is based on the perceived consequences of that decision in terms of social, emotive and cognitive outcomes (Ajzen I & Fishbein M, 1980; Triandis H, 1977). The anticipated consequences of one's rural career choice are dependent on how well one believes s/he will perform (A Bandura, 1997)¹⁰³ and how much control s/he believes s/he has in carrying out the act (Ajzen, 2002). These issues are discussed in detail in Chapter Eighteen.

Preview of abbreviations used in this chapter

SES: Situational Expectation Score. This is considered an estimate of the likelihood that someone will choose to work in a rural environment. It comprises the five variables

¹⁰² Susan Stratigos, Policy Officer Rural Doctors Association of Australia, at the Health Services Policy and Research Conference, Melbourne. 2003.

¹⁰³ Bandura 1996, p21

associated with eventual rural career choice discussed in the previous section. If this estimate is reliable, it will accurately predict which students are likely to choose a rural career. This likelihood should be relatively stable over the years. It includes:

(RI) stated rural intent, (rural intent less urban intent)

(GP) intention to become a general practitioner, $((\log_{10})$ generalist intent less specialist intent)

(UG) intention to seek additional undergraduate rural experience,

(Ease) perceived ease of being a rural doctor, and

(YR) Years Rural, the number of years spent in a rural environment (divided by four).

SIS: Situational Intent Score. Although closely related to the SES, the estimate of the *likelihood of a rural outcome*, the SIS is an estimate of the more variable and changeable *intention to choose a rural career*. It therefore comprises the three more changeable intention/self-efficacy variables of the SES, namely RI, UG, and Ease and does not include the more constant YR and GP components. As an estimate of stated intention, the SIS is more likely to be affected by programs designed to influence rural career choice. The SES, on the other hand, is buffered by years of rural upbringing (YR) and intention to become a generalist (GP), both of which are less subject to change.

The "guy" score: This is used in the development of the SES, using RI as the gold standard. It therefore consists of the SES variables less RI, namely, GP, UG, Ease and YR. It is an acronym of these variables.

The "eu" score: This is used to evaluate the SIS against the gold standard RI. It consists of the SIS variables less RI, namely, Ease and UG.

RIQ2003: The Rural Intent Questionnaire, 2003 version. The suffix 2003 refers to the version of the RIQ being discussed.

RB: Rural Background refers to whether the respondent *feels* they have a rural background, regardless of the number of years that they have spent in the country.

Developing a gold standard

Introduction

A 'gold standard' is required for the analysis of the validity of an instrument. This chapter describes the development of a gold standard against which to test the Rural Intent Questionnaire (RIQ2003).

As discussed above, obtaining a 'true score' for rural intention can be problematical. This construct, as it is difficult to measure directly, may be considered a latent variable. Classical measurement theory holds that a scale of items, each of which is related to the latent variable, can be used to provide a reliable estimate of the magnitude of that latent variable (DeVellis RF,

1991)¹⁰⁴. The Situational Expectation Score (SES) is such a scale that seeks to estimate the likelihood of choosing a rural career based on five items that have been found in the literature to be related to such a choice: stated rural intent (RI), intention to become a general practitioner (GP), intention to seek additional undergraduate rural experience (UG), perceived ease of being a rural doctor (Ease), and the number of years spent in a rural environment (YR).

The evaluation of a scale involves an assessment of its structure, reliability and validity. The analytic techniques required for these assessments were discussed in Chapter Four, but will be very briefly reviewed here.

The structure of a scale can be determined through the process of principal components analysis (PCA). This technique reveals which variables within the scale "hang together" better. That is, whether there are subsets of items within the scale that correlate together, but not necessarily with other items.

The reliability of the scale is a reflection of its measurement error. The more its variables correlate with each other, the more they are considered to correlate with the construct they measure, and the less is the error. This is usually measured through the Cronbach alpha coefficient.

Finally, the validity of a scale relates to whether it measures what it purports to measure. An instrument may be highly reliable, but may not be measuring the construct of interest. It is then not valid. Therefore, the strength of association between the instrument and a gold standard, often determined through regression modelling, informs on the (construct) validity of the instrument.

The following section of the thesis uses these analytic techniques to examine the characteristics of a scale designed to estimate rural intention and likelihood, for the purpose of developing a gold standard against which to test the RIQ2003.

Methods

During 2004, all 604 medical students in the first, second and fourth years of the undergraduate entry medical course at Monash University were asked to complete the Rural Intent Questionnaire (RIQ). Of these, 530 (88%) provided useable responses. Of these respondents, 131 were full fee-paying international students, and 399 (89% response rate) were local students. Five international and three local students were subsequently found to be multivariate outliers and data from these eight students have been excluded from the following analyses.

The intentions of the international students were likely to be under the influence of different drivers to those of the local students. For example, many had a legal obligation to work in rural areas, and the socio-cultural determinants of a rural career choice were likely to be different. This study acknowledged the difficulty associated with these differences, and looked at the cohorts both individually and together, to test the validity of treating them as a single population.

¹⁰⁴ DeVellis 1991 p12ff

Results 1: The items

Definition, distributions and transformation of the variables used in the development of the gold standards

The five variables discussed in the introduction to this chapter as predictors of choosing a rural career were all available in the RIQ2003. The characteristics of data collected on these five variables will be examined prior to a discussion on the development and evaluation of the scale that will serve as a gold standard against which to test the RIQ2003.

Rural intent (RI)

Rural intent (RI) was defined in this study as the intention to work in any place outside the capital cities and their metropolitan suburbs for a period of more than 6 months at any stage after completion of all undergraduate and postgraduate training. RI was measured on two items each with a 10-point scale from zero to nine. The first item asked how strongly the respondent intended to work 'only' in the city, and the second asked how strongly the student intended to work 'for any period' in the country, as defined above. While these questions may seem intuitively to be equal and opposite, only 56.1% of students believed them to have "different meanings." Therefore, the scores for these two situational intent items were subtracted, resulting in a range of 18 with -9 indicating a strong intention to stay only in the city, and +9, a strong intention to work for some time in the country. This variable had a reasonably normal distribution (mean: -.77, standard deviation (SD): 3.8, skewness: .205, kurtosis: -.398).

Rural origin or 'Years rural' (YR)

Two different items measured rural origin. The first asked whether the student felt s/he had a 'rural background' (RB) with a yes/no response option. Overall 31.8% felt they had a rural background, (36% of the internationals, and 30.5% of the locals). The second item asked how many years the respondent had lived in a rural environment. The majority of respondents (58.5%) answered zero years and the remainder had a wide responses range of 0.5 to 23 (one older student his YR reduced from 27 to the next lowest score, 23). In order to reduce the range to one similar to the other variables, this score was divided by 4 to produce the non-normal variable: YR (mean: 1.23, standard deviation (SD): 1.8, skewness: 1.106, kurtosis: -.512). Due to the large numbers with zero years, and a moderate loading at the upper end of the scale (17-19 years), transformation did not improve this distribution.

GP intent (GP)

Five items contributed to a scale of GP intent. Respondents were asked to allocate a percentage likelihood of becoming each of the following: specialist, GP, GP with an interest such as obstetrics, academic/researcher, or other (Table 1). A ratio of GP to non-GP likelihood was calculated by dividing the sum of the percentages of the two GP items by the sum of the percentages of the three non-GP items. So, a score of 1.0 equated to an equal likelihood of

generalising or specialising. This score had a highly skewed distribution and was converted, for statistical reasons, to a far more normal distribution by \log_{10} transformation (mean: -.85, standard deviation (SD): 1.6, skewness: -.121, kurtosis: .226). As 10^0 equals 1.0, the neutral point on this index was zero. This score was multiplied by two to form the variable: GP, with a range similar to the other variables.

Undergraduate intent (UG)

A single item asked respondents to indicate their intention to seek undergraduate rural experience on a scale from 0 to 9. This was annotated, so that 0 was "none", 1 was "as little as possible", 4 was "~6months" 7 was "12 months" and 9 was "as much as possible". The School of Rural Health seeks to deliver half of the three-year undergraduate clinical training in a rural environment, that is, 18 months, to 25% of the student cohort. Some students may intend to seek more than 18 months, so a score of 10 may mean more than 18 months for them. This may limit the linearity of the scale, but the data were reasonably normally distributed (mean: 4.28, standard deviation (SD):2.3, skewness: .318, kurtosis: -.522).

Ease of living and working in the country (Ease)

Perceived ease of living and working in the country was measured on a 10-point scale ranging from extremely easy (+5) to extremely difficult (-5). Albeit with some kurtosis, this variable also had an acceptable distribution (mean: .26, standard deviation (SD):2.6, skewness: -.207, kurtosis: -1.116).

Results 2: The scales

Exploratory principal components analysis

Analysis performed during the development of the RIQ and presented in Section Two of this thesis, found five variables to correlate strongly with rural intention (see Chapters Six and Eight). These were: rural intent, rural origin, general practice or specialist intent, intention to gain additional rural undergraduate experience and perceived ease, or self-efficacy. The construction of these variables and their characteristics are described in the following section.

Preliminary principal components analysis was performed, including these five variables and the remaining 41 variables in the RIQ. This was to confirm that these five variables were interrelated, and when considered in the context of the other variables of the instrument, loaded onto a single factor; one that described rural intention. While Principal Components Analysis (PCA) revealed 10 factors with an Eigenvalue greater than 1.0, explaining 60.3% of the total variance, the two strongest factors explained over half of this. When all 46 variables were 'forced' into these two factors, and varimax rotation with Kaiser normalization was undertaken, their meanings could be interpreted as being 'positive' and 'negative' towards a rural career. The five variables discussed above loaded onto the positive first factor. Rural intent (RI) was the index variable for the total cohort, the local cohort, and the international cohort. The

remaining four variables loaded in the same order for the three cohorts, with years rural (YR) and GP intent (GP) loading very weakly for the international cohort (see Table 40). This chapter studies the value of using a scale consisting of these five variables as an estimate of rural intention.

Table 40 Preliminary principal components analysis: all items (n=46) forced into 2 factors, Positive, Negative. (Varimax rotation with Kaiser normalisation).

Total variance explained		Total	Local	International
Factor				
Positive	Eigenvalue	10.46	10.90	9.12
	% total variance explained	22.50	23.76	19.80
Negative	Eigenvalue	4.52	4.31	5.28
	% total variance explained	9.80	9.36	11.50
Both	% total variance explained	32.30	33.10	31.20

Table 41 Loadings of intention variables onto the positive component identified when all 46 variables were included. The remaining variables are not shown in this table.

Variable	Total	Cohort	
		Local	International
RI (index variable)	0.809	0.830	0.796
Ease	0.738	0.748	0.735
UG	0.697	0.718	0.693
YR	0.433	0.474	0.235
GP	0.410	0.467	0.125

There is little doubt that students with a rural background are more likely to have an intention to return to the country. The variable 'years rural' (YR) was studied in some detail, to determine how many years of rural upbringing are required for this influence, and how this variable can best be utilized to predict rural intention. The variable, 'rural intent' (RI) will be used as the 'gold standard' against which to measure the remaining four variables. As a scale, or index, is likely to be a more reliable measure than a single variable, a scale comprising a combination of these four variables will be tested for its sensitivity and specificity as a test of rural intent (RI) and the results will be compared with those of 'years rural' and a sense of rural background (RB).

Relationships between the variables

Regression modelling provides information on the strength of association between two variables (the Pearson product-moment correlation coefficient) as well as the slope gradient (unstandardised beta value). These are tabulated for the variables under discussion in Table 42.

The effect size for the Pearson correlation coefficient as suggested by Cohen is:

- a) $0.1 < r < .29$ small
- b) $0.3 < r < .49$ moderate
- c) $0.5 < r < 1.0$ large.

An equivalent value applies to negative values (Cohen, 1988). The correlation coefficient was stronger for locals in all cases, but was not significant for the international cohort for the two relationships involving GP intent. For them GP intent did not seem linked to rural intent, and years rural was not significantly associated with GP intent. While the latter relationship was also weaker for locals, local students did strongly associate becoming a GP with working in the country. It is possible that the concept of general practice may not have been the same for international students as it was for local students.

Table 42 Relationships between the variables making up the gvey scale, and rural intent: results from regression modelling.

DV	IV	Cohort	Pearson Correlation Coefficient (R)	Unstandardised B	significance
Rural intent	GP intent	internationals	0.06	ns	ns
		locals	0.47	1.10	0.0005
Rural intent	UG intent	internationals	0.65	0.82	0.0005
		locals	0.69	1.23	0.0005
Rural intent	Ease	internationals	0.59	0.68	0.0005
		locals	0.68	1.00	0.0005
Rural intent	Years rural	internationals	0.32	0.53	0.001
		locals	0.50	1.06	0.0005
GP intent	Years rural	internationals	0.06	ns	ns
		locals	0.12	0.11	0.022

Regression modelling

Whole cohort

A regression model, with RI as the dependent variable (DV) and YR, UG, GP, and Ease as the independent variables (IVs) was fitted. For the whole cohort (n=522) the model had an adjusted R^2 of 0.638 ($p < .001$), suggesting that over 60% of the variance in RI could be explained by the variance in these four variables (Table 43). Analysis of the residuals revealed that the assumptions of normality, linearity, and homoscedasticity of the residuals had not been violated. Each of the four independent variables had a highly significant ($p < .001$) standardised Beta value within the range of .196 to .386. Each also had a similar level of unique variance; the semi-partial correlations ranged from .185 to .304). Analysis of the collinearity diagnostics revealed no multi-collinearity. This suggested that each of the four variables contributed independently, and at a similar level, to the variance of RI. As described above, in order to have variables with equivalent ranges, the years spent in a rural environment (YR) had been divided by four and GP intent (GP) had been doubled. This did not affect the regression results except that the unstandardised Beta values now fell within a similar range for each independent variable so that the relativity of their influence in the proposed combined scale would be improved (see Table 50 on page 163 for a full description of the coefficients).

Local cohort

Using data from the local students, the model had an adjusted R^2 of 0.667 ($p < .001$), suggesting that, for this cohort, two-thirds (66.7%) of the variance in RI could be explained by these four variables (Table 43). For the locals, each of the four independent variables had a highly significant ($p < .001$) standardised Beta value within the range of .232 to .360 (Table 50). Each also had a similar level of unique variance (semi-partial correlations ranged from .211, to .274). The unique contribution of each variable to R^2 is the square of the semi-partial correlation. So, for YR, the semi-partial correlation = .211, and the unique contribution to R^2 is .045; 4.5% of the variance in RI is explained uniquely by YR after all the other variables have been accounted for. The total unique variance of the four IVs is .213 (or 21.3%) leaving $.667 - .213 = .454$, or 45.4 % of the explained variance as being shared (or 'overlap'). Again, there was no evidence of multi-collinearity. This suggested that for this cohort each of the four variables contributed independently, and at a similar level, toward the variance in RI explained by the scale.

Table 43 Regression model summary: rural intent and the four gey variables: international and local students.

	R	R Square	Adjusted R Square	Std. Error of the Estimate	F (degrees of freedom)	Sig.
whole cohort	0.801	0.641	0.638	2.308	203.0 (4, 455)	0.0005
international	0.735	0.540	0.522	1.896	30.5 (4, 104)	0.0005
local	0.819	0.671	0.667	2.355	176.3 (4, 346)	0.0005

Predictors: (Constant), Years rural/4, GP intent, UG intent, Ease
Dependent Variable: Rural intent

International cohort

For the international students the adjusted R^2 was a lower, but still respectable, .522. Regression modelling for the international students revealed that GP intent did not contribute to the variance of rural intent for this cohort, and years of rural experience during childhood contributed only weakly (see Table 50 on page 163).

Principal components analysis

Whole cohort

Principal Components Analysis PCA was performed on the five variables of the SES scale, RI score, GP, UG, Ease, YR. Sphericity was adequate and KMO test was .719. A single factor with an Eigenvalue = 2.75, explained 55.0% of the total variance. RI was the index variable and the order of strength of the remaining variables was: Ease, UG, YR, and then GP. This suggested that the underlying factor was singular, and was likely to relate most closely with the index variable, RI.

When the four variables of the 'guey' scale, YR, UG, GP, and Ease were analysed, similar results were found. Sampling adequacy and sphericity were confirmed with the KMO (.655) and Bartlett's ($p < .001$) tests respectively. Only one component had an Eigenvalue greater than one (2.02) and scree plot analysis confirmed the presence of a single factor. This explained 50.4% of

the variance produced by the four variables, of which Ease loaded most heavily. The order of strength of association of the variables with the component after Ease was: UG, YR, and then GP.

GP was a weak contributor, so RI, UG, Ease, and YR were assessed. A single factor (Eigenvalue 2.57) explained 64.2% of the total variance. The component matrix was: RI: .895, Ease: .837, UG: .818, YR: .631.

When RI, Ease and UG were analysed, a single factor was identified (Eigenvalue 2.28), explaining 76.1% of total variance. The component matrix was: RI: .897, UG: .866, Ease: .853. These three variables would later form the Situational Intention Score (SIS).

Local cohort

When principal components analysis (PCA) was performed on the five variables of the SES scale using data from the local cohort, sampling adequacy and sphericity were again confirmed with the KMO (.655) and Bartlett's tests respectively. Only one component had an Eigenvalue greater than one (2.86) and scree plot analysis confirmed a single factor. This explained 57.1% of the variance produced by the five variables, of which RI loaded most heavily. As was the case with the whole cohort, the order of strength of association of variables with the component after RI was: Ease, UG, YR, GP.

When the remaining 4 variables were analysed without RI, similar results were found: KMO = .661; single factor; Eigenvalue = 2.10; Total variance explained = 52.4%; order of strength; Ease, UG, YR, GP. This suggested that the underlying factor was singular, and was likely to relate most closely with the index variable, RI.

As GP was the weakest contributor to the factor, and was problematic for the international cohort (see next subsection), the four variables: RI, UG, Ease and YR were considered. A single factor was identified (Eigenvalue 2.63) which explained 65.8% of the total variance.

When the three SIS variables (RI, UG and Ease) were analysed, a strong single factor (Eigenvalue 2.32, total variance explained = 77.4%) was identified.

International cohort

Principal components analysis (PCA) of data from the international students revealed a single factor when all five variables were included (Eigenvalue: 2.34, total variance explained: 46.8%). Its make-up was similar to that for the local students but with negligible loading (0.169) from GP intent.

Indeed, the strongest factor resulting from principal components analysis of the GP, UG, Ease and YR variables had an Eigenvalue of 1.70 and explained only 42.4% of the total variance. GP contributed little.

When RI, UG, Ease and YR were considered, a single factor (Eigenvalue 2.32) explained 58.1% of the total variance.

A single strong factor (Eigenvalue 2.15, total variance explained = 71.7%) was identified when only the SIS variables, RI, UG and Ease were included in the analysis.

Internal consistency

Whole cohort

Reliability analysis was performed on the five variables of the SES scale. The Cronbach's alpha coefficient was found to be .79 (n=446). Exclusion of the RI variable reduced the standardised alpha of the remaining scale to a barely acceptable value of .68. The corrected item-total correlations were lower for GP at .36, and YR at .44 than the other three variables (.69 to .81) and removal of both of the weaker variables improved the alpha for the SIS scale to .82. A scale consisting of RI, UG, Ease and YR had an alpha of .80. This suggested that the scale measured the underlying factor(s) with an acceptably low measurement error, and that inclusion of GP increased this error.

Local cohort

Reliability analysis was performed on the five variables (RI, GP, UG, Ease, YR) and the Cronbach's alpha coefficient was found to be .81 (n=343). Exclusion of the RI variable reduced the standardised alpha of the remaining 'gucy' scale (four variables) to a still acceptable value of .71. The corrected item-total correlations were again lower for GP at .41, and YR at .46 than the other three variables (.70 to .83). Removal of both weak variables, leaving RI, UG and Ease (the SIS scale) improved the alpha to .83. A scale consisting of RI, UG, Ease and YR had an alpha of .76.

International cohort

Alpha for a scale with all five variables for the international students was .71 and this reduced to an unacceptable .53 without RI. It improved with removal of the weaker two variables. When GP was removed, alpha = .76, and without both GP and YR, leaving the SIS scale, the alpha was .80.

Results 3: Performance of the scales

Rural origin and rural intent

Scale characteristics

Figure 7 is a scatterplot of the years spent in a rural environment (years rural) and the stated rural intent (RI) for the whole cohort. Although each mark on a scatterplot may represent more than one response, a weak tendency for a direct correlation is evident on the graphs. Regression modelling found the Pearson correlation coefficient = .46 (R^2 of .210, $F(1,514)=136.9$; $p < .001$). This suggests a moderate but highly significant strength of association between years rural and rural intent (Cohen, 1988).

The other feature of interest in Graph 1 is the distribution of markers according to the sense of rural background (RB). It can be seen that an arbitrary dotted line at 5 years rural separates almost all those with a sense of rural background from those who declare no such feeling. Of the combined cohort of 521 responses, only nine students with less than five years rural living considered themselves rural and only eleven with more than 5 years rural considered themselves not to be so. An additional 12 students had lived 5 years in the country.

Discriminant validity

As the distribution of YR was not normal, crosstabulation was performed and bar graphs were prepared to analyse the ability of years rural to predict rural intent for local students (Figure 8) and international students (Figure 9). In both cohorts, students with no rural background at all (no hatching) dominated the strong urban intent block, and were progressively less likely to be found in the other two groups. The reverse was seen for local students with greater than 15 years rural living (double hatched), but not so for the international students. The two remaining columns described in the legend (single hatched) represent (a) students with less than 5 years rural living, and almost all of these denied a sense of rural background, and (b) students with 5-15 years rural living, almost all of whom claimed a rural background.

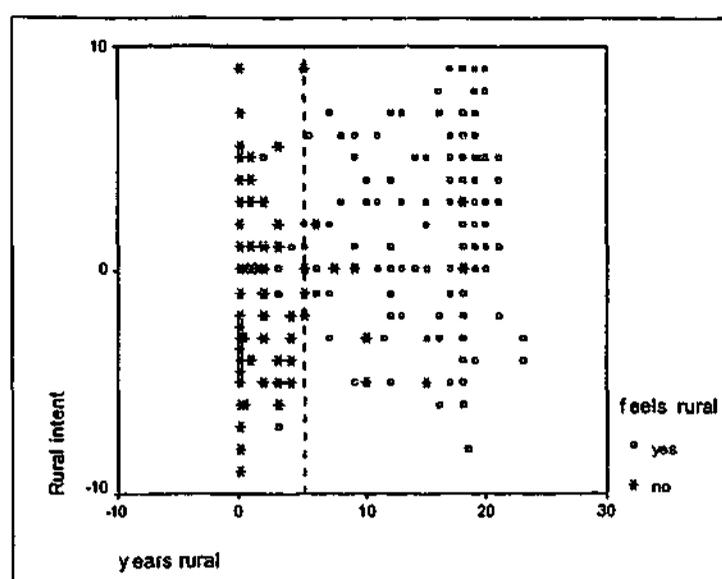


Figure 7 Sense of rural background (RB): years rural (YR) and rural intent (RI). Markers are by the sense of having a rural background (feels rural). The reference line at years rural = 5 separates those with and without a sense of rural background: all students

In the local cohort, both of these groups performed similarly, and varied little across the three levels of rural intent (Figure 8). So, for local students, only the two extreme categories of YR (zero years and 15+ years) were predictive of rural intent. It may be possible that the group of local students with 15+ years of rural living had an increased number of facilitated-entry rural students. These rural students gain easier entry to the selection process because they are deemed more likely to return to a rural area. Students with a sense of rural background in the 1 year to 14 years rural cohort were evenly spread among the three RI groups.

For international students, the absence of any rural living predicted an increased likelihood to not work in the country, but a rural background seemed not to be predictive of rural intent (Figure 9). This may have been a function of the small numbers on international students with a strong rural intent (n=11).

Because there seemed no advantage to splitting the 0.5 to 15 years rural living group, the 'years rural' variable was converted to three categories (zero, up to 15 years, and more than 15 years). When local and international students are considered together the expected trend for the greater than 15 years group to be more likely to consider a rural career is evident. The group with no years of rural living appear to prefer an urban choice. It is possible that more of the 0.5 to 14 years group fell into the neutral RI group (Figure 10).

The 'guy' score and rural intent

Scale characteristics

The 'guy' score was computed for 460 respondents by adding the scores for GP, UG, Ease and YR. The guy scale had a normal distribution (mean=4.8; SD=6.3; range=30.77;-9.46 to 21.3; skewness=.178; kurtosis=-.471). A scatterplot was produced to test the relationship between the guy scale and rural intent (Figure 11). This relationship was found to be linear, and simple regression modelling found the strength of the relationship to be large with the Pearson correlation coefficient = .792 ($R^2=.626$; $F(1, 450)=754.8$; $p < .001$) (see Table 44 and Table 45). The guy score had a better distribution and correlation with rural intent than years rural (Figure 7 and Figure 11). This continuous variable was reduced to a variable with three categories, each with an approximately equal number of responses in order to test its ability to discriminate between levels of rural intent. A high or strong guy score was expected to indicate a high rural intent, and a low, or weak guy score, a strong urban intent.

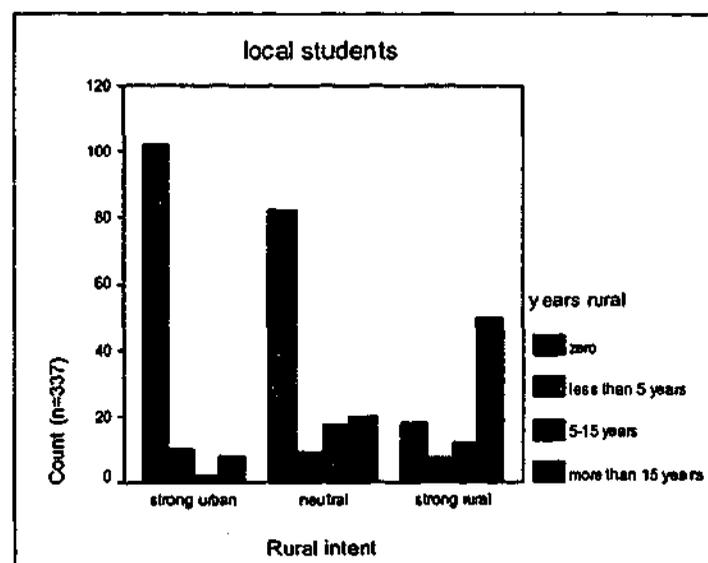


Figure 8 Rural intent and years lived in a rural environment (years rural): local students

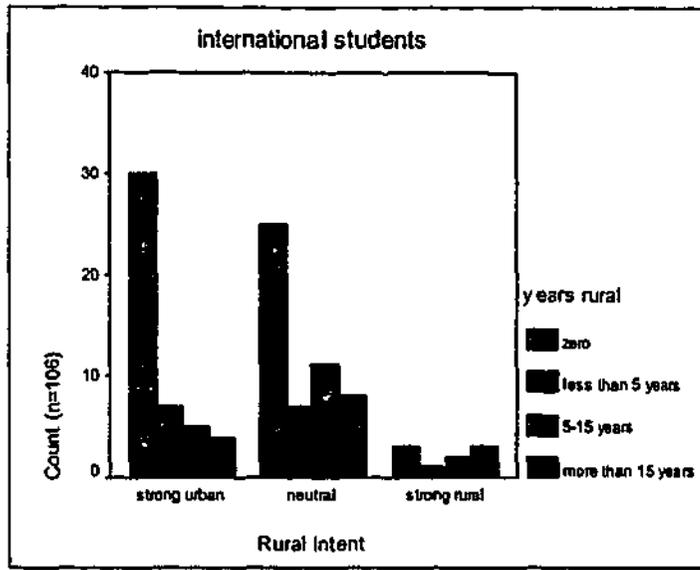


Figure 9 Rural intent and years lived in a rural environment (years rural): international students

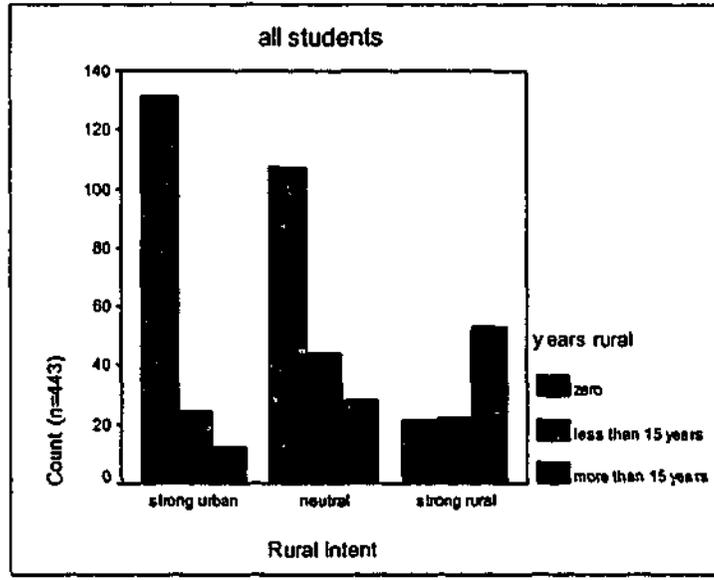


Figure 10 Years rural in three categories and rural intent for all students

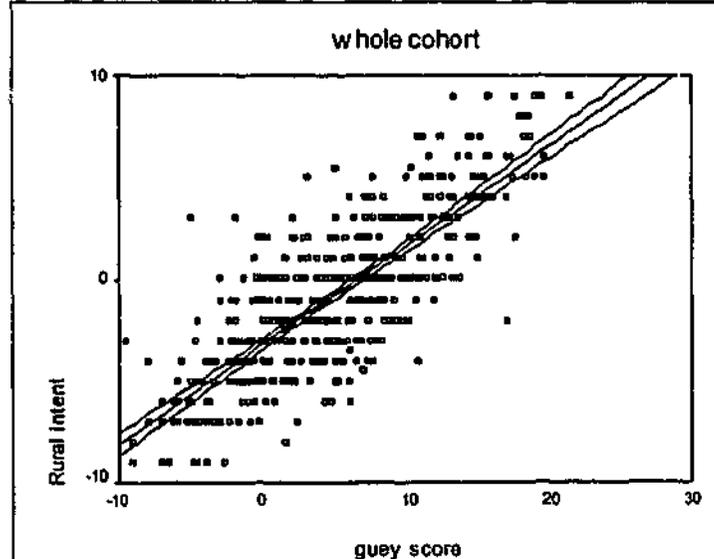


Figure 11 Scatterplot of rural intent and guy score for the whole cohort with 95% confidence limits for means

Table 44 Model summary. Regression model: DV rural intent, IV: guey score

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F (degrees of freedom)	Sig.
all	0.792	0.626	0.626	2.347	754.7 (1, 450)	0.001
international	0.587	0.344	0.338	2.254	55.1 (1, 105)	0.001
local	0.826	0.683	0.682	2.305	739.2 (1, 343)	0.001

Predictors: (Constant), guey score

Dependent Variable: Rural intent

Table 45 Coefficients table: DV Rural intent, IV guey score, for whole cohort, and for cohort split by international/local status.

Cohort		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
whole cohort	(Constant)	-3.115	.140		-22.271	.001
	guey	.485	.018	.792	27.473	.001
international	(Constant)	-2.894	.284		-10.210	.001
	guey	.317	.043	.587	7.425	.001
local	(Constant)	-3.104	.157		-19.808	.001
	guey	.514	.019	.826	27.190	.001

Dependent Variable: Rural intent

Discriminant validity

The 3-category guey score was cross tabulated against rural intent for local and international students and for the combined cohort (Figure 12, Figure 13 and Figure 14). The guey scale included more variables than years rural and was therefore expected to perform better than years rural alone. For the local students the predictive trends for a strong guey score and for a weak guey score were as hypothesised. These seemed to perform better for both locals and international students than years rural had done. In particular, the specificity of both high and low guey scores was strong; very few students with a low guey score had a strong rural intent (none in the local cohort), and very few with a high guey score had a strong urban intent.

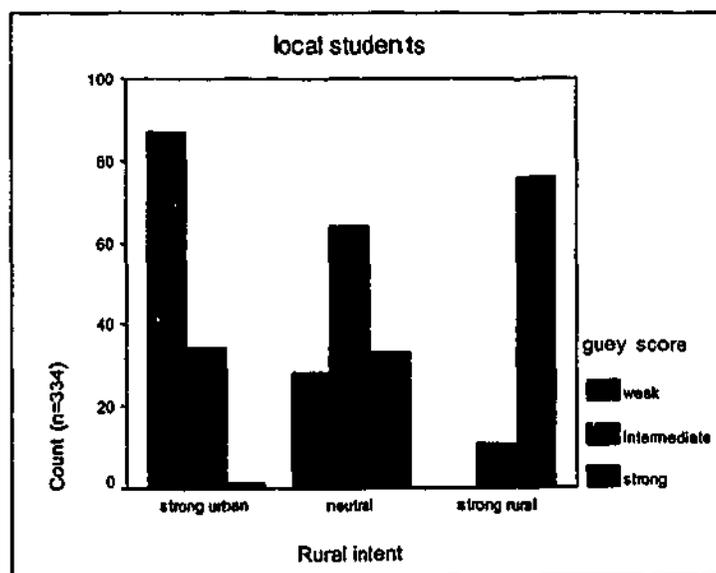


Figure 12 Guey score in three categories and rural intent for local students

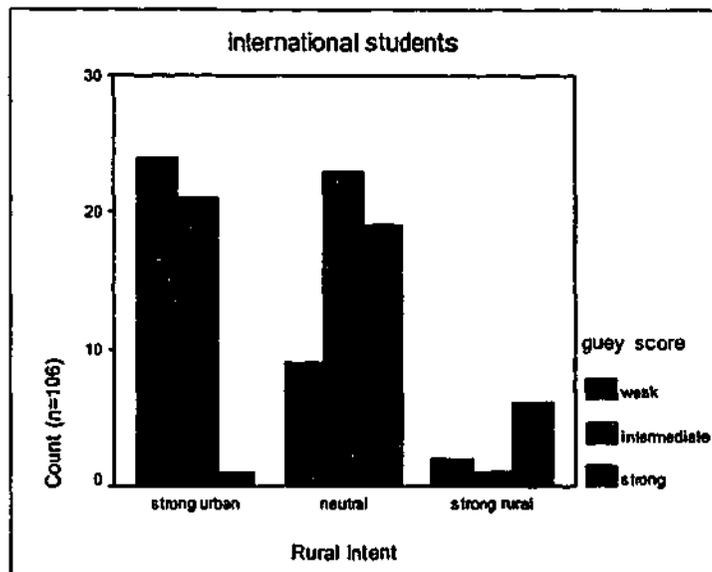


Figure 13 Guey score in three categories and rural intent for international students

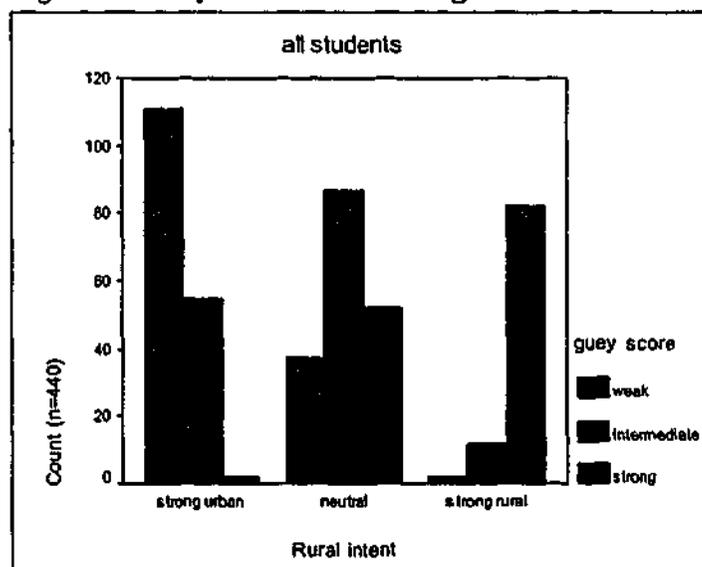


Figure 14 Guey score in three categories and rural intent for the whole cohort

International students and volitional control

As the majority of international students are funded by their governments, and most have an obligation to serve in a rural area on their return home, it is possible that local students have a greater volitional control over a rural career choice. A local exception may be those students with an Australian Medical Rural Bonded Scholarship. There are 16 of these in the 'local' cohort. While 7 of these students have zero years of rural upbringing, the guey/RI pattern is, within the limitations of the small sample size, more like that of the broader local cohort than that of the international cohort. All the strong guey scores fell in the strong rural intent group and relatively fewer of the intermediate guey scores fell in the strong urban group (Figure 15).

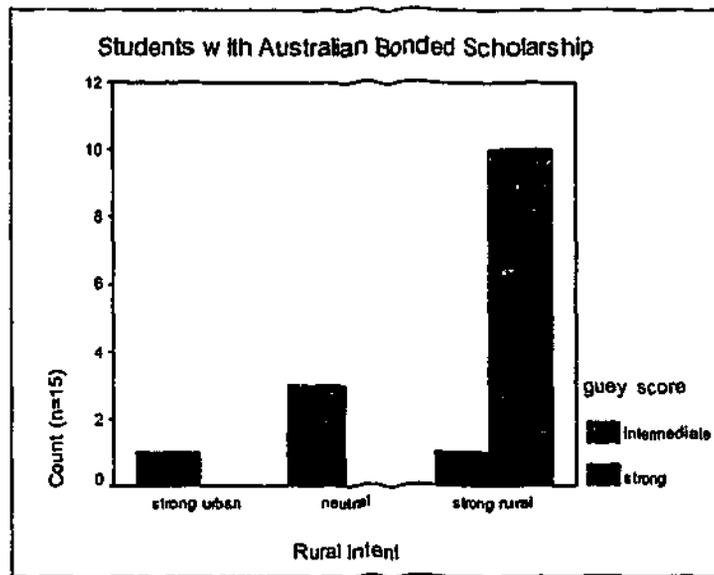


Figure 15 Years rural in three categories and rural intent for Australian bonded scholars.
 A shortened scale excluding GP and YR was developed, consisting only of Ease and UG, as these were the strongest variables common to both cohorts. Figure 16 shows how low, medium and high scorers in the 'eu' scale fared on RI. Both locals and internationals, as expected, had similar patterns of responses to that of the combined cohort. Strong discrimination between high and low scorers can be identified, and the intermediate scorers were mostly placed in the neutral RI category.

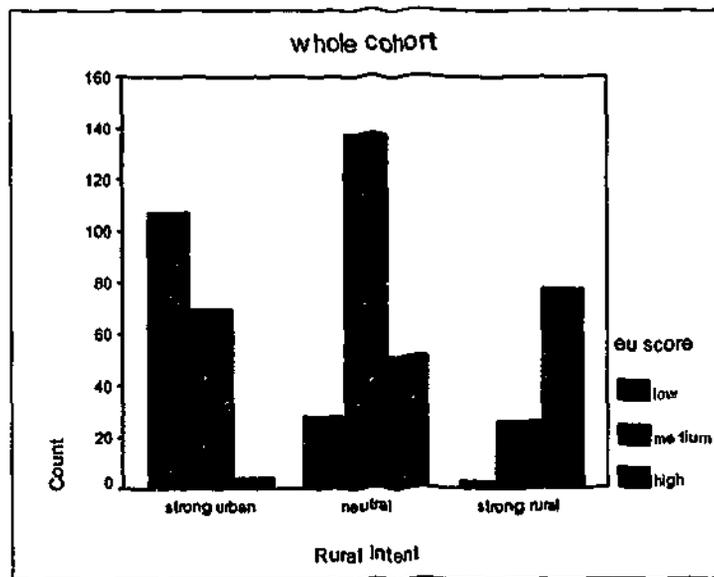


Figure 16 Eu score in three categories and Rural Intent for the whole cohort
 The eu score was compared to the full Situational Expectation Score (SES), comprising not only all the guey variables, but also Rural Intent. Figure 17 shows that eu was a very good approximation for the SES, with the greatest number by far falling into the expected categories, and with only members of the 'medium' categories in either scale crossing over to adjacent categories. The same pattern occurred when the whole cohort was divided by international/local status.

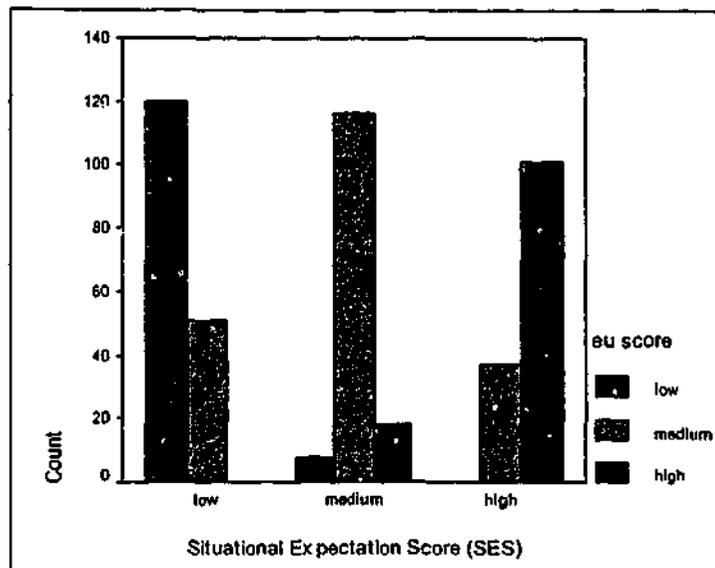


Figure 17 Eu score in three categories and the Situational Expectation Score: whole cohort

Results 4: Test characteristics

2X2 table format

Diagnostic tests are often described in terms of their sensitivity and specificity. A strong performance on these indicators adds to the predictive and construct validity of tests. Other descriptors used in such studies include positive and negative predictive values and likelihood ratios of a positive test, or of a negative test. These terms will be explained before they are applied to the three main 'tests' for rural intent, namely the gvey score (low, neutral or high), years rural (YR) (divided into 'zero', 'up to 15 years' and 'over 15 years') and a sense of rural background (RB).

Many tests have a positive or a negative result, predicting the presence or absence of a condition. These are usually described in a 2X2 table format such as that depicted in Figure 18. Here the true positives are in cell a and the true negatives are in cell d. False positives (an incorrect positive test) are in cell b and false negatives (an incorrect negative test) are in cell c. Table 46 defines the terms commonly used to describe the attributes of a diagnostic test, and uses the nomenclature of Figure 18 to provide formulae to calculate the various descriptors.

		Condition		
		present	absent	total
Test result	positive	a	b	a+b
	negative	c	d	c+d
	total	a+c	b+d	a+b+c+d

Figure 18 Typical 2X2 table format to describe test characteristics.

Table 46 Definitions of terms describing characteristics of a test. The formulae refer to the cells in Figure 18 Typical 2X2 table format to describe test characteristics.

Term	Definition	Formula
sensitivity	the ability of the test to detect the true positives	$a/(a+c)$
specificity	the ability of the test to detect the true negatives	$d/(d+b)$
positive predictive value	the probability that a positive test result is correct	$a/(a+b)$
negative predictive value	the probability that a negative test result is correct	$d/(d+c)$
Likelihood ratios positive test	the ratio of: the proportion of present that are predicted positive, over the proportion of absent predicted positive	$\frac{a/(a+c)}{b/(b+d)}$ equals $\frac{\text{sensitivity}}{1-\text{specificity}}$
negative test	the ratio of: the proportion of present that are predicted negative, over the proportion of absent predicted negative	$\frac{c/(a+c)}{d/(b+d)}$ equals $\frac{1-\text{sensitivity}}{\text{specificity}}$

Results of the 2X2 table analysis

The 2X2 format demanded a dichotomous test result and a dichotomous condition. It precluded full consideration of those with an undecided rural intent, and those with an intermediate test result. It was possible to use these descriptors to describe the three tests. Two outcomes (conditions) were considered. The first was whether there was a rural or an urban outcome, with a positive test in the high (pro-rural) category, and a negative test in the low (pro-urban) category. Partial analysis was also made of a second outcome, namely whether the student is neutral/undecided or not. Characteristics of such tests for international and for local students are presented in Table 47. The sensitivity and specificity of the guey scale were almost perfect, and this was reflected the graphical depiction of the data in Figure 12, where very few high scores on guey were in the lowest RI category, and no low guey scorers were in the strong rural intent category.

Table 47 Characteristics of tests of rural intent based on a sense of rural background, years rural and the guey scale a 2X2 table format.

	Measure				
	guey		years rural (0, 15+)		feels rural
	rural	undecided	rural	undecided	rural
local students					
sensitivity	1.00	0.51	0.74	0.20	0.93
specificity	0.99		0.93		0.70
pos predictive value	0.99	0.59	0.86	0.46	0.81
neg predictive value	1.00		0.85		0.87
correct/total	0.68		0.53		0.52
international students					
sensitivity	0.75	0.45	0.50	0.35	0.80
specificity	0.96		0.88		0.56
pos predictive value	0.86	0.51	0.43	0.55	0.90
neg predictive value	0.92		0.91		0.36
correct/total	0.50		0.48		0.40

The ability to detect a truly undecided person (specificity) and the likelihood of a mid-range score actually being undecided on the RI measure were closer to 50% for the three tests. Whereas, for almost all other tests, the local cohort had higher scores, local undecided students were less easy to predict than their international counterparts. The final information in Table 47 was the correct/total figure. This gave the number of true positives, true negatives plus true 'undecideds' divided by the total number in the respective local or international cohort. This was the "proportion of correct placements."

3X3 table format

Such powerful results reflect the ability of the guey score to differentiate between strong rural intent and strong urban intent. It could be argued that such a differentiation was not really so difficult, nor very useful. The purpose of the test was to identify strong rural intent *ipso facto*, not relative to strong urban intent. How powerful then, were these tests in the identification of strong rural intent students and of strong urban intent students? Another important instrument characteristic for workforce and education planning is to be able to predict the students who were undecided, that is, who had a neutral attitude towards a rural career. It seems likely that resources devoted to these students during undergraduate training would be more effective than if they were used on committed rural or urban students.

Figure 19 therefore depicts a 3X3 table format, which was used to better describe these three tests in terms of absolute prediction rather than prediction relative to an opposite extreme. The calculation of the characteristics of tests from a 3X3 format was more complicated, as the choice of which cells to include would influence the result. Both guey and years rural can consist of three separate tests; a test for strong rural intent, a test for strong urban intent and a test for a neutral position. These tests can have a positive result or a negative result for each of the three outcomes tested. RB can only test for the former two as it did not have an 'uncertain' option.

		Rural intent			
		strong rural	neutral	strong urban	Total
Test (guey, YR, RB)	high	a	b	c	M
	neutral	d	e	f	N
	low	g	h		O
	Total	P	Q	R	Z

Figure 19 A 3X3 table to describe the characteristics of the tests: guey and years rural. Sense of rural background (RB) is described without the Test - neutral row.

Consider, then, a test for strong rural intent. Cell "a" in Figure 19 represented the number of students who had a high (pro rural choice) test result, and who also had a strong rural intent. These represent the "true positive" result. Similarly, cell "h" represented the "true positives" for strong urban intent, and cell "e" for the undecided group. "True negatives" for strong rural intent were those predicted by the test *not* to be strong positives, that is, those who scored low or neutral, *and* who did not have strong rural intent (i.e. cells e, f, g and h). Similarly, cells a, b,

d and e represented "true negatives" for the strong urban intent/low-test combination, and a, c, f and h for the undecided group. In the test to determine strong rural intent (i.e. expecting a high response category), false positives were in cells f and g, and false negatives were in cells c and d.

Results of the 3X3 table analysis

Scores on guey, years rural and a sense of rural background were evaluated using the techniques used to assess the characteristics of diagnostic tests, including analyses for sensitivity, specificity, positive and negative predictive value, and likelihood ratios of positive test result, and of a negative test result. Only the correct/total score or the proportion of correct placements from Table 47 was the same. This item considered the sum of the true positives and the total response count, neither of which had altered. Results of these tests for both local and for international students are presented in Table 48.

The predictive capacity of almost all tests was greater for local students than for the international cohort. Tests with high sensitivity are able to rule out those without the condition under study, while those with high specificity can rule in those with it. For example, consider the prediction of a strong rural intent, the second column for all three 'tests'. Sensitivity told how well a negative (low) score identified those without rural intent. A low guey score (sensitivity = .89) was better able to rule out those without rural intent than either years rural (.57) or 'feels rural' (.70).

Specificity meant how well those with a high rural intent could be predicted by a positive (high) test score. A high guey score (specificity = .86) was about as predictive for those with a high rural intent grouping as a high years rural (.89) and a positive sense of rural background (.83).

Positive predictive value was the probability that the condition was present if the test was positive. This tested the proportion of students with a high score result that actually did have high rural intent. The guey score may be marginally better than the other two tests. Negative predictive value was the probability that a negative (low) test score reflected a low rural intent score. Again, the guey score was a little better than the other two tests.

Explanations of the meaning of the likelihood ratios for positive tests and of the likelihood ratios for negative tests are filled with double negatives. The positive likelihood ratio refers to the positive test, and is the ratio of two likelihoods: the proportion of positives (strong rural intent) that are detected as true positives (high score); and the proportion of negatives (no strong rural intent) that are incorrectly called positives (high score) (see Table 46). The negative likelihood ratio refers to the negative test and is the ratio of the proportion of positives (strong rural intent) incorrectly called negatives (low score) over the proportion of negatives (not strong rural intent) that are true negatives (low score). The likelihood ratios take into account the number of cases in each condition, and are a better indicator when there are uneven numbers in the cohorts.

A good test, then, has a high positive likelihood ratio and a low negative likelihood ratio. Indeed, in the prediction of strong rural intent, the guey score had good likelihood ratios, being 6.35

times more likely to be correct than incorrect when it scores highly, and 0.15 times as likely that a low guey score will be *incorrect*. The rural background (RB) test (.17) outperformed the guey score (.33) on the likelihood ratio of a negative test result for strong urban intent (Table 48). This meant that, in testing for urban intent, the likelihood of an incorrect low score on guey was twice as great as the likelihood of an incorrect low score for RB.

Discussion 1: Choice of variables for the SES and the SIS scales to estimate rural situational likelihood and intention

Situational Expectation Score (SES)

As predicted by the literature, all four 'guey' variables (GP, UG, Ease and YR) made independent contributions to the model when data from the whole group and from the local cohort were used (Table 50). The papers cited in the introduction to this chapter suggested that these variables would be associated with career choice outcome. In this chapter their association with stated rural intent (RI) was tested and found to be strong. As intention is a strong predictor of behaviour, this association was also expected. If intention is strongly associated with outcome and the four 'guey' variables are associated with outcome, then, consistent with classical measurement theory, intention should be related to the 'guey' variables (DeVellis RF, 1991). Conversely, the SES, comprising all five variables, should be associated with rural career choice. Therefore, the SES was chosen as the scale to estimate this behavioural expectation.

Situational Intention Score (SIS)

The RIQ2003 was designed to evaluate the effectiveness of programs designed to influence rural career choice. It does this by estimating changes in intention. This assumes, therefore, that there is a change in intention associated with these programs. A gold standard against which to test such an instrument would also need to be sensitive to changes. The SES, as described above, contains two variables that are relatively stable over the medium term. These are: years rural (YR) and intention to become a general practitioner, and there are therefore theoretical grounds to question their usefulness in a scale designed to measure changes in rural intention.

From the above analyses, it was also apparent that while GP and YR were good predictors of rural intent, they were not as strong, particularly for the international cohort. In order to test the value of YR, a regression model was fitted with RI as the dependent variable and UG and Ease as the independent variables. Hierarchical regression was carried out for the local and the international cohort data, by adding YR to this model. The results are presented in Table 51 on page 164.

Table 48 Characteristics of tests of rural intent based on a sense of rural background, years rural and the guey scale for a 3X3 table format.

local students	guey			years rural (0, 15+) (YR)			feels rural (RB)	
	Urban intent	Rural intent	Undecided	Urban intent	Rural intent	Undecided	Urban intent	Rural intent
sensitivity	0.71	0.87	0.51	0.84	0.57	0.20	0.93	0.70
specificity	0.87	0.86	0.78	0.53	0.89	0.85	0.44	0.83
pos predictive value	0.76	0.69	0.59	0.50	0.64	0.46	0.48	0.59
neg predictive value	0.84	0.95	0.73	0.85	0.86	0.64	0.91	0.89
correct/total		0.68			0.53			0.52
Likelihood ratio (pos)	5.40	6.35	2.38	1.80	5.13	1.37	1.65	4.17
Likelihood ratio (neg)	0.33	0.15	0.62	0.31	0.48	0.94	0.17	0.36
international students								
sensitivity	0.52	0.67	0.45	0.65	0.33	0.35	0.80	0.56
specificity	0.82	0.79	0.60	0.53	0.88	0.73	0.45	0.68
pos predictive value	0.69	0.23	0.51	0.52	0.20	0.55	0.53	0.14
neg predictive value	0.69	0.96	0.54	0.67	0.93	0.55	0.75	0.94
correct/total		0.51			0.48			0.40
Likelihood ratio (pos)	2.85	3.23	1.13	1.40	2.69	1.29	1.46	1.74
Likelihood ratio (neg)	0.59	0.42	0.92	0.65	0.76	0.89	0.43	0.65

The addition of YR to the model that included Ease and UG, resulted in a statistically significant R^2 change of 0.04 ($p < .001$) in the local cohort. The change of 0.014 in the international cohort just failed to reach significance ($p=.07$). These represent a 4.4% and a 1.4% increase respectively in the explanation of the variance in rural intent (RI). This analysis suggests that most of the variance in RI seen in data from the individual cohorts can be predicted from Ease and UG alone.

Internal consistency was greatest for both cohorts when only the three SIS variables were included: RI, UG and Ease. These three variables formed a strong single factor for both cohorts. The power of the 'eu score' to predict RI category and SES category was also found to be strong (see Figure 16 and Figure 17). Therefore, for theoretical and statistical reasons, these three variables, RI, UG and Ease were chosen to form a scale, the Situational Intent Score (SIS), to estimate true rural intent,

Discussion 2: Usefulness of the SES- a gender analysis

Introduction

There is little doubt that currently, the vast majority of rural medical practitioners are male (Carter, 1987; Strasser R et al., 1997). Some researchers have found that females are more likely to take up a generalist career than males (Kassebaum et al., 1996), and rural doctors tend, for logistic reasons, largely to be generalists. There is little evidence in the literature; however, to show that this translates to a greater likelihood that females will practise in the country. Indeed, a recent study found a lack of gender influence on rural intention (Woloschuk & Tarrant, 2002). While this may be considered a negative finding, it may also be considered a move away from the currently observed male dominance of rural practice. A swing will have occurred, not only if the number of females exceeds the number of males, but also if the number of males no longer exceeds the number of females entering rural practice.

Methods

The SES score was calculated for the 452 students who provided sufficient data to calculate the SES. Three SES groups, each with similar numbers, were formed when students were split at scores of -.33 and 8.33. These were named strong urban (less than -.33), strong rural (above 8.33) and neutral. Chi square tests were performed on the cross tables of SES group by sex.

Results

The mean SES was significantly greater for females than males (student's t (1 degree of freedom) = 2.38, $p < .05$), suggesting that females in this cohort were more likely, on average, to take up a rural career than the males. Means, standard deviations and numbers of respondents are presented in Table 49.

Table 49 Means numbers and standard deviations of Situational Expectation Scores (SES) for males and females.

sex	N	Mean	Std. Deviation
male	162	2.54	9.62
female	290	4.79	9.62

The cross-tabulation between SES sub-group and sex is represented graphically in Figure 20. The graph shows that there were equivalent numbers of females in each of the three SES sub-groups, but that the males were progressively less likely to be members of the more pro-rural subgroups. (χ^2 (1 degree of freedom) = 9.31, $p < .005$).

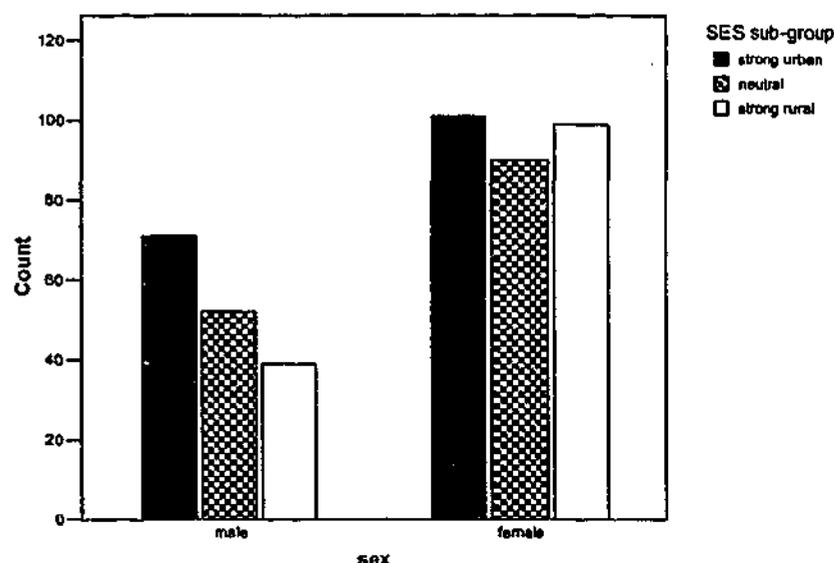


Figure 20 Graph of cross tabulation of sex against SES group.

Discussion

While this study confirmed that females were more likely to choose a rural career than males, it has shown that this was more because males tended to choose not to have a rural career rather than because females actively seek a rural career over an urban career. That is, males tended to be more pro-urban than pro-rural, whereas females tended to be evenly divided into the three SES groups.

One of the major issues in rural general practice is that there are insufficient 'procedural' GPs. A procedural GP may be defined as one who carries out procedures usually the preserve of specialists in urban areas, such as obstetrics, anaesthetics and operative surgery. Due to the paucity of specialists in the country, a supply of GPs capable of, and willing to perform these duties, is essential for the provision of services to rural hospitals.

With the decline in the number of rural procedural GPs, rural general practice may be seen to be more 'office-based.' As the rural "superdoc" image, that is, the rural GP who did everything, may have been unattractive for females, this may be one of the reasons that rural general practice is becoming more attractive to female graduates. This may increase the number of rural

medical practitioners, but raises questions as to whether the procedural GP problem will be thus addressed. Further study, using the SES, may reveal whether those males and females who have a high SES score are more likely to intend to practise procedural medicine.

Discussion 3: Stability of the SES sub-groups

Introduction

The SES contains several variables that fluctuate little. These include years spent in the country during childhood, and the intention to become either a GP or a specialist. If the SES is truly an estimate of likelihood to choose a rural career, and this likelihood is known to vary for many students, the stability of SES required to be tested.

Methods

The data necessary to calculate the SES were obtained on three occasions throughout this year-long study. These formed a part of the controlled, crossover trial on the students who were in second year in 2003, and which is the subject of Section Four. There was an interval of six months between the first and last of these. In order to assess the stability of the SES over this relatively short time-frame, a comparison of SES subgroups calculated from these data was made. One hundred and twenty-seven (127) students provided adequate data to calculate the SES at both times. Students were split evenly into three SES sub-groups. These were matched through cross-tabulation, and chi square analysis was performed to assess whether there was a change in membership.

Results

A graph was produced of the cross-tabulation and is presented in Figure 21. The membership of the two extreme groups did not alter a great deal, with almost all students who had fallen into these groups in 2b, remaining in them in 2d. Only three students changed from one committed group to the other. Students who did change, changed in and out of the neutral subgroups. The overall movement between these groups was significant (χ^2 (4 degrees of freedom) = 89.6, $p < .001$).

Discussion

The comparison of SES group membership changes over a six month period produced predictable results. The strong urban group and the strong rural group were expected to remain stable, and were shown to do so. Those who did change from these groups, moved to the neutral group. The less committed group had changed membership considerably. This is in keeping with the understanding that students' likelihood to choose a rural career is not stable. As discussed in Chapter Three, it varies with intention and self efficacy (perceived ease). The SES was shown not to be rigid, and membership of the neutral sub-group may be predictive of a susceptibility to the influence of programs designed to change intention to choose a rural career.

Conversely, those in the committed groups are less likely to be susceptible to such influences. This is discussed further in the SES sub-groups section of the presentation of Stated Situational Intent in Section Four. The implications for career development are discussed in Chapter Eighteen.

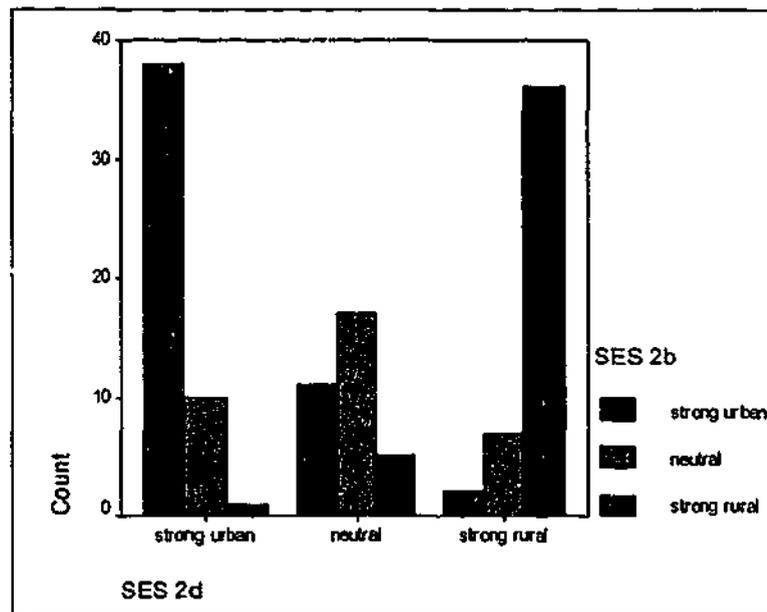


Figure 21 Graph comparing SES calculated from two surveys of second year students conducted 6 months apart (surveys 2b and 2d).

Summary and Conclusion

Whole cohort

Principal components analysis of the four variables found them to represent a single principal component, with ease as the index variable. When RI was added to the four variables, analysis of the correlation matrix suggested that a scale that included rural intent still consisted of a single principal component. RI now became the index variable and the ranking of the remaining variables did not alter. Total variance explained increased from 51.4% to 55.7%. Internal consistency, as measured by the Cronbach's alpha coefficient, increased from .67 for the four variables to .79 when the RI variable was added.

Local students

The gues score performed slightly better for the local cohort than for the whole cohort. Although much of the analysis presented above was on a scale consisting of four indirect variables, the addition of RI improved the scale for the local cohort. This five-item scale was called the Situational Expectation Score (SES) based on the variables, rural intent, GP intent, undergraduate intent, ease and years of rural living. The SES provided one 'gold standard' against which the situational intent questionnaire could be gauged.

International students

Throughout the preceding analyses, calculations based on data from the international cohort had lower internal consistency and lower regression coefficients, than the data from local students.

Principal components analysis suggested that while there was some similarity in the main factor, international students revealed a second factor which was predominantly GP intent. This was consistent with the regression model with RI as the DV and with the four gvey variables as the IVs (Table 50 on page 163). The model for the international cohort did not show GP to be correlated with RI, and YR was only weakly associated with RI. For local students on the other hand, the all four variables were equally important for RI variance.

There were many likely causes for the difference between local and international student response patterns and they will not be fully discussed at this stage. Rural intention was not related to intention to specialise for the international students, and was less affected by the number of years they had lived in the country than was the case for local students. This weakened the value of the gvey score for the international cohort.

Conclusion

A gold standard was developed and assessed for reliability and validity. The SES, consisting of RI, GP, UG, Ease and YR was found to be the strongest for the local cohort in absolute terms. This scale included two variables (YR and GP) that may be more related to a measure of behavioural expectation than behavioural intent, so the five-item scale was named the Situational Expectation Score (SES). Some studies suggest that this expectation may be equivalent to situational intent (Warshaw & Davis, 1985a), and the theoretical framework for this current study, as described by Triandis (Triandis H, 1977) and Fishbein and Ajzen (Ajzen I & Fishbein M, 1980), is based specifically on intention. This score had some stability, and was found to be useful for the purpose of dividing students into groups based on their likelihood to choose a rural career.

The SES was considered to also be an estimate of intention. However, it may be inappropriate to include years rural (YR) in this scale, especially when considering the changes in rural intention over a short period of time, while YR remains relatively constant. Further, GP was not found to be an important determinant of situational intention for the international students. It is less likely to change than the other variables, so, like YR, it has a diluting effect on any intention scale that contains it.

Although a scale consisting of RI, Ease and UG may have underutilized information provided by YR and GP for local students, it performed better statistically for the combined cohort than did the SES. The gold standard for rural intention, the Situational Intent Score (SIS), in comparative studies of the two cohorts, or in studies of the whole student cohort was therefore based on the RI, Ease and UG.

The next chapter will discuss the internal structure, reliability and construct validity of the indices that make up the RIQ2003. It investigates their internal structure, and their strength of association with the SIS, the estimate of rural intention described in this chapter.

Table 50 Coefficients for regression model: DV Rural intent, IVs GP intent, UG intent, Ease, Years rural/4, For whole cohort, and for cohort split by international/local status.

Model		<u>Unstandardized</u>		<u>Standardized</u>		Sig.	<u>Correlations</u>		
		<u>Coefficients</u>	<u>Coefficients</u>	<u>Beta</u>	<u>t</u>		<u>Zero-order</u>	<u>Partial</u>	<u>Part</u>
		B	Std. Error						
Whole cohort	(Constant)	-3.814	.293		-13.028	.001			
	GP intent	.452	.069	.196	6.602	.001	.414	.296	.185
	UG intent	.645	.060	.386	10.834	.001	.684	.453	.304
	Ease	.425	.052	.295	8.140	.001	.655	.357	.229
	Years rural/4	.454	.064	.219	7.117	.001	.470	.317	.200
international	(Constant)	-4.269	.439		-9.717	.001			
	GP intent	-.054	.139	-.026	-.389	ns	.057	-.038	-.026
	UG intent	.586	.095	.469	6.136	.001	.653	.516	.408
	Ease	.382	.090	.331	4.271	.001	.589	.386	.284
	Years rural/4	.206	.115	.125	1.791	(.08)	.319	.173	.119
local	(Constant)	-3.601	.358		-10.047	.001			
	GP intent	.538	.077	.232	6.986	.001	.472	.352	.215
	UG intent	.635	.072	.360	8.877	.001	.694	.431	.274
	Ease	.430	.061	.290	7.026	.001	.675	.353	.217
	Years rural/4	.503	.073	.234	6.857	.001	.495	.346	.211

Dependent Variable: Rural intent
 zero-order: Pearson Correlation
 partial: Partial Correlation
 part: Semi-partial Correlation

Table 51 Hierarchical regression model. DV: RI, IVs: Ease, UG, and YR

	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
international	.725(a)	.525	.517	1.9	.525	63.1	2	114	.001
	.734(b)	.539	.527	1.9	.014	3.4	1	113	.066
local	.762(a)	.581	.579	2.7	.581	266.7	2	385	.001
	.790(b)	.624	.621	2.5	.044	44.6	1	384	.001

a Predictors: (Constant), Ease, UG intent

b Predictors: (Constant), Ease, UG intent, Years Rural

c Dependent Variable: Rural intent

Chapter Eleven

Structure, reliability and validity of the indices and sub-indices of the RIQ2003

Introduction to Chapter Eleven

Chapter Ten described the development and evaluation of a gold standard for situational intent. This consisted of a scale of five variables to estimate the likelihood, or expectation that a student would choose to work for some time in the country (the Situational Expectation Score, SES). It also described a sub-scale consisting of three of these variables that was likely to be a more sensitive estimate of the student's current intention to choose a rural career (the Situational Intent Score, SIS). Chapter Eleven uses that latter version of the gold standard (SIS) as a benchmark against which to assess the value of the three indices that comprise the RIQ2003, affect, perceived consequences and social drivers.

Introduction

In order to determine whether an instrument is valid and reliable, the characteristics of its component parts, the indices and sub-indices, must be determined. This is especially the case for an instrument that is grounded in proven theory. For such an instrument to be valid, its structure must be consistent with that demanded by the theoretical framework upon which it is based. This chapter considers the structure and function of these three indices, using data from the 2003 cross-sectional study of Monash University medical students.

Methods

A cross-sectional study of all first, second and fourth year medical students at Monash University, Melbourne, Australia was undertaken during 2003. In that year there was not a year three cohort. Monash University has an undergraduate-entry medical course so the vast majority of students were undergraduates.

The Rural Intent Questionnaire was distributed to the first year students at lectures and tutorials over a two-week period in the first semester. It was distributed to the fourth year students at a lecture at about that time, but as these students were spread throughout the university hospitals, a single follow-up request was made to non-respondents by mail. The second year students were approached on four separate occasions throughout the year (see Section Four for a full description of the second-year research design). One hundred and seventy-five (175) of the second year students responded to the fourth sampling at the end of the year. An additional 21 students who had not responded at that time did respond to one of the earlier samplings, so, for

these 21 students, their earlier responses were used. In this way, all 196 students who had responded during the year were included.

There was a total of 604 students in the three year-groups, 533 responded, and 529 (88.5%) provided usable responses. The breakdown of the three cohorts by sex, sense of rural background, and local/international status, is presented in Table 52. One-third were male, one-third considered themselves to be rural and a quarter were international students. Of the 131 international students, 108 came from Malaysia, and the remaining 23 students came from fourteen other nations.

Chapter Ten described the development of three 'gold standards': Rural Intent (RI), the Situational Expectation Score (SES) and the Stated Intent Score (SIS). In that chapter, it was concluded that, for the purposes of validation and reliability testing, the local and international cohorts should be analysed separately, as well as when combined in a "whole" cohort. This would help to identify any cross-cultural issues in the use and interpretation of the instrument. The SIS was found to be more reliable across the three cohorts, and will be used as the dependent variable in regression modelling. As discussed in the previous chapter, the SIS had a normal distribution for each of the three cohorts, and Figure 22 displays the distribution of the whole-group data.

Table 52 Demographic breakdown of respondents.

Subgroup	YEAR			Total	Percentage of respondents	
	1	2	4			
sex	male	69	69	49	187	35%
	female	116	126	100	342	65%
feels rural	no	115	133	110	358	68%
	yes	66	62	39	167	32%
	missing	4	.	.	4	.
international	local	141	140	117	398	75%
	international	44	55	32	131	25%
	Total	185	196	149	530	100%

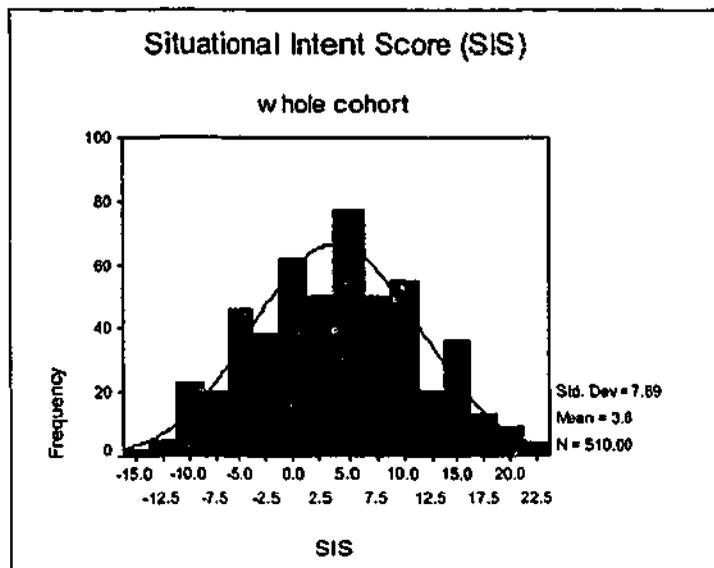


Figure 22 Situational Intent Score: distribution of responses for all respondents (N = 510)

Results

The development of the three indices of the RIQ2003 has been described in Section Two of this thesis. During that description, the characteristics of the early versions of the indices have been investigated on smaller groups of students. This analysis looks at the final version of the indices of the RIQ2003, and tests them using a large cross-sectional study.

The three indices, affect, perceived consequences and social drivers are considered in turn and their characteristics are presented under the headings of:

- Data cleaning and characteristics

This heading describes the distribution of the data and any manipulations that were necessary to meet the assumptions of the statistical analyses that were to follow.

- Principal components analysis

The internal (factor) structure of the index is analysed.

- Reliability: internal consistency, and

The Cronbach Alpha is used to assess the internal consistency of the index.

- Validity: regression modelling

The index and its components are regressed against the SIS to determine the strength of association of the index with situational intent. This offers a measure of predictive, or construct validity.

Affect

The items for the affect scale were derived from the PANAS schedule (Watson D et al., 1988). Watson et al. identified 20 items, which formed two separate valid and reliable subscales; a positive and a negative sub-scale, each with ten items. The purpose of their sub-scales was to measure mood, whereas the purpose in the RIQ was to study attitudes toward a rural career. The descriptors themselves, however, were similar to those offered by students in an earlier

qualitative phase of this study¹⁰⁵ and were therefore used as a core sample of descriptors. Of equal importance was the finding by Watson et al. that the positive and negative sub-scales were independent of each other, and not extremes of a single bipolar scale. For this reason, the measurement scales used in this study varied from the bipolar semantic scales with a positive and a negative descriptor at either extreme, as used by Triandis, to a separate Likert-type scale for each item. This produced separate positive and negative sub-indices.

One can not assume that any of the validity and reliability testing performed by Watson would be transferable to this sub-index, and this part of the thesis will study the validity and reliability of the RIQ affect sub-index. During the developmental phase of this research, these 20 items were reduced to nine, three positive items: proud, determined and excited; and six negative items: jittery, irritable, apprehensive, ashamed, scared and guilty (see Section Two for a description of this process). Following the leader, "The thought of me working in a rural area rather than the city makes me feel:" were listed the nine affect descriptors, each adjacent to a 10-point Likert scale with the extremes: "Not at all", and "extremely." Because "Not at all" had a closer meaning to zero than to 1, responses were recoded from a 1-10 scale to a 0-9 scale.

Data cleaning and characteristics

Each item had between 1 to 7 missing values. It was assumed that any respondent, who had answered most of the affect items and had left one or two blank, would be unlikely to be strongly influenced by the missed item. Any such missing values were recoded as zero, provided that that respondent had answered most of the other affect items. One local student failed to respond to any items in this sub-index, but all other responses, treated in the manner described, were complete.

The distribution of each item was variable. 'Jittery' and 'irritable' were moderately skewed to the left, and 'ashamed' and 'guilty' were severely skewed to the left, with almost all responses in the 0-4 range. As these response patterns were expected, and as these variables were subsequently to be combined into sub-indices, no attempt was made to improve their distribution at this stage.

Principal components analysis

Although principal components analysis (PCA) and factor analysis are commonly used interchangeably, there are some statistical differences between them (Pallant, 1998)¹⁰⁶. All analyses performed in this thesis are based on PCA, so this term will be used. The suitability of the data for PCA was tested. Comrey suggests that 200 cases allow for only a fair analysis, and that a sample of 300 is good, 500 being very good (Comrey, 1988). The whole cohort sample size of 529 is very good. Ideally there should be at least five, but preferably ten times the

¹⁰⁵ See Chapter Five and Appendix Five

¹⁰⁶ Pallant 1998, p152

number of cases per item in the analysis (Nunnally JC, 1978; Tabachnick BG & Fidell LS, 2001). There were 9 items and even in the smaller international cohort, 131 cases was adequate, based on the 10 for 1 principle. The Kaiser-Meyer-Okin measure of sampling adequacy was .77 exceeding the minimum recommended of .60 (Tabachnick BG & Fidell LS, 2001)¹⁰⁷, and the Bartlett's test for sphericity gained significance, supporting the factorability of the correlation matrix.

Two components, virtually in 'simple structure,' were identified when the nine affect variables were subjected to PCA using SPSS (version 11.5) (SPSS, 2002). One consisted of the 6 negative items (Eigenvalue 3.2), and explained 35.9% of the total variance, and the other consisted of the three positive items (Eigenvalue 2.4) and explained a further 27.1% of the total variance. The rotated component matrix using the Direct Oblimin method with Kaiser Normalisation is presented in Table 53. The positive and negative components were virtually orthogonal (correlation = -.06, and see the simple structure in Table 53), consistent with the findings of Watson et al. (Watson D et al., 1988).

Table 53 PCA solution after Direct Oblimin rotation (suppress all values <.3). Component correlation: -.06.

	<u>Component</u>	
	<u>negative</u>	<u>positive</u>
irritable	0.81	
jittery	0.77	
scared	0.76	
apprehensive	0.73	
ashamed	0.68	
guilty	0.60	
determined		0.91
excited		0.87
proud		0.87

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Reliability: internal consistency

PCA identified two components within the affect sub-index, in keeping with the findings of Watson et al. These were evaluated separately for internal consistency as suggested by Cronbach (Cronbach LJ, 1951)¹⁰⁸. The Cronbach's Alphas were .87 for the positive variables and .81 for the negative variables (Table 54). These are very high values suggesting that the measurement error associated with these two sub-indices was low.

Table 54 Cronbach alpha of the affect component constituents for three cohorts

Component	<u>cohort</u>		
	<u>total</u>	<u>local</u>	<u>international</u>
Positive	0.87	0.89	0.78
Negative	0.81	0.80	0.82

¹⁰⁷ Tabachnick and Fidell 2001, p589

¹⁰⁸ Cronbach 1951, p297

Validity: regression modelling

The validity of the sub-indices was further tested through regression modelling. According to the Triandis model of interpersonal behaviour (H.C. Triandis, 1971), the strength of association of positive and negative affect with the rural intention variables described in the previous section should be strong. Further, a positive correlation between positive affect and rural intention, and a negative correlation between negative affect and rural intention would be expected.

Regression models were fitted with the Stated Intent Score (SIS) as the dependent variable (DV) and the two affect sub-indices as the independent variables (IV). The assumptions of normality, linearity, homoscedasticity and independence of residuals were tested with residuals plots, and found not to be violated. There were adequate cases for this analysis (Tabachnick BG & Fidell LS, 2001)¹⁰⁹.

The strength of association between SIS (DV) and the two affect sub-indices (IVs) as measured by the Adjusted R² of the regression model, was high for all three cohorts (whole: .55, local: .55, and international: .49). The positive affect score had standardised betas of .61, .63 and .53 respectively (all $p < .001$), and the negative affect score had standardised betas of -.40, -.39 and -.40 respectively (all $p < .001$), suggesting that positive affect had a stronger influence than negative affect (see Table 55). These results support the construct validity of the affect sub-indices.

Table 55 Coefficient output from SPSS regression models: DV Stated Intent Score, IVs positive affect, negative affect.

Model	Variable	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
whole cohort	(Constant)	-1.20	0.59		-2.02	0.044
	positive affect	0.71	0.04	0.61	20.23	0.001
	negative affect	-0.36	0.03	-0.40	-13.51	0.001
international	(Constant)	-1.73	1.34		-1.29	0.200
	positive affect	0.63	0.08	0.53	8.19	0.001
	negative affect	-0.29	0.05	-0.40	-6.15	0.001
local	(Constant)	-1.09	0.67		-1.63	0.104
	positive affect	0.72	0.04	0.63	18.35	0.001
	negative affect	-0.38	0.03	-0.39	-11.56	0.001

Dependent Variable: Stated Intent Score (SIS)

Total affect score (TAS)

The nine affect variables were found to represent two components, positive and negative affect. This was in keeping with the theory underpinning the PANAS schedule, on which the index was based (Watson D et al., 1988). Internal consistency of the two affect sub-indices was strong, and they predicted rural intention in a theoretically sound manner. Distribution of the scores on the

¹⁰⁹ Tabachnick and Fidell 2001, p117

positive sub-index was normal (Figure 23), but the negative sub-index was skewed to the right (Figure 24). Square root transformation of negative affect improved the skewness considerably, but resulted in a flatter distribution with a moderate negative kurtosis (Figure 25 and Table 56). As this transformation resulted in only a moderate overall improvement, and as transformation of only one of the affect sub-indices would result in loss of meaning for the new variable, especially with regard to the development of a 'total affect' variable, transformation was not used in subsequent analyses.

Table 56 Distribution statistics of the affect variables

Statistics	Variables			
	positive affect	negative affect	square root negative affect	total affect
Mean	12.7	11.2	3.0	7.1
Std. Deviation	6.6	8.6	1.5	8.0
Skewness	-0.067	0.723	-0.286	-0.069
Std. Error of Skewness	0.106	0.106	0.106	0.106
Kurtosis	-0.621	-0.176	-0.475	-0.160
Std. Error of Kurtosis	0.212	0.212	0.212	0.212

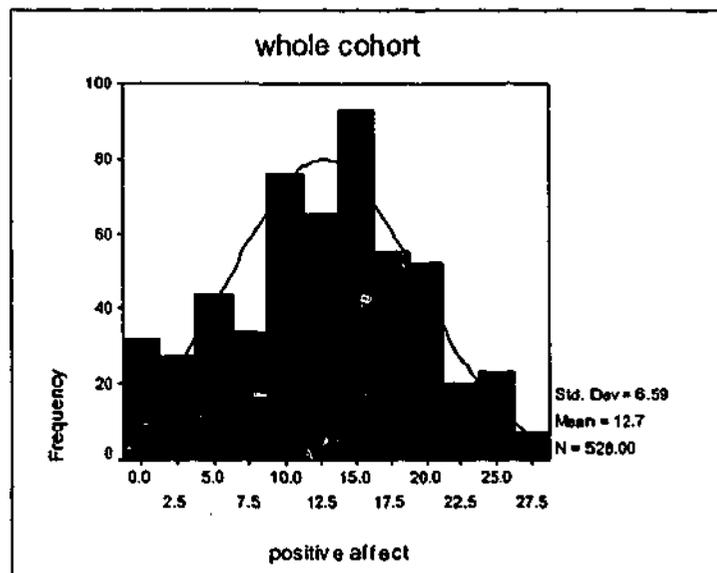


Figure 23 Positive affect: distribution of responses

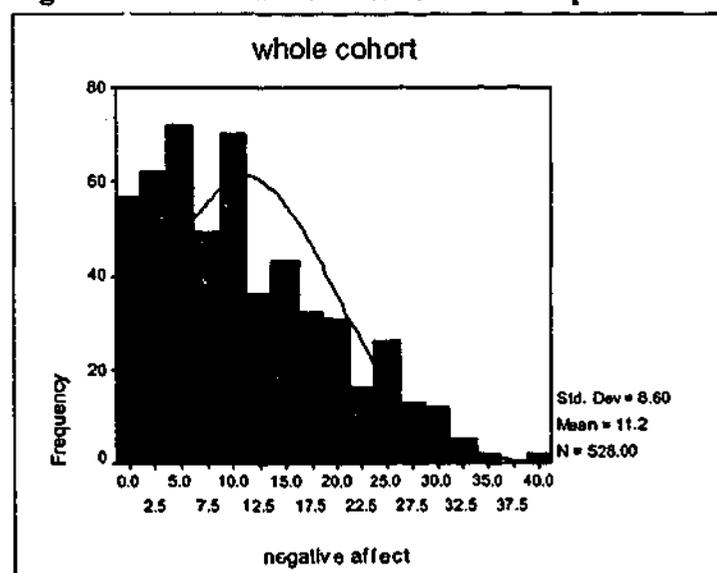


Figure 24 Negative affect: distribution of responses

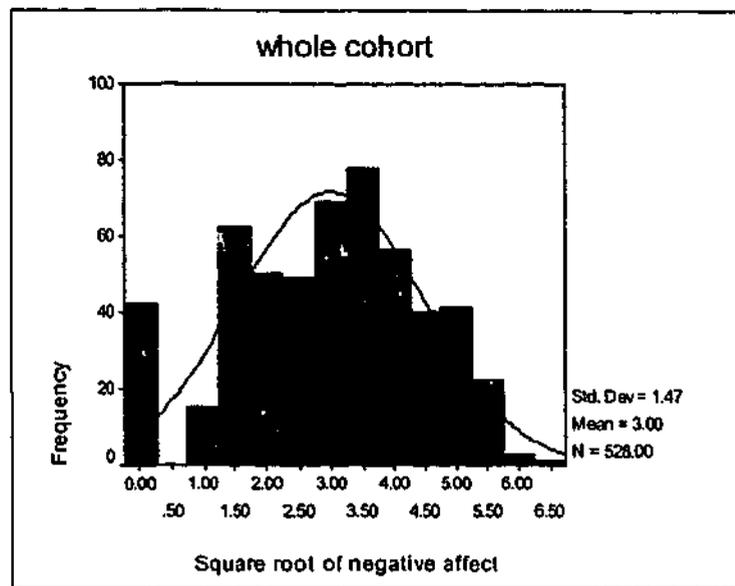


Figure 25 Square root of negative affect: distribution of responses

The Triandis theory deals with affect as a single index, so the characteristics of an index consisting of the positive and negative components were studied. The negative sub-index score was divided by 2 as it had twice as many variables as the positive sub-index. This new score was subtracted from the positive affect sub-index score to produce a 'total affect' score. Data from the total affect scores had a normal distribution (see Figure 26).

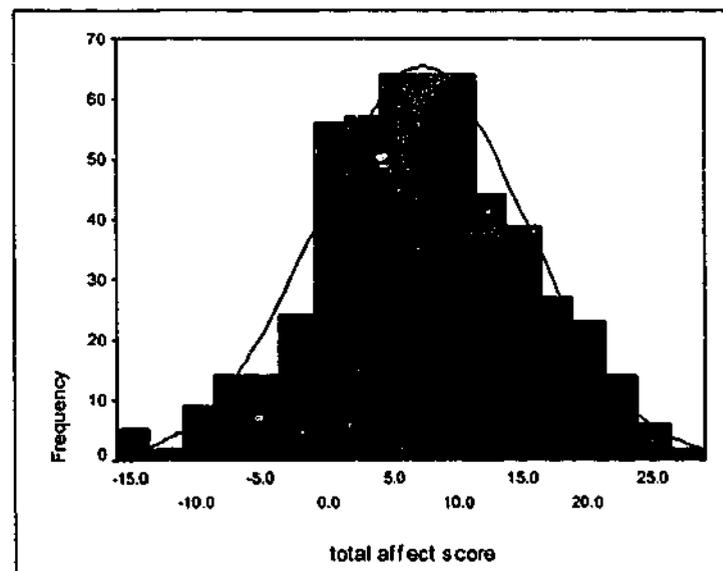


Figure 26 Total affect scores: distribution of responses (n=529)

The Cronbach's alpha for the whole affect index was .70 for the whole cohort (.70 for locals and .66 for internationals). Good internal consistency suggested an acceptable measurement error for this index, although it consisted of two distinct sub-indices. Cronbach writes:

For a test to be interpretable, however, it is not essential that all items be factorially similar. What is required is that large proportion of the test variance be attributable to the principal factor running through the test.

...where the first factor accounts for the preponderance of the common-factor variance, alpha is a close estimate of first-factor concentration (Cronbach LJ, 1951)¹¹⁰.

It may be, then, that the Total Affect Score more closely reflects positive affect than negative affect as this sub-index had the higher standardised Beta value. This was more apparent for

¹¹⁰ Cronbach 1951, p320

local than international students (Table 55). Regression modelling with SIS as the DV and the Total Affect Score as the IV revealed equivalent R^2 values to when the positive and negative sub-indices were entered as separate IVs (whole: .55, local: .56, and international: .50). This suggested that the TAS alone was as good a predictor of SIS as when the two affect sub-indices were added independently, and greater than either alone. Further, the standardised Beta, reflecting the slope of the association, was similar among the three cohort groupings (whole: .740, local: .746 and international: .706), supporting the validity of the cautious combination of positive and negative affect into a single Total Affect Score (TAS).

Summary and discussion

In their original application, that is, in mood measurement, Watson et al. had concluded that positive and negative affect were not opposite meanings on a single scale, but formed two separate sub-scales. In this current study, principal components analysis, internal consistency analysis and regression modelling supported the use of the separate positive and negative sub-indices, but found that a combination, as the Total Affect Score (TAS), performed at least as well as the components in regression modelling. The results supported the validity and reliability of either approach, according to the requirements of the theoretical considerations being studied. It is likely, however, that in studies comparing respondents from different cultures, separate analyses of the subscales may provide greater insight into the influence of affect on intention, than the global TAS.

Perceived Consequences

During the development of the RIQ the perceived consequences, or cognitive component of the instrument was reduced from 48 items to 11 items. These had been generated from semi-structured questionnaires answered by medical students, and from a search of the world literature¹¹¹.

According to the recommendations of both Triandis (H.C. Triandis, 1971) and Ajzen (Ajzen I, 2002), each item had two components, one to measure the likelihood of the consequence, and the other to measure the importance of that outcome to the respondent. In the RIQ, each of these components was measured on a 10-point Likert-type scale ranging from 1 to 10. The likelihood items had end-points of "totally unlikely" and "a certainty," and were subsequently recoded to a range from zero to 9. The importance items had end-points of "not important at all" and "extremely important" and were recoded 0-9. No mid-point was offered in an attempt to obtain at least a positive or negative evaluation from each response. By multiplying these two scores, eleven evaluated consequences were derived, each with a possible range from 0 to 81.

¹¹¹ See Chapter Five for a discussion on the pilot study and Appendix Five for the literature search

Data cleaning and characteristics

As there were only between 0 and 4 missing values on each of these 11 'evaluated consequences' variables, these were not replaced and missing data was excluded 'pairwise' in order to minimize the effect of these missing values.

The importance variables were all skewed to the left, as was expected. The respondents therefore rated these issues to be important, supporting the content validity of the sub-index. Nevertheless, for four of the variables ('keeping in touch', 'spouse', 'schooling' and 'cultural needs'), over 10% of responses were "zero". Many students had commented that it was difficult to imagine the needs of non-existent spouses or children, and keeping in touch was not an issue for over 25% of both the local and the international cohort. That some issues were not salient for some respondents was to be expected. These zero importance scores were of interest, but did not diminish the validity of these items or the validity of the index as a whole.

The likelihood variables were reasonably distributed. Once the zero values indicating non-salience had been allowed for, the evaluated consequence variables were all reasonably distributed.

Principal components analysis

Preliminary component analysis was performed including all 22 'raw' perceived consequences variables. The KMO was .861 and Bartlett's test was highly significant supporting the factorability of the data. Four components had an Eigenvalue significantly greater than 1.0, and these could be termed 'personal likelihood', 'personal importance', 'professional likelihood' and 'professional importance' (Table 57). The variables that made up 'personal' were: keeping in touch, lifestyle, surroundings, spouse and schooling, and those that made up 'professional' were: appreciated, difference, autonomy and context.

Table 57 Principal component analysis of the 22 non-evaluated consequence variables

Component	Total Variance Explained		
	Initial Eigenvalues	% of Variance	Cumulative %
personal likelihood	4.6	20.9	20.9
professional importance	3.6	16.4	37.3
personal importance	1.7	7.6	44.8
professional likelihood	1.4	6.4	51.3
(next component)	1.1	4.8	56.1

As with all the perceived consequences, 'flexibility' and 'cultural' each had a likelihood as well as an importance component. However, while all the other perceived consequences loaded onto either personal or professional for both the likelihood and the importance component, these consequences both loaded onto the personal *likelihood* component, but onto the professional *importance* component. This apparently inconsistent pattern was seen in all three cohort groupings.

The two components had fundamentally different meanings; while likelihood reflected a perceived outcome, importance was more a reflection of the respondent's personality. So while

flexibility and cultural were factorially associated with 'personal' outcomes (likelihood), they were linked through the 'professional' traits (importance rating) of the respondents.

When the likelihood score for each item was multiplied by its importance score, the eleven evaluated consequences variables were produced. These were subjected to principal components analysis with Varimax rotation and Kaiser Normalisation and simple structure was achieved when loadings less than 0.4 were suppressed (Table 58). The same two components were found and flexibility and cultural loaded onto the personal component. 'Flexibility' was the item nearest to loading on both components, with a loading of .33 on the professional component. This made sense, as having "better workplace support and flexibility to bring up a family" had meaning for both the personal and the professional construct.

Table 58 Rotated component matrix for PCA of the 11 evaluated consequences variables

Variable	Component	
	Personal	Professional
schooling	0.80	
in touch	0.76	
spouse	0.74	
surroundings	0.64	
flexibility	0.58	
lifestyle	0.53	
cultural needs	0.52	
make a difference		0.83
appreciated		0.81
context		0.71
autonomy		0.64

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalisation

Reliability: internal consistency

Reliability analysis for the index of 11 evaluated consequences produced a Cronbach's Alpha of .84 for the whole cohort, .85 for the internationals and .83 for the locals. These results suggested that the consequences index had a low level of measurement error. A high alpha did not prove, however, that the scale measured only one latent variable. The results of the principal components analysis suggested that two meaningful components existed. The Cronbach's Alpha for the personal items was .80 and for the professional items was .78 (Table 59). According to these results, the sub-indices, divided along factorial lines, each had an acceptable level of measurement error, allowing the split of the perceived consequences index into personal and professional sub-indices.

Table 59 Cronbach alpha values for the evaluated consequences components

Cohort	Component		
	Personal	Professional	all 11 vars
whole	0.80	0.78	0.84
local	0.79	0.78	0.83
international	0.82	0.79	0.85

Validity: regression modelling

Regression models were fitted for each of the three cohorts, whole, local and international. The Situational Intent Score (SIS) was the DV, and the two evaluated perceived consequences sub-indices were the IVs. The strength of association for the three models, as indicated by the Adjusted R² values were, whole cohort: .338, local cohort: .420, and international cohort: .209. The IV with the larger standardised beta value is the IV that makes the strongest unique contribution to the model (Pallant, 2001)¹¹². While both sub-indices contributed significantly for both the whole cohort and the local cohort, the beta value for the personal sub-index was greater, and the professional sub-index did not gain significance for the international cohort model (Table 60).

Table 60 Coefficients table for regression models: DV SIS, IVs personal consequences, professional consequences

Cohort	Unstandardised Coefficients		Standardized Coefficients			Correlations Part
	B	Std. Error	Beta	t	Sig.	
whole cohort						
(Constant)	-6.57	0.84		-7.79	0.001	
personal	0.04	0.00	0.50	11.82	0.001	0.43
professional	0.02	0.01	0.15	3.58	0.001	0.13
international						
(Constant)	-3.96	1.58		-2.50	0.014	
personal	0.03	0.01	0.43	4.61	0.001	0.37
professional	0.01	0.01	0.07	0.73	0.464	0.06
local						
(Constant)	-7.77	0.94		-8.26	0.001	
personal	0.053	0.00	0.56	12.42	0.001	0.49
professional	0.02	0.01	0.16	3.55	0.001	0.14

Dependent Variable: SIS

The perceived consequences sub-indices

Perceived consequences in the RIQ can be divided into two sub-indices; personal, comprising seven variables; and professional, comprising four variables. These variables consist of the products of scores on two items, one measuring the likelihood, the other measuring the importance of an outcome. The distribution of responses for the professional sub-index was reasonably normal (Figure 27), but that of the personal sub-index was skewed to the right (Figure 28). Square root transformation converted the positive consequences data into a more normal distribution (Figure 29). The square root transformation of personal consequences was used in subsequent analyses. Such a transformation had only a small effect on the regression modelling described above.

¹¹² Pallant 2001, p146

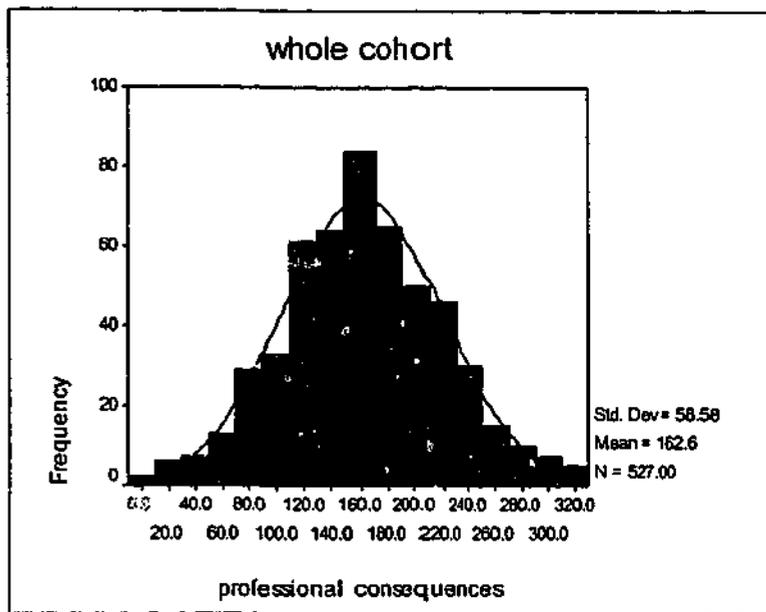


Figure 27 Professional consequences: distribution of responses

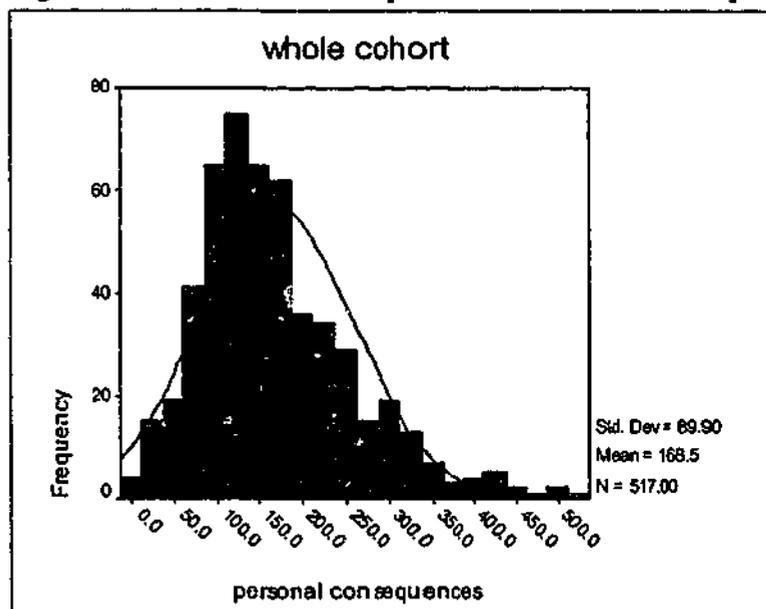


Figure 28 Personal consequences: distribution of responses

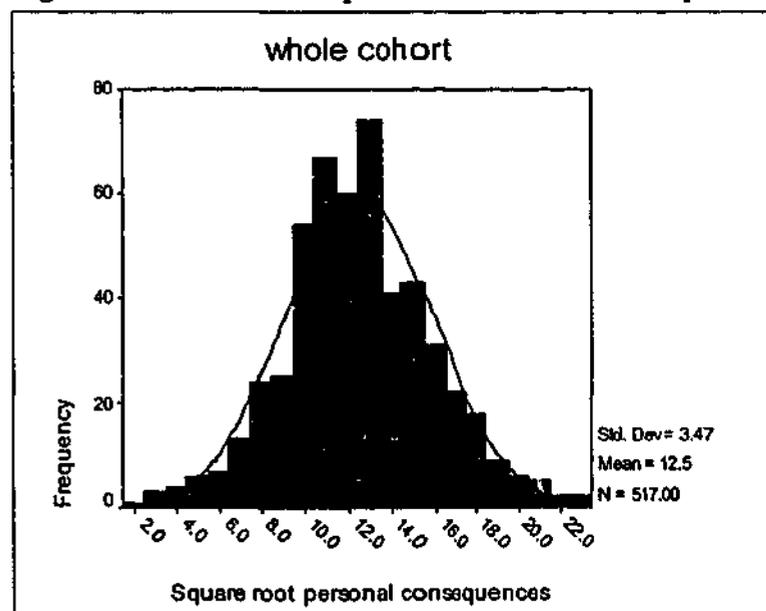


Figure 29 Square root of personal consequences: distribution of responses

Although regression modelling revealed that the personal and professional sub-indices had differing degrees of association with SIS for different subgroups of students, a total perceived

consequences score was computed (TCS). The two sub-indices with normal distributions were used, and as the range of the 'square root of personal' score was about 0.075 that of the professional score, this latter was multiplied by .075 and the product added to square root personal, to derive the Total Consequences Score (TCS). This TCS had a normal distribution (Figure 30 and Table 61)

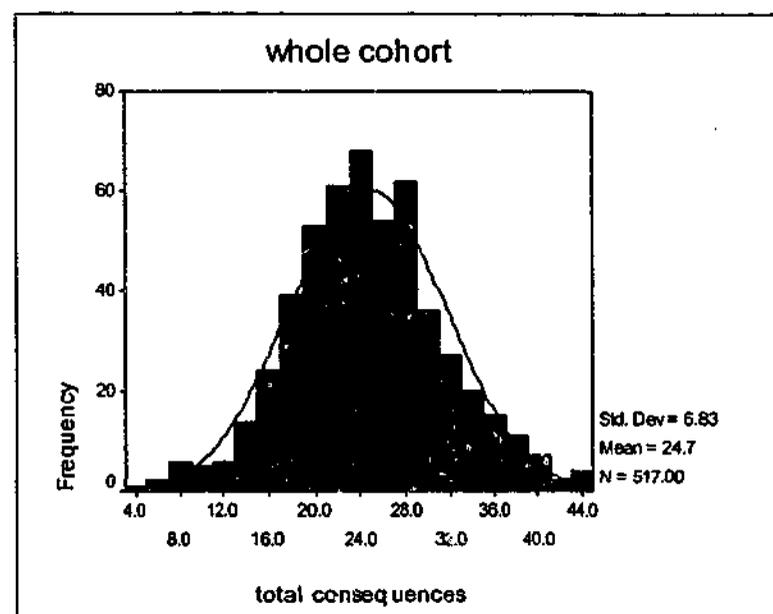


Figure 30 Total Consequences Score (TCS): distribution of responses (n=517)

The strength of association between TCS and SIS was a little weaker (Adjusted $R^2 = .301$) than when both personal and professional were added independently (Adj. $R^2 = .355$). Indeed, for the whole cohort, personal consequences, had a stronger association with SIS ($R^2 = .343$) than did the TCS, suggesting that an additive combination may not offer the strongest relationship for analyses dealing with the whole-group as a single cohort.

Table 61 Distribution statistics for perceived consequences variables

Statistics	professional consequences	personal consequences	square root of personal consequences	total consequences
Mean	162.6	168.5	12.5	24.7
Std. Deviation	58.6	89.9	3.5	6.8
Skewness	0.092	1.019	0.105	0.103
Std. Error of Skewness	0.106	0.107	0.107	0.107
Kurtosis	0.009	1.380	0.381	0.326
Std. Error of Kurtosis	0.212	0.214	0.214	0.214

Summary and discussion

Eleven issues concerned with personal and professional life in a rural community, were retained from the forty-eight items used in earlier versions of the RIQ. These formed two distinct components along the expected lines and were divided into a personal sub-index (with a square root transformation for statistical reasons) and a professional sub-index. The sub-indices had good internal consistency, as determined by the Cronbach's Alpha individually (personal .80, professional .78) and when combined into a Total Consequences Score (TCS .84). The TCS had

a normal distribution in all three cohorts (local, international and whole-group). Regression modelling revealed the personal sub-index had a greater influence on the SIS than professional sub-index, and this was in keeping with reports in the literature (Pathman et al., 1999). Pathman, in the United States of America, has reported a similar finding, with respect to retention. He claimed that the retention of rural doctors was more influenced by the ability to live in a rural community than by the ability to practice rural medicine. This current data on medical students suggests that this may also be the case for recruitment.

Indeed, when the whole-group was considered as a single cohort, the personal sub-index had a greater bearing on SIS than did the Total Consequences Score, suggesting that the professional sub-index may 'dilute' the effect of the personal sub-index when combined with it. As the professional sub-index did add to the regression model for the local cohort, it was retained for further analysis. This is reported in Chapter Twelve under the heading Relative values of indices/sub-indices (beta values): Hypothesis 5 on page 206.

Social Drivers

Introduction

The Triandis theory of interpersonal behaviour differs from the Fishbein and Ajzen theory of planned behaviour more in its dealing with subjective culture and social drivers than any other element (Ajzen, 2002; Ajzen I & Fishbein M, 1980; Triandis H, 1977; H.C. Triandis, 1972). While the Fishbein and Ajzen theory claims all social influences can be measured through the influence of salient referents, Triandis claims that normative belief (NB), personal normative belief (PNB), role belief (RB), interpersonal contracts (IPC), level of understanding of the issues, and self concept (SC) all have a direct role in the prediction of intention. In order to maximize the predictive validity of the RIQ2003, it was necessary to determine whether the components of these two theories contributed independently to the social drivers construct. To enable this analysis, the RIQ2003 included all components from both theories. It includes an estimate of the influence of referents and also sought to measure NB, PNB, IPC, understanding and SC. Role belief in relation to career choice was difficult to determine in medical students and was not found to have an effect in earlier versions of RIQ. RB has been omitted from this version of the questionnaire. It is possible that undergraduate intent (UG), one of the items discussed in Chapter Ten, had some construct overlap with role beliefs, in that, among other things, it measured the students' belief that it is appropriate to gain the experience necessary for a rural career option.

Triandis items

Eight items were included to measure the Triandis social factor concepts, and two items to measure the Fishbein and Ajzen subjective norm concept. Three items measured the students' self-concept as: one who could become a really good rural doctor; one who could really enjoy living in a rural environment; and one who really enjoys a challenge. One item tested the self-

reported level of understanding of the issues, one asked if there was an agreement with someone to work in the country, and one tested normative belief (NB) by seeking the level of agreement that "doctors should be willing to work where they are needed most."

Personal normative belief (PNB) had been problematic in earlier versions of the RIQ. In earlier surveys, students strongly resented any suggestion that they *should* have any obligation to work in the country, and questions asked in this manner were often left unanswered by large numbers of students. In the RIQ2003, two questions were asked, the first to investigate PNB toward an exclusively urban career, and the second to measure PNB toward practising medicine "at least for a while" in the country. Fishbein and Ajzen felt that PNB may be merely another way of asking about rural intent (Ajzen I & Fishbein M, 1980)¹¹³. Indeed, the question, "I think I should work in ..." could well have a large degree of overlap with rural intention. For this reason, a balance between an offensive direct approach, and an ambiguous approach was developed.

Fishbein and Ajzen items

"Subjective norms" were estimated in a way similar to that described by Ajzen and Fishbein (Ajzen I & Fishbein M, 1980). In the RIQ, one item (approval) asked whether "most people that are important to me would disapprove/approve..." The other (compliance) measured the general level of compliance with important others' wishes, that the respondent had "when I plan for the future." The Fishbein and Ajzen model utilizes this two-pronged approach for each individual referent. It then measures the subjective norm as the sum of the products for these salient referents. This approach was tested in the RIQ2001 and was found not to be significantly better than the single global referent estimate. This global estimate 'referent approval' was utilized in the RIQ2003 (see Chapter Eight, under Predictive validity of Triandis and Fishbein and Ajzen constructs).

The evaluated (two-prong) approach was found to be more useful when the influence of several individual referents, each with a different level of salience was to be tested. This was not likely to be relevant when testing for the influence of "most people that are important to me", a term which subsumes salience. Indeed, Ajzen and Fishbein use the single-item approach to a global estimate of total subjective norm (Ajzen I & Fishbein M, 1980)¹¹⁴. The method of estimating subjective norms in the RIQ2003 was the 'referent approval' score. While the compliance item was not used to determine the estimate of subjective norm, it may be useful as an estimate of compliance in subgroups of students.

¹¹³ Ajzen and Fishbein 1980, p247 (footnote).

¹¹⁴ Ibid, p57

The social driver items

For the Theory of Planned Behaviour (TpB) subjective norm items, 'approval' was delimited with "disapprove strongly" and "approve strongly. This was the only item that had a mid-scale marker. It had indicators "just disapprove" and "just approve" which were to be printed over the 5 and the 6 of the scale respectively. This would prevent a neutral response. Unfortunately, a printing error caused these descriptors to be printed on either side of the "6," leaving a score of 6 as a neutral mid-point. It also resulted in 5 points below the mid-point and 4 points above it. These were recoded so that 6 = zero, and the negative scale went to -5, while the positive scale went to +4.

All ten items in the social drivers sub-index were measured on a scale, 1 to 10. The extremes for the self-concept items, understanding, and NB were "I disagree strongly" and "I agree strongly." These were recoded -5 to +5. IPC was recoded 0 to 9, as to disagree strongly with the statement; "I have made an agreement..." suggested that no agreement had been made.

For the PNB city and the PNB rural items, the end-points were "no sense of obligation at all" and "compelling sense of obligation." These were recoded zero to 9. It seemed logical that these two items should be mutually exclusive, and a combined PNB item was computed. The 'PNB city' score was subtracted from the 'PNB rural' score to form an estimate of combined personal normative beliefs (PNB) with a possible range of -9 to +9. The relationship between PNB city and PNB rural was not as strong as had been expected. (Pearson correlation $R = -.081$, $p = .064$), but this was likely due to the strongly skewed distribution of PNB city. When those who scored zero on PNB city were excluded, this statistic improved to $R = -.211$, $p < .001$. The relationship between the PNB items was discussed in Chapter Eight.

Data cleaning and characteristics

There were only 1 to 3 missing values from each of these variables, so no steps were taken to replace them. Distributions of data from individual items were reasonably normal except for IPC, where 54% responded that they had no interpersonal contract (disagree strongly), and PNB-city where 40% denied any sense of obligation to work in the city. These two items did have a reasonable spread for the remaining response options.

Principal components analysis

Principal components analysis was performed on the eight items from the Triandis theory; the three self-concept (SC) items (good doctor, living, challenge), understanding, IPC, the two PNB items (city, rural), and NB. Two components (Eigenvalues 2.77, 1.20) explaining 53.9% of the total variance were identified. This suggested that the Triandis items formed two components, 'social preparedness' (three self-concept items and knowledge with a negative loading from PNB city) and 'norms' (NB, PNB rural, IPC). When a combined variable, (PNB rural minus PNB city) called PNB, was entered instead of its constituent variables, PNB loaded onto the

'norms' component. All of these items were combined to form a single a sub-index called 'the triandis score.'

When the Fishbein and Ajzen variable, 'referent approval' was also included into the PCA matrix, the same two components (Eigenvalues 3.20, 1.50; total variance explained = 52.2%) were identified. Referent approval loaded moderately (.55) onto social preparedness (Table 62). It was retained as a separate single-item 'sub-index' representing the Fishbein and Ajzen theory. The KMO (.795) and Bartlett's tests supported factorability of the data.

Table 62 Pattern matrix after PCA, Direct Oblimin rotation of 9 social drivers items (suppress < .2)

	social preparedness	norms
s/c good doc	0.78	
s/c enjoy living	0.77	
pnb city	-0.72	
knowledge	0.62	
s/c challenge	0.57	
referent approval	0.55	
nb docs should		0.83
pnb rural		0.82
agreement		0.56

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Rotation converged in 4 iterations.

Reliability: internal consistency

The Cronbach's Alpha values for the five social drivers sub-indices are presented in Table 63. Only one of the proposed sub-indices did not have good internal consistency. This was the 'norms' sub-index, as applied to the international cohort. It is possible that cultural/language differences may have reduced the strength of this sub-index. This is discussed as the etic-emic dilemma in Chapter Three.

As the norms sub-index had considerable measurement error for the international group, the triandis score was chosen to measure the contribution of the Triandis components. The index, the Social Drivers Score (SDS) consisted of two 'sub-indices', the triandis score plus referent approval item, and utilised the combined PNB item. It had very good internal consistency (Alpha = .79), which was weakened slightly if PNB was broken up into its constituent variables (Alpha = .76) (see Table 63).

Validity: regression modelling

Fishbein and Ajzen found that for them, PNB was an alternative way of measuring stated intent (Ajzen I & Fishbein M, 1980). A regression model was fitted using the RIQ2003: Item 2 (intention to take up a rural career) as the DV, and 'PNB rural' as the IV, to test whether this was the case in this study. The Pearson correlation coefficient (R) was .358 and the adjusted R² was a very moderate .127 (F (1, 517) = 76.2, p < .001), suggesting that in this questionnaire, while related, these variables did not have the same meaning. The correlation between RIQ2003 Item 1 (intention to work only in the city) and PNB city, however, was greater (R = .507, R²

=.256, $F(1, 517) = 179.2$, $p < .001$) and these questions did have similarities in their wording¹¹⁵. Nevertheless, this instrument uses the SIS as DV, which is a broader index of rural intent, reducing this potential problem. Subsequent analyses showed PNB to be a weak contributor to the variance in rural intent.

Table 63 Cronbach's Alpha values for the social drivers sub-indices

scale	cohort		
	whole	local	international
social preparedness (6 items)	0.78	0.78	0.72
norms (3 items)	0.63	0.68	0.27
triandis score (7 items)*	0.72	0.74	0.69
Social Drivers Score (SDS) (8 items)*	0.79	0.80	0.76
social drivers (9 items)	0.76	0.77	0.72

*combined PNB was used instead of PNB city and PNB rural as separate variables

A regression model was fitted with the DV, SIS, and IVs, the Triandis score and referent approval (Table 64 and Table 65). Both the Triandis and the Fishbein and Ajzen constructs made a significant unique contribution to the regression model, suggesting the best solution includes both constructs. The Triandis construct made a greater contribution, as evidenced by the greater standardised beta values. This pattern was similar in all three cohorts. When the evaluated referent score (approval multiplied by compliance) was used instead of approval, all results were marginally weaker.

Table 64 Regression model statistics, DV: SIS, IVs: Triandis score and approval

Cohort	R	R ²	F(df)	significance
whole	0.79	0.62	(2, 500) 410.5	0.001
local	0.78	0.64	(2, 377) 311.6	0.001
international	0.77	0.59	(2, 120) 88.2	0.001

Dependent Variable: Stated Intent Score (SIS)

¹¹⁵ See Appendices One to Four for copies of the questionnaires

Table 65 Coefficients table for regression model: DV, SIS; IVs, triandis, referent approval.

cohort	Variable	Unstandardized Coefficients		Standardized	t	Sig.	Correlations sr ²
		B	Std. Error	Beta			
whole cohort	(Constant)	-1.04	0.29		-3.57	0.001	
	triandis	0.40	0.02	0.62	18.99	0.001	0.52
	referent approval	0.87	0.12	0.25	7.57	0.001	0.21
international	(Constant)	-0.79	0.47		-1.70	0.092	
	triandis	0.36	0.04	0.62	9.76	0.001	0.57
	referent approval	0.95	0.22	0.27	4.31	0.001	0.25
local	(Constant)	-1.12	0.36		-3.15	0.002	
	triandis	0.41	0.02	0.63	16.27	0.001	0.51
	referent approval	0.84	0.14	0.24	6.17	0.001	0.20

Dependent Variable: SIS

Summary and discussion

The social drivers variables were reduced to two sub-indices along theoretical and statistical grounds. One measured the social norms as described by Triandis, the other was an estimate of subjective norms as described by Fishbein and Ajzen. It was shown that a valid and reliable index consisting of the sum of the sub-indices could be produced. This 'Social Drivers Score' was normally distributed (Figure 31). Simple regression modelling of this social drivers score (SDS) against the DV: SIS, showed a strong association between the SDS and SIS, with SDS explaining over 60% of the variance in SIS ($R = .78$ $R^2 = .608$, $F(1, 500) = 779.2$ ($p < .001$)).

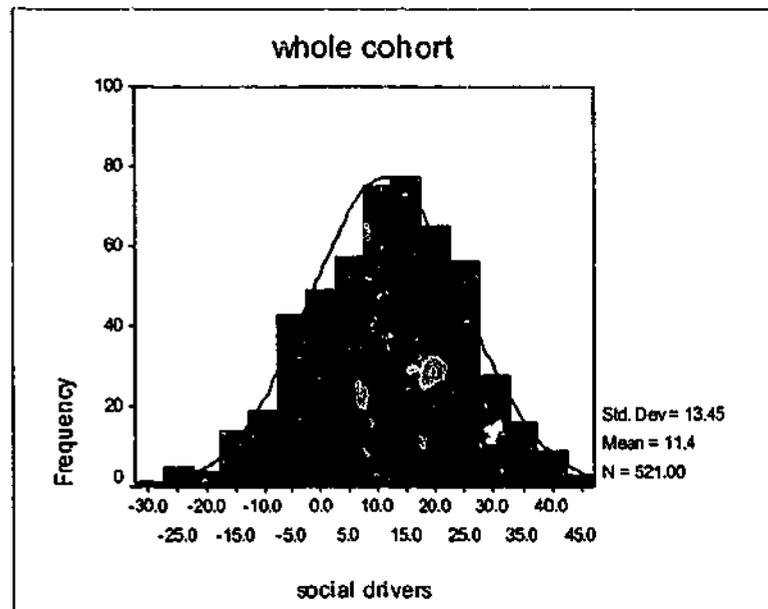


Figure 31 Social drivers: distribution of responses

Summary of Chapter Eleven

This chapter presented the properties of the three indices of the RIQ2003. These were tested using 530 responses to a cross-sectional survey of early-year medical students at Monash University.

Each index was found to consist of two factors, and each had good internal consistency. They were found to be strongly associated with SIS, the gold standard for situational intent, which had been described in Chapter Ten.

The following two chapters will present the performance of the RIQ2003 as a measure of intention. Chapter Twelve presents the statistical analysis of the instrument as a whole and the relationships between the indices. Chapter Thirteen makes an argument in favour of the validity of the instrument.

Chapter Twelve

Characteristics of RIQ2003

Introduction to chapter Twelve – hypotheses to be tested

The previous chapter looked at the structure, reliability and validity of the three indices that comprise the RIQ2003. This chapter looks at how the instrument performs as a whole. The instrument was evaluated by testing six hypotheses presented in Chapter One under the headings of:

- Reliability

The internal consistency was tested on data from the whole cohort and the data from a small group of students were available to look at the temporal stability of the instrument.

- Validity

The structural validity of the instrument was tested through principal components analysis and predictive validity was analysed with regression modelling.

This chapter tests the following hypotheses presented in Chapter One:

Reliability

Internal consistency

The measurement error of an instrument can be determined statistically through the calculation of the Cronbach coefficient Alpha.

Hypothesis 1:

That each of the indices will have good internal consistency.

Test:

The Cronbach's Alpha of each of the components of the index will exceed 0.7

Temporal Stability (Test-retest Reliability)

Although data suitable for testing the temporal stability of the RIQ2003 was available for only a few students, the results will be presented in this section.

Hypothesis 2:

That the instrument remains stable over a two-week period.

Test:

The average correlation coefficient between a response and its repeated response two weeks later will exceed 0.9

Validity

Construct Validity

The RIQ2003 was based on the theoretical frameworks developed by Triandis and by Fishbein and Ajzen. The Triandis theory suggests that the items for such a questionnaire should fall into three categories, affect, perceived consequences and social factors. Fishbein and Ajzen measured subjective norm in a different manner to Triandis, and it was postulated that this component should add to the predictive strength of the Triandis model.

Hypothesis 3:

That the variables, sub-indices and indices are structurally aligned with the expectation of the theoretical frameworks on which they are based.

Tests:

1. The variables will be factorially related according to the Triandis dimensions of affect, perceived consequences and social factors.
2. The Fishbein and Ajzen construct of subjective norm will make an independent contribution to the model.

Predictive Validity

The purpose of this instrument is to predict the situational intention of respondents. Therefore, the items, indices and the sub-indices should display a strong association with intention to work in a rural environment. The Situational Intention Score (SIS) as described in Chapter Ten, was devised as an estimate of this intention.

Hypothesis 4:

That the index will predict which students are likely to have a higher stated intention to work in the country. Students with higher stated intent, as determined by the Situational Intent Score (SIS) will score higher on the components of the index than students with lower stated intent.

Test:

The strength of association between the index and the SIS will be high. The adjusted R^2 for a fitted regression model will be greater than 0.5.

Cultural distinctiveness

Triandis claimed that the weighting of each of the indices, and indeed, sub-indices, would be expected to vary for different cultural sub-groups, as they draw their influence more from different sub-sets of variables. Data from the 'culturally distinct' sub-groups of students were analysed to determine whether the independent contributions made by the various components of the RIQ2003 were different for different sub-groups, as hypothesised.

Hypothesis 5:

That there is a cultural distinctiveness evident in the questionnaire responses from the following groups of students:

- local-international,
- male/female,
- high, intermediate and low SES.

Test:

There will be different patterns of regression weights on the affect, perceived consequences and social drivers for the comparator groups.

Level of commitment to career choice

It is postulated that students falling into the pro rural or the pro-urban SES sub-groups will have more authenticated belief system, in relation to career choice (see also Chapter Eighteen for a discussion on career choice) and those with an intermediate SES are less likely to be committed. If this is the case, members of this last group are less likely to show consistent responses across the range of items in the RIQ2003. Therefore, the strength of association between intent and the indices will be weaker.

Hypothesis 6:

That the more 'committed' students with high or low Situational Expectation Scores (SES) will display a greater strength of association between their beliefs and stated intention (SIS) than the 'less decided' students with a neutral SES.

Test:

The Adjusted R^2 for regression models fitted for the high and low SES subgroups will be greater than that for models fitted for the neutral SES subgroup.

Statistical reliability

As discussed in Chapter Four, the reliability of an instrument can be measured in several ways. The Cronbach's Alpha is a measure of freedom from measurement error using the internal consistency of the variables. Another means of measuring reliability is to consider its 'repeatability,' that is, the error involved with repeating the test under similar conditions, when the same result should be expected. This latter method may be described as temporal stability. The internal consistency of the RIQ2001 was examined in Chapter Eight and that of the RIQ2003 indices was presented in Chapter Eleven. This analysis of the reliability of the RIQ2003 will consider the internal consistency of the instrument as a whole (Hypothesis 1), and then it will examine the temporal stability of the RIQ2000, and the RIQ2003 (Hypothesis 2).

Internal consistency: Hypothesis 1

Sub-indices

In order to calculate Cronbach's Alpha for the six sub-indices, two additional transformations were necessary. Professional consequences required a square root transformation to bring its range closer to that of the remaining variables, and the negative affect score was negatively recoded to bring its meaning in line with the other variables. The variables entered were: positive affect, (negatively recoded) negative affect, (square root of) personal consequences, (square root of) professional consequences, triandis score and referent approval. The Cronbach's alpha values for the scale consisting of these six sub-indices were: whole cohort, .67; local cohort, .69; and international cohort, .64.

The Cronbach Alpha was calculated for the positive component identified during principal components analysis of the sub-indices (see Table 69 on page 195), that is, excluding the negative affect sub-index. The Alpha values were: .69; locals = .70; internationals = .65. These values were only marginally better than the scale consisting of the six sub-indices suggesting that the six sub-indices produced a scale with a reasonable level of internal consistency.

Indices

The Cronbach Alpha for the three indices, affect, perceived consequences and social drivers was .77 (whole cohort), .79 (locals) and .72 (internationals). So the proximate determinants of intention had good internal consistency.

Summary

The Cronbach Alpha, as a measure of internal consistency, was strong for the indices (.77) and reasonable for the sub-indices (.67), suggesting that the RIQ has an acceptable level of measurement error. The temporal stability had been determined on two occasions, each time over a two-week interval, and these produced overall coefficients of .91 and .85. Hypothesis 1 is supported.

Temporal stability: Hypothesis 2

Introduction

Two main issues limit the validity of test-retest stability. If the interval is too short, respondents may recall their previous responses and repeat them. Conversely, if the interval is too long, there may be a true change in the variable being measured. Test-retest reliability was tested on two separate occasions during the development and testing of the RIQ, once on the longer, more complex RIQ2000, and a second time on the briefer RIQ2003. On both occasions the number of respondents was very low, limiting the power of these calculations.

2000 survey

Methods

On the first occasion, seven students who had volunteered to take part in focus group discussions of the 2000 version some 10 to 14 days after first completing it in the classroom setting, repeated it prior to commencing the focus groups (see Chapter Seven for a report on the focus groups).

Results

The Pearson correlation coefficients of the seven pairs of responses to the 2000 survey are presented in Table 66. The coefficients for the whole survey, student by student, were .89 or above, except for student 4, for whom it was .79. Student 5 had lower correlations for most subsets, yet was consistent for intention, demographics and norms. The mean of the correlation coefficients for the seven students was .81.

When the instrument was broken down to component parts, the coefficients were lower, reflecting the smaller number of variables in the analyses. All students had high correlations between their two sets of responses to the intention items, the demographics and the triandis norms, and apart from student 5, for the city likelihood of consequences.

On the other hand, the section evaluating the importance of the affect items reached significance for only two students. These were both rural females, and they had rated all the affect items at the highest level on both occasions. The strength-of-affect items also failed to reach significance for four of the seven students, although the coefficient was over .94 for the other three.

Student 1 had only responded to three of the 44 consequences items, so was excluded from the analysis of those variables. The correlations were stronger for the city subset of items, even for the students with a rural background.

Discussion

The weak performance of the evaluation variables for affect suggested that it was not a reliable or useful item. It was not one of the features of either of the theories on which the instrument was based, and was not used in subsequent versions of the instrument. The poor performance of the strength of affect variables was likely to be the result of poor item selection, and the affect section was remodelled on the PANAS score for the next and subsequent versions. Each of these affect subsets consisted only of five variables, so significant correlations were difficult to achieve.

Students, during the focus group discussions that followed the retest, commented that responses in the quieter, more 'focused' setting were more likely to be well thought out and valid. The focus group setting of the retest was less hurried and quieter than the original classroom setting. In this sense, this test-retest exercise was also a test of process validity. The fact that the

consistency in responses was acceptable (.91) provides evidence in support of the validity of the instrument, based on test process (see further discussion on this in Chapter Thirteen).

Overall the correlations were high; although significance was not reached for many subsets for individual students. This latter is likely to reflect the lower power of those tests that had fewer variables. These results support the reliability of most variables used in the 2000 version.

Table 66 Significant ($p < .05$) Pearson correlation coefficients for test-retest reliability. Seven students repeated the 2000 version during a focus group. Coefficients for whole survey and for subsets of items.

student number		1	2	3	4	5	6	7
rural upbringing (yrs)		18	18	6	0	0	0	0
sex		F	F	M	F	F	F	M
Pearson Correlation coefficients								
all variables		0.97	0.98	0.90	0.79	0.93	0.94	0.89
indices								
intention		1.00	1.00	1.00	0.89	0.99	1.00	1.00
affect	importance	1.00	1.00	ns	ns	ns	ns	ns
	strength	0.94	ns	0.95	ns	ns	ns	0.96
consequences	importance	missing	0.65	0.82	ns	ns	0.62	0.71
	city	missing	0.81	0.84	0.88	0.30	0.76	0.81
	rural	missing	0.68	0.71	0.70	ns	0.61	0.77
referents	power	0.77	ns	1.00	ns	ns	0.80	0.76
	compliance	0.69	ns	0.91	0.85	ns	0.84	1.00
triandis norms		0.94	0.73	0.98	0.81	0.84	0.97	0.96
demographics		1.00	0.99	0.99	1.00	0.98	0.96	0.98

2003 Survey 2d

Again, the small number of respondents limited the power of this analysis.

Methods

On the second test-retest occasion, five of the second-year students repeated survey 2d (the fourth survey in 2003), within two weeks of their first response. During one of the visits during which completed surveys were collected, these students had stated that they were not sure that they had completed the questionnaire after returning from the second rotation in 2003. They volunteered to complete it, "just in case." They were subsequently found to have already completed the questionnaire within the previous 10 days. The individual time intervals between test and retest were not recorded, but ranged from three to twelve days.

Results

The Pearson correlation coefficients measuring the consistency of each student's responses, index by index, are presented in Table 67. The range of the means for the five respondents was .69, to .98, and for the indices was .77, to 1.0. The reliability of the scale as measured by the overall temporal stability on these five students was .85.

Discussion

All students in this year-group had been approached to complete the questionnaire on six occasions over the previous 18 months, so it was understandable that some were not sure whether they had completed this particular survey. If these students were not sure that they had already completed the questionnaire, it was less likely that their recollection of previous responses would be clear.

Unlike the RIQ2000 test-retest, these students repeated the survey under the same conditions (classroom) as they had on the previous sitting. This test-retest exercise therefore did not provide evidence for validity based in response process. The consistency detected provided empirical evidence in favour of the temporal stability and test-retest reliability of the RIQ instrument, albeit over a short period of time. Hypothesis 2 is supported.

Table 67 Test-retest reliability. Pearson correlation coefficients for five students who responded to the same survey twice within 2 weeks. Includes means and standard deviations of correlation coefficients for each student and each index.

case	Index					total	
	intention	affect	consequences	social drivers	demographics	mean	std dev
case 1	1.00	0.98	0.92	0.98	1.00	0.98	0.03
case 2	0.44	0.56	0.67	0.76	1.00	0.69	0.19
case 3	0.72	0.99	1.00	0.99	1.00	0.94	0.11
case 4	1.00	0.92	0.56	0.60	1.00	0.81	0.20
case 5	0.83	0.64	0.71	0.95	1.00	0.83	0.14
number	11	9	22	10	11		63
mean	0.80	0.82	0.77	0.85	1.00		0.85
Std dev	0.23	0.20	0.18	0.17	0.00		0.18

Statistical validity

Introduction

The three indices described in the previous chapters, affect, perceived consequences and social drivers, each consisted of two sub-indices, making a total of six sub-indices. One of the social drivers 'sub-indices' comprised a single item, and therefore was not a true sub-index. This variable has been shown in Chapter Eight and by Fishbein and Ajzen (Ajzen I & Fishbein M, 1980)¹¹⁶ to be a good estimate of subjective norm, so when sub-indices are discussed in this thesis, referent approval is included amongst them. The distribution of data within each of these sub-indices has been described in the previous chapter for the whole, the local and the international cohorts, and all were reasonably normal.

Individually, the sub-indices correlated well with the Situational Intent Score (SIS). The SIS comprised the two stated rural intent items (RI), the undergraduate intent item (UG) and the perceived ease item (Ease). Results of regression modelling with SIS as DV, and the sub-indices as IVs have also been described above.

¹¹⁶ Ajzen and Fishbein 1980, p57

Each of the sub-indices consisted of between one and seven of the variables from the RIQ. Each sub-index had reasonable internal consistency for all three cohorts. A total of 29 variables comprised the RIQ. These consisted of nine affect, eleven consequences and nine social driver items.

Construct validity: Hypothesis 3

Principal components analysis

Variables

PCA was performed on the 29 variables. The Kaiser-Meyer-Olkin measure of sampling adequacy was .887, well above the recommended minimum of .6 (Tabachnick BG & Fidell LS, 2001)¹¹⁷. Bartlett's test of sphericity was highly significant ($< .001$). The sample size for both the whole and the local cohorts exceeded the "general rule of thumb" minimum number advised by Tabachnick and Fidell of 300 cases (Tabachnick BG & Fidell LS, 2001)¹¹⁸.

A solution consisting of five components, each with an Eigenvalue greater than 1.0, was accepted. One additional component had an Eigenvalue of 1.1, but the five-component solution had more meaning than the six component solution, and was chosen for this discussion. Together these five components explained 54.5% of the total variance, and each had a Sum of Squared Loadings (SSL) ranging from 4.62 to 3.34, suggesting roughly equivalent importance (Tabachnick BG & Fidell LS, 2001)¹¹⁹.

The pattern matrix from an oblique rotation with direct oblimin and Kaiser Standardisation offered a meaning for the components (Tabachnick BG & Fidell LS, 2001)¹²⁰. When the values of the loadings of variables onto components below a cut-off point of .3 were suppressed, very close to simple structure was obtained for all three cohorts. The output from SPSS (SPSS, 2002) for such a pattern matrix (whole cohort) is presented in Table 68.

Five components were identified, and were attributed the following meanings:

- **Component 1 (positive)** was dominated by the positive affect variables and the normative social drivers. It had a moderate loading from referent approval, IPC and self concept (living).
- **Component 2 (negative)** consisted of the negative affect variables with moderate loading from PNB city (-.45). Components 1 and 2 explained 37.7% of the total variance of the solution.

¹¹⁷ Tabachnick and Fidell, 2001 p589

¹¹⁸ Ibid, p588

¹¹⁹ Ibid, p 625

¹²⁰ Ibid, p585

- **Component 3 (personal)** consisted of the personal consequences variables. It also had a light loading from autonomy, which is understandable, as this relates to personal consequences as well as professional consequences.
- **Component 4 (professional)** consisted of the professional consequences variables.
- **Component 5 (self-efficacy)** was dominated by three variables, knowledge, self concept (challenge), and self concept (rural doctor). It also had a weaker (negative) loading from NB and a loading from PNB city. Both of these last loadings suggest that those students 'supporting' this component disagree that doctors have an obligation to

Table 68 Pattern matrix after PCA and Direct Oblimin rotation of 29 variables from the RIQ (suppress < 0.3)

	Component				
	1	2	3	4	5
determined	.73				
excited	.71				
proud	.70				
pnb rural	.69				
nb docs should	.63				-.36
referent approval	.47				
agreement	.35				
irritable		.78			
scared		.75			
jittery		.73			
apprehensive		.69			
ashamed		.67			
guilty		.64			
pnb city		-.45			.36
schooling			.76		
spouse			.71		
in touch			.70		
flexibility			.61		
surroundings			.51		
lifestyle			.51		
cultural needs			.48		
make a difference				-.76	
appreciated				-.76	
autonomy			.30	-.65	
context				-.60	
knowledge					.72
s/c challenge					.62
s/c good doc					.53
s/c enjoy living	.32				.41

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

work where they are needed, and do not have an obligation to work in the city. This component may reflect a commitment to self-determination.

The principal component analysis supported the structure of the sub-indices. When the 29 variables were 'forced' into a two component solution, the six negative affect items were the only members of the second component. All other items loaded onto the positive component. This is consistent with the wording used for the items, where a positive outcome was seen to be pro-rural.

Sub-indices

When PCA with Direct Oblimin (oblique) rotation was performed on the six sub-indices, and loadings with a value less than 0.3 were suppressed, simple structure was achieved (Table 69).

Table 69 Pattern matrix after PCA and Direct Oblimin rotation of 6 sub-indices from the RIQ (suppress < 0.2)

	Component	
	positive	negative
positive affect	.82	
professional consequences	.82	
SQRT(personal consequences)	.75	
triandis score	.68	-.39
negative affect		.92
referent approval	.43	-.54

Extraction Method: Principal Component Analysis.
 Rotation Method: Oblimin with Kaiser Normalization.
 Rotation converged in 7 iterations.

The KMO measure of sampling adequacy was an acceptable .771 and Bartlett's test of sphericity was highly significant (<.001). Two components, one 'positive' (Eigenvalue = 2.93) and the other, a weak 'negative' (Eigenvalue = 1.09) were identified, and these two components explained 67.1% of the total variance. The Eigenvalue of the "negative" component was barely greater than 1.0. That is, the variance explained by the negative component was not much more than that of a single sub-index, and its meaning was close to that of negative affect.

Indices

When PCA with Direct Oblimin (oblique) rotation was performed on the three indices (affect, perceived consequences and social drivers), a single component solution was derived, which explained 71.1% of the total variance. The KMO measure of sampling adequacy was acceptable at .663 and Bartlett's test of sphericity was highly significant (<.005).

Summary of PCA

Principal components analyses of the variables, sub-indices and indices of the RIQ were performed. The indices and the sub-indices each provided single component solutions. The 29 variables loaded predictably onto a five-component solution, which closely followed the sub-indices in meaning. There is strong evidence, based on structure, supporting the validity of the instrument as a measure of intention. The internal structure of the instrument closely follows that of the theoretical framework proposed by Triandis and by Fishbein and Ajzen, and discussed in Chapter Two. Hypothesis 3 is supported.

Predictive validity: Hypothesis 4

This section is divided into two parts. The first looks at regression models fitted to data from the whole cohort, the second looks at models derived from data split according to membership of student according to local/international status, gender, and SES subgroups. The second part follows a discussion on predictive validity as it relates to the subgroups (Hypothesis 4) with a discussion on cultural distinctiveness (Hypothesis 5) as demonstrated by the instrument.

Whole of cohort analysis

A regression model was fitted with SIS as the DV, and positive affect, negative affect, personal consequences, professional consequences, triandis and referent approval as IVs. Analysis of the variables and any transformations were described in the preceding sections. There were two multivariate outliers as determined by the mahalanobis distance at the $p < .001$ criterion as recommended by Tabachnick (Tabachnick BG & Fidell LS, 2001)¹²¹. As the dataset is large, these were not deleted (Pallant, 2001)¹²². The Adjusted R^2 was .715 ($F(6, 493) = 210.1, p < .001$).

All sub-indices had statistically significant standardised Beta values except professional consequences (Table 70) indicating that each made a unique contribution to the variance of the DV, SIS. There was no evidence of multicollinearity, as none of the tolerance statistics approached zero.

When a regression model was fitted with the DV, SIS and the IVs, total affect (TAS), perceived consequences (TCS) and social drivers (SDS), the adjusted R^2 was .683 ($F(3, 495) = 358.1, p < .001$). All three indices had statistically significant beta values at the $p < .001$ level (Table 71). There was no evidence of multicollinearity and there were only two multivariate outliers with a mahalanobis value greater than the critical χ^2 of 16.3 (Tabachnick BG & Fidell LS, 2001)¹²³. These models suggested that the sub-indices and the indices predict 71.5% and 68.3% of the variance in SIS respectively, and apart from the professional consequences sub-index, each sub-

¹²¹ Tabachnick and Fidell 2001, p 157

¹²² Pallant 2001, p145

¹²³ Tabachnick and Fidell 2001, p933

index and each index contributed significantly to its respective model. This is strong evidence in support of the validity of the instrument based on its predictive properties. Hypothesis 4 is supported.

Because professional consequences failed to contribute to the regression, personal consequences (srperson) was used in this final model instead of the total consequences score. The R² improved to .706 (F (3, 495) = 400.4, p < .001) and the unique contribution of the consequences component (semi-partial correlation coefficient, labelled 'part' in the coefficients tables) increased from .110 to .189 (Table 72). The role of professional consequences is discussed in more detail on pages 201 and 207.

Table 70 Coefficients table for regression model: DV, SIS; IVs, positive and negative affect, personal and professional consequences, triandis score and referent approval: whole cohort.

	Unstandardized Coefficients		Standardized Coefficients		Correlations	
	B	Std. Error	Beta	t	Sig.	sr ²
(Constant)	-5.61	.83		-6.76	.001	
positive affect	.30	.04	.26	7.94	.001	.19
negative affect	-.19	.02	-.21	-7.83	.001	-.19
professional	-.01	.01	-.04	-1.36	.175	-.03
personal (sq. root)	.46	.07	.21	6.75	.001	.16
Triandis score	.23	.02	.36	9.92	.001	.24
referent approval	.51	.11	.15	4.90	.001	.12

Dependent Variable: SIS

Table 71 Coefficients table for regression model: DV, SIS; IVs, total affect, perceived consequences, social drivers

	Unstandardized Coefficients		Standardized Coefficients		Correlations	
	B	Std. Error	Beta	t	Sig.	sr ²
(Constant)	-7.66	.76		-10.10	.001	
total affect (TAS)	.33	.04	.34	9.24	.001	.23
Consequences (TCS)	.15	.03	.13	4.35	.001	.11
social drivers (SDS)	.31	.03	.46	12.14	.001	.31

Dependent Variable: SIS

Table 72 Coefficients table for regression model: DV, SIS; IVs, total affect, personal consequences, social drivers

	Unstandardized Coefficients		Standardized Coefficients		Correlations	
	B	Std. Error	Beta	t	Sig.	sr ²
(Constant)	-6.75	.43		-15.70	.001	
total affect (TAS)	.31	.03	.33	9.26	.001	.23
personal consequences	.02	.01	.22	7.77	.001	.19
social drivers (SDS)	.30	.02	.44	12.20	.001	.30

Dependent Variable: SIS

Cultural distinctiveness: Hypothesis 5

Subgroup analysis

Triandis suggested that when his theory of interpersonal behaviour was applied in a cross-cultural setting, the weighting of the three indices, affect, perceived consequences and social drivers, would not be the same for different cultural groups. The construct validity of this instrument was tested through the analysis of regression models with SIS as the dependent variable and the indices or sub-indices, described above, as independent variables. Sub groups of students from differing cultural backgrounds were expected to have different beta weightings for the indices and sub-indices. Some variation in regression models between local and international students has been described previously during the discussions on the construction of the sub-indices. This section will investigate differences in the standardised beta weightings of student subgroups based on sex and international/local status. It will also investigate differences in strength of the models (adjusted R^2) and beta values based on the Situational Expectation Score groupings.

Table 73 presents the statistics for regression models fitted with SIS as the DV, and either the three indices (affect as TAS, personal consequences, and social drivers as SDS), or the six sub-indices (positive affect, negative affect, (square root of) personal consequences, professional consequences, referent approval and social drivers as the triandis score). Regression models were fitted for subgroups based on local/international status, male/female sex. These groups were further reduced to international male, local male, international female and local female cohorts.

The number of cases recommended by Tabachnick for testing individual predictors in regression models is 104 plus the number of IVs (Tabachnick BG & Fidell LS, 2001)¹²⁴. One hundred and ten cases were required when the IVs were the six sub-indices and 107 cases when the IVs are the three indices. There were insufficient cases in the international male ($n=46$) or the international female ($n=75$) subgroups. So, while it was valid to examine the larger groups, divided by sex or by local/international status, only the local male and local female subgroups were large enough to be compared at the subgroup level.

As the numbers in the subgroups were smaller than for the whole group, the three cases that comprised the four outliers discussed earlier (Chapter 12.5.1) were excluded from these studies. All models were highly significant, and the adjusted R^2 values ranged from .66 to .73, meaning that the models explained 66% to 73% of the variance in SIS. In all cases the R value was above .8 (Table 73). These results support Hypothesis 4.

¹²⁴ Tabachnick and Fidell 2001, p 117

Subgroups according to local/international status

The beta values in regression models indicate the relative importance of the independent variables (Pallant, 2001)¹²⁵. They reflect the relative amount of unique contribution of the variable toward the variance of the DV, after the unique variance of all the other variables included in the model has been accounted for.

When regression models were fitted with SIS as the DV and the indices as IVs, both subgroups scored most highly on social drivers, then on affect and finally on perceived consequences (see Table 74). The international cohort had a slightly higher beta value for the affect index (.38 versus .33), and a relatively lower value for the personal consequences index (.14 versus .24). Locals and internationals scored similarly on the social drivers index.

The three indices were broken down into their six components, and these were entered as the IVs. The small difference previously seen between subgroups of students in the total affect score translated to a large difference in negative affect, and to similar scores on positive affect. The large difference in perceived consequences persisted. Although the SDS seemed equivalent for the two groups, the beta value for social referent approval was higher for the international group (Table 74). These observations were confirmed by analysis of the squared semi-partial correlations (labelled 'part' in SPSS output), which are a measure of the unique contribution of each independent variable.

Table 73 Regression model statistics for models testing local/international and male/female cohorts.

Cohort	Independent Variables	R	Rsq	F	Degrees of freedom	sig.
whole	indices (n=3)	0.85	0.72	414.9	3, 493	<.001
	sub-indices (n=6)	0.85	0.72	212.2	6, 490	<.001
international	indices (n=3)	0.82	0.66	79.3	3, 119	<.001
local		0.85	0.73	332.8	3, 367	<.001
international	sub-indices (n=6)	0.83	0.67	41.7	6, 116	<.001
local		0.86	0.73	166.7	6, 367	<.001
male	indices (n=3)	0.84	0.71	137.8	3, 170	<.001
female		0.85	0.72	269.0	3, 317	<.001
male	sub-indices (n=6)	0.85	0.70	69.5	6, 167	<.001
female		0.85	0.72	141.0	6, 315	<.001
local male	indices (n=3)	0.85	0.72	109.7	3, 123	<.001
local Female		0.85	0.72	214.4	3, 241	<.001
local male	sub-indices (n=6)	0.86	0.73	56.8	6, 120	<.001
local Female		0.86	0.73	109.8	6, 239	<.001

Dependent Variable: Stated Intent Score (SIS)

¹²⁵ Pallant 2001, p146

Table 74 Significant standardised beta values for the Independent Variables in models testing for differences in local/international and male/female cohorts.

Cohort	Independent Variables	Affect			Consequences			Social drivers		
		total (TAS)	positive	negative	total (srperson)	professional	personal	total (SDS)	referents	triandis
whole	indices (n=3)	0.35			0.20			0.43		
	sub-indices (n=6)		0.26	-0.20		ns	0.21		0.15	0.36
international	indices (n=3)	0.38			0.14			0.44		
	local	0.33			0.24			0.41		
international	sub-indices (n=6)		0.24	-0.24		ns	0.14		0.20	0.37
	local		0.26	-0.18		ns	0.25		0.13	0.35
male	indices (n=3)	0.38			0.19			0.41		
	female	0.33			0.21			0.40		
male	sub-indices (n=6)		0.28	-0.22		-0.11	0.23		0.10	0.40
	female		0.24	-0.19		ns	0.20		0.18	0.33
local male	indices (n=3)	0.33			0.22			0.42		
	local Female	0.33			0.25			0.41		
local male	sub-indices (n=6)		0.26	-0.21		-0.17	0.29		ns	0.41
	local Female		0.26	-0.16		ns	0.23		0.16	0.31

Dependent Variable: Stated Intent Score (SIS)

This suggests that, although the overall influence of the three indices was similar, international students were more influenced by the negative affect and referent approval than local students were. It also suggests that local students were more influenced by perceived consequences than the international students were. This supports the cultural distinctiveness of these two subgroups, as predicted by Triandis. Hypothesis 5 is supported.

Subgroups according to sex

Indices

When similar models were fitted for local student subgroups divided by sex, the models based on the three indices (affect, TAS), personal consequences (srperson) and social drivers (SDS) suggested that the indices had similar beta weights for both male and female subgroups (Table 74). This analysis used personal consequences as the indicator for the perceived consequences index and did not include the professional consequences. Sub-index analysis including the professional consequences, however, uncovered a distinct difference between the effect of professional consequences depending on sex. The presence of a 'suppressor variable', the triandis score, will be introduced here, and discussed further on page 207.

A suppressor variable: the triandis score

A suppressor variable is one that 'suppresses' unwanted background variance otherwise associated with the variable in question. This background variation masks the relationship the suppressed variable has with the dependent variable (Tabachnick BG & Fidell LS, 2001)¹²⁶. Such a suppressor variable was found in the regression model fitted for the males.

A regression model was fitted with the DV, SIS, and two IVs, professional consequences and personal consequences (Model 1 in Table 75 and in Table 76). Both IVs had highly significant positive beta values for the females (Table 76). For the males, after the variance shared with the stronger personal consequences IV had been allowed for, the remaining variance in professional consequences did not make a significant independent contribution to the model. (Model 1, Table 76).

When the triandis score was added as a third IV to the model for males (Model 2), the beta value for professional consequences gained significance ($p < .02$), and had a negative value. This meant that in a model with only the two IVs, personal and professional consequences, any contribution attributable to professional consequences was channelled via personal consequences. The remaining variance had a positive and a negative component, and these cancelled each other out to some extent. Much of the positive variance was shared with the triandis score, so when the triandis score was added as a third IV, additional positive variance was channelled from professional consequences, via the stronger triandis score, leaving only the

¹²⁶ Tabachnick and Fidell 2001, p148

negative component of the variance. This was significant, and represented a unique negative influence on Intention for males. This relationship is represented diagrammatically in Figure 32. While this phenomenon was not observed in the whole female cohort, it did occur for the 86 females with a neutral SES score (Table 76). It was not evident in females in either of the two other SES groups, and in none of the three smaller male SES groups. This means that while the professional consequences sub-index often fails to show a significant effect for the group as a whole, it plays an important (negative) role in the decision-making for some subgroups, including males and undecided females.

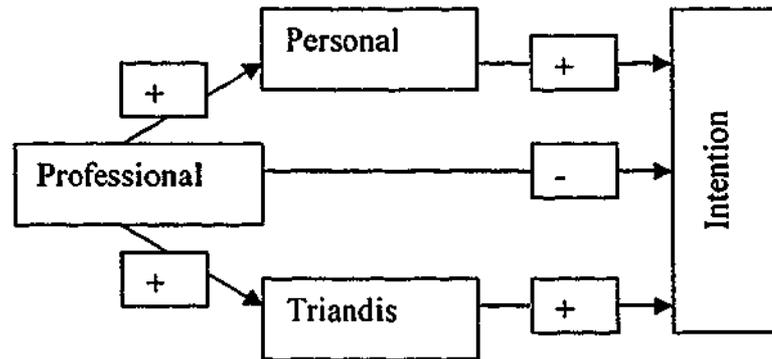


Figure 32 Male model: the relationship between professional consequences and intention is negative, after the normative and personal components have been allowed for.

Table 75 Regression model statistics for models testing the suppressor variable, triandis score

		R	R ²	F	degrees of freedom	significance
Model 1	male	0.68	0.45	52.3	2, 124	0.001
	female	0.68	0.46	103.7	2, 244	0.001
Model 2	male	0.82	0.67	84.7	3, 123	0.001
	female	0.81	0.66	156.8	2, 242	0.001

Table 76 Coefficient tables for models testing the suppressor variable, triandis score

cohort	Independent Variables	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Model 1						
male	(Constant)	-16.07	2.00		-8.04	0.001
	personal	1.61	0.19	0.68	8.67	0.001
	professional	-0.01	0.01	-0.01	-0.14	0.887
female	(Constant)	-16.55	1.53		-10.84	0.001
	personal	1.31	0.13	0.55	10.32	0.001
	professional	0.03	0.01	0.22	4.24	0.001
Female SES2	(Constant)	2.62	1.21		2.17	0.033
	personal	-0.01	0.01	-0.15	-1.31	0.195
	professional	0.25	0.09	0.31	2.72	0.008
Model 2						
male	(Constant)	-8.41	1.77		-4.75	0.001
	personal	0.88	0.17	0.37	5.31	0.001
	professional	-0.02	0.01	-0.15	-2.39	0.018
	triandis score	0.39	0.04	0.62	9.03	0.001
female	(Constant)	-10.25	1.33		-7.74	0.001
	personal	0.74	0.11	0.31	6.61	0.001
	professional	0.01	0.01	0.05	1.22	0.224
	triandis score	0.37	0.03	0.57	11.96	0.001
Female SES2	(Constant)	1.97	1.12		1.77	0.081
	personal	0.27	0.09	0.33	3.16	0.002
	professional	-0.02	0.01	-0.31	-2.83	0.006
	triandis score	0.14	0.03	0.45	4.44	0.001

Dependent Variable: SIS

The addition of social drivers to the model also resulted in a reduction in the beta values for personal consequences for both the male and the female cohorts. This indicated that part of the effect of personal consequences on SIS was also mediated through social norms (Figure 33). Indeed, for the female cohort, almost all of the positive predictive value of professional consequences was explained by social norms (Model 2 Table 76). This suggested that the negative direct path between professional consequences and intention seen in males (Figure 32) was not significant for females (Figure 33). This supports a 'cultural distinctiveness' between males and females. Hypothesis 5 is further supported.

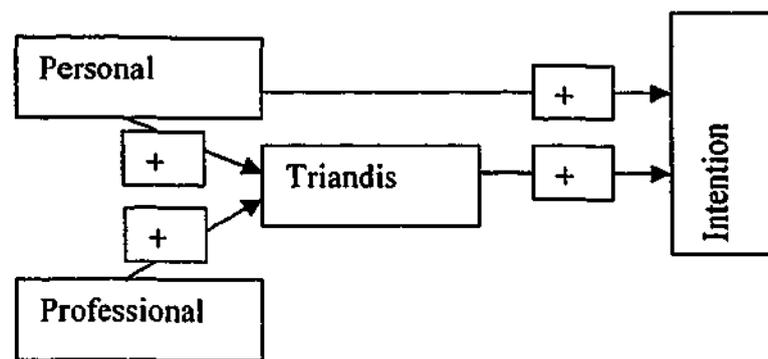


Figure 33 Female model: professional consequences is mediated by the positive normative social drivers. The residual negative direct path was significant for males but not for females

These observations help to explain the findings on the whole-group models presented in Table 71 and Table 72. The TCS, that is, personal plus professional, made a lesser unique contribution to the models than personal consequences alone. This was because some of the subjects considered professional consequences as a negative influence, and others as a positive influence, effectively cancelling each other out in combined group studies. Indeed, males felt both a positive influence from professional issues through the social sub-index, as well as a unique direct negative influence. The uncontaminated personal consequences sub-index performed better, and so it was used for some whole-group studies on the indices.

Sub-indices

Analysis of regression models with DV, SIS and IVs positive affect, negative affect, personal consequences, professional consequences, referent approval and triandis score (Table 74) exposed some differences in the determinants of SIS between the male and female subgroups.

As discussed in the previous section, triandis score was a suppressor variable for professional consequences in the males, exposing it as a negative determinant in that group, whereas professional consequences did not make a significant unique contribution to regression in the female model.

The triandis score had a greater standardised beta value for the males (.41) than the females (.31), while, referent approval gained significance for females but not for males, suggesting a different pattern of influence within social drivers for the sexes. It was also possible that negative affect played a larger role in males (-.21) than it did in females (-.16). This adds further support for Hypothesis 5, based on sex differences.

Subgroups according to SES membership

Introduction

The Situational Expectation Score was developed and shown to be a reliable and valid measure of the likelihood to take up a rural career in Chapter Ten. It was considered valuable to break the student cohort into approximately equal groups according to their SES score. In this way, differences in influences on rural career choice between students with high, neutral and low rural expectation could be studied.

The low-scoring group were more likely to choose an urban career, and were termed "strongly urban," the high-scoring group were termed "strongly rural" and the intermediate group were termed "neutral." This neutral group, for example, consisted of those who were likely to have had few years rural upbringing, an intermediate stated rural intent, intermediate intention to become a generalist, intermediate intention for extra undergraduate training and an intermediate assessment of the ease of rural living and practice. In brief, these students are likely to be undecided. As such, they are of special interest to those providing courses designed to facilitate a rural career choice.

It was hypothesised, therefore, that members of the strong rural group may have had some cultural distinctness, as displayed by different beta weightings, from the strong urban group. Further, it was postulated that the neutral group may not have had strongly formed intentions, and that regression models would have been weaker (lower adjusted R^2) for this group.

Methods

Four hundred and ninety-six of the 530 students (94%) had provided enough data for regression modelling and 452 supplied responses sufficient to calculate their SES scores. Three students were excluded from these analyses because they were multivariate outliers. Analysis of the frequencies of the SES scores among students revealed that the group could be divided into three roughly equal SES subgroups using -0.33 and +8.3 as the cut-off points. Of the 450 students, 171 fell into the strong urban group, 141 were neutral and 138 strong rural.

Two sets of linear regression models were fitted with the Situational Intention Score (SIS) as the dependent variable; one for the indices: Total Affect Score (TAS), personal consequences (srperson) and Social Drivers Score (SDS); the other for the sub-indices: positive affect, negative affect, personal consequences (srperson), professional consequences (profess), normative (triandis score) and referent approval. Modelling was performed for the whole group ($n=496$) and for each of the three SES groups, using SPSS for Windows v11.5.0 (SPSS, 2002).

Results

Strength of association (Adjusted R²): Hypothesis 6

Models for the whole group of students revealed both the set of indices and the set of sub-indices to be strong predictors for SIS, with Adjusted R² of .715 and .719 respectively (Table 77 below and Table 81 on page 211). The adjusted R² values were similar for two models, whether based on the indices or the sub-indices. The strength of association (adjusted R²) was not as great for the smaller numbers in the strong urban and strong rural SES groups; however these models still explained 43% and 34% of the variance in SIS, respectively. The neutral group, as hypothesised, had much lower R² values for both the indices and the sub-indices models (.093 and .114 respectively). All models had highly statistically significant strengths of association ($p < .001$).

This supports the hypothesis that the neutral SES subgroup had less strongly defined beliefs about their intention to choose a rural career. Hypothesis 6 is supported. This issue is revisited in Chapter 17 under the heading: The strength of association between RI score and RIQ for the neutral SES sub-group.

Relative values of indices/sub-indices (beta values): Hypothesis 5

The beta values (indices and sub-indices) for the whole-group models were all strong with the exception of professional consequences. When groups were divided by SES, regression modelling with SIS as the dependent variable (DV) and the indices as independent variables (IVs) produced similar outcomes for the 'committed' subgroups. Affect and social drivers made the strongest unique contributions to the model, with a lesser contribution from consequences (srperson) (see Table 77).

Table 77 Characteristics of regression models fitted for subgroups determined by SES membership. Dependent Variable: SIS, Independent Variables: affect, consequences (srperson) and social drivers

SES Group	Number	R	Adjusted R Square	F	significance	Standardised beta values		
						Affect	srperson	Social drivers
whole group	496	0.85	0.72	415	***	0.35***	0.20***	0.43***
strong urban	165	0.67	0.44	43.9	***	0.37***	0.16*	0.36***
neutral	135	0.34	0.09	5.6	***	ns	ns	0.19*
strong rural	133	0.60	0.34	23.8	***	0.24**	0.18*	0.37***

Dependent Variable: SIS

Consequences = srperson

*** $p < .005$

** $p < .01$

* $p < .05$

When the sub-indices were entered as the IVs, considerable and plausible differences could be identified between SES groups (see Table 81 on page 211). The urban group was influenced

strongly by both positive and negative affect, and by social norms, but to a lesser extent by personal consequences; the rural group was influenced mostly by social norms with some contribution by referent approval, personal consequences and positive affect.

The neutral SES group had much weaker strengths of association between the dependent variable (SIS) and the indices (adjusted $R^2 = .09$), as well as the sub-indices (adjusted $R^2 = .11$) than either of the more committed groups. This was also reflected in the beta values. In the model fitted for the indices (with srperson representing consequences), only social drivers had a beta value significant at the .05 level (Table 77). Srperson was a possible influence, but only at the .06 level of significance. The model with the sub-indices as IVs produced significant beta values only for positive affect and personal consequences (Table 81). Professional consequences (profess) and social norms (triasf2) only reached significance at the .06 level.

Additional consideration of two sub-indices

The role of professional consequences: Hypothesis 5

As discussed in Chapter Eleven, the Total Consequences Score had a lesser strength of association with the SIS than personal consequences alone. Professional consequences was shown to have either a positive influence or a negative influence, depending on whether the student group studied was male or female (Figure 32 and Figure 33). Further analysis was carried out to clarify these relationships.

The personal consequences variable had been subjected to a square root transformation in order to correct a grossly non-normal distribution (srperson). This manoeuvre was not necessary for professional consequences, however any linear combinations of profess and srperson would have been dominated by profess, as it had 13 times the range of srperson. Therefore, the professional consequences variable was multiplied by .075 (.075profess) before being used in linear combinations with srperson.

Two additional regression models similar to that presented in the previous section (see Table 77), were fitted for the whole group as well as for the SES subgroups. SIS was the DV, and the indices were the IVs. In the model presented in Table 77, the consequences variable was srperson, that is, the square root transformation of the personal consequences sub-index. Instead, one of the additional models used srperson plus .075profess (Total Consequences Score, TCS) (see Table 78), and the other used srperson minus .075profess (ctot2) (see Table 79) as the independent variable representing perceived consequences. These were compared with the model using srperson (Table 77).

Whole group

There was little difference observed in the three models based on the three perceived consequences IVs when the whole group was considered as a single cohort (Table 77, Table 78 and Table 79). All three perceived consequences IVs were found to have a strong association with the SIS.

Table 78 Characteristics of regression models fitted for subgroups determined by SES membership. Dependent Variable: SIS, Independent Variables: affect, consequences (TCS) and social drivers

SES Group	Number	R	Adjusted R Square	F	significance	Standardised beta values		
						Affect	TCS	Social drivers
whole group	496	0.84	0.70	377.0	***	0.36***	0.11***	0.48***
strong urban	165	0.67	0.43	43.2	***	0.36***	0.14*	0.37***
neutral	135	0.30	0.07	4.3	**	ns	ns	0.23*
strong rural	133	0.58	0.32	22.2	***	0.24**	ns	0.34***

Dependent Variable:SIS

TCS = srperson + .75profess

*** p<.005

** p<.01

* p<.05

Table 79 Characteristics of regression models fitted for subgroups determined by SES membership. Dependent Variable: SIS, Independent Variables: affect, consequences (ctot2) and social drivers

SES Group	Number	R	Adjusted R Square	F	significance	Standardised beta values		
						Affect	ctot2	Social drivers
whole group	496	0.84	0.70	388.0	***	0.39***	0.12***	0.52***
strong urban	165	0.65	0.42	40.1	***	0.38***	ns	0.42***
neutral	135	0.39	0.14	8.0	***	0.21*	0.27***	0.26***
strong rural	133	0.58	0.32	21.4	***	0.27***	ns	0.41***

Dependent Variable:SIS

ctot2 = srperson-.075profess

*** p<.005

** p<.01

* p<.05

As noted earlier (see Chapter 11.2.2.6), srperson made a greater unique contribution to the models than TCS or ctot2, as evidenced by higher beta values relative to those of affect and social drivers.

SES subgroups

When the whole-cohort was divided into the SES groups, the importance of the structure of the perceived consequences IV became evident:

When TCS (srperson plus .075profess) was used as the sub-index for perceived consequences (see Table 78), the pattern of results was similar to that seen in Table 77 for the model based on srperson. The beta values for the 'committed' SES groups, (strong urban and strong rural) were strong for affect and social drivers and moderate for consequences. (When TCS was used, the beta value of consequences only reached significance at the .08 level in the strong rural subgroup). Again, the regression model for the neutral SES group was weak, the IVs explained

only 6.8% of the variance in the SIS, and only social drivers made a significant unique contribution to the model.

When $ctot2$ ($sraperson$ minus $.075profess$) was used (Table 79), the unique positive contribution by perceived consequences in the committed sub-groups was redistributed to affect and social drivers. The regression model for the neutral SES group, however, doubled in predictive power (adjusted $R^2 = .135$) and the three IVs all had significant beta values, with those of SDS and $ctot2$ being highly significant (Table 79).

Conclusion

Professional consequences were found to have both positive and negative influences on rural career choice. In females, generally, the positive influence was linked to social drivers, suggesting that for them, the professional issues surrounding rural career choice had a strong positive social value. Professional consequences did not make a further unique contribution to rural career choice for this group after this positive social aspect was allowed for.

For males, women in the undecided SES subgroup, and members of the neutral SES subgroup, generally, professional consequences had both a positive and a negative component. Again, the positive component was linked to social drivers. For these subgroups, however, after this positive shared variance was allowed for, a unique negative influence on rural career choice remained.

In all groups, personal consequences had a positive association with rural intent. Therefore, the measured influence of total consequences depends on whether the sub-indices are summed or subtracted. For some subgroups, addition will potentiate their measured effect, and for others, subtraction causes this. When either is applied to the whole cohort, the overall effect is to reduce the measured influence of perceived consequences. At times, it is beneficial to consider the stronger personal consequences alone. This does, however, risk the loss of some valuable information.

The role of the Fishbein and Ajzen estimate of subjective norms (referent approval): Hypothesis 3 (part 2)

Sequential regression was employed to ascertain whether subjective norms, that is, the influence of important others, added to the predictive ability of a model based purely on the sub-indices derived from the Triandis theory. The regression model expanded by the inclusion of referent approval was the same as that described in the previous section, using all six sub-indices as IVs. Step 1 involved entry only of the five sub-indices based on the Triandis model. Step 2 added referent approval.

Table 80 displays the R , R^2 , adjusted R^2 before and after entry of referent approval. After step 1, the R^2 (unadjusted) was .705. There was a small but significant ($p < .001$) change in R^2 after step 2, increasing it to .719. This suggested that referent approval did make a significant

contribution to the model, but that it was very small. The new model explained only an additional 1.4% of the variance in SIS above that explained by the Triandis sub-indices.

When the squared semipartial correlations (sr^2) of the expanded model were calculated however, referent approval could be seen to have made a moderate unique contribution in the expanded model (Table 70 on page 197). Comparison of the squared semipartial correlations after step 1 (not tabulated) and step 2 revealed that the unique variance of each of the other variables had dropped as a result of the inclusion of referent approval to the model.

Table 80 Sequential regression model statistics testing the additive value of the Fishbein and Ajzen variable, referent approval.

Model	R	R Square	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1 ^a	.84(a)	.71	.70	.71	236.3	5	494	.001
2 ^b	.85(b)	.72	.72	.01	24.0	1	493	.001

a Predictors: (Constant), triandis score, negative affect, positive affect, profess, srperson

b Predictors: (Constant), triandis score, negative affect, positive affect, profess, srperson, referent approval

c Dependent Variable: SIS

Most of referent approval's contribution to the variance in the expanded model had been explained in the Triandis model by the other variables, and, as discussed under Statistical reliability on page 188, the reliability of the model based on the Triandis variables increased only slightly with the addition of referent approval. Despite the low magnitude of these effects, this variable was left in the instrument for theoretical reasons. It was clear that referent approval was more important for some student subgroups than for others, and that it was very important for a few. For example, when students are subdivided by SES, referent approval gained considerable significance for the strong rural group, equivalent to that of positive affect and personal consequences (Table 81). Although the effect size was small, the Fishbein and Ajzen component of the instrument, referent approval, added to the predictive validity of the instrument. Its addition to the understanding of the influences on rural career choice was likely to be of even greater value. Hypothesis 3 (part 2) was supported.

Summary of Chapter Twelve

Chapter Twelve considered the structure of the RIQ2003 and analysed the relationships between its component parts. It also investigated the function of the instrument by measuring its ability to predict intention to work in a rural environment, and to identify culturally distinct sub-groups of respondents.

The hypotheses listed in the introduction to this chapter were all supported by a statistical analysis of the properties of the RIQ2003. This shows it to be a reliable and valid instrument, consistent with the theoretical framework upon which it is based. A systematic theoretical argument in favour of the validity of the instrument is presented in Chapter Thirteen.

Table 81 Characteristics of regression models fitted for subgroups determined by SES membership. Dependent Variable: SIS, Independent Variables: positive and negative affect, professional and personal consequences, Triandis score and referent approval

SES Group	Number	R	Adjusted R Square	F	significance	Standardised beta values of independent variables					
						Affect		Consequences		Social drivers	
						Positive	Negative	Professional	Personal	Triandis	Referents
whole group	496	0.850	0.72	387.9	***	0.26***	-0.20***	ns	0.21***	0.36***	0.15***
strong urban	165	0.675	0.44	22.2	***	0.36***	-0.21***	ns	0.14*	0.31***	ns
neutral	135	0.391	0.11	3.9	***	0.21*	ns	ns	0.22*	ns	ns
strong rural	133	0.609	0.34	12.5	***	0.18*	ns	ns	0.17*	0.31***	0.17*

Dependent Variable:SIS

*** p<.005

** p<.01

* p<.05

Chapter Thirteen

Validity of the RIQ2003

Introduction to Chapter Thirteen

The Standards for Educational and Psychological Testing is considered to be the international benchmark on the development and testing of educational and psychological instruments. In its most recent edition it states:

Validity is a unitary concept. It is the degree to which all the accumulated evidence supports the intended interpretation of test scores for the proposed purposes (American Educational Research Association et al., 1999).

As discussed in Chapter Four, this means that, rather than breaking up validity along traditional lines, such as construct, content, and predictive validity, a cohesive argument should be presented outlining the sum of evidence in favour of the validity of an instrument. In doing so, however, it seems appropriate to source this evidence along the traditional lines. Chapter Thirteen presents an argument in favour of the validity of the RIQ under the headings used in the Standards.

Evidence Based on test content

Evidence based on test content has two main components, how well the content correlates with the construct that it is meant to measure, and the relevance of the content domain with the proposed interpretation of the scores. Evidence of the former can be sought through logical and empirical analyses, and of the latter from experts and others involved in the field (American Educational Research Association et al., 1999)¹²⁷

The items were developed after consultation with medical students as described in Chapter Five. Open-ended and semi-structured questionnaires were used to build up a large database of terms and issues identified by students to be relevant to them when they consider a rural career choice. These were discussed with small groups of experts, and were reduced to the modal salient (most often quoted) items along the lines of the theoretical framework, provided by Triandis and Fishbein and Ajzen.

The instrument was pilot-tested on 36 students in 1999. The data from these responses were analysed, and the sub-indices were found to be strong predictors of stated intention. The 2000 version was developed and tested on first year medical students. This questionnaire included an open-ended question asking for feedback on its style and content. Of the 162 respondents, 57 made a comment. These were reported in Chapter Seven.

Two focus groups, one of rural students and the other of urban students, were run after this survey, and the outcomes are also presented in Chapter Seven. Open-ended questions were again included in the 2001 version completed by 131 second-year students and 65 final year

¹²⁷ The Standards, 1999 p11

students. The bulk of Chapter Seven deals with the empirical relationship between the content of the instrument and the constructs that it measures. There was strong evidence in support of the validity of the instrument, based on test content.

Evidence based on response processes

Throughout the four years of this study, and particularly throughout 2003, questionnaires were distributed to students before or after lectures and tutorials. Although students were requested not to do so, some were completed during the lecture. Other students completed the questionnaire at home and returned them over the two weeks following distribution. Some of the less accessible groups were mailed the questionnaire, and asked to return them by mail. In some surveys, each of these response processes was involved.

If there were systematic differences in response pattern according to the process, the whole-group response would have been affected. Further, groups using different response processes would have different response patterns as a result of the process, not of true differences in attitudes. Evidence was sought to support the validity of the instrument based on response processes. If response patterns were similar, regardless of the process of the survey, evidence in support of validity would have been demonstrated.

As discussed during the report on the focus groups in Chapter Seven, the mail-out process enabled a more reasoned response, and may have attracted responses only from the more willing students. This may have had opposing effects on response validity. A more reasoned response should have provided more valid and consistent responses, whereas the generalisability of the instrument may be limited by self-restriction of the response group, to those more willing to do so.

This testing was performed by comparing responses from the classroom process and the mail-out process and was presented in detail in Chapter Seven. These processes were chosen as representing the extremes with regard to time available, level of distraction and free-will not to respond (social conformity). Few differences were identified in the analysis, lending support to the validity of the instrument based on response processes. The instrument measured attitudes just as well when students were rushed in the classroom situation, as when they were free to take their time at home.

The students who volunteered for the focus groups also repeated the test prior to the discussion. The setting was significantly different to the noisy and almost chaotic setting in the classroom for the first response. The groups were small, the setting subdued, and time was not restricted. The test-retest analysis found that the overall averaged correlation coefficient for the seven students was .91. This is strong empirical evidence in favour of the validity of the earlier, more complex instrument, based on response process (see also Temporal stability: Hypothesis 2 on page 189).

Evidence based on internal structure

The data presented in Chapter Twelve of the thesis showed the items of the instrument to be factorially valid. The indices formed through analysis of data obtained after sampling 604 students, with an 88% response rate, were the same as those predicted by the underpinning theories of Triandis and Fishbein and Ajzen. When all 29 of the items of the instrument were entered into a principal components analysis, the three domains of the Triandis model, affect, perceived consequences and social drivers, were dominant (see Table 68 on page 194). Further, the sub indices identified through scale reduction processes (principal components analysis) and scale reliability techniques (internal consistency – Cronbach coefficient alpha), were supported by the literature (personal and professional consequences) (Strasser, Hays, Kamien, & Carson, 2000), previous scale analyses (positive and negative affect) (Watson D et al., 1988) and the theoretical framework (Triandis social scale and Fishbein and Ajzen subjective norms).

The Triandis approach suggests that culturally distinct subgroups should have systematically different responses to different sub-indices. The weighting of these sub-indices was greater for some sub-groups than others. The discussion: Subgroups according to local/international status on page 199, describes this quality of the instrument in considerable detail. This is a type of multidimensionality that conforms to the theoretical framework of Triandis. Further, especially in reference to personal/professional consequences, subsets of items functioned differently for different sub-groups of students (male/female) who had otherwise had similar scores. This is a type of unexpected multidimensionality that nevertheless supports the validity of the instrument based on its internal structure. Both of these types of multidimensionality support the validity of the instrument based on internal structure (American Educational Research Association et al., 1999)¹²⁸.

Evidence based on relations to other variables

External variables (construct)

Validity evidence based on external variables involves showing a relationship between the instrument and variables identified in other research as measuring the same underlying construct. Chapter Two included a comprehensive description of the literature surrounding factors which predict eventual rural career choice in medical graduates. These include rural origin (Laven et al., 2003), intention to become a family physician (Rabinowitz, Diamond, Hojat et al., 1999), self efficacy (A Bandura, 1997), undergraduate rural training (Wilkinson, Laven, Pratt, & Beilby, 2003) and stated intention to practice in rural areas (Rabinowitz et al., 2001). All of these influences are incorporated into the Situational Expectation Score (SES) described above. As there is a strong relationship between behavioural expectation and behavioural intention (Warshaw & Davis, 1985a), group membership of the SES subgroups was expected to be

¹²⁸ The Standards 1999, p13

associated with the indices and sub-indices of the RIQ. This was shown to be the case in the discussion: Subgroups according to SES membership on page 205, providing evidence based on external variables that the proposed test interpretations are consistent with the construct that the instrument actually measures, or construct consistency.

The relationship between the components of SES and the sub-indices is consistent with a form of convergent evidence. This is a type of correlational evidence, however, convergent evidence may also be experimental (American Educational Research Association et al., 1999).¹²⁹ Section Four provides both convergent and discriminant experimental evidence for the validity of the instrument based on relations to other variables. In Chapter Fifteen, it is shown that the strong rural SES group respond differently to a rural program than do the strong urban group, and that the neutral SES group responds differently according to which program its members participated in. An increase in rural intent (SIS) was observed in those attending a rural program and a decrease for those attending an urban program. These findings were also reflected in the sub-indices of the instrument (see Chapter Sixteen).

Criterion-related validity

A related source of evidence is the relationship of test scores with a relevant criterion. In this case, the criterion of interest is rural intent, which may be measured as SIS. The relationship may be predictive, concurrent or postdictive. As it is the strength of the relationship, and not the time relationship between the measure and the criterion that is of interest, DeVellis prefers the temporally neutral term, criterion-related validity (DeVellis RF, 1991)¹³⁰. The same data used to support construct validity can be used to provide evidence based on the test-criterion relationship. In this case, the relationship described is between SES group membership as predicted (albeit concurrently) by the instrument. The difference between construct-related and criterion related validity lies in the purpose of the researcher (DeVellis RF, 1991)¹³¹.

One such relationship was highlighted in the presentation: A suppressor variable: the triandis score on page 201. Here, the relationship between several sub-indices and SIS was shown to be different for males and females, and in this case, this difference was shown to be plausible. The Standards for Educational and Psychological Testing comments,

...a finding that the relation of test scores to a relevant criterion variable differs from one group to another may imply that the meaning of the scores is not the same for members of different groups, perhaps due to construct underrepresentation or construct-irrelevant components. However, the difference may also imply that the criterion has different meaning for different groups (American Educational Research Association et al., 1999)¹³².

Another example of a difference in the relationship between sub-indices and the criterion was in the case of SIS and the 'norms' subscale (see Table 63 page 183). Here, there was a strong

¹²⁹ The Standards 1999, p14

¹³⁰ DeVellis 1991, p45

¹³¹ Ibid, p47

¹³² The Standards, p14

relationship for local students but only a weak relationship for the international students. It is likely that the international students had a different set of salient normative beliefs, and that the three items offered, which were based on the input from local students, were not adequate for the international cohort ('construct underrepresentation'). When the sub-index was expanded to the 7-item Triandis score, this relationship improved.

Validity generalisation studies:

Validity generalisation raises the question as to whether the evidence based on test-criterion relations can be transferred to other situations. The literature does provide evidence of meta-analytic studies comparing the validity of similar instruments in differing situations. Some of the work based on the theories underpinning the RIQ, and on other instruments based on the theories of Triandis and Fishbein and Ajzen has been presented in Chapter Three, and will be expanded upon in Chapter Eighteen.

The data presented in the chapters comprising this Section of the thesis support the application of the RIQ2003 to international students (see page 187ff). The issues of the etic-emic dilemma raised in Chapter Three pertain to this situation, as the instrument design was largely based on the input of local students. However, several opportunities for feedback were imbedded in early versions of the instrument, providing valuable feedback from international students that resulted in changes to wording and the inclusion of religious/cultural items. Nevertheless, as suggested in the Standards, the application of instruments in different cultural groups than those upon which its design was based requires additional preliminary validity analysis.

Only one application of the underpinning theories specifically relating to rural career choice could be found in the literature. That was the use of the Theory of Reasoned Action in relation to rural retention (Feeley, 2003). This paper however, did not seek to develop an instrument based on the TRA, nor did it report on such instruments. It used the TRA as a framework within which to organise the current literature on rural retention. The author found this early version of behavioural theory useful in this regard, supporting the generalisability of these theoretical frameworks in this field, but not necessarily for this purpose.

Future use of this instrument in a new situation therefore, will require further studies of its validity with particular reference to situational facets that may have varied. Some of the major facets to consider are,

- differences in the way rural intention is measured, including the definition of rural and other career-related constructs,
- the type of test-takers; students, trainees, or established doctors,
- the nature of the curriculum or programs being evaluated; undergraduate, post-graduate, and
- the time period between the program and the evaluation; whether other programs intervene.

Evidence based consequences of testing

The Standards for Educational and Psychological Testing states,

Tests are commonly administered in the expectation that some benefit will be realized from the intended use of the scores. ...A fundamental purpose of validation is to indicate whether these specific benefits are likely to be realized.

The RIQ was designed for two purposes; to identify students more likely to benefit from programs designed to increase rural intent, and to evaluate these programs. It is not designed to identify which students will become better rural doctors, or even who will become better doctors. The beliefs listed in the instrument may be useful in understanding some of the attitudes of students during the medical school selection process and the instrument may facilitate the selection of students who are more likely to eventuate in rural or under-served areas.

Its utility in evaluating undergraduate programs has been discussed in Section Four. The instrument is capable of identifying belief changes that result from these programs, and therefore informs on improvements that may be made. Further application of the instrument to subsequent cohorts undergoing revised programs can evaluate the effectiveness of those changes. Longitudinal studies can enable the evaluation of a series of programs, and the interaction of their effects. Sub-group analysis can provide information about which groups should receive scarce rural educational resources.

Focus groups identified that answering the questions in the RIQ provoked thought about a possible rural career. It exposed them to a wide range of issues relevant to career choice, and may have been instrumental in some attitudinal changes by challenging their beliefs.

Discussion: the structure and function of the Rural Intent Questionnaire

The preceding parts of this Section have outlined the results of an investigation into the structure, reliability and validity of the Rural Intent Questionnaire. More detailed discussion of the interpretation of the findings and an argument for the validity of the instrument is required.

The following pages of discuss how the structure and function of the instrument matches the expectations raised by the theoretical framework and seek to relate some of the findings from this cross-sectional study on this group of medical students to issues of rural workforce shortage and career choice. In brief, it seeks to present "a scientifically sound validity argument to support the intended interpretation of test scores and the relevance of the proposed use (American Educational Research Association et al., 1999)."¹³³ This discussion will be reinforced in Chapter Eighteen, when the process of career development through the authentication of self-concept is explored.

¹³³ The Standards 1999, p9

The Triandis model and the incorporated aspects of the Fishbein and Ajzen model

The Triandis Theory of Interpersonal Behaviour (Triandis H, 1977) was presented in Chapter Three. In that chapter, it was shown that intention (I) is a proximate and important determinant of behaviour, and that intention is determined by attitudes toward the behaviour. These attitudes include affect (A), perceived consequences (C) and social drivers (S). This theory was represented algebraically as:

$$I = w_A A + w_C C + w_S S$$

Equation 8

and can be expanded to the following equation:

$$I = w_A A + w_C \sum_{i=1}^n B_i a_i + (w_{RB} RB + w_{PNB} PNB + w_{NB} NB + w_{IPC} IPC + w_{SC} SC)$$

Equation 9

where affect (A) is unchanged, perceived consequences (C) is the sum of the products of the importance rating of an outcome (a_i), and its perceived likelihood to ensue (B_i). The social drivers are expanded to include an array of influences including role belief (RB), personal normative belief (PNB), normative beliefs (NB) interpersonal contracts (IPC) and self-concept (SC).

The Theory of Reasoned Action (TRA) of Fishbein and Ajzen (Ajzen I & Fishbein M, 1980) was also presented in Chapter Three, and similarities between the two theories were discussed. This theory was presented algebraically as Equation 6.

$$I = w_o \sum_{i=1}^n B_i a_i + w_1 \left[\sum_{i=1}^n NB_i (M c_i) \right] + \epsilon_i$$

Equation 6

The perceived consequences measure was identical in both models. Affect was not measured separately in the TRA, as the authors felt it was included in the semantic differential measure of consequences. The social drivers, according to the TRA equated to the sum of influences of important referents. This was measured as the sum of the products of perceived attitude of referents to the act (NB) and the motivation to comply with them (Mc).

As the TRA assumed complete voluntary control over the act, a precondition not commonly available, this model was expanded by Ajzen and was called the Theory of Planned Behaviour (TpB(sic)) (Ajzen, 2002; Ajzen I, 2002). The TpB was presented in Chapter Three as Equation 7. Ajzen added a construct which sought to measure the level of control the individual had over the act, and this was operationalised as the product of the perceived control strength (c), or how likely it is that the inhibiting/facilitating factors exist, and the control power (p), or how much such a factor would interfere with/aid the act.

The Triandis model had already incorporated elements measuring perceived control. These were operationalised as the self-efficacy and the level-of-understanding items under self-concept (SC).

$$I = w_0 \sum_{i=1}^n B_i a_i + w_1 \left[\sum_{i=1}^n N B_i (M C_i) \right] + w_2 \sum_{i=1}^n c_i p_i + \varepsilon_i$$

Equation 7

This research tested and sought to incorporate into an instrument those features of both models that provided the best predictive and explanatory power. The RIQ was based on the Triandis model, which, as discussed in Chapter Three, had the stronger predictive power, and seemed theoretically more attuned to the complex socio-cultural milieu in which career choices are made. The instrument also borrowed the subjective norm construct from the Fishbein and Ajzen model. The inclusion of this construct was tested and found to add a small amount (1.5%) to the predictive power of the Triandis model, but referent approval made a moderate unique contribution to it (see The role of the Fishbein and Ajzen estimate of subjective norms (referent approval): Hypothesis 3 (part 2) on page 209).

The final RIQ instrument can be represented algebraically as Equation 10:

$$I = w_A A + w_C \sum_{i=1}^n B_i a_i + (w_{RB} RB + w_{PNB} PNB + w_{NB} NB + w_{IPC} IPC + w_{SC} SC) + w_1 \left[\sum_{i=1}^n N B_i (M C_i) \right] + \varepsilon_i$$

Equation 10

This may be summarised in terms of the indices:

$$\text{Intention} = \text{Affect} + \text{Perceived Consequences} + \text{Social Drivers}$$

Equation 11

or in terms of the sub-indices:

$$\text{Intention} = \text{Positive Affect} + \text{Negative Affect} + \text{Personal Consequences} + \text{Professional Consequences} + \text{Triandis score} + \text{Referent Approval.}$$

Equation 12

Summary of Chapter Thirteen

Chapter Thirteen has presented an argument in favour of the validity of the RIQ2003. In doing so, it has drawn from analyses and discussions presented in several other chapters of this thesis. The instrument was shown to remain consistently valid in all of these discussions. Its content, structure and function support the argument in favour of its validity as an instrument that can predict a student's intention to practise in a rural environment after completion of studies. It relies on the theoretical framework on which it is based to support the contention that this intention will ultimately likely to translate to behaviour. As the belief structure underpinning such intentions become more authenticated, the intention itself will be more predictive of the behaviour being carried out. This process of career development is discussed in more detail in Chapter Eighteen.

Summary of Section Three

Chapter Ten, the first chapter in Section Three, described the development and properties of two gold standards, one for the likelihood of a rural career (SES) and the other for stated rural intention (SIS). The SES consisted of five variables that had been shown in the literature to

predict a rural locational choice after graduation. This was used to divide cohorts into three SES subgroups, one 'strong rural', one 'strong urban' and the middle-scoring 'neutral' or 'undecided' subgroup. The SIS consisted of the three more changeable intention/self-efficacy variables of the SES, and was used as the gold standard for stated rural intention. When the SIS was not available, the less reliable Rural Intent score (RI) component was used alone.

The remaining part of Section Three then presented the analysis of the reliability and validity of the components of the RIQ, in relation to the prediction of the Stated Intent Score (SIS). The data used was from 530 medical students in years one to four of the undergraduate-entry medical course at Monash University, Australia.

Three indices were found to exist along the theoretical parameters predicted by Triandis, namely, affect, perceived consequences and social drivers. The index to estimate social drivers performed better when it also included the Fishbein and Ajzen estimate of subjective norms, referent approval. Each of the indices consisted of two distinct components, one of which, referent approval, was a single variable. The five sub-indices were each found to consist of a single factor, and to have good internal consistency.

Regression models were fitted and the indices and sub-indices were shown to be strong predictors of the SIS for the whole group as well as for sub-groups based on sex, international status or SES. These models were able to predict up to 72% of the variance in SIS. All sub-indices made significant unique contributions to the models. The patterns of the relative strengths of the beta values of these sub-indices showed plausible variations between students based on sub-group membership.

The relationship between the professional consequences sub-index, the personal consequences and social drivers was explored in depth. It seemed that different subgroups of students were influenced differently by these three sub-indices in a complex and interactive fashion.

Evidence in support of the validity of the instrument was presented based on these findings and a comprehensive argument for the validity of the instrument based on multiple sources of evidence was presented in the final chapter of Section Three, Chapter Thirteen. This discussion was presented according to the recommendations laid out in the Standards for Educational and Psychological Testing (American Educational Research Association et al., 1999).

In order for the instrument to be useful as an evaluative tool for programs designed to increase rural recruitment it must be able to measure fluctuations not only in intention, but also in the strength of the beliefs that underpin it. In order to test this, a crossover trial was set up in which students were exposed to both a rural and an urban rotation at different times. This research is presented in Section Four.

SECTION FOUR

A Controlled Crossover Trial

Introduction to Section Four

Section Three detailed the development of the Situational Expectation Score (SES) and the Situational Intention Score (SIS), and the testing of the Rural Intent Questionnaire (RIQ) against these gold standards. It showed that, grounded in the theories of Triandis and of Fishbein and Ajzen, the RIQ2003 was a valid and reliable measure of intention to work in a rural environment. The affect, consequences and social indices, and their components, were found to be strong predictors of intention to work for some time in a rural setting. While this may be useful in determining which students are more likely to ultimately choose a rural career, Section Four investigates whether such an instrument could have other uses.

The three chapters of Section Four present a crossover trial performed during 2003 on students in the 2002 intake year at Monash University, Australia. The trial is presented in the accepted format: Introduction, Methods, Results and Discussion, and Section Four is divided into chapters along these lines: **Chapter Fourteen** offers an introduction and an outline of the methodology of the trial; **Chapter Fifteen** presents the effects of rural and urban undergraduate placements on the Stated Rural Intent (RI) and offers a discussion on these findings. **Chapter Sixteen** looks at the effects of the rotations on the indices, sub-indices and beliefs and seeks to explain the changes to SIS presented in the three chapters preceding it, based on these effects.

Chapter Fourteen

Controlled crossover trial: Introduction and Methods

Introduction to the Crossover Trial

As was highlighted in Chapter Two, while many programs seeking to increase the rural career uptake among medical graduates have been put in place, measurement of their effectiveness has been problematical. Indeed, one major study in the USA has suggested that apart from undertaking an elective senior family practice rural preceptorship, conditions extant prior to entry into medical school (rural background, male sex, intention to be a family physician, being enrolled in their rural undergraduate program (PSAP) and having a National Health Service Corps scholarship) were the only valid independent predictors of a future rural career (Rabinowitz et al., 2001). Another found that, despite the fact that undergraduate programs designed to improve the rural workforce imbalance had been in place for many years, little improvement to the maldistribution of doctors has been seen in the USA over the past decade (United States General Accounting Office, 2003).

Longitudinal studies with eventual career choice as the outcome have been the gold standard for research in this field. Such longitudinal studies are weakened by the interactions between the many, often conflicting influences affecting future rural doctors over the many years of the studies. It is not possible to measure the individual effects of the many intervening events by measuring a single end-point outcome. Norman made this point clearly, when he wrote:

In medicine, indicators of scientific progress might be measured by objective indicators such as death from cardiovascular disease. In education such "hard" evidence may be lacking for several reasons. Firstly, paradoxically, real differences in educational strategies may not be reflected in outcomes, such as licensing examination performance, simply because students are highly motivated and are not blinded to the intervention, so will compensate for any defects in the curriculum. Secondly, a curriculum is not like a drug, which can be given at standard doses, but instead contains many components, delivered with variable quality by different teachers. Finally, the time between learning and important outcomes may be so long that the effects of the curriculum are obscured—although not always (Norman, 2002).

In a subsequent paper, Norman questioned the validity and the utility of large randomised, controlled trials in medical education, as such "grand experiments average too many variables to yield any real insights (Norman, 2003)". He went on to write, however:

This does not, in any way, constitute a rejection of the basic strengths of experimentation. Quite the opposite, I am convinced that significant advances in education have come about, and will continue to occur, as a result of careful, theory-guided, experimental research (Norman, 2003).

He also criticised qualitative research as not sufficiently able to be generalised to other situations and suggested that one solution for the difficulties in educational research lay in "reductionism." He suggested that many small tightly controlled laboratory-style experiments with larger effects, systematically dealing with individual influences, would provide a more sound methodology.

Section Four describes an experiment with many of the characteristics Norman espoused. It consisted of a series of experiments on a single year-group of medical students over a two-year period. The students were assigned to control and intervention groups in the second year. After the first round of interventions, these groups crossed-over and the educational experiment was repeated. While the trial was carried out in the 'real world' attempts were made to control the participants, interventions and outcomes.

Norman, as quoted above, emphasised the importance of careful, theory-guided research. Indeed this work was grounded in the theories of Triandis, and Fishbein and Ajzen, as described in Chapter Three of this thesis. Behavioural theory suggests that intention is a strong predictor of behaviour and that this predictive strength persists over many years (Randall & Wolff, 1994). Intention does change throughout medical training (Kassebaum & Szenas, 1995), and it is likely that the net effect of all of these interval changes determines eventual career choice. This theme will again be discussed in Section Five.

Having shown in Section Three that the underlying belief structures measured by the RIQ do predict intention to take up a rural career, Section Four describes how the measurement of fluctuations in these beliefs can predict and explain changes in rural intent. It focuses not only on the utility of this instrument to measure changes in intention brought about by medical undergraduate rural rotations. It also describes the ability of the instrument to explain these fluctuations in intention through the analysis of changes in individual beliefs brought about by brief specific educational programs.

Methods

Research design

All 215 students entering the medical course in 2002, hereafter called the '2002-intake year-group', or the 'year-group', experienced a one week rural rotation during their first year (2002). In addition, during their second year in 2003, all students experienced a two-week rural rotation. While the students all went to the country over the same week in 2002, in 2003, students were randomly split into two groups, ('Cohort A' and 'Cohort B'). Cohort A had a rural rotation in the first semester and Cohort B went to the country during the second semester. While Cohort A was in the country, Cohort B undertook an urban rotation, and vice versa.

The rural rotation was essentially the same in the two semesters, and is described in detail below. The first and second semester urban rotations were also essentially the same. Both the rural and the urban rotations were based on general practice themes. All students were surveyed on six occasions over the two years, before and after each of the three rotations (Figure 34 on page 230).

In order to test the instrument's usefulness in an educational setting, a cohort study, as described above, was set up, in which students were followed over the first two years of the undergraduate-entry medical course at Monash University, Australia. Based on the theoretical

framework provided by Triandis (Triandis H, 1977) and Fishbein and Ajzen (Ajzen I & Fishbein M, 1980), and supported by the empirical data presented in Section Three, an explanation of the changes in intention was sought by studying the changing belief structure underpinning students' attitudes. The theoretical framework underpinning the instrument suggested that such changes in the belief structure should not only explain any changes in intention, but may offer an insight into the strengths and weaknesses of the educational program responsible for the changes. This section describes the measured changes in intention, attitudes and beliefs, as students underwent the two rural rotations.

Research questions

1. Was there a global change in intention to work in the country over the whole year group during 2003?
2. Was there a measurable change in intention associated with the urban and rural rotations? Using the effect of the urban rotation as a control, was there an effect of the rural rotation?
3. Did the order in which rotations were attended affect the effectiveness of the program?
4. Were certain sub-groups of students more likely to show change in intention than others?
5. Were there changes in the belief system, as measured by the Rural Intent Questionnaire (RIQ), associated with the rotations? Did the changes in beliefs offer a plausible explanation for the effects of rotations on intention?

Description of the 'treatments'

First-year rural program

In 2002, all first-year medical students at Monash University participated in a compulsory one-week residential rural program delivered by the School of Rural Health. The purpose of the program was to introduce the students to the importance of context in relation to rural health services delivery. While attitudinal change was not one of the stated objectives of the program, it was a major objective of the School of Rural Health.

The program had four components:

- a pre-residential tutorial, which served as an introduction to the program.
- a one-week residential placement.
- a post-residential tutorial, which served as a debriefing exercise.
- a written assignment due two weeks after completion of the residential. This was a mapping exercise of the health services available in the region in which the student had been placed.

While the residential was one week in duration, the whole program took place over a four-week period. During the one-week residential, students were accommodated in groups of 16 to 35 in rural settings throughout Victoria. Tutors escorted small groups of 2-6 students to a variety of health services and rural work environments during the day. The timetable also included group tutorials and workshops designed to enable students to share their experiences, and to focus on

differences between rural and urban health service needs and delivery. The program did not seek to provide an attachment for students with rural doctors, although issues surrounding rural general practice and specialist medical services were discussed, and some students did work with a rural doctor for a few hours.

Second year programs

During the second year of the course, all students attended a two-week rural residential as well as a two-week metropolitan rotation (see Figure 34). Students attending the rural attachment in the first semester were allocated to a rural location. Students attending the rural rotation in the second semester were given the opportunity to nominate a preferred rural location. Most students were sent to the location of their first choice for the second semester rotation.

Rural attachment

Logistically, the structure of the rural program was similar to that of the first year, with students being assigned into small groups and these groups accommodated in rural areas. Again, a major theme was the rural context and its influence on rural health service delivery, but there was a greater focus on clinical practice and community-based activities (Five Year Curriculum Committee, 2003). The main objectives were to enable students to:

- appreciate the ways in which rural diversity can impact on rural health, illness and clinical practice
- reflect on the nature of a clinician's role in a rural clinical practice
- describe how rural contexts impact on the assessment of health conditions and the clinical and non-clinical management of patients
- recognise the importance of context and clinical reasoning in relation to focused history taking

The main features of the attachment were:

- an indigenous health visit
- a GP practice visit
- a pharmacy visit
- a hospital visit
- a rural ambulance visit and First Aid training
- occupational health: Zoonoses
- a health promotion and community service providers visit

These activities were supported by group discussion sessions. The learning during the attachment was integrated through a 'Patient Centred Learning' (PCL) exercise that introduced a rural clinical scenario on the first day, and revisited and developed the case throughout the fortnight. An assignment, discussing the advantages and challenges of rural practice, was to be completed within two weeks of the completion of the attachment.

Metropolitan placement

This two-week placement was delivered at the university campus and the nearby major teaching hospitals. Students continued with their usual accommodation arrangements. The main focus was the acquisition of skills, in relation to:

- Basic First Aid
- Venepuncture
- Breast examination
- Hospital ward work.

Although this placement was based in the city, and involved considerable time with a city-based GP and in a city hospital, a very limited amount of rural exposure was also imbedded in the curriculum. Rural themes included the career change from a metropolitan to a rural general practice, gender issues in rural practice, indigenous issues and differences between rural and metropolitan ambulance services. The likelihood that this may have contaminated the intervention is analysed in Chapter Sixteen.

Issues surrounding the 2003 placements

It was intended that each student would gain a similar overall academic experience during the year. As discussed above, the rural placement was different to the urban placement in both context and curriculum. The first semester rural rotations were designed to be the same as the second semester rural rotation, as were the first and second semester metropolitan rotations. All students undertook both a rural and an urban rotation. Students were allocated to groups according to whether they attended the rural rotation in first semester (Cohort A) or in the second semester (Cohort B) (see also Figure 34).

Students in Cohort B were able to choose their rural location, and to some extent, the students with whom they went, whereas cohort A could not. This was likely to be a major difference, as elective rotations have been found to have a positive effect on rural intent, and non-elective rotations a negative one (Rolfe et al., 1995). Other benefits could have resulted from the order in which a student had attended the rotations. By the time the student had started the second rotation, s/he would not only have matured somewhat, but would have benefited from the first semester experience. As both rural and urban rotations contained rural subject matter, the second semester experience, both urban and rural, may have been 'primed' by the first semester rural components.

This research project was designed to allow for a controlled crossover trial with the capacity for strong causal inferences. Educational events overtook this intention. This new five-year curriculum was delivered for the first time in the first semester of 2003. Because it was novel, staff delivering the programs are likely to have benefited from this first semester 'rehearsal' and subsequent reflection, so that, although the material may have been the same, the delivery of both rural and urban rotations may have been more refined in the second semester. Indeed, discussion with tutors involved with both the urban and the rural programs confirmed this.

For these reasons, the research design may not have been a simple crossover trial, but rather a controlled double-intervention trial, where there was considerable but not complete similarity in the initial and the repeated program. Norman referred to such situations when he wrote:

educational experimenters must live with ... uncertainty about how much of the 'therapy' was actually received by the student. Indeed, it is unclear with most curriculum interventions exactly what the therapeutic intervention actually was (Norman, 2003).

Another of Norman's main concerns was that such research would control for so many variables that a true effect would not be measurable. Despite these concerns, the repeated nature of this study over a relatively short period of time, as well as the double pretest sampling (after the first rotation and before the second), allowed for a research design which was more likely to enable the following questions to be addressed:

Data collection

Data were collected on six occasions from the 2002-entry year-group, over the two-year period (Figure 34). This occurred within two weeks of commencement and/or completion of the interventions. Surveys were carried out using the then-current version of the RIQ. The 2002 version did not include the GP intent items, the UG intent item, and three of the belief items, and the situational intent items were worded differently to the 2003 surveys. While otherwise essentially the same as the other 2003 surveys (surveys 2b, 2c, 2d), the first survey in 2003 (survey 2a) lacked the UG intent item.

Questionnaires were distributed to students before lectures and tutorials and were collected over a period of two weeks on each occasion except survey 2c, when a timetabling change allowed only one week. Respondents were asked to provide their student identification number (ID) on each response. De-identified in this way, responses from the 215 individuals in the year-group were tracked over the six surveys.

Statistical tests

The data were analysed in pairs, comparing differences in means before and after the three rotations, and before and after the two intervals. Analyses were also performed on means at the beginning and end of 2003, evaluating differences between Cohort A and Cohort B; that is, evaluating the importance of the order in which the rotations were undertaken.

When researchers set the p-value (alpha) for significance at .05, they accept a significant result to be one with a 95% likelihood that it would not occur by chance. There is a 5% risk of a false positive. So, if 100 tests were done at this level, five of them would have found statistically significant results, although they occurred by chance. Therefore, when large numbers of tests are performed on the same data it could be argued that a lower significance level should be set than the usual .05.

Nevertheless, all results with p value less than .05 are reported in this section of the thesis. In view of the large number of tests performed, and the risk of Type 1 Error, results with a p value

greater than .01 should be viewed cautiously. An adjustment for this, similar to the Bonferroni adjustment, would suggest that accepting results with a $p < .005$ would be appropriate.

Data were analysed using the Statistical Package for the Social Sciences (SPSS) (SPSS, 2002).

Analysis of respondents and non-respondents

Demographic characteristics of respondents and non-respondents were studied in order to exclude this source of selection bias, and to enhance the validity generalisation of the instrument. Of the 215 students in the whole class, 211 (98%) had responded on at least one occasion enabling a good estimate of the class characteristics for sex, international status and the self-reported sense of having a rural background. Of the group of four who did not answer any surveys, one had left the course, one was a local male, and the other two were international students, one male and one female.

The breakdown of the respondents is presented in Table 82. About one third of the students were males, about a quarter were international students and about a third claimed a rural background. For each of the surveys, there was a response rate of about 170 (79%). Survey 2c had a slightly lower response rate (162, or 75%), reflecting the shorter collection period on that occasion. The characteristics of the respondents to each of the individual surveys were similar to those of the total class with the exception of surveys 1b and 2c when proportionately less males had responded.

Response rates to each survey, each pair of surveys, and to series of four, and of six surveys were compared according to sex, international status and sense of rural background. Chi square analysis revealed differences only in the membership according to sex. Males were less likely to respond than females (Table 82).

While the overall proportion of males in the year-group was 37%, about 34% responded to each of the individual surveys; about 32% of males responded to both in each pair of surveys, 28% of males responded to the whole series of four, and 25% of the males responded to the entire series of six surveys. Significance levels on chi square analyses testing for differences in male response rates from expected levels are presented in Table 82.

Summary of Chapter Fourteen

Chapter Fourteen is the first of four chapters in Section Four that describe a controlled crossover trial designed to study the effect of medical undergraduate programs on the beliefs, attitudes and intentions of medical students. This chapter presented an overview of the rationale and methodology of a crossover trial designed to test how the RIQ2003 could be used in the evaluation of programs designed to influence rural career choice. Chapter Fifteen will present the results of the trial and will offer a discussion of these results. The final chapter in Section Four, Chapter Sixteen, will discuss the usefulness of the RIQ2003 in explaining the changes in attitudes and intention presented in this section.

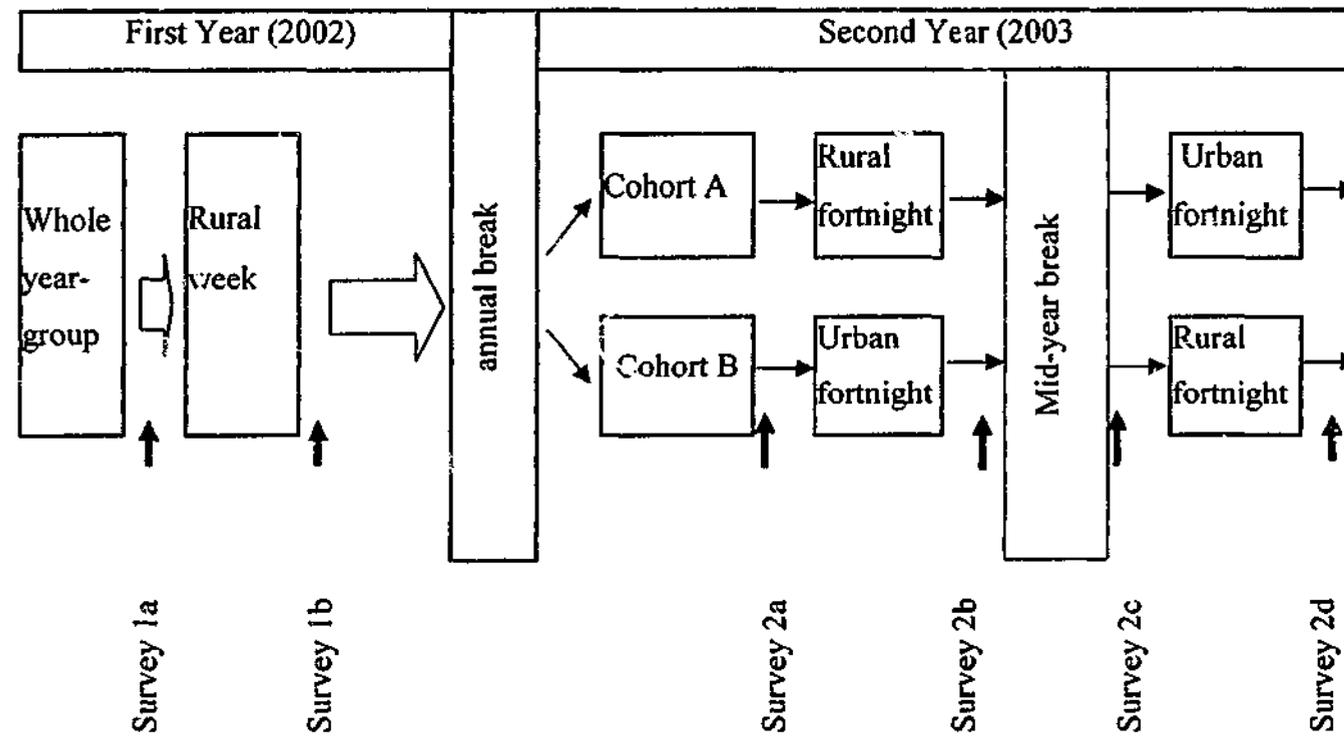


Figure 34 Research design displaying six collection times over two years. Cohort A attended the rural fortnight first semester and the urban fortnight second semester. Overall, both cohorts had the same experience in first year.

Table 82 Response numbers and characteristics of respondents and non respondents to individual surveys, pairs of surveys and series of surveys.

cohort	number of respondents	percentage response	%male		%international		% 'rural'	
			37		28		34	
			respondents	non-respondents	respondents	non-respondents	respondents	non-respondents
total class (n=215)	211	98						
survey 1a	170	79	34	49	29	22	37	23
survey 1b	173	80	33	55*	29	21	36	24
survey 2a	170	79	34	51	25	38	35	31
survey 2b	174	81	34	51	26	35	32	42
survey 2c	162	75	31	55**	29	23	36	27
survey 2d	176	82	34	51	29	23	34	34
surveys 1a and 1b	151	70	32	50*	29	25	37	26
surveys 1b and 2a	144	67	31	51*	26	32	36	28
surveys 2a and 2b	154	72	32	49*	25	36	34	33
surveys 2b and 2c	146	68	30	52**	27	28	35	32
surveys 2c and 2d	153	71	32	50*	29	24	35	31
surveys 2a and 2d	151	70	32	50*	26	32	35	30
All 4 surveys in 2003	128	60	28	51**	27	30	35	33
All 6 surveys (2002 and 2003)	100	47	25	48**	26	29	39	29

* significance p < .05
 ** significance p < .005

Chapter Fifteen

Controlled crossover trial: Results and Discussion

Introduction to Chapter Fifteen

This chapter deals predominantly with the results of the crossover trial introduced in Chapter Fourteen. A discussion of these results is presented immediately following the results.

The main part of this chapter deals with the Stated Situational Intent, or RI Score (RI) changes detected between surveys over the two years of the trial. This is divided into four main sections:

1. Overall RI changes in the group over the two years
2. Differences in RI changes in subgroups according to rotations attended (Cohort A and Cohort B)
3. Differences in RI changes in subgroups according to SES grouping
4. The total effect of the rotations over 2003, and the order-effect of the rotations.

The sections 2 and 3 were performed firstly on all available responses thereby maximising the number of responses and the power. Analyses were then repeated using only the paired data from those who responded to each of the four surveys in 2003. This approach resulted in an almost 30% reduction in the number of responses but ensured that the membership of the groups remained constant, allowing for more valid comparisons of within-group changes in responses.

The measure of stated situational intent (RI)

Stated situational intent, that is, the self-reported level of intention to work in either an urban or a rural setting, was measured by two items, stated rural intent and stated urban intent (see a copy of the RIQ2002 in Appendix Three, and the RIQ2003 in Appendix Four). The Rural Intent (RI) score was calculated by subtracting the stated urban intent from the stated rural intent.

While these variables were the direct measures of stated situational intent used in this chapter, other indices had been developed in Chapter Ten for the Situational Intent Score (SIS) and the Situational Expectation Score (SES). The RI was shown to correlate closely with the non-RI components of SES and SIS and was a component of both scales. Another component of both the SIS and SES, the intention to seek additional undergraduate rural experience (UG), was not available in the version of the RIQ used for the first survey in 2003. Therefore the SES and SIS could not be calculated for comparisons involving this survey and the RI was used as an indicator of stated situational intent.

SES and SIS are likely to be more stable and reliable than shorter measures (see Chapter Four for a discussion on reliability). While this stability has advantages in other settings, the stated intent items and the derived RI are likely to be more sensitive to change. These stated situational

intent items are cognitive belief items, reflecting what the respondent believes to be the case at the time. They therefore have a close theoretical relationship with the belief systems measured by the remainder of the instrument and were used in the following discussion on the effect of educational programs on situational intent.

The research design of this study (see page 224ff) enabled the evaluation of the effect of rural rotations on the intention of medical students to choose a rural career. This included a controlled 'crossover' trial design with matched subgroups offering a strong potential for causal inference. The following presentation of the results to the cross-over trial is divided into four parts as discussed in the introduction, above.

Part 1: Overall changes in intention over the two years

Introduction

Prior to a comparison of the effects of the programs on cases and controls, changes in whole-group scores on the situational intention variables were considered. In this way, underlying trends affecting all cohorts could be identified.

Methods

In this analysis, all responses to each survey were used to calculate the whole-group scores at each node, and to demonstrate the overall trends. The respondents to any particular survey were not exactly the same students as those who responded to any other particular survey.

Paired t-tests were then performed on data from students who answered consecutive surveys. This necessarily resulted in smaller numbers of responses, as those who missed either of the pair of surveys could not be included. This loss of power, however, was outweighed by the theoretical advantages of using paired t-tests on individuals rather than groups of students.

All differences that reached statistical significance at the .05 level were presented, although it could be argued that a lower cut-off point for significance, such as 0.01, would be more appropriate in view of the number of t-tests performed. It was hypothesised that there should be no overall change in whole-group stated intent, so the increased risk in Type 1 error would result in a bias toward the null hypothesis.

Results

The means, numbers of responses and standard deviations of the stated situational intent items for the whole year-group are presented in Table 83 and in Figure 35. All responses were included, and the data represent whole-group means. From these average responses, there appeared to be a small change in intent during 2002, a relatively large change, especially due to the urban intent variable after survey 1b, and little change throughout 2003.

Table 83 Means, response rate and standard deviations of responses to situational intent items. All respondents reported.

variable	survey	mean	responses (n)	standard deviation
<u>stated rural intent</u>	1a	5.08	142	2.50
	1b	5.47	151	2.23
	2a	4.60	170	2.10
	2b	4.61	174	2.03
	2c	4.65	161	2.20
	2d	4.79	173	2.23
<u>stated urban intent</u>	1a	4.01	83	2.93
	1b	3.14	103	2.50
	2a	5.30	170	2.04
	2b	5.29	173	2.06
	2c	5.34	161	2.00
	2d	5.38	172	2.08
<u>Rural Intent Score (RI)</u>	1a	2.24	55	4.88
	1b	2.77	81	4.11
	2a	-0.71	170	3.86
	2b	-0.67	173	3.81
	2c	-0.69	161	3.91
	2d	-0.62	171	3.99

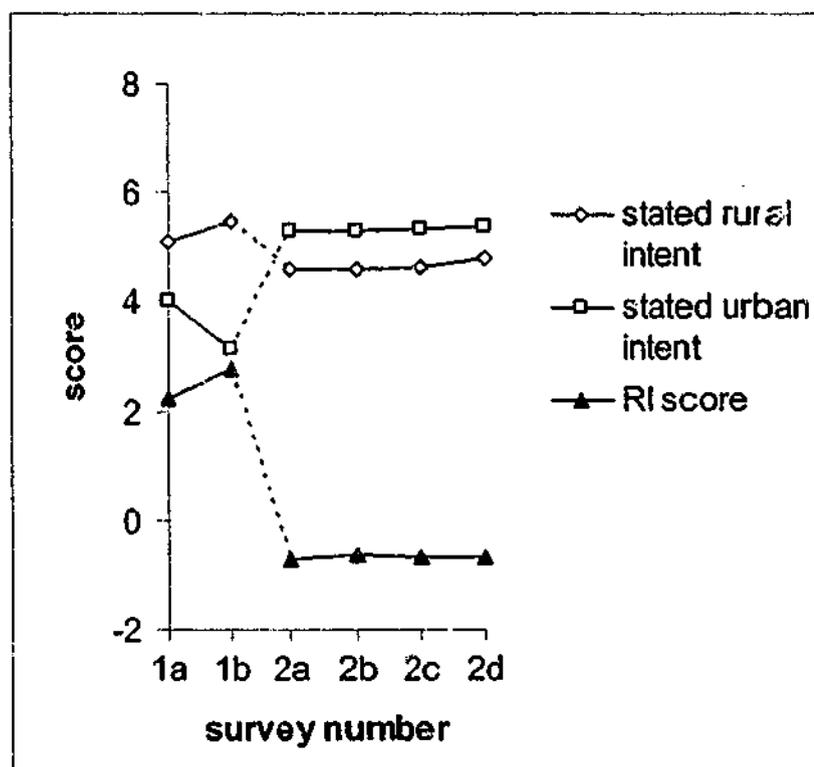


Figure 35 Stated rural intention, stated urban intention and the Rural Intent score. Means of all responses for the six surveys. RI score is rural intent minus urban intent.

Paired t-tests were performed, testing differences in the means of consecutive surveys; the mean of the responses of Survey 1a was compared with that of Survey 1b, 1b with 2a, 2a with 2b, 2b with 2c and 2c with 2d. The means of the responses to Surveys 2a and 2d, that is, at the

beginning and at the end of 2003, were also compared. All of the significant differences (at $p < .05$) in means are reported in Table 84.

Table 84 Significant differences in paired responses to the situational intent items – whole year-group. All differences significant at $p < .05$ are reported.

survey pairs	Paired Differences			t-test	degrees of freedom	Significance (2-tailed)
	mean	95% Confidence Interval of the Difference				
		Lower	Upper			
<u>Survey 1b-1a</u>						
urban intent	-0.87	-1.39	-0.35	-3.34	59	0.001
rural intent	0.46	0.18	0.73	3.27	124	0.001
RI Score	1.36	0.40	2.32	2.87	38	0.007
<u>Survey 2d-2c</u>						
rural intent	0.31	0.05	0.56	2.35	146	0.020
RI Score	0.39	0.01	0.77	2.02	144	0.045
<u>Survey 2a-1b</u>						
urban intent items	2.50	2.05	2.95	11.17	81	0.001
rural intent items	-0.56	-0.88	-0.24	-3.43	127	0.001
'RI Score'	-3.21	-3.97	-2.45	-8.43	65	0.001

Significant changes were evident between only three of the survey-pairs. There was a moderate decrease in urban intent and a smaller increase in rural intent resulting in a moderate increase in the RI score during the rural rotation of 2002 (surveys 1b and 1a). Small differences were observed in the whole-group stated rural intent items during the second rotations in 2003 (2d-2c). This translated to a small increase in the RI score. These were significant at the .05 level, but not significant at the more stringent .01 level.

Following changes to the questionnaire at the end of 2002 (survey 1b-2a) changes in both the stated urban intent and the stated rural intent were highly statistically significant. These observed changes were more likely to be a reflection of changes in the questionnaire than of changes in attitudes, although both may have contributed. No other statistically significant changes in the intent items were identified when the year-group was considered as a whole, even at the more 'generous' .05 level.

Discussion

The program effects seen in 2002 and not in 2003 may have been influenced by:

- Both cohorts attended the rural rotation simultaneously, and there was not an alternative 'urban' rotation to 'contaminate' the effect.
- The RIQ2002 was significantly different to the RIQ2003 (see Chapter Nine).
- Smaller numbers of students responded to the stated intent items, particularly urban intent, than in 2003.

Two data treatments were described. In the first, presented in Table 83 and Figure 35, each survey was represented as the mean response for the whole year. These results generalise to the whole year, and therefore represent the same respondents at each node. Although there appeared

to be an effect in 2002, there appeared to be no change throughout 2003. The second data treatment (see Table 84) considered consecutive pairs of responses by the same individuals. While the within-pair data sets were provided by the same individuals, the between-pairs data sets were not all from the same individuals. This may have led to some response variation due to the inclusion of different respondents, rather than to the effects of programs.

It may be that a program effect was seen between surveys 2c and 2d, but not between 2a and 2b, because different individuals were surveyed. Other possible reasons include:

- A rehearsal effect may have resulted when the delivery of the second program benefited from the tutor experiences during the first program. As the rural program was new, and the urban program was not, this may have had a greater effect on the second delivery of the rural program (see also Chapter Fifteen, Research design).
- The size of effect may not have been large enough to be detected using the methodology described.

Part 2: Effects of rotations – Cohort A and Cohort B

Introduction

It was not surprising that there were not large swings in situational intent over the year when the whole-group was analysed together. While one cohort was in the country, the other was in the city. This may have had a diluting effect on any true changes brought about by the rural rotation, and opposing changes in the cohorts may even have cancelled each other out. Analysis by cohort was therefore carried out to study the effects of the programs.

Methods

The year-group was split into Cohort A and Cohort B at the end of 2002. Cohort A went on the rural rotation in the first semester of 2003 and Cohort B did so in the second semester. At the same time that one cohort was in the country, the other experienced an urban-based placement (Figure 34). Surveys were carried out concurrently on the two cohorts on four occasions; before they had split up for each of their two respective rotations, and again, both times after their return.

The analysis had two parts:

In Part 2a, the data was split by cohort and independent samples t-tests and paired samples t-tests were employed to identify any significant changes in consecutive surveys using the maximum available numbers of responses. This approach sought to gain the maximum advantage from the longitudinal trial but could not access the full advantages purchased by a controlled crossover trial, as respondents to each individual survey were not the same.

Part 2b utilised only data from the 128 students who responded to each survey in the series-of-four surveys over 2003. Although this methodology resulted in a reduction in power through a smaller sample size, it ensured that membership of the cohorts remained constant over the year.

This enabled direct comparison of the concurrent changes seen in the two cohorts during and across rotations, and in the intervals between the rotations.

Mixed between-within subjects analysis of variance (ANOVA) was used to investigate:

- the total effects of programs over the year (main effect for time),
- the difference in main effect due to cohort membership (interaction effect),
- overall differences in levels of intent between the two cohorts (between subjects effect).

Independent samples t-tests were used to further analyse significant interaction effects, using the urban cohort as controls for the rural cohort.

Part 2a: Effects of programs on intent using all available data

Results

In order to maximise sample size, data from all respondents were used for this section. The data were split according to cohort membership (Cohort A and Cohort B). The mean scores, standard deviations and numbers of responses from all students in each cohort at each survey time are presented in Table 85, Figure 36, Figure 37 and Figure 38 for RI score, urban intent and rural intent. The apparent differences between cohorts seen in the figures were first tested using independent-samples t-tests to compare the means of scores for the two cohorts at any survey point. These means, presented in Table 85 were not statistically different for the two cohorts.

Next, paired t-tests compared changes between consecutive surveys using all respondents to that respective pair of surveys. This resulted in pairs with larger numbers than the 128 from the series-of-four surveys (see Part 2b), but smaller numbers than for individual surveys (see Figure 34 on page 230). The results of all significant differences at the .05 level over the interval between each pair of consecutive surveys are presented in Table 86.

Table 85 Means, standard deviations and number of responses for the three intent variables split by cohort

RI score			
survey	mean	std deviation	number
Cohort A			
1a	2.62	4.45	26
1b	2.88	3.96	40
2a	-0.75	3.40	87
2b	-0.38	3.39	90
2c	-0.49	3.60	81
2d	-0.71	3.94	87
Cohort B			
1a	2.08	5.36	26
1b	2.79	4.26	34
2a	-0.47	4.29	79
2b	-0.94	4.22	82
2c	-0.83	4.20	75
2d	-0.49	4.08	83

urban intent			
survey	mean	std deviation	number
Cohort A			
1a	3.68	2.84	38
1b	2.90	2.35	48
2a	5.34	1.80	87
2b	5.20	1.95	90
2c	5.26	1.84	81
2d	5.49	1.97	88
Cohort B			
1a	4.05	2.96	39
1b	3.33	2.65	46
2a	5.15	2.28	79
2b	5.37	2.18	82
2c	5.38	2.16	75
2d	5.25	2.20	83

rural intent			
survey	mean	std deviation	number
Cohort A			
1a	4.95	2.27	74
1b	5.57	2.08	75
2a	4.60	1.87	87
2b	4.80	1.78	91
2c	4.77	2.05	81
2d	4.79	2.23	87
Cohort B			
1a	5.22	2.64	58
1b	5.43	2.30	65
2a	4.68	2.32	79
2b	4.43	2.28	82
2c	4.55	2.34	75
2d	4.82	2.24	85

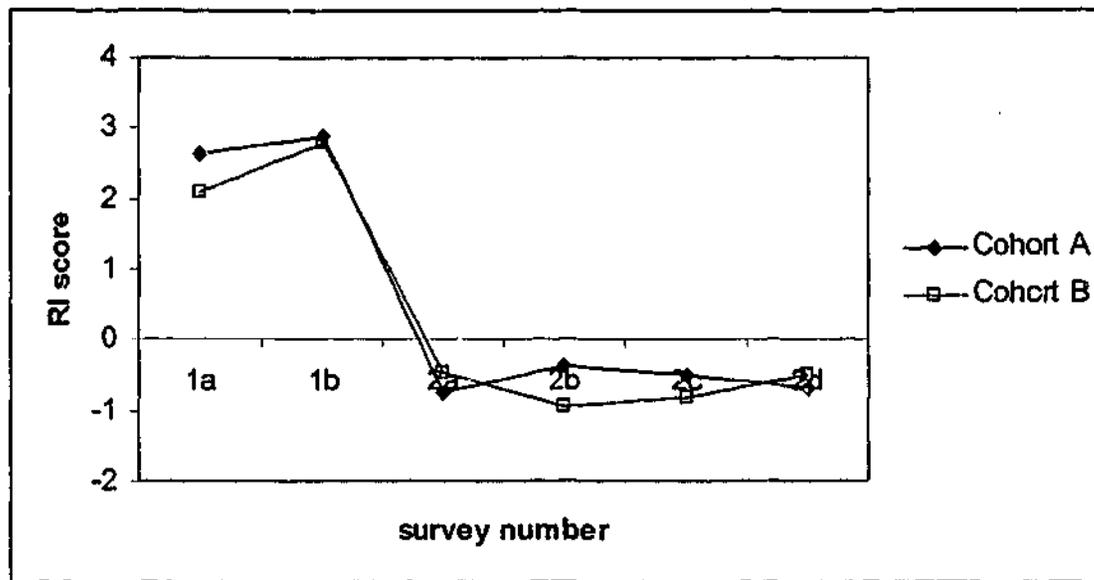


Figure 36 RI score for the six surveys split by cohort: all valid responses (not paired).

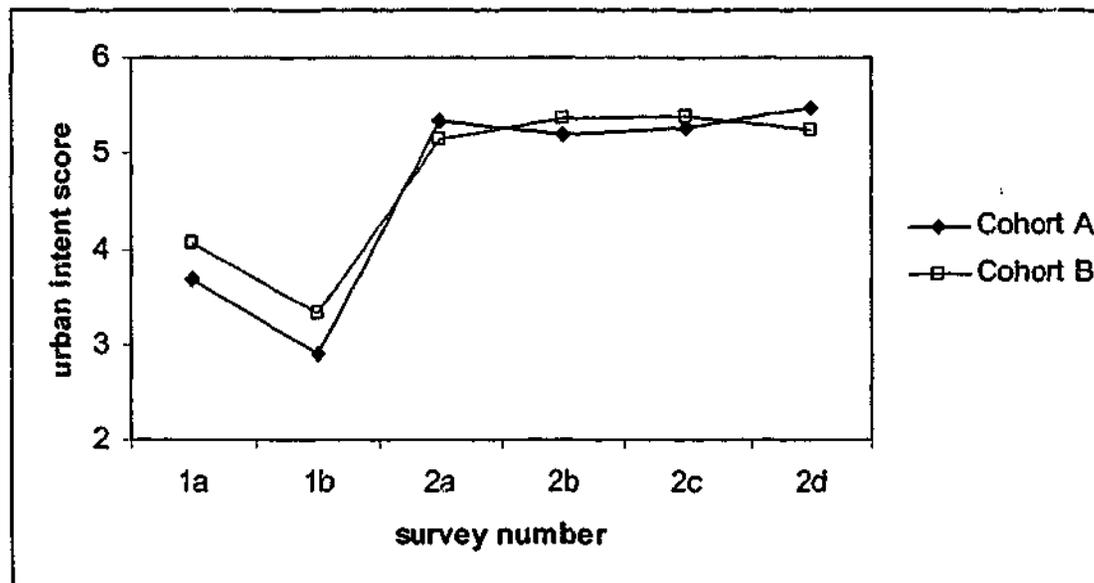


Figure 37 Urban intent for the six surveys split by cohort: all valid responses (not paired).

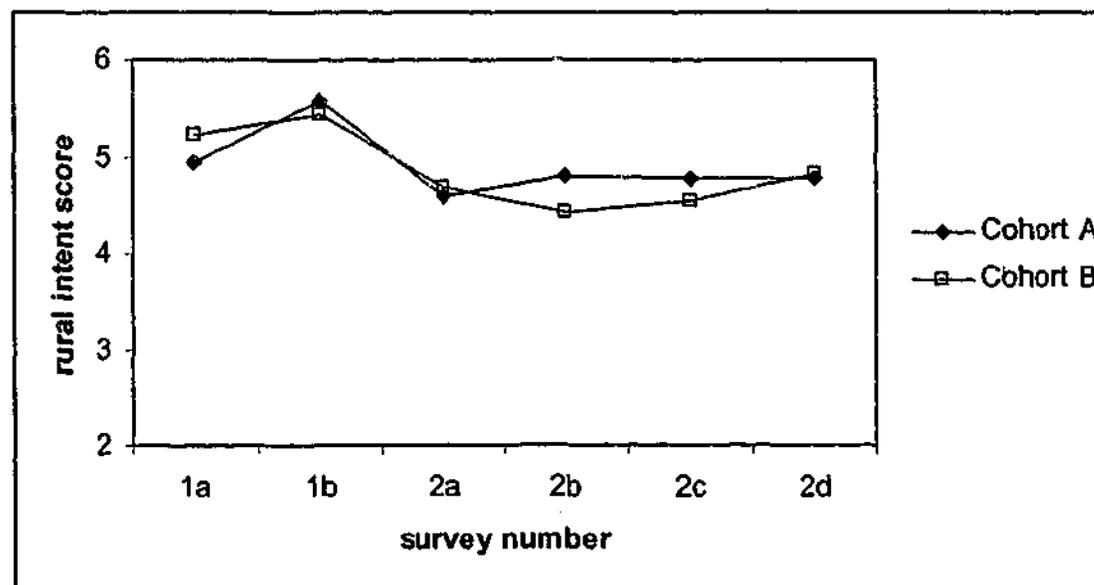


Figure 38 Rural intent for the six surveys split by cohort: all valid responses (not paired).

Cohort A showed a pro-rural change during the 2002 rotation, no significant change during its rural rotation in 2003, and pro-urban change during the interval between the rotations in 2003. Students in Cohort B also showed a strong pro-rural change during their rural rotation in 2003. No significant changes in any of the intent items were found during the urban rotations.

Table 86 Significant differences in paired responses to the situational intent items – Cohort A and Cohort B. All differences significant at $p < .05$ reported.

cohort	survey pairs/items	mean	Paired Differences		t-test	degrees of freedom	Significance (2-tailed)
			95% Confidence Interval of the Difference				
			Lower	Upper			
Cohort A	surveys 1b-1a						
	urban intent	-1.00	-1.79	-0.21	-2.598	27	0.015
	rural intent	0.51	0.10	0.91	2.510	66	0.015
	surveys 2c-2b						
	rural intent	-0.32	-0.64	0.00	-2.017	73	0.047
	RI score	-0.55	-1.03	-0.07	-2.269	72	0.026
Cohort B	surveys 2d-2c						
	urban intent	-0.43	-0.67	-0.19	-3.561	68	0.001
	rural intent	0.59	0.23	0.95	3.306	70	0.001
	RI score	1.01	0.53	1.49	4.189	68	0.001

In order to further improve the power of the analysis, the cohort that remained in the city was used as a control for the cohort in the country. Independent samples t-test analyses, testing now for differences between the cohorts in changes in intention during the rotations as well as during the interval between the rotations were performed. Results are presented in Table 87.

Statistically significant differences between the change in intention of Cohort A and Cohort B were seen during the interventions in 2003. These took place when the slopes of the lines of the graphs (Figure 36 to Figure 41) showed maximal divergence, namely between 2a and 2b, and between 2c and 2d.

The effect of the second rural rotation in 2003 was greater than that of the first. The difference between surveys 2c and 2d only reached significance at the .06 level when all available pairs were used. This significance reached .04 when only pairs from those responding to all four 2003 surveys were used (see Table 87 and Part 2b, below). No significant difference between the cohorts was found during the interval between the 2003 rotations, nor was there a significant difference found during the common 2002 rural rotation.

Discussion

Both cohorts appeared to have an increase in rural intent and a decrease in urban intent during the rural rotation in 2002 (Figure 37 and Figure 38), however, these changes only reached significance ($p < .02$) for Cohort A. A difference in effect was unexpected, as students were not allocated to cohorts until after this rotation.

Changes in the RI score in 2002 were not significant for either cohort, possibly due to inadequate power resulting from the small numbers (Cohort A, n=19; Cohort B, n=16) as a consequence of the different approach to RI adopted in the RIQ2002. Further, the students exhibiting the change in rural intent may not have been among the small group who also answered the urban intent item. Indeed the wording of the questionnaire directed students to answer either the urban intent item or the rural intent item, not both. (see also discussion on Research instruments in Chapter 16 on page 260).

During 2003, students showed an increase in RI score while attending rural rotations, and did not show a significant change while attending urban rotations. When the students who were concurrently attending the urban rotations were used as controls, students attending rural rotations showed an increase in RI score. This effect was repeated when students crossed over in the second semester.

Table 87 Significant differences in program effect between cohorts: Relative change towards greater rural intent, (t-test comparing mean Cohort B change and mean Cohort A change)

survey pairs/items	Paired Differences			t-test	degrees of freedom	Significance (2-tailed)
	Mean difference	95% Confidence Interval of the Difference				
surveys 2b-2a	Coh. A-B	Lower	Upper			
RI score (all pairs)	0.7	0.0	1.5	1.94*	127	(0.055)
RI score (series of 4)	0.9	0.2	1.7	2.04*	97	0.044
surveys 2d-2c	Coh. B-A					
RI score	1.1	0.4	1.9	3.02	142	0.003
urban intent	-0.6	-1.0	-0.2	-3.18	143	0.002
rural intent	0.5	0.0	1.0	2.00	144	0.048

*Equal variances not assumed

Part 2b: Effects of programs on intent using only data from respondents to all four 2003 surveys

Results

Visual analysis of Figure 36, Figure 37 and Figure 38, suggested a pro-rural trend for all three variables during the rural rotations, and an opposing trend during the urban rotations. In order to improve the power of the analyses, data were restricted to that provided by the 128 students who had responded to all four surveys in 2003. Means standard deviations and numbers of responses to the situational intention variables are presented in Table 88.

The trends described earlier are more evident in graphs produced using matched data (Figure 39, Figure 40 and Figure 41). In this methodology, all respondents to any one survey also responded to the other three surveys, and so data were matched throughout the year. Although this led to a smaller overall number of eligible respondents, this was outweighed by the statistical and validity advantages of using such matched data.

Scores on all three variables were very similar for the two cohorts at the beginning of the both rotations (see data for surveys 2a, 2c in Table 88). Visual analysis of the figures suggested that

Cohort A (in the country) showed an increase in RI score and rural intent, and possibly a decline in urban intent during the first semester (surveys 2a, 2b). This was only statistically significant for the RI score (Table 87). Cohort B seemed to show no change, and during the interval, between rotations, Cohort A seemed to return to its pre-rotation levels (surveys 2b, 2c). During the second semester, Cohort B seemed to increase its RI score and rural intent, and decrease its urban intent (surveys 2c, 2d). These changes were relatively small, but were consistent with the findings displayed in Table 87.

Table 88 Means, standard deviations and numbers of responses to situational intention variables, using data from respondents to the 2003 series-of-four surveys, split by cohort.

variable/survey	Cohort A			Cohort B		
	Mean	Std. Deviation	Number	Mean	Std. Deviation	Number
RI score						
2a	-0.85	3.46	61	-0.77	4.43	60
2b	-0.16	3.5	61	-0.8	4.42	60
2c	-0.66	3.62	61	-0.88	4.38	60
2d	-0.72	3.94	61	-0.07	4.24	60
urban intent						
2a	5.29	1.8	62	5.24	2.33	60
2b	5.08	2.02	62	5.27	2.3	60
2c	5.26	1.83	62	5.44	2.16	60
2d	5.44	1.96	62	5.13	2.3	60
rural intent						
2a	4.47	1.85	62	4.56	2.38	62
2b	4.9	1.8	62	4.5	2.32	62
2c	4.56	2.05	62	4.63	2.43	62
2d	4.68	2.22	62	5.15	2.19	62

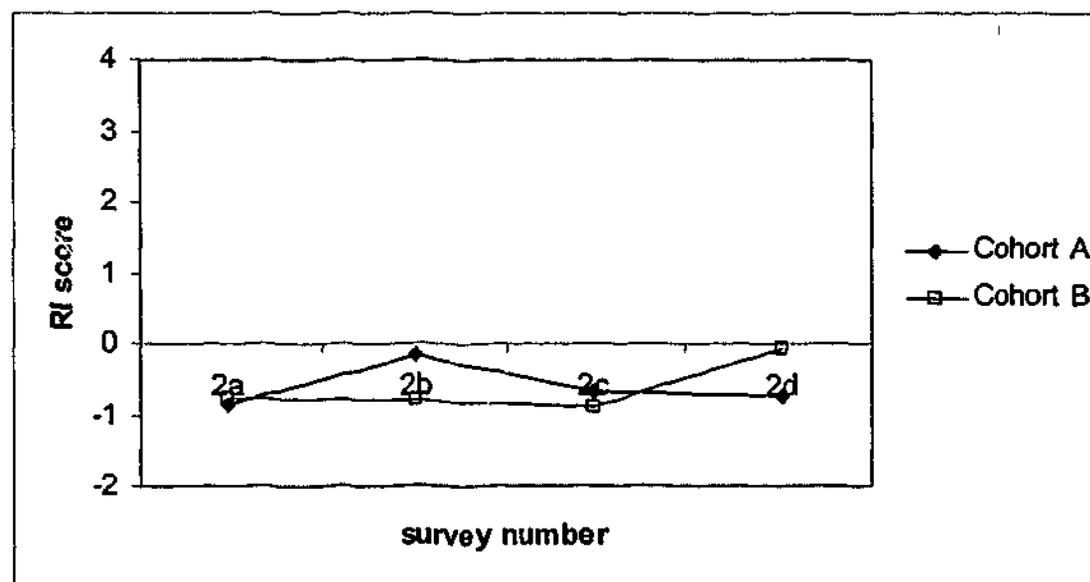


Figure 39 RI score for the 2003 surveys split by cohort: only responders to all four surveys

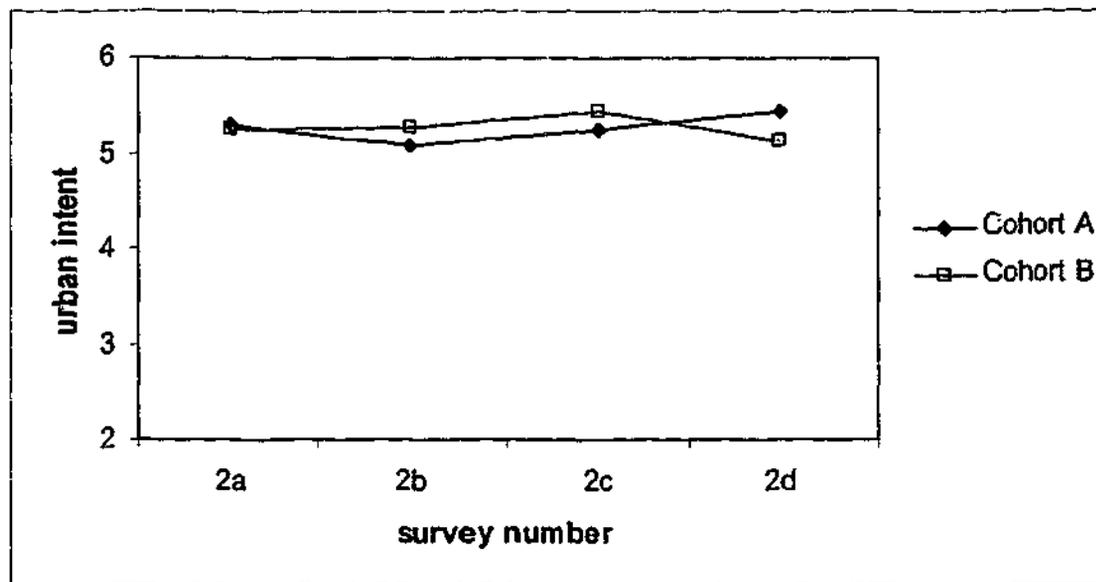


Figure 40 Urban intent for the 2003 surveys split by cohort: only responders to all four surveys

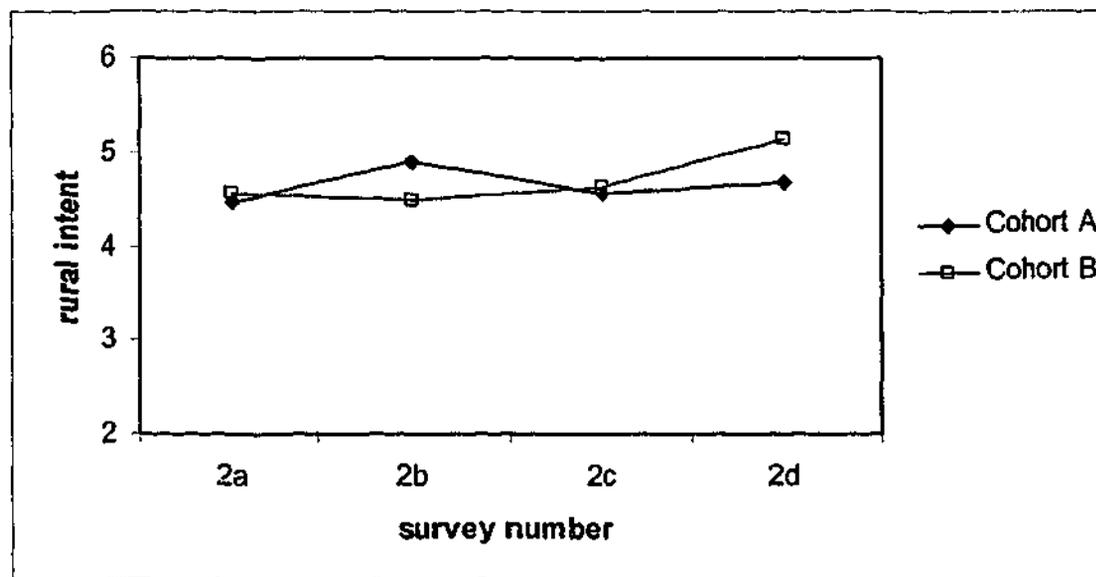


Figure 41 Rural intent for the 2003 surveys split by cohort: only responders to all four surveys

Mixed between-within subjects analysis of variance was performed on the data to ascertain whether there was a significant difference between cohorts, in the overall changes in situational intention scores over the entire year. This investigated the effect of the timing of the rural or urban rotation, that is, whether a rural rotation was more effective before or after the urban rotation. Moderately sized differences between cohorts were detected in both the RI score change (Wilks' Lambda = .93, $p < .05$, Eta Squared = .07) and rural intent change (Wilks' Lambda = .93, $p < .05$, Eta Squared = .07) over the year. Analysis of the changes in urban intent during the second semester rotation revealed a smaller but significant difference between the cohorts (Wilks' Lambda = .96, $p < .05$, Eta Squared = .04). These findings are consistent with those expected from visual analysis of the figures, with the cohort which had the rural rotation in the second semester appearing to have the greater overall annual effect.

Discussion

The first part (Part 2a) of the results section utilised the maximum number of available responses for each analysis, in an effort to increase power. The number of cases in each cohort

was about 80, and numbers in paired analyses averaged about 70. The second part (Part 2b) of the results section used only data from the 128 students who had completed all four surveys, and sample size of pairs was about 60 cases in each cohort. While this latter number was lower, the additional power offered to the analyses by the stronger research design, produced results that are more meaningful.

Significant differences between the cohorts over the periods of the rotations were detected by t-test analyses of the pre-post data in Part 2a (Table 87). These were confirmed through mixed between-within ANOVA in Part 2b. Analysis of data from this latter group of students showed that students attending rural rotations had a significant increase in rural intention, when compared to those who did not. This situation was repeated when the cohorts crossed over to the second arm of the study. During the second semester, students attending the rural rotation also showed a decrease in urban intent (Figure 39, Figure 40, and Figure 41).

Mixed between-within ANOVA investigated the effect of the order of the rotations on intention. Cohort B benefited more from the second rural rotation than Cohort A did in the first semester. As discussed later under the heading Research design on page 259, the quality of the rotations, especially the novel rural rotation, may have benefited from the 'rehearsal' in first semester, resulting in a better educational program in the second semester. Another plausible explanation is that Cohort A had 'adjusted' during the interval between rotations, and it is likely that Cohort B would display a similar adjustment if an additional survey were taken at a later time. Although such an adjustment may question the duration of effect, it would not deny the changes seen during the rotations, that is, the effect, albeit temporary, on intention.

This study provides very strong evidence of causality, in that the rural rotations were likely to have been the cause of the increased rural intention measured over that time. The next section investigates whether students with differing levels of likelihood to take up a rural career, benefit equally from the rotations.

Part 3: Effects of rotations: SES sub-groups

Part 3a: Effects of programs on intent using all available data

Introduction

In the preceding section, analyses were performed on the whole year-group, not allowing for differences in sub-groups among the students. If, indeed, subgroups based, for example, on sex, international status or SES behaved differently, true changes in some of these sub-groups would be diluted or neutralised by weaker or opposing changes in other sub-groups. Further, although the overall pattern did correspond with predictions based on the assumption that the rural rotation increases rural intention, not all of the changes in intent identified in the preceding section could be explained.

Section Three included a description of the Situational Expectation Score, and showed it to be a reliable predictor of rural intention (see The 'guy' score and rural intent, in Chapter Ten). It

was concluded in Chapter Ten, that the SES was a reasonable estimate of the likelihood of choosing a rural career but that SES sub-group membership has been shown to change over time, especially for the neutral sub-group. It was suggested, therefore, that the less committed 'neutral' SES sub-group may be more open to the influence of a rural (or urban) rotation. It was also possible that the pro rural and the pro-urban SES sub-groups may remain resistant to change, or even increase their SES score regardless of rotation. This would dilute the observed changes in the neutral SES sub-group. It was considered valuable, therefore, to test whether analysis of the above data split by SES would offer insights into the results obtained.

Methods

As in the foregoing sections, situational intention was estimated using the rural intent and the urban intent items, as well as the combined variable, the Rural Intent (RI) score. Urban intent increased as stated intent to work 'only in the city' increased, so RI was calculated as: rural intent minus urban intent.

Data necessary to estimate the SES were only available in surveys 2b, 2c and 2d. As discussed in Chapter Ten, membership of SES sub-groups is not completely stable. Therefore, analyses on pairs of data were performed on sub-groups whose SES membership was determined by the most recent data available, that is, by the second survey of the pair, and by survey 2b for analyses of the 2002 data (1a, 1b).

Four sets of analyses were performed, one on the 2002 rotation (surveys 1a, 1b), one on each of the 2003 rotations (surveys 2a, 2b and 2c, 2d) and one on the interval between the 2003 rotations (surveys 2b, 2c). Paired samples t-tests were performed to test changes in the means of the intent variables, over the four periods, in order to determine whether individual sub-groups were responsible for the changes observed in Table 86 and Table 87.

Results and discussion

All significant results of the paired t-tests, with two-way significance set at .05, are presented in the four tables, Table 89 to Table 92. Changes over the four time periods are discussed in turn in the following part of the thesis.

Surveys 1a, 1b

Results

It was seen in Table 84, page 230, that when the whole-group was considered, significant changes to all three variables occurred during the 2002 rotation. Table 86 on page 240 presented changes in both rural intent and urban intent but only in Cohort A. No differences were found when concurrent changes in the cohorts were compared to each other.

Table 89 shows that when the whole group (not cohorts) is divided into SES sub-groups, the only significant changes were in the strong urban sub-group and in the 'unknown' group. This latter group comprised those students who did not provide sufficient data to calculate the SES.

In the strong urban sub-group, there was an increase in RI score, mediated by a reduction in urban intent. The unknown sub-group had an increase in rural intent.

Analysis by sub-group and cohort found the strong urban sub-group in cohort A to have a decrease in intention to only work in cities, and the strong rural sub-group in cohort B to have an increase in rural intent.

Table 89 Significant changes in intention ($p < .05$) during the rural rotation in 2002 (surveys 1a, 1b) (df = Number-1)

cohort (rotation 1ab)	SES group*	intent variable	Paired Differences		t	Number	significance
			Mean	Std. Deviation			
Whole group (rural)	urban	urban intent	-1.21	2.04	-2.898	24	0.01
		RI score	2.36	3.47	2.258	11	0.05
	unknown**	rural intent	0.91	1.38	3.097	22	0.01
Cohort A (rural)	urban	urban intent	-1.80	1.99	-2.862	10	0.02
Cohort B (rural)	rural	rural intent	1.00	1.32	2.268	9	0.05

*SES group at survey 2b

** insufficient data to calculate SES

Discussion

It is likely that the pro-urban students, many of whom would have little rural background, gained an understanding of rural health and lifestyle issues and softened their intention to only work in urban areas (urban intent), without necessarily increasing their stated intention to work in the country. It is also apparent that the pro-rural students attending this first rural rotation increased the strength of their already existing intention to work in the country.

Because the 2002 instrument requested that students answer either the urban or the rural intent question, these patterns of response were to be expected. The mechanisms suggested, however, remain plausible.

Surveys 2a, 2b

Results

During the first rotation in 2003, relative to Cohort B, Cohort A showed an increase in RI score while it was in the country (Table 87 on page 241). However, there were no absolute changes found in the intent items when students were considered as a single group (Table 86) or split by cohort membership.

When students were further subdivided into SES groups, the strong-rural group in Cohort A showed an increase in RI, mediated mainly through a decrease in urban intent. This group had not shown a significant change during the 2002 rural rotation. Meanwhile, the seven students in Cohort B, whose SES could not be determined from data of survey 2b, had a decline in their RI score (Table 90).

Discussion

This combination may have been responsible for the relative differences seen between the cohorts during the first 2003 rotation (Table 87). It was not evident in the studies on absolute changes due to the dilution effect caused by the relative stability of intent for the majority of students. These findings suggest that the changes, when they were evident, were as strong as those caused by other rotations, but seemed to affect a relatively small numbers of students.

Table 90 Significant changes in intention ($p < .05$) during the first rotation in 2003 (surveys 2a, 2b) (df = Number-1)

cohort (rotation 2ab)	SES group*	intent variable	Paired Differences		t	Number	significance
			Mean	Std. Deviation			
Cohort A (rural)	rural	urban intent	-0.67	1.45	-2.393	27	0.02
		RI score	1.26	2.87	2.277	27	0.03
Cohort B (urban)	unknown**	RI score	-0.71	0.76	-2.500	7	0.05

*SES group at survey 2b

** insufficient data to calculate SES

Surveys 2b, 2c

Results

While there was not a significant change detected for the whole-group during the 2003 interval between rotations (surveys 2b, 2c), Cohort A did show a small decline in RI score mediated through a small reduction in rural intent during that time (Table 86 on page 240). This did not translate into a significant difference between the cohorts (Table 87). Analysis of these changes by sub-groups reveals that the decline in Cohort A was, at least in part, due to a moderate decrease in RI, mediated through a large decrease in rural intent, in the strong urban sub-group (Table 91).

Discussion

In this case, a relatively small change in the whole-group was shown to be important for the strong urban SES sub-group. It suggests that the pro-rural movement in intention seen in this group during the 2002 rural rotation, and possibly maintained during the 2003 rural rotation (no change was identified) was 'adjusted' downwards between rotations, when students from both cohorts mingled and shared experiences. This 'contamination effect' only seemed to affect this pro-urban group, possibly because their rural intent was higher than expected, having been through two rural rotations, one in 2002 and the other in 2003, but not yet the urban rotation.

Table 91 Significant changes in intention ($p < .05$) during the interval in 2003 (surveys 2b, 2c) (df = Number-1)

cohort (rotation 2bc)	SES group*	intent variable	Paired Differences		t	Number	significance
			Mean	Std. Deviation			
Cohort A (none)	urban	rural intent	-0.75	1.48	-2.480	24	0.02
		RI score	-1.22	2.83	-2.065	23	0.05

*SES group at survey 2c

Surveys 2c, 2d

Results

Most changes were seen during the second rotation in 2003. The year-group as a whole showed an increase in the RI score and rural intent (Table 84 on page 235). Cohort B displayed an increase in RI score mediated by both a reduction in urban intent and an increase in rural intent, while Cohort A appeared to have no significant changes (see Table 86 on page 240). As expected, then, Cohort B was found to have had a greater increase in RI and its components, relative to Cohort A (Table 87 on page 241).

Analysis by SES sub-groups allowed closer scrutiny of these findings. Table 92 shows that in Cohort B all sub-groups apart from the strong urban sub-group increased their RI scores during the rural rotation. The 'non-responsive' strong urban group had not shown significant changes in any period over the two years.

Although Cohort A as a whole, had not manifested any significant changes, analysis by SES revealed significant changes in all three SES sub-groups.

Discussion

One reason that the changes were not apparent in the combined cohort was that the strong rural sub-group had an opposite change to the rest of the cohort. The strong rural sub-group increased its rural intent while the other two groups decreased theirs during the urban rotation. This 'neutralised' the expected effect.

Discussion

The significant results presented in Table 89, Table 90, Table 91 and Table 92 are summarised in Figure 42. The research design was presented diagrammatically in Figure 34 on page 230. The power of these analyses was compromised somewhat by the relatively small sample size remaining in each sub-group of each cohort, after such a six-way split. The number of cases in each analysis presented in the tables is the degrees of freedom plus one.

Despite the small sample size, important, meaningful and plausible results were found. These were strengthened by the separation of data by SES sub-groups. For this reason, the .05 level of significance was retained despite the large number of analyses performed.

It is possible that the lack of power due to small numbers has resulted in Type II error; it is possible that more true changes exist than those that have been detected. If this were the case, the 'undiscovered' true changes are likely to follow patterns similar to those of the 'discovered' changes.

Table 92 Significant changes in intention ($p < .05$) during the second rotation in 2003 (surveys 2c, 2d) (df = Number-1)

cohort (rotation 2cd)	SES group*	intent variable	Paired Differences		t	Number	significance
			Mean	Std. Deviation			
Cohort B (rural)	unknown**	rural intent	0.82	1.17	2.324	11	0.04
		urban intent	-1.33	1.50	-2.667	9	0.03
		RI score	2.11	2.09	3.033	9	0.02
	neutral	rural intent	1.00	2.00	2.179	19	0.04
		urban intent	-0.68	0.82	-3.637	19	0.00
		RI score	1.68	2.40	3.053	18	0.01
rural	RI score	0.70	1.22	2.570	19	0.02	
Cohort A (urban)	urban	rural intent	-0.61	1.34	-2.179	23	0.04
		urban intent	0.57	1.20	2.260	23	0.03
		RI score	-1.17	2.27	-2.481	23	0.02
	neutral	urban intent	0.79	0.92	3.750	19	0.00
		RI score	-1.00	1.76	-2.471	19	0.02
	rural	rural intent	0.58	1.02	2.807	24	0.01
	RI score	0.71	1.40	2.482	24	0.02	

*SES group at survey 2d

** insufficient data to calculate SES

Cohort A					
SES	1ab*		2ab	2bc**	2cd
strong urban	R			U	U
neutral					U
strong rural			R		R
Whole A	R				U
Cohort B					
unknown			U		R
strong urban					
neutral					R
strong rural	R				R
Whole B					R

* all students attended a rural rotation simultaneously in 2002

** no rotations at this time

 Rural rotations
 Urban rotations
 R = change towards rural
 U = change towards urban

Figure 42 Summary table of all significant ($p < .05$) effects of rotations on intention to practice in the country. Sub-groups divided by the SES scores obtained closest to second survey.

Year 1 rural rotation: 2002

There was an overall trend towards a rural career during the rotations of 2002 (1ab). Analysis by cohort suggested that this was not consistent across the whole year-group, but could not explain this. Subsequent analysis by SES sub-group revealed changes toward a rural choice in the strong urban (Cohort A) and in the strong rural (Cohort B) sub-groups.

The strong urban sub-group reduced their determination to only work in the city. This may mean that they discovered that there were viable alternatives to a city career. The strong rural group, on the other hand increased its already strong commitment to work in the country. This is consistent with work by Rabinowitz, when he found that membership of his rural support program (PSAP) was the only independent predictor of increased retention in a rural medical workplace (Rabinowitz et al., 2001). Rural undergraduate programs may act on committed rural students by reinforcing and confirming rural intention, and thus may increase the duration of work in rural areas. It makes sense that the better informed the graduate is, the less likely s/he will become disenchanting after arriving in the country, and return to the city.

Year 2 rotations: 2003

Overall, students in Cohort A, who went on the first rural rotation in 2003, had an increase in rural intention relative to those in Cohort B, who stayed in the city at that time (Table 87). Subsequent analysis by sub-group suggested that this was due to a decrease in urban intent among the strong rural group.

During the previous rural rotation (in 2002) the strong rural group of Cohort B showed an increase in rural intent. It is likely that the strong rural sub-group in Cohort A, who were intermingled with Cohort B in 2002, would have also had an increase in rural intent during 2002. If this was the case, the 2003 decrease in urban intent built on this increase in rural intent. This is in keeping with the additive/reinforcing model discussed in the previous section.

The decrease in RI score of the 'unknown' SES group during the first urban rotation, although consistent with other findings, could not be explained. There were only seven respondents in this sub-group, and as the missing SES data was spread across the items, these students may have belonged to any combination of SES sub-groups. These observations are presented here because this subgroup features again in later analyses.

During the interval between the two rotations in 2003 (surveys 2b, 2c), only one change was found. The Cohort A strong urban group had had a significant reduction in their rural intent. This was the same group that had had a reduction in urban intent during the 2002 rural rotation. As suggested earlier, this reduction 'to the norm' during the interval may have been an 'adjustment' for an earlier increase in RI score.

The sub-group changes during the second rotation in 2003 were reasonably consistent with the overall pattern (Table 87). While Cohort B was in the country, all of its SES sub-groups (including 'unknown') had an increase in rural intention, except the strong urban sub-group. This sub-group had shown no changes throughout the trial. Meanwhile, two of the three Cohort

A sub-groups attending a city placement, had a change away from rural. The strong rural group was the exception, and continued to increase its rural intention. The only changes seen in strong rural groups of either Cohort was further toward a rural career, irrespective of rotation.

Conclusion

Despite the loss of power due to the reduced sample size resulting from the six-way division, analysis by SES added to the understanding of changes in rural intention. The changes identified and discussed in this section were restricted to those that did reach statistical significance. Several other differences were seen between cohorts and sub-groups that failed to reach significance at the commonly accepted .05 level, but would have reached significance at the .08 level. This suggests that the changes discussed above may not fully describe all the effects of the rotations on rural intent. They are likely, however, to be the most important.

Sub-group division improved the sensitivity of the analysis in at least two ways. Some important changes, unique to individual small SES sub-groups and that had been diluted in the whole-group analysis, became obvious, and contributed to the understanding of the effects of the programs. So too did changes that were in opposing directions for sub-groups and that had cancelled each other out when these sub-groups were considered as a single group.

Part 3b: Effects of programs on intent using only data from respondents to all four 2003 surveys

Introduction

In order to develop a clearer understanding of the movements of the intention items over the year, data were restricted to the 128 students who responded to all four surveys in 2003 ('series-of-four surveys'). This enabled tracking of that cohort without dilution by less consistent responders over the year. The analysis presented under the heading, Analysis of respondents and non-respondents on page 229 revealed few differences between respondents and non respondents to the series-of-four, apart from there being relatively less males among the responders.

Methods

The 128 respondents to all four of the 2003 surveys were divided into SES sub-groups based on their SES at survey 2d. The breakdown by cohort and SES sub-groups is presented in Table 93.

Table 93 Breakdown of 128 respondents to the 'series-of-four' surveys by cohort and SES sub-groups

Cohort	SES subgroup				Total
	urban	neutral	rural	unknown*	
A	21	14	19	10	54
B	19	16	19	10	54
Total	40	30	38	20	108

* 20 students provided inadequate data to calculate SES

Twenty students (10 from each cohort) did not provide adequate data on the components of the SES to calculate its value. Although it was not possible to determine their SES characteristics, these students are discussed below as a separate sub-group when analysis of their data reached significance.

Results

The complete set of means, standard deviations and numbers of responses at each of four the survey times, for each of the three situational intention variables, broken down by SES sub-group at survey 2d, is presented in Table 94, Table 95 and Table 96. These results are summarised in Figure 43.

Scores on urban intent tended to be higher for the strong urban SES group, intermediate for the neutral group and lower for the strong rural group. Conversely, the scores on rural intent tended to be higher for the rural group and lower for the urban group. The RI score is a combination of the other two intent variables, and followed the urban intent pattern. Scores from the unknown SES sub-group tend to lie between those of the neutral and the rural sub-groups.

As displayed in Figure 43, the unknown SES sub-group, especially in Cohort A, showed more variability between surveys than scores from the three identifiable SES sub-groups. This variability may have been due, in part, to smaller numbers and was reflected in the higher standard deviations for that sub-group for each survey. Data from this group were included for the sake of completeness, as their meaning is difficult to determine.

Both the strong urban subgroup and the strong rural sub-group in Cohort B, which had the urban rotation first, appear to have changed little over the year, even during the rural rotation between surveys 2c and 2d. The strong rural sub-group in Cohort A showed little change except for an increase in rural intent during the urban rotation. The strong urban sub-group in Cohort A appeared to have decreased urban intent and increased rural intent during the rural rotation in first semester, but both of these variables returned to levels similar to those of Cohort B by the end of the year.

Two differences in effect were of particular interest:

The first was that the second semester rotations appeared to have predicted effects on the neutral (or undecided) SES sub-groups of the two cohorts, according to which rotation they attended. The RI score of those who attended the rural rotation (Cohort B) became more pro-rural and that of those who attended the urban rotation (Cohort A) became more pro-urban (Table 97). While the change in urban intent differed significantly ($p < .0005$), the difference in effect on rural intent did not.

The second difference in effect was that the urban rotation in the second semester appeared to have different effects on the strong rural and the strong urban sub-groups of Cohort A. A pro-urban effect was seen on the strong urban sub-group. The same rotation, concurrently attended by the strong rural sub-group, had an opposite (pro-rural) effect on their intention. This

difference of effect was predominantly manifested through differing changes in rural intent (Table 98).

Discussion

The diagrammatic representation of the responses from this group enabled an overview of the effects of the rotations on the cohorts and the SES sub-groups (Figure 43). By excluding those who did not respond to all four surveys, these figures reflect 'paired' responses to all questions. It was clear that the second semester rotations had a greater effect on all sub-groups than did the first semester rotations. This is most likely because more experienced staff delivered the second rotations, particularly the second rural rotation. This issue is discussed further on page 259 in the general discussion under the heading Research design.

As expected, the less committed neutral sub-group responded more to the rotations than their more committed colleagues did. While the strong rural sub-group tended to continue to build on their intention to work in the country, and the strong urban sub-group tended overall to strengthen their intention to stay in the city, the neutral group responded to whichever rotation they were currently attending.

Table 94 Scores on urban intent by cohort and SES sub-group at survey 2d: respondents to series-of-four surveys

urban intent SES subgroup	Survey	Cohort B			Cohort A		
		Mean	Std. Deviation	N	Mean	Std. Deviation	N
unknown	2a	4.14	1.77	7	5.78	1.56	9
	2b	4.14	1.46	7	4.78	1.99	9
	2c	4.71	0.95	7	5.33	2.06	9
	2d	3.86	1.57	7	4.22	2.11	9
strong urban	2a	7.18	0.93	19	6.63	1.04	20
	2b	7.16	1.01	19	6.40	1.67	20
	2c	7.18	0.87	19	6.55	1.57	20
	2d	7.32	0.89	19	7.15	0.99	20
neutral	2a	5.53	1.65	16	5.14	1.46	14
	2b	5.69	1.54	16	5.43	1.60	14
	2c	6.06	1.39	16	5.50	1.02	14
	2d	5.44	1.41	16	6.21	0.70	14
strong rural	2a	3.36	2.41	18	3.76	1.64	19
	2b	3.33	2.40	18	3.58	1.67	19
	2c	3.33	2.17	18	3.68	1.25	19
	2d	3.06	2.04	18	3.63	1.30	19

Table 95 Scores on rural intent by cohort and SES sub-group at survey 2d: respondents to series-of-four surveys

rural intent SES subgroup	Survey	Cohort B			Cohort A		
		Mean	Std. Deviation	N	Mean	Std. Deviation	N
unknown	2a	5.44	2.19	9	3.25	2.25	8
	2b	5.67	1.50	9	5.75	2.25	8
	2c	5.56	1.81	9	4.63	2.83	8
	2d	6.33	1.22	9	6.00	2.20	8
strong urban	2a	2.68	1.67	19	3.29	1.45	21
	2b	2.53	1.39	19	3.64	1.41	21
	2c	2.47	1.54	19	2.86	1.46	21
	2d	2.58	1.17	19	2.19	0.75	21
neutral	2a	3.97	1.64	16	4.93	1.21	14
	2b	3.81	1.56	16	4.93	1.44	14
	2c	4.50	2.07	16	5.21	1.42	14
	2d	5.50	1.03	16	5.07	1.21	14
strong rural	2a	6.61	1.91	18	5.95	1.22	19
	2b	6.61	1.94	18	5.92	1.42	19
	2c	6.56	1.95	18	5.95	1.27	19
	2d	6.94	1.55	18	6.58	1.07	19

Table 96 Scores on RI score by cohort and SES sub-group at survey 2d: respondents to series-of-four surveys

RI score SES subgroup	Survey	Cohort B			Cohort A		
		Mean	Std. Deviation	N	Mean	Std. Deviation	N
unknown	2a	0.86	3.08	7	-2.75	3.73	8
	2b	1.57	2.51	7	0.88	4.16	8
	2c	0.57	2.44	7	-0.63	4.87	8
	2d	2.14	2.48	7	1.88	4.22	8
strong urban	2a	-4.50	2.29	19	-3.43	2.29	20
	2b	-4.63	2.22	19	-2.73	2.65	20
	2c	-4.71	2.14	19	-3.70	2.74	20
	2d	-4.74	1.88	19	-4.95	1.39	20
neutral	2a	-1.56	3.10	16	-0.21	2.22	14
	2b	-1.88	2.73	16	-0.50	2.56	14
	2c	-1.56	3.05	16	-0.29	2.13	14
	2d	0.06	1.57	16	-1.14	1.41	14
strong rural	2a	3.25	4.06	18	2.18	2.51	19
	2b	3.28	4.06	18	2.34	2.74	19
	2c	3.22	3.98	18	2.26	2.00	19
	2d	3.89	3.36	18	2.95	2.04	19

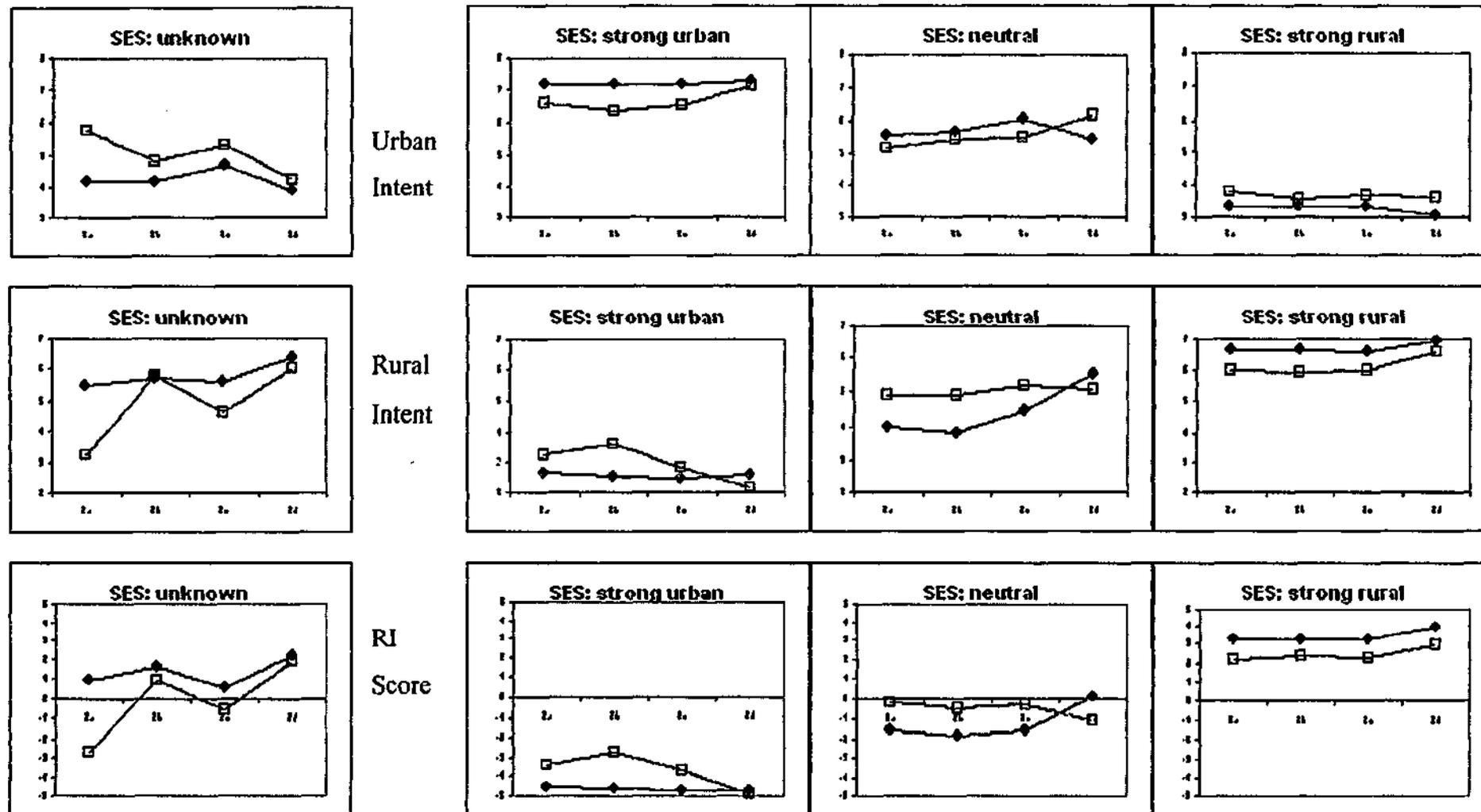


Figure 43 Scores on situational intention variables by cohort and SES sub-group at survey 2d (graphs): only respondents to whole series-of-four surveys.
 Legend: Cohort A (rural rotation first): (open square) Cohort B (urban rotation first): (closed diamond)

Table 97 Opposing changes in intention of the neutral SES sub-group during the second semester rotations (surveys 2c, 2d): series-of-four respondents

item	Cohort-Rotation	Number	Mean change	Std. Deviation	t-test for Equality of Means			Significance. (2-tailed)
					mean difference in change (Cohort B-A)	t	df	
RI score	A-urban	14	-0.86	1.46				
	B-rural	16	1.63	2.45	2.48	3.42	25	0.002
urban intent	A-urban	14	0.71	0.99				
	B-rural	16	-0.63	0.81	-1.34	-4.07	28	0.001

* equal variance not assumed

Table 98 Opposing changes in intention of the two extreme SES sub-groups during the same rotation (semester two – urban)

item	SES sub-group	Number	Mean change	Std. Deviation	t-test for Equality of Means			Significance. (2-tailed)
					mean difference in change (Cohort B-A)	t	df	
RI score	urban	21	-1.24	2.23				
	rural	19	0.68	1.38	-1.92	3.23	38	0.003
rural intent	urban	21	-0.67	1.24				
	rural	19	0.63	1.12	-1.30	3.47	38	0.001

Part 4: Effects of the order of rotations

Introduction

The effects of the individual rotations, that is, changes over consecutive surveys, have been discussed in the preceding sections. This part of the thesis looks at changes seen over the whole of 2003, both the net effect of the two rotations on students, and the effect of the order of the rotations on this outcome.

Methods

For each of the three intention variables, a derived variable was calculated to estimate the change in intention between surveys 2a and 2d, that is, over the whole year of 2003. This allowed for a measure of the net effect of all events over the year. It was possible to calculate these variables for 151 students (70% response rate) who had completed both survey 2a and 2d. The students were divided into three equal sub-groups based on the SES scores at survey 2d. A fourth group consisted of those students with insufficient data at survey 2d to calculate the SES. Independent samples t-test analysis was performed on whole-group data for the three situational intention variables, using cohort membership as the grouping variable. This was repeated after the data were split according to SES sub-group membership at the end of the year (survey 2d).

Results

Whole-of-group

Table 99 presents the whole-group numbers of responses, means and standard deviations of the change in the intention items for Cohort A and Cohort B. The mean changes were all small and were similar for the two cohorts and independent samples t-test analysis of these means failed to find any significant differences between the whole-group cohorts on any of the situational intention items.

Table 99 Numbers, means and standard deviation of changes over 2003 (surveys 2a, 2d) in items measuring intention. Whole of year group.

Variable	Cohort	N	Mean	Std. Deviation
change in RI score over 2003	A	77	-0.02	3.32
	B	71	0.39	2.56
change in urban intent over 2003	A	78	0.19	1.80
	B	71	-0.04	1.20
change in rural intent over 2003	A	77	0.16	1.98
	B	73	0.36	1.92

SES sub-groups

When SES sub-groups were analysed separately, using all available data, only the neutral sub-group showed significant differences between cohorts in the change over 2003 (survey 2d minus survey 2a). Means, standard deviations and numbers of responses for the neutral SES sub-group are presented in Table 100, and the results of the t-tests are presented in Table 101. The cohorts had large and opposite changes in RI score. Urban intent increased for Cohort A while it remained static for Cohort B. Rural intent increased for Cohort B but remained reasonably static for Cohort A.

Table 100 Numbers, means and standard deviation of changes over 2003 (surveys 2a, 2d) in the situational intention items. Neutral SES group.

Variable	Cohort	N	Mean change	Std. Deviation
change in RI score over 2003	A	20	-1.55	2.24
	B	18	1.22	2.73
change in urban intent over 2003	A	20	1.20	1.36
	B	18	-0.03	1.24
change in rural intent over 2003	A	20	-0.35	1.53
	B	18	1.19	1.96

Table 101 Independent samples t-test analyses of differences between Cohorts of changes in intention items over 2003 (surveys 2a, 2d): Neutral SES sub-group.

change in variable:	Mean Difference between Cohorts	95% Confidence Interval of the Difference		t-test for Equality of Means		
				t	df	Sig. (2-tailed)
RI score	2.77	Lower 1.14	Upper 4.41	3.44	36	0.002
urban intent	-1.23	-2.09	-0.37	-2.89	36	0.006
rural intent	1.54	0.39	2.70	2.72	36	0.01

When the analyses were repeated on data from the 128 respondents to the series-of-four surveys, similar results were found. In addition to those listed above, the difference in effect due to cohort membership in the strong urban group reached significance. In the strong urban group Cohort A had a greater reduction in RI score over the year than did Cohort B (mean difference between cohorts = 1.41 $p < .05$). That is, while the strong urban sub-group of Cohort A had a greater intention at the beginning of the year, both strong urban subgroups (Cohort A and Cohort B) were similar at the end of the year (see also Figure 43 on page 255).

Discussion

Apart from this difference, neither the whole-group, nor the committed SES sub-groups (strong urban or strong rural) showed any significant differences in the changes in intention attributable to the order in which they attended the rotations. The course was designed to deliver equivalent programs in the first and the second semester, so that students would benefit equally, regardless

of the order in which they had attended them. As discussed in the section Research design, on page 224, improvements in educational programs were likely to have resulted in a different and arguably better product on its second delivery. It was hypothesised that such stronger programs would have greater effects on situational intention.

It had also been hypothesised that the more committed students in the strong urban and strong rural SES sub-groups would be less likely to show fluctuations in situational intention, and that the 'undecided' neutral sub-group would be more likely to change their position. Consistent with these hypotheses, the neutral sub-group responded differently according to which of the stronger programs they attended in the second semester, and the stronger sub-groups were less influenced by either of the programs they attended.

These hypotheses were supported by the data, restricted to respondents to the series-of-four surveys, presented in Figure 43 on page 255. The situational intention variables followed a flat and parallel pattern for the two cohorts from the strong rural sub-group. Cohort B from the strong urban sub-group also displayed flat curves. The pattern for Cohort A from the strong urban group was consistent with an increase in rural intent during the rural rotation in first semester, followed by a return to the Cohort B levels over the remainder of the year. The reduction in the RI score during the interval following the rural rotation was statistically significant (see Table 91 on page 247).

Members of the less committed 'neutral' SES sub-group responded to the whole-of-year experience according to the order in which the programs were delivered. The patterns presented in Figure 43 show that these changes occurred predominantly during the second semester.

Discussion on research design and instruments

Research design

This project was designed to enable inferences of causality, in relation to the rural programs described and any observed change in rural intention. The two surveys in 2002, conducted before and after a one-week rural rotation, enabled observation of a change in intention to work in the country, but as there were no close controls, external influences may have caused the changes.

A more rigorous design was developed for 2003, when four surveys were carried out (Figure 34 on page 230), once before and once after each of two rotations. The class had been assigned to two groups. One group attended the rural rotation first and the other the urban rotation first. They switched over for the second semester rotations.

In order for this to be considered a true "cross-over" trial, the treatments (rural rotations) and the "non-treatments" (urban rotations) would need to be the same in first and second semester. The second semester experience in 2003, although planned to be the same as that delivered in first semester, was different in several respects. Both the teachers and the students had experienced a rotation in the first semester, which impacted on the second semester experiences: the teaching

skills were enhanced on the one hand, and prior learning facilitated the learning experience on the other. The other major difference in the two semesters was that students were assigned their rural posts in the first semester, but were allowed to request locations in the second semester. Almost all of these students went to their first preference.

The tutors had gained experience during the first rotation, and developed a sounder understanding of the program objectives. Further, delivery of the second rotations were said to run more smoothly.¹³⁴ It is possible that this would have resulted in a more positive learning experience for the students. As the rural program was new, and many of the components of the urban program had been taught before, the rehearsal effect was likely to have been greater for the rural program. Indeed, the innovative components of the urban program were those with a rural element, so even within the urban program, it is likely that the rural elements benefited most from the "rehearsal" in first semester.

By the second semester then, all students, had already had a rural experience during 2002, as well as either a rural rotation, or an urban rotation with some rural elements, during the first semester of 2003. In the interval between the two rotations there were many opportunities for students to share their experiences with their colleagues, 'contaminating' the trial. As a result, students attending the rural rotation in second semester had had more prior rural training than those who attended it in first semester. Those entering the urban rotation in second semester also had had more prior rural experience than those entering it in first semester. This may have equipped them better to benefit from the rural components in the urban rotation.

Studies have shown that elective rotations are more likely to have a positive effect than assigned posts (Rolfe et al., 1995). It seems logical that elective rotations would be a more positive experience, as students would also have had some capacity to select with whom they went.

Therefore, despite the 'levelling' influence of the 2002 rural rotation (see Figure 36 on page 239), students entered the second semester rotations with a considerably greater rural understanding than when their colleagues experienced them in first semester. Continuing improvement in educational standards, such as those described above, provide some of the hurdles to educational experimental research that Norman alluded to in the quotation presented in the introduction of Chapter Fourteen (Norman, 2002).

Research instruments

The 2002 instrument was fundamentally different to the 2003 instrument. While the earlier instrument attempted to measure the intention of students to eventually work for some time in the country, the RIQ2002 targeted those students who had some intention to do so. This approach assumed that those who, in the first year of their medical undergraduate training, had "definitely no intention" to work in the country, would never change their minds and resulted in a reduced number of eligible respondents. As it has been shown that students attitudes toward a

¹³⁴ Personal communication with tutors of both rural and urban rotations.

rural career do change (Kassebaum & Szenas, 1995; Rolfe et al., 1995), the instrument was refined to enable the inclusion of those who may have had negligible or even no plans to work in the country at the time of the survey.

This necessitated a change from a purely rural intention-based approach to a choice-based approach. Rather than asking just the students with some degree of intention what strength this intention had, all students were asked to state their strength of intention towards two competing, but not mutually exclusive careers.

As well as a changed approach, this resulted in increasing the proportion of eligible respondents from below 50% to 100%. For example, referring to the Cohort A respondents to survey 1a in Table 85 on page 238, it can be seen that 74 responded to rural intent, 38 to urban intent, and only 26 to both, enabling the calculation of the RI score. The RI score, then was calculated on 2/3 of the respondents to urban intent and only 1/3 of the respondents to rural intent. Virtually 100% of respondents to the 2003 version answered both questions. These changes were reflected in the apparent reduction in rural intent seen the whole-group responses in Figure 35 (page 234). It was therefore not possible to justify a comparison of responses to the intent items across the two years.

In order to maintain consistency between behaviour, intention and attitudes in this new approach, changes were made to many sections of the 2002 version of the instrument to produce the RIQ2003. These were described in Chapter Nine. Some items remained unchanged while others, including stated rural intent, changed little. With the changed approach, even items with minor changes were looked at from a new perspective. Although the change in response to rural intent between surveys 1b and 2a were not as great as the change in response to urban intent, it was still highly significant (Table 84, page 235). For most analyses therefore, the 2003 results were not considered a continuation of the 2002 results, but rather a second, related trial.

Summary of Chapter Fifteen

Chapter Fifteen is the results chapter of Section Four. It presented a considerable amount of data emanating from the controlled crossover trial that is the subject of Section Four of this thesis. The effects of the rotations on intention were presented in four parts:

1. Overall effects of the two years: students considered as a single group

While changes in RI were apparent in 2002 when all students attended a rural placement together, these changes were not seen in the group as a whole when half were in the city and half in the country. While there was an apparent effect due to completion of Year One in 2002, there was unlikely to be an effect on rural intent due to completion of Year Two of the course per se (see Figure 35 on page 234).

2. Effects of rotations: Cohort A and Cohort B

When the year-group was considered as a whole, those attending the rural rotation increased their intention to work in the country, while those attending the urban rotation showed little change in intention (see Figure 39 on page 242).

3. Effects of rotations: SES sub-groups

When students were considered separately according to SES sub-group membership, the greatest changes in intention were seen in the 'undecided' sub-group, particularly during the second semester rotations (see Figure 43 on page 255).

4. Effects of the order of rotations

Almost all of the changes in intention were seen in relation to the second semester rotations. That the second semester rotations would have a greater effect may have been expected as the programs had undergone refinement after the first semester. Chapter Fifteen also included a discussion on these observations.

The power of the analyses was maximised by treating the data in two ways: in the first, all available data was used to maximise the number of available responses; in the second, only matched data from those who responded to each of the four surveys of 2003 were used.

Chapter Sixteen will present the changes in beliefs and attitudes over the same period, and will discuss the usefulness of the RIQ2003 instrument in using these changes in beliefs to explain the changes in intention described in this chapter.

Conclusion for Chapters Fourteen and Fifteen

This and the previous two chapters have presented a crossover trial that evaluated the effect of a rural rotation on the Rural Intent (RI) of medical students. The RI is an estimate of the intention beliefs of the students to choose a rural career based on the difference between their stated intention to work in the country, and their stated intention to only work in the city, and changes in this global estimate have been presented.

The RIQ2003 is also an estimate of rural career intention, designed on a theoretical framework based on the ability of intention to predict behaviour. The RIQ measures the belief structure underpinning intention and self-concept, and provides an estimate of intention and ultimately, career choice. More than merely a 'barometer' to measure changing intention, it is postulated that the RIQ can offer a deeper insight into the mechanism of action of programs.

Chapter Sixteen presents the changes in the beliefs, sub-indices and indices that were observed during the trial.

Chapter Sixteen

Utility of the RIQ2003 during a controlled crossover trial

Introduction to Chapter Sixteen

The preceding chapters of Section Four have described the controlled crossover trial and movements in the situational intention variables, urban intent, rural intent, and the Rural Intention (RI) score over the two years of the trial. They outlined how the nature of the instrument used in 2002 was fundamentally different to that used in 2003. Therefore, this part of Section Four will deal only with the data collected from the four surveys conducted in 2003.

Section Three also presented evidence on the reliability and validity of the gold standards: the Situational Expectation Score (SES) and the Situational Intention Score (SIS). The usefulness of dividing respondents into subgroups based on SES was discussed in Chapter Ten and Chapter Fifteen. Chapters Eleven, Twelve and Thirteen showed that the indices, sub-indices and the individual variables of the Rural Intent Questionnaire were reliable and valid determinants of the SIS and of the situational intention variables.

As these indices, sub-indices and variables have been shown to be the determinants of intention (see Chapters Three, Eleven and Twelve), changes in their scores can therefore offer an explanation for concurrent changes in intention. This chapter deals with the changes in the indices, sub-indices and the individual variables seen over the period covered by the four surveys in 2003 and discusses how these changes can inform on the mechanisms underlying changes in stated intention brought about by educational programs.

This chapter is divided into three parts:

- Part 1: Changes in beliefs associated with the placements.

This part of the chapter reports the changes seen in the components of the RIQ2003 during the trial. Very few overall changes in intention were seen in Chapter Fifteen (Part 1) unless the year group was divided according to student characteristics, or split according to which placement they had completed. Therefore, Part 1 of Chapter Sixteen looks in turn at data of sub-groups based on:

- 1a: Cohort A and Cohort B
- 1b: SES sub-groups
- 1c: sex
- 1d: international status

- Part 2 Strength of association between RIQ2003 and the RI Score for the neutral SES sub-group.

As the neutral SES sub-group is considered to be less committed to either a rural or an urban career, it could be postulated that their belief system in relation to career choice, or career maturity, is not as well developed. If this is the case, there would be less consistency among the beliefs, and the strength of association between the beliefs as measured by the RIQ2003, and the RI score would be lower. This part of Chapter Sixteen reports on an analysis of regression models fitted to test this hypothesis.

- Part 3: Effect of repeated exposure to RIQ2003 on the strength of association.

Various versions of the RIQ had been applied to these students on six occasions over a two year period. This part of Chapter Sixteen investigates the effects of this repeated testing on the function of the instrument.

Part 1: Changes in beliefs associated with the placements

Introduction

This chapter considers the changes seen in the beliefs and attitudes of the students during the crossover trial of 2003. It seeks to relate these changes to the changes in intention reported in Chapter Fifteen. The only change in intention seen over 2003 when the whole year group was considered together was a weak increase in rural intent during the second semester placements (see Figure 35 on page 234). This suggested that there was not a strong background effect on intention throughout the year, and that it was therefore necessary to consider the data after it was split by sub-groups. Part 1 of Chapter Sixteen considers this data split by cohort membership, SES membership, sex and international status.

If Cohort A has an increase in mean score on an item while attending a rural rotation, this may be an effect of the rotation, and/or of external influences. Meanwhile, if Cohort B, concurrently attending an urban rotation, has an increase in mean score on an item, this too may be an effect of the rotation, and/or of external influences. It is assumed that, all other things being equal, the external influences for Cohort A and Cohort B, that is, those not related to the rotations, are similar. This does not assume that the urban program is neutral. Therefore, the net difference in scores between Cohort B and Cohort A should reflect the difference in the effect of the programs attended. This is the essence of a controlled trial, and is the procedure followed in this chapter.

Methods

The research design has been discussed in Chapter Fourteen. The data collected for this chapter was all obtained from the same responses to the RIQ instrument as that discussed in the previous two Chapters.

Paired samples t-tests were performed on data collected in consecutive surveys, and on data collected at the beginning and at the end of the year (surveys 2a and 2d). T-tests were performed

to compare the mean changes in scores in the urban cohort and the rural cohort over these time intervals. These analyses were performed on data from the whole-of-year group, and after data had been split according to three sets of subgroups, that is, based on sex, SES status and international/local status. The structure of these subgroups has been described earlier in this section, and in Chapter Twelve.

Chi square analyses were performed to determine whether there were differences in membership of the SES sub-groups at survey 2d according to sex. Although the trend for males to be strong urban described in Chapter Ten seemed present, neither the males nor the females were found to be significantly unevenly distributed among the SES sub-groups (Figure 44). Similar results were obtained for the SES sub-groups determined at survey 2b and survey 2c.

Rather than restrict the exploratory analyses to those who responded to all four surveys, all available pairs of data were used in these analyses. This resulted in larger numbers of pairs, which was especially important for some of the smaller sub-groups. A list containing the variables studied and their abbreviations is presented in Table 102. Subsequently, data from students who responded to the entire series-of-four surveys were utilised to clarify significant findings.

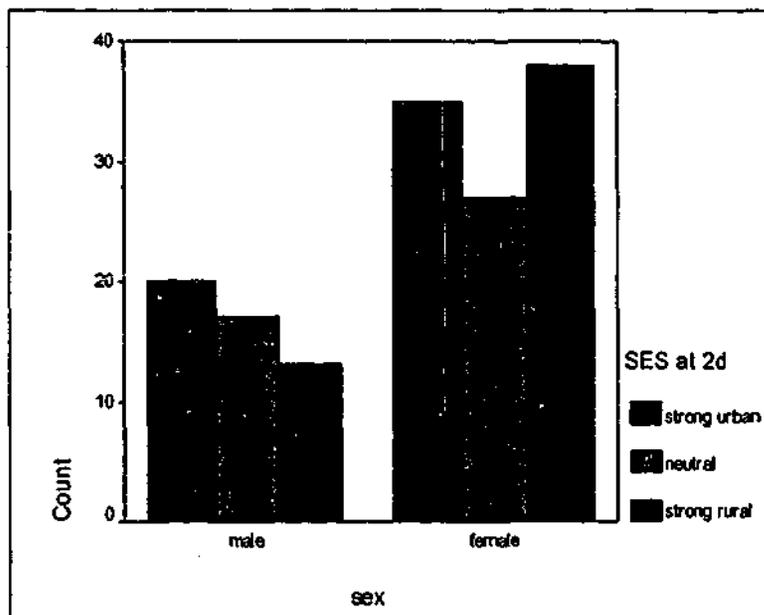


Figure 44 Cross tabulation of sex and SES sub-groups at survey 2d

Results and Discussion

Part 1a: Sub-groups based on Cohort A and Cohort B

This results section should be read in conjunction with Table 86 on page 240, which is repeated here for convenience as

Table 103. This table showed all significant changes found in the situational intention variables for Cohort A and Cohort B. During 2003, this was limited to the interval between rotations for Cohort A, and to the second semester (rural) rotation for Cohort B.

Table 102 List of abbreviations used in the analysis of indices and sub-indices

abbreviation	meaning
RI score	Rural Intent score is stated rural intent minus stated urban intent
urban intent	Stated urban intention item
rural intent	Stated rural intention item
positive affect	sum of three positive affect items
negative affect	sum of six negative affect items
total affect score (TAS)	positive affect minus 0.5 X negative affect
personal consequences	square root transformation of sum of seven personal consequences items
professional consequences	sum of four professional consequences items
total consequences score (TCS)	personal consequences minus .075 X professional consequences
triandis score	all eight social driver items (excludes B9, subjective norm)
subjective norm	social referent approval (B9) item
social driver score (SDS)	triandis score plus subjective norm
ease	perceived ease item
self-concept	three self-concept items minus personal normative belief-urban
RIQ score	TAS plus personal consequences plus .075 X professional consequences plus SDS
Situational Intention Score (SIS)	RI score plus undergraduate intent plus ease

Table 103 Copy of Table 86 page 240. Significant differences in paired responses to the situational intent items – Cohort A and Cohort B. All differences significant at $p < .05$ reported.

cohort	survey pairs/items	Paired Differences		t-test	degrees of freedom	Significance (2-tailed)	
		Mean difference	95% Confidence Interval of the Difference				
			Lower	Upper			
Cohort A	surveys 1b-1a						
	urban intent	-1.00	-1.79	-0.21	-2.598	27	0.015
	rural intent	0.51	0.10	0.91	2.510	66	0.015
Cohort A	surveys 2c-2b						
	rural intent	-0.32	-0.64	0.00	-2.017	73	0.047
	RI score	-0.55	-1.03	-0.07	-2.269	72	0.026
Cohort B	surveys 2d-2c						
	urban intent	-0.43	-0.67	-0.19	-3.561	68	0.001
	rural intent	0.59	0.23	0.95	3.306	70	0.001
	RI score	1.01	0.53	1.49	4.189	68	0.001

The first columns of Table 104, Table 105 and Table 106 display the mean changes between surveys in scores on the items in Table 102 for Cohort A and Cohort B. They also list the number of respondents included from each cohort and standard deviations. The last columns of these tables contain results of the independent samples t-tests comparing changes in Cohort B with those of Cohort A (B-A). Only significant program effects, that is, significant differences between cohorts, are presented.

Most of the program effects were seen during the last rotation (Table 105), and many of these were again seen in the whole-of-year data (Table 106). Significant differences between cohorts after the first rotation were restricted to the personal consequences sub-index and the perceived ease item (Table 104). There were no significant program effects on indices and subindices detected between cohorts during the first semester rotations.

Results and discussion

Surveys 2b, 2c

Over the interval between surveys 2b and 2c, Cohort A did show a significant reduction in RI score and in rural intent (Table 103). Although these differences did not translate to a significant difference between cohorts (Table 104), there was a relative decrease in personal consequences and perceived ease of living and working in the country. These two variables carry some overlapping meaning.

Table 104 Significant differences in program effects experienced by Cohort A and Cohort B during the interval between rotations in 2003

item	change in score between surveys				t-test for Equality of Means			
	Cohort-Rotation	Nr	Mean change during interval	Std. Deviation	Mean difference in change (Cohort B-A)	t	df	Sig.
personal consequences	A-nil	72	-0.46	2.16	0.75	2.00	135	0.05
	B-nil	65	0.28	2.20				
ease	A-nil	73	-0.29	1.99	0.74	2.52	139	0.01
	B-nil	68	0.45	1.45				

A plausible explanation for these findings is that the reduction in RI score observed in Cohort A was mediated through reduced intention to ever work for a period in the country (rural intent). This in turn, was mediated through a loss of perceived ease to live and work in rural areas (ease) and a coincident reduction in the belief that personal requirements would be met in such a setting (personal consequences).

It is of interest that this effect did not occur during the rotations but was delayed until the interval between programs, when the students had intermingled for several months. It is possible that the 'contamination' of effects led to opposing movements from the cohorts, so that those who may have had an increase in positive attitude toward a rural career during the rural rotation (Cohort A) may have been influenced by those who had not (Cohort B), and vice versa. These opposing movements were responsible for the observed differences between cohorts.

Surveys 2c, 2d

During the second semester rotations, the cohort in the country (Cohort B) had an increase in all three situational intent items when compared with Cohort A, concurrently on urban rotation (Table 105). These three situational intention results are the same as those that have been presented in Table 87 on page 241. Analysis of the data presented in the column, 'Mean change during interval' shows that changes in Cohort B were responsible for most of these differences.

Consistent with the changes in the situational intention items, there were increases in affect, self-concept, social drivers, and the RIQ score in Cohort B relative to Cohort A. Not all of these differences were solely the effect of the rural rotation. The differences in the RIQ score was attributable as much to an increase due to the rural rotation (Cohort B) as to a decrease during the urban rotation (Cohort A).

These changes in attitudes may offer insight into the observed differences in stated intention. Stated intention is a declaration of the conscious willingness to do something. An overtly positive or negative experience works, by definition, at this conscious level, and would be expected to affect stated intention. The RIQ is an instrument designed to measure the overall attitudinal effect, and its component indices, and seeks to offer an explanation for the mechanisms of effect. In this instance, changes in RIQ did reflect this global effect of the rotations.

The indices, however, were more discriminating. The difference in changes in positive affect, Triandis score, and social driver score (SDS) were attributable to an increase in Cohort B (about 2/3 of the effect) as well as a decrease in Cohort A (about 1/3). On the other hand, almost all of the difference in the effect of the programs on self-concept as a rural doctor/dweller was due to a decrease in Cohort A while in the city.

The objectives of the rural rotation were built around context and rural health care, including to "reflect on the nature of a clinician's role in a rural clinical practice." It was of interest that neither the personal nor professional components of the perceived consequences index seemed to be influenced by this experience. Indeed, the observed differences in changes to self-concept as a rural doctor were almost totally due to a decrease in Cohort A.

As discussed in Chapter Twelve the perceived consequences index was weaker than either affect or social drivers as a predictor of intention. While it may be that its importance as a predictor of intention was relatively low, changes in attitude to this aspect of a rural career were expected, as context was specifically addressed in the rural rotation. It may be that analysis by sub-group will shed light on this finding as the rural rotations may have affected student sub-groups differently.

Table 105 Significant differences in program effects experienced by Cohort A and Cohort B during the second semester rotations

item	change in score between surveys			t-test for Equality of Means				
	Cohort-Rotation	Nr	Mean change during interval	Std. Deviation	Mean difference in change (Cohort B-A)	t	df	Sig.
urban intent	A-urban	76	0.18	1.28	-0.61	-3.18	143	0.002
	B-rural	69	-0.43	1.00				
rural intent	A-urban	75	0.08	1.58	0.51	2.00	144	0.048
	B-rural	71	0.59	1.51				
RI score	A-urban	75	-0.12	2.44	1.13	3.02	142	0.003
	B-rural	69	1.01	2.00				
positive affect	A-urban	76	-0.39	3.94	1.27	2.06	146	0.041
	B-rural	72	0.88	3.52				
triandis score	A-urban	72	-2.53	6.99	3.93	3.10	135	0.002
	B-rural	65	1.39	7.83				
self-concept	A-urban	76	-1.78	3.88	2.05	2.97	143	0.003
	B-rural	69	0.28	4.43				
SDS*	A-urban	72	-3.03	7.22	4.29	3.22	134	0.002
	B-rural	64	1.26	8.34				
RIQ score	A-urban	69	-2.70	10.93	5.23	2.43	126	0.016
	B-rural	59	2.52	13.38				

* Social Driver Score

Surveys 2a, 2d

This section deals with the differences in effect due to the order in which the rotations were experienced. Over the whole year, a significant difference in the situational intent variables due to the order of the programs was not found (Table 106). The effect of the rotations in first semester and subsequent 'adjustments' had been sufficient to neutralise the difference in effect on situational intent observed in the second semester rotations.

Table 106 Significant differences in program effects experienced by Cohort A and Cohort B over the entire year (2003)

item	change in score between surveys			t-test for Equality of Means				
	Cohort-Rotation	Number	Mean change during interval	Std. Deviation	Mean difference in change (Cohort B-A)	t	df	Significance
positive affect	A-all	78	0.21	5.64	2.32	2.67	148	0.01
	B-all	72	2.53	4.95				
total affect score	A-all	76	0.09	6.54	2.28	2.11	143	0.04
	B-all	69	2.37	6.47				
triandis score	A-all	75	-1.46	9.71	4.11	2.69	146	0.01
	B-all	73	2.65	8.86				
SDS	A-all	75	-2.65	10.16	4.19	2.54	146	0.01
	B-all	73	1.54	9.93				
RIQ score	A-all	70	-1.43	18.35	6.34	2.08	135	0.04
	B-all	67	4.91	17.22				

This was not the case, however, for the RIQ score, and several of its components. Changes in the RIQ scores suggested that over the year the programs had a far more pro-rural effect on

Cohort B than Cohort A. Indeed, Cohort A had a small overall reduction in positive attitude toward a rural career, while Cohort B had a moderate increase (Cohort A -1.43, Cohort B 4.91). This difference due to the order of the rotations was confirmed as significant and of moderate size with mixed between-within subjects ANOVA on data limited to that from respondents to the series-of-four surveys (Wilks lambda = .914, $p < .05$, eta squared = .09). These changes are represented diagrammatically in Figure 45.

Figure 45 suggests that there may have been a net pro-rural effect to both cohorts from the year leading to survey 2c (see also Table 106). Interestingly, this 'prior' pro-rural effect seemed greater for the cohort that spent the first rotation in the city (Cohort B).

Indeed, Figure 45 suggests that the difference between cohorts was greater during the interval between rotations than during the first rotation, and that such 'adjustments' were greater than the direct effects of the rotations. This may be consistent with the observation of Norman when he wrote.

...paradoxically, real differences in educational strategies may not be reflected in outcomes, ...simply because students are highly motivated and are not blinded to the intervention, so will compensate for any defects in the curriculum(Norman, 2002).

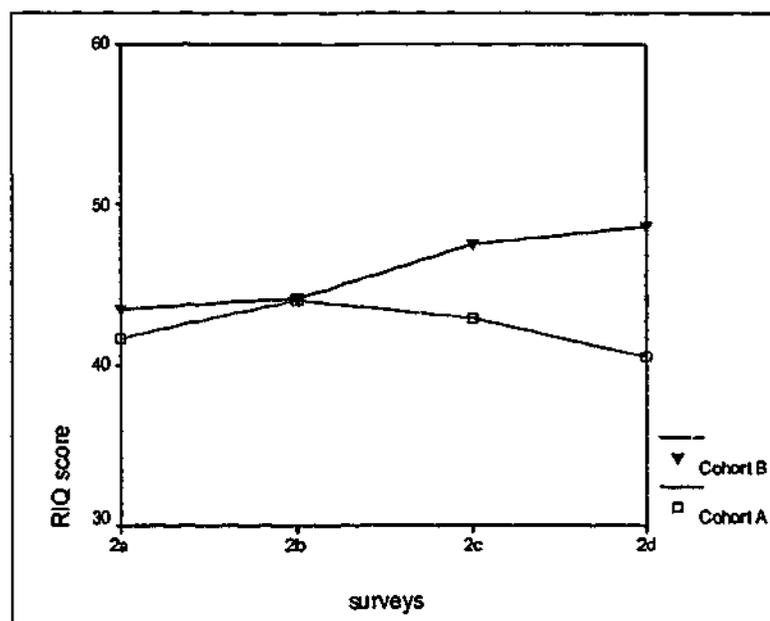


Figure 45 RIQ scores for respondents to series-of-four surveys: all SES sub-groups

The changes in the SDS scores were similar over the entire year (Table 106) to what they were for the second rotation (Table 105). Unlike the RIQ score, neither cohort changed significantly as a result of the experiences leading up to survey 2c. Figure 46 suggests that, while SDS may have been an important contributor to the change in RIQ over the whole the year, little of this took place in the first semester. Further, the negative effect of the urban rotation (-3.03) was greater than the positive effect of the rural rotation (1.26) on SDS during the second rotation (Table 105). The difference in effect due to the order of the rotations as determined by mixed between-within subjects ANOVA was significant and had a moderate effect size (Wilks' lambda = .898, $p < .01$, eta squared = .102)

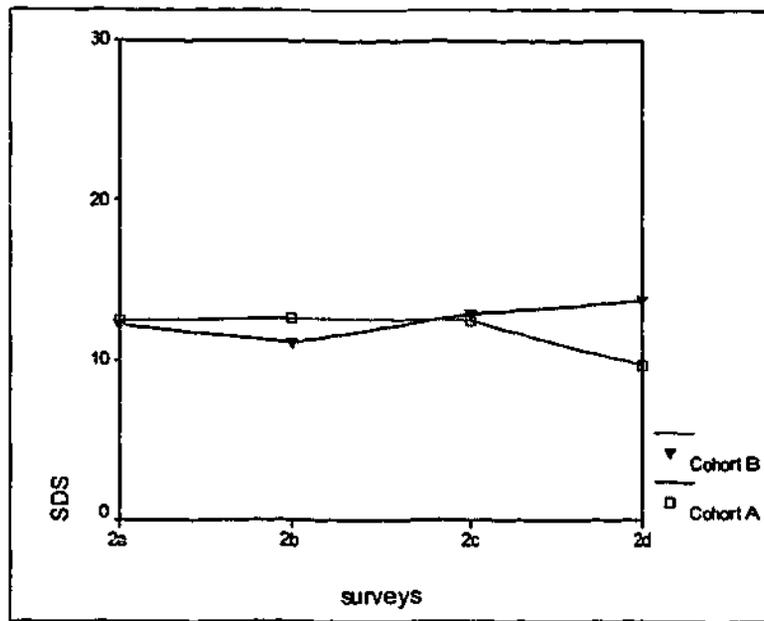


Figure 46 SDS for respondents to series-of-four surveys: all SES sub-groups

On the other hand, differences between cohorts in the changes in the positive affect score were much greater over the whole year than for the second rotation alone (Table 106 and Figure 47). The increase in positive affect in Cohort B was spread over the whole year, and was not confined to the second rotation. So while both cohorts may have increased positive rural affect in the year up to survey 2b this may have been marginally more so in the cohort that had had the urban rotation during that time. This overall pattern was similar to that seen for RIQ score in Figure 45.

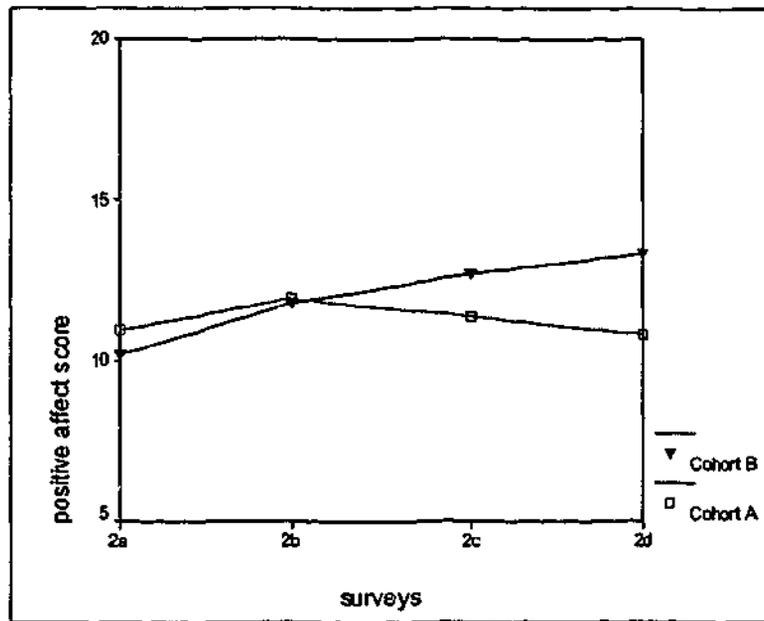


Figure 47 Positive affect scores for respondents to series-of-four surveys only, all SES sub-groups

Both cohorts showed an increase in positive affect during the first rotation, irrespective of whether the rotation was rural or urban. Cohort A had an 'adjustment' between survey 2b and 2c, while Cohort B continued to increase its positive affect score. The effects of the second rotations were as expected. So it was not that the urban rotation in first semester that caused a greater increase in positive affect, but that, the interval between rotations saw opposing changes. The reason for this warrants further investigation. The interaction effect, that is, the fact that the

positive affect of the cohorts responded differently due to the order of rotations, was significant and moderately large (Wilks Lambda = .885, $p < .005$, partial eta squared = .115).

Part 1b: Sub-groups based on SES at survey 2d

As described earlier (see Chapter Ten) students were divided into three subgroups based on the SES tertiles: 'strong urban', 'neutral or undecided', and 'strong urban'. As in the previous section, this section will present all significant differences in effect on the components of the RIQ between cohorts during the intervals between surveys. A fourth sub-group consisted of those who had not provided sufficient data in survey 2d to determine their SES.

Results and discussion

Unknown SES sub-group at survey 2d

Although this sub-group may have been a mixture from the various sub-groups, they were represented in several of the previous tables. Despite their small numbers, they seemed to behave as a cohesive group lying between the neutral and the strong rural sub-groups (see Figure 43 on page 255).

Significant differences between cohorts were found on several variables for this small group of students during the second semester rotation (Table 107). These were the same as for the whole-of-group during the entire year (Table 106). It was difficult to determine the importance of these findings, and the effect of loss of power due to the small numbers in this group.

They were consistent, however, with the earlier findings that the unknown SES sub-group in Cohort B showed a significant increase in RS score and rural intent and a decrease in urban intent while on rural rotation (second semester), while no significant changes were found in this sub-group of Cohort A (Table 92 page 249).

Strong urban SES sub-group at survey 2d

While significant changes in the stated intention scores were not identified for the strong urban sub-group during the first semester rotations (Table 90 on page 230), analysis of the sub-indices showed that Cohort A had a paradoxical decrease in total consequences score mediated through professional consequences while in the country. Meanwhile, Cohort B showed a paradoxical increase while in the city. The difference in effect of the programs was significant at the .02 level (Table 108).

While perceived ease remained static during the interval between rotations for Cohort B, it showed a decline in Cohort A, who had previously returned from the country. This difference between cohorts was also significant. This reduction in perceived ease in Cohort A during the interval coincided with the significant reduction in RI score and rural intent in a similar sub-group presented in Table 91.

During the second semester rotations, Cohort A, now in the city, continued to show a decrease in its stated rural intent relative to Cohort B (Table 108). This strong urban sub-group of Cohort

A had been found to have a significant decrease in all three intent variables during their urban rotation in second semester, while no significant changes were seen for the cohort that went to the country Table 92. During this time, the only RIQ variable found to have been affected differently between the cohorts was self-concept.

Over the entire year, the difference between cohorts was only seen in the SDS, mediated through the Triandis score, and the RIQ score. Again, this was more due to a reduction in score in Cohort A, than to an increase in Cohort B (see Table 92 and Table 108).

It seems from this analysis that while the strong urban sub-group of Cohort B, which had its first rotation in the city, showed little change over the year, Cohort A showed a progressive strengthening of its pro-urban position throughout the year. For cohort A, this started with a reduction in the belief that their professional needs would be served in the country while they were actually on rural rotation. Between rotations, there was a decrease in perceived ease of living and working in the country. Then, while on the urban rotation in second semester, this strong urban sub-group of Cohort A had a decrease in self-concept as a rural doctor/dweller.

These results are consistent with the results presented diagrammatically in Figure 43 on page 255. Although these figures use data only from the respondents to the entire series-of-four surveys, the overlay is substantial, and similar trends would have been expected. In the second column of graphs (strong urban SES sub-group), Cohort B does not alter significantly over the year, and Cohort A shows a decline in RI score.

From the above discussion, Cohort A appeared to show progressive anti-rural changes in attitudes, while Figure 43 suggested an initial rise in stated rural intent, followed by a decline. This is consistent with the cognitive dissonance theory (Festinger, 1957). It may be that students felt compelled to state an increase in their rural intent during their rural rotation, although their attitudes were changing in the opposite direction. This was followed by a period during which they were not under the direct influence of urban or rural rotations, and during which they lowered their score only on the question, "Considering all things, how easy would living and working in the country be for you?" During the urban rotation, they were no longer under a social obligation to maintain this artificially raised level of stated rural intent, and were 'permitted' to show a reduction. This occurred and there was a significant reduction in stated rural intent during the urban rotation (see Table 92 on page 249).

Cognitive dissonance is often associated with discomfort, which may be translated into anger toward the causative object (Festinger, 1957). The resultant on-going deepening of negative attitudes towards a rural career seen in this cohort is consistent with this theory. This effect was not as strong in the second semester, when students had some say in where and with whom they would travel. These findings offered a strong argument against sending students on rural rotation against their wishes. This was especially the case for the strong urban sub-group, and when choice of rural location was restricted.

These findings are consistent with the premise that stated intent is a cognitive manifestation of a belief. It is subject to external influence, and may not always be a reliable indicator of the entire belief system underlying the decision-making process. While there was no difference between cohorts in the stated situational intention items over the entire year, there was a difference detected in significant RIQ scores, probably mediated through changes in perceived consequences and social drivers (Table 108). This is discussed further in Part 1d: Sub-groups based on international status on page 284.

Neutral or undecided SES sub-group at survey 2d

Table 92 presented data that showed that during the second semester rotation, students from the neutral SES sub-group from each cohort had had significant changes in the stated intent items according to which program they attended. Cohort A had a significant decrease in RI score and an increase in urban intent during their urban rotation, and Cohort B had a pro-rural change in all three variables during their rural program. These results were supported by independent t-test analyses of the difference in these responses (Table 109).

In addition to the stated intent variables, there were significant differences in the professional consequences sub-index, and in the SIS. During the rotations, those in the county increased their beliefs that their professional needs would be met in the country, while an almost equal but opposite shift occurred for those in the city.

The SIS was the sum of RI score, perceived ease and undergraduate intention, that is, intention to seek additional undergraduate rural experience (see Table 102, page 266). As ease is likely to have some overlap in meaning with professional consequences, and as these and the RI score had been shown to vary according to the rotation attended, it was not surprising that the SIS would also do so. This was the only sub-group, however, for whom the difference in SIS change had reached significance.

Over the entire year (survey a to survey d), a similar effect was seen on the stated intent variables, and positive affect was the only sub-index to reach significance. Visual analysis of Figure 43 on page 255 suggests that virtually all of these changes may have occurred during the second rotation, as the stated situational intention variable were relatively 'flat' until then. However, it was shown in the discussion on the strong urban group in the previous section that the RIQ variables may measure something different to stated intent, so positive affect was plotted against the surveys, over time (Figure 48). While there were predictable trends during the second semester rotation, the trend over the first semester rotation suggested that the students in the country had had a decrease in positive affect toward the country, and that those in the city had had an increase. Neither of these trends reached statistical significance, although mixed between-within subjects ANOVA confirmed a very large and significant interaction effect (Wilks' lambda = .676, $p < .05$, eta squared = .324). This suggested that the order of the rotations had a large effect on the change in positive affect over the year, and Figure 48 suggests that this difference in effect may have started during the first semester rotations.

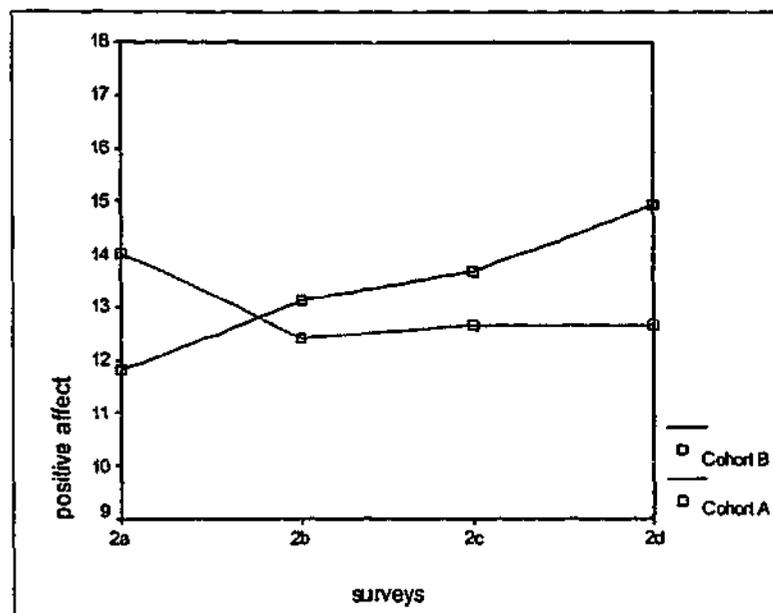


Figure 48 Positive affect scores for respondents to series-of-four surveys only, neutral SES sub-group

The pattern of response of the neutral SES sub-group was unlike that of the strong urban group. While the changes occurred during similar time frames, they were in fundamentally different variables. The strong urban sub-group, as discussed in the previous section, displayed differences in effect predominantly through the RIQ variables. The neutral sub-group did so almost solely through the stated intent items.

The effects of programs are likely to be mediated through changes in underlying belief systems. It is likely that the neutral SES sub-group did not have a strongly developed attitudinal belief system in relation to a rural career choice. If that were the case, the effect of rural programs could not be effectively mediated through this route. Instead, the effects of programs were mediated through intentional beliefs, that is, the stated intent items.

An argument could be put that this represents a social desirability bias, with students changing their stated intent according to the influence of their tutors. This argument is weakened by the fact that a similar effect was not seen during the first semester rotation (see Figure 43). Although the case has been put that the second semester programs may have been more developed than those in first semester, at least some effect would have been expected in the first semester.

As will be further discussed under the heading Part 3: Effect of repeated exposure on strength of intention on page 292, while the actual scores on the variables in the RIQ score reflect changes in beliefs, the validity of these beliefs to predict rural intent can also be shown to increase during the rotations. This means that the beliefs system underpinning the instrument is becoming more consistent and reliable. Even without shifts in the direction of the beliefs, this effect of the education process is essential to the career decision-making process. Immersion in rural and in urban posts challenges the student's belief system, forcing him/her to re-evaluate it, and to create a new, better informed and more mature belief system. It was expected that this 'undecided' SES sub-group would be the most likely sub-group to show these effects. This

process is consistent with the concept of existential crises raised by Scott Webster (Webster RS, 2004) and discussed in Chapter Eighteen.

It is of interest that the positive affect sub-index appeared to undergo paradoxical changes. While the expected changes did occur during the second semester, the opposite appeared to be the case in the first (Figure 48). The apparent difference in positive affect level at survey 2a was not significant, and while the differences in change during the two rotations did not reach significance, the overall effect did.

Rolfe found that compulsory rotations early in undergraduate training may have a negative effect on the likelihood to practice in the country (Rolfe et al., 1995). The students attending the rural rotation in the first semester were not given the option of location or traveling companions, whereas those in second semester did have some input into this. During the development of this instrument, students were very strong in their opinion that rural careers should not be forced upon them. Indeed, this led to difficulty in the wording of the personal normative belief items, as they rejected any possibility of an 'obligation' being forced upon them (see Chapter Six). It is plausible that such factors may have played a role in this apparently paradoxical outcome, and should be considered in the planning of rural rotations.

Strong rural SES sub-group at survey 2d

The differences in the effect of the rotations on the strong rural group were restricted to the first two time intervals. Although members of the strong rural sub-group of Cohort A did show an increase in RI score during their rural rotation in semester one (Figure 44), this did not translate into a significant difference when compared with changes in the strong rural sub-group of Cohort B, concurrently in the city. The differences in program effect that were seen were in the total consequences score (TCS). This was largely mediated through a pro-rural change in the personal consequences sub-index of the cohort in the country, although there was also a smaller opposite contribution from the cohort in the city (Table 110). The changes seen in the strong urban sub-group during this same interval had also been in the TCS but had been mediated through an anti-rural change in the professional consequences index of the students in the country (Table 108).

So it seems that the main effect of the first rural rotation on both the strong rural sub-group and the strong urban sub-group may have been to strengthen pre-existent beliefs about having their needs met in the country. Members of the strong rural sub-group in the city, however, changed their beliefs according to the rotation they were attending at the time, that is, away from the belief that their personal needs would be met in the country.

During the interval between rotations, when the cohorts were again together for several months (surveys 2b, 2c), there were opposite 'adjustments' towards the pre-rotation levels in the strong rural sub-group of both cohorts. During this interval the RIQ scores for the strong rural sub-group moved in opposite directions according to cohort membership. This was greater than what could be explained by the 'adjustment' in personal consequences seen at the same time,

and was largely a pro rural shift in the cohort that had spent the first rotation in the city, however it may have been a consequence of the same forces.

During the second semester, both the rural rotation and the urban rotation resulted in an increased RI score in this sub-group (Table 92), and there was not a statistically significant difference in the strengths of these effects. The strong activity seen in the rural undergraduate club, Wildfire, especially during the second half of the year may have had an effect over and above that of the urban program, contributing to the pro-rural changes in both cohorts

Table 107 Unknown SES sub-group: Significant differences in program effects experienced by Cohort A and Cohort B

item	change in score on item between surveys				t-test for Equality of Means				
	surveys	Cohort- Rotation	N	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t	df	Sig.
positive affect	d-c	A-urban	11	-3.00	4.17				
		B-rural	12	2.67	4.21	5.67	3.24	21	0.004
total affect score	d-c	A-urban	11	-2.45	3.45				
		B-rural	12	2.92	3.79	5.37	3.54	21	0.002
triandis score	d-c	A-urban	8	-5.00	3.21				
		B-rural	9	1.67	6.16	6.67	2.74	15	0.015
SDS	d-c	A-urban	8	-5.13	3.40				
		B-rural	8	0.88	7.08	6.00	2.16	14	0.049
RIQ score	d-c	A-urban	8	-5.73	4.20				
		B-rural	8	5.97	7.46	11.70	3.87	14	0.002
positive affect	d-a	A-all	11	-0.27	5.48				
		B-all	11	4.45	5.05	4.73	2.10	20	0.048

Table 108 Strong urban SES sub-group: Significant differences in program effects experienced by Cohort A and Cohort B

item	change in score on item between surveys					t-test for Equality of Means			
	surveys	Cohort- Rotation	N	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t	df	Sig.
professional consequences	b-a	A-rural	23	-23.61	67.83	35.65	2.37	48	0.02
		B-urban	27	12.04	36.22				
total consequences score	b-a	A-rural	22	-1.71	5.93	3.30	2.38	47	0.02
		B-urban	27	1.59	3.68				
ease	c-b	A-nil	24	-1.00	2.15	1.19	2.42	46	0.02
		B-nil	24	0.19	1.07				
rural intent	d-c	A-urban	23	-0.61	1.34	0.85	2.04	42	0.05
		B-rural	21	0.24	1.41				
RI score	d-c	A-urban	23	-1.17	2.27	1.39	2.21	42	0.03
		B-rural	21	0.21	1.86				
self-concept	d-c	A-urban	23	-2.74	5.03	3.26	2.17	42	0.04
		B-rural	21	0.52	4.93				
triandis score	d-a	A-all	24	-5.75	10.76	8.38	2.84	46	0.01
		B-all	24	2.63	9.67				
SDS	d-a	A-all	24	-6.79	10.85	8.75	2.76	46	0.01
		B-all	24	1.96	11.13				
RIQ score	d-a	A-all	23	-10.06	17.01	12.90	2.13	43	0.04
		B-all	22	2.84	23.34				

Table 109 Neutral SES sub-group: Significant differences in program effects experienced by Cohort A and Cohort B

item	change in score on item between surveys					t-test for Equality of Means			
	surveys	Cohort- Rotation	N	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t	df	Sig.
urban intent	d-c	A-urban	19	0.79	0.92				
		B-rural	19	-0.68	0.82	-1.47	-5.22	36	0.001
rural intent	d-c	A-urban	19	-0.21	1.65				
		B-rural	19	1.00	2.00	1.21	2.03	36	0.049
RI score	d-c	A-urban	19	-1.00	1.76				
		B-rural	19	1.68	2.40	2.68	3.92*	33	0.001
professional consequences	d-c	A-urban	19	-15.04	43.65				
		B-rural	18	13.44	40.22	28.48	2.06	35	0.047
SIS	d-c	A-urban	19	-1.26	3.09				
		B-rural	18	2.00	3.96	3.26	2.81	35	0.008
urban intent**	d-a	A-all	20	1.20	1.36				
		B-all	18	-0.03	1.24	-1.23	-2.89	36	0.006
rural intent**	d-a	A-all	20	-0.35	1.53				
		B-all	18	1.19	1.96	1.54	2.72	36	0.010
RI score**	d-a	A-all	20	-1.55	2.24				
		B-all	18	1.22	2.73	2.77	3.44	36	0.002
total affect score	d-a	A-all	20	-0.88	4.96				
		B-all	18	2.72	4.43	3.60	2.35	36	0.024

* equal variance not assumed

** the same data is presented in Table 97 and Table 98

Table 110 Strong rural SES sub-group: Significant differences in program effects experienced by Cohort A and Cohort B

item	change in score on item between surveys					t-test for Equality of Means			
	surveys	Cohort- Rotation	N	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t	df	Sig.
personal consequences	b-a	A-rural	26	1.68	2.14				
		B-urban	20	-0.50	2.15	-2.18	-3.42	44	0.001
total consequences score	b-a	A-rural	26	3.83	4.57				
		B-urban	20	0.04	4.79	-3.80	-2.73	44	0.009
personal consequences	c-b	A-nil	26	-0.44	1.42				
		B-nil	20	0.95	2.12	1.39	2.65	44	0.011
RIQ score	c-b	A-nil	25	-0.79	8.55				
		B-nil	18	5.76	11.61	6.55	2.13	41	0.039

Part 1c: Sub-groups based on sex

Results and discussion

There were more significant differences in the effect of programs for females than males. Part of this may have been due to the smaller male sub-group, and subsequent loss of power, however, more differences were identified in the small SES sub-groups than the male sub-group.

Males

During the first semester rotations, males showed differences in effect on the TCS according to the rotation they attended. The males in the country (Cohort A) increased their belief that their needs would be met in the country. The opposite was found for those in the city. The difference in effects of the programs was significant at the .03 level (Table 112). Only the two committed SES sub-groups showed significant differences in effects due to which rotation they attended. For both the strong rural and the strong urban SES sub-group, these changes were in the TCS. While the TCS increased during the rural rotation for the strong rural sub-group (Table 110), the opposite was observed for the strong urban sub-group (Table 108). The changes in TCS seen in the males during the first semester rotations were more consistent with those of the strong rural sub-group despite a possible trend for males to be more pro-urban (see Figure 44 on page 265).

During the interval between rotations, the self-concept variables for males continued to move in the direction predicted by the first semester rotations. Cohort A males continued to increase their pro-rural attitudes, and Cohort B males continued to decrease theirs. This difference between cohorts was significant (Table 112). It was opposite in direction to the movements seen in RIQ and its sub-indices for both committed SES sub-groups (Table 108 and Table 110), and for the females (Table 111).

Only the RI score, mediated through a predictable increase in rural intent in the cohort then in the country (Cohort B), showed significant differences in program effects during the second semester rotations (Table 112). These observed changes in stated rural intention during the second semester rotations represented attitudinal changes that did not reach significance. For each cohort, movements during the second semester rotations were again predictable and in the opposite direction to those seen in the earlier part of the year. Subsequently, there were no significant differences detected over the whole year (surveys 2a, 2d) due to the order of the rotations in the male sub-group.

Females

There were, however, significant differences in effect due to the order in which the rotations were experienced for the females. While the effects of the rotations on males were largely manifested through perceived consequences, those on females were due to differential effects on positive affect and on social drivers (Table 111). This suggests that the influences on males and

on females may be quite different. This issue is further discussed under the heading Part 3: Effect of repeated exposure on strength of intention on page 292.

The results for females were consistent with the whole-group differences presented in Table 106 on page 269, and shared some characteristics with the unknown, strong urban and neutral SES sub-groups, but not with males, or with the strong rural SES sub-group. That there were similarities with other sub-groups was not surprising as females made up two-thirds of the whole year group.

Over the year (surveys d-a), the positive affect sub-index rose for Cohort B, but failed to do so for Cohort A. This difference between cohorts seemed to be largely due to differences observed during the interval between rotations (surveys c-b). Similar differences over this period were identified and discussed earlier using data from respondents to the series-of-four surveys (see Figure 47 on page 271). A small difference in the effect of cohort membership on perceived ease was also identified for that period.

The SDS index, mediated through the triandis score, was the other index to show a differential effect over the entire year due to the order in which programs were experienced. Highly significant differences during the second semester rotations (surveys d-c) may have been responsible for most of the observed entire-year differences in these sub-indices (surveys d-a).

While no significant differences in changes according to cohort membership were detected during the first semester rotations (surveys b-a), many of the observed significant differences occurred during the second semester rotations (surveys d-c). These included both the RI score and the RIQ score suggesting global differences in the effect of the two programs during the second semester. The greater effectiveness of the second semester rotations is consistent with the whole group findings presented in Table 84 on page 235. The differences during the second semester rotations in urban intent, which underpinned the RI differences, and the triandis score and SDS, which underpinned RIQ score differences, were highly significant. The other sub-index to show a significant difference in effect at this time was self-concept.

Summary of cohort effects on sub-groups based on sex

Not only did sex influence the number of indices and sub-indices that were affected by cohort membership, but the timing of changes and the indices involved were different for males and females. Males showed progressive changes with the effects of rotations consistent with the rotation being experienced. Much of this change centred on the perceived consequences sub-indices, and had a similarity to changes seen in the strong rural sub-group.

Most of the differences due to cohort seen in the females occurred during the second semester rotations. For them, affect and social drivers showed differential changes according to the rotation attended. For the females, there were differences in effect on global indicators such as the RIQ score and the RI score during this time.

Part 1d: Sub-groups based on international status

Introduction

Students were asked to identify whether they were "full fee-paying, or international students (that is, not on HECS)." Those responding yes to this were assumed to be international students.

A follow-up question asked for their country of origin. None had answered, "Australia."

Of the 211 students who responded to at least one questionnaire, there were 152 local students, 58 international students and one "missing" response. Data from sub-groups created according to international or local status were analysed separately.

Results and discussion

International sub-group

Results from independent samples t-tests comparing the changes during the various intervals according to cohort membership for the international sub-group are presented in Table 112. Significant differences in program effects: males

item	change in score on item between surveys					t-test for Equality of Means	
	surveys	Cohort-Rotation	Number	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t
total consequences score	b-a	A-rural	26	1.66	4.76	-2.72	-2.20
		B-urban	22	-1.05	3.61		
self-concept	c-b	A-nil	27	1.81	3.98	-2.49	-2.46
		B-nil	23	-0.67	3.01		
rural intent	d-c	A-urban	25	-0.08	1.98	1.18	2.09
		B-rural	20	1.10	1.74		
RI score	d-c	A-urban	25	-0.28	3.48	1.88	2.11
		B-rural	20	1.60	2.14		

Table 113. Significant differences were seen in all three time intervals, and over the entire year. During the first semester rotations, the international students attending a rural rotation increased the feeling that important others would disapprove of them working in the country. Meanwhile those in the city felt more strongly that their referents would approve of a rural career. This may mean that anxieties were confirmed while on rural rotation. A similar trend was not seen, however, when Cohort B went to the country in the second semester. It is possible that 'contamination' during the interval between rotations had already modified their response to this issue, prior to the second rotations.

Although no significant changes in RI score were observed during the first semester rotations, both cohorts displayed an 'adjustment' of RI score during the interval (surveys c-b). The difference in these changes reached significance at the .04 level.

As with other sub-groups, the second semester rotations seemed to have greater differential effects than the first semester rotations. During this time, both the RI score and the RIQ score increased significantly more for the cohort in the country than for the cohort in the city. The

rural rotation increased the KI score predominantly by increasing rural intent. The increase in the RIQ score was mediated through affect and social drivers.

The effect of the order of the rotations over the entire year (surveys d-a) was similar to that seen over the second semester rotations. The same indices and sub-indices were affected, and to a similar degree. Most of this overall effect may have been due to the second semester, and a second posttest survey may have revealed an 'adjustment' similar, or stronger, to that seen during the interval between rotations.

Local sub-group

There were fewer differences between cohorts for the local students than for the international students, particularly during the second semester rotations (surveys d-c) and in the overall effect (surveys d-a). During the first semester rotations, local students in the country (Cohort A) increased their rural intent, and during the second semester rotations, the students then in the country (Cohort B) decreased their urban intent. A second difference during the second semester rotation was that the students in the city (Cohort A) diminished their self-concept as a rural doctor/dweller (see Table 114).

There was a large 'adjustment' during the interval between rotations when affect, personal consequences and ease each showed a reduction for Cohort A and an increase for Cohort B.

The only sub-index to be affected by the order of the rotations was positive affect. This remained higher for the cohort that had just completed the rural rotation, and that had not shown a large decrease during the 'adjustment' during the interval between rotations. Again, it is uncertain whether this cohort would have shown a similar adjustment in a subsequent posttest survey.

Table 111 Significant differences in program effects: females

item	surveys	change in score on item between surveys				t-test for Equality of Means			
		Cohort- Rotation	Number	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t	df	Significance. (2-tailed)
positive affect	c-b	A-nil	49	-0.63	4.01				
		B-nil	49	1.45	4.85	2.08	2.32	96	0.02
ease	c-b	A-nil	50	-0.11	2.03				
		B-nil	50	0.61	1.46	0.72	2.04	98	0.04
urban intent	d-c	A-urban	50	0.20	0.93				
		B-rural	49	-0.40	1.03	-0.60	-3.05	97	0.003
RI score	d-c	A-urban	50	-0.04	1.75				
		B-rural	49	0.77	1.91	0.81	2.19	97	0.03
triandis score	d-c	A-urban	47	-2.18	6.84				
		B-rural	47	2.24	7.89	4.43	2.90	92	0.005
SDS	d-c	A-urban	47	-2.73	7.10				
		B-rural	46	2.12	8.66	4.85	2.96	91	0.004
self-concept	d-c	A-urban	50	-1.48	3.68				
		B-rural	50	0.56	4.63	2.04	2.44	98	0.02
RIQ score	d-c	A-urban	45	-3.33	11.31				
		B-rural	43	3.01	14.32	6.34	2.31	86	0.02
positive affect	d-a	A-both	53	0.00	6.22				
		B-both	49	2.96	5.05	2.96	2.63	100	0.01
triandis score	d-a	A-both	50	-1.65	9.52				
		B-both	50	2.70	9.85	4.35	2.24	98	0.03
SDS	d-a	A-all	50	-3.09	9.89				
		B-all	50	1.72	10.97	4.81	2.30	98	0.02

Table 112 Significant differences in program effects: males

item	change in score on item between surveys					t-test for Equality of Means			
	surveys	Cohort-Rotation	Number	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t	df	Significance. (2-tailed)
total consequences score	b-a	A-rural	26	1.66	4.76	-2.72	-2.20	46	0.03
		B-urban	22	-1.05	3.61				
self-concept	c-b	A-nil	27	1.81	3.98	-2.49	-2.46	48	0.02
		B-nil	23	-0.67	3.01				
rural intent	d-c	A-urban	25	-0.08	1.98	1.18	2.09	43	0.04
		B-rural	20	1.10	1.74				
RI score	d-c	A-urban	25	-0.28	3.48	1.88	2.11	43	0.04
		B-rural	20	1.60	2.14				

Table 113 Significant differences in program effects: international students

item	change in score on item between surveys					t-test for Equality of Means			
	surveys	Cohort-Rotation	Number	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t	df	Significance. (2-tailed)
subjective norm*	b-a	A-rural	19	-1.00	1.15	1.31	2.33	26	0.03
		B-urban	18	0.31	2.09				
RI score	c-b	A-nil	20	-0.55	1.39	1.18	2.19	37	0.04
		B-nil	19	0.63	1.95				
rural intent	d-c	A-urban	21	-0.33	1.28	1.24	2.64	40	0.01
		B-rural	21	0.90	1.73				
RI score	d-c	A-urban	21	-0.33	1.91	1.73	2.52	39	0.02
		B-rural	20	1.40	2.48				

Table 113
(continued)

item	change in score on item between surveys				t-test for Equality of Means				
	surveys	Cohort- Rotation	Number	Mean	Std. Deviation	mean difference in change (Cohort B-A)	t	df	Significance. (2-tailed)
total affect score	d-c	A-urban	21	6.12	3.84				
		B-rural	21	2.93	4.28	2.81	2.24	40	0.03
triandis score	d-c	A-urban	21	-3.57	8.60				
		B-rural	18	4.22	9.42	7.79	2.70	37	0.01
SDS	d-c	A-urban	21	-4.00	8.65				
		B-rural	18	4.11	10.35	8.11	2.67	37	0.01
RIQ score	d-c	A-urban	20	-3.57	9.66				
		B-rural	18	8.57	17.06	12.14	2.73	36	0.01
rural intent	d-a	A-all	20	-0.75	1.59				
		B-all	19	1.16	1.61	1.91	3.73	37	0.001
RI score	d-a	A-all	20	-0.90	2.34				
		B-all	18	1.06	2.86	1.96	2.32	36	0.03
total affect score	d-a	A-all	20	-0.18	4.72				
		B-all	18	4.47	5.29	4.65	2.86	36	0.01
triandis score	d-a	A-all	20	-2.00	10.05				
		B-all	18	3.78	6.49	5.78	2.08	36	0.04
SDS	d-a	A-all	20	-3.40	10.50				
		B-all	18	3.06	6.78	6.46	2.22	36	0.03
RIQ score	d-a	A-all	18	-3.21	16.57				
		B-all	18	7.92	13.04	11.13	2.24	34	0.03

*equal variance not assumed

Table 114 Significant differences in program effects: local students

item	change in score on item between surveys					t-test for Equality of Means			
	surveys	Cohort- Rotation	Number	Mean	Std. Deviation	mean difference in change (Cohort B- A)	t	df	Significance. (2-tailed)
rural intent*	b-a	A-rural	60	0.53	1.82				
		B-urban	55	-0.17	1.14	-0.71	-2.51	100	0.01
positive affect	c-b	A-nil	51	-1.25	4.53				
		B-nil	51	0.80	4.59	2.06	2.28	100	0.02
total affect score	c-b	A-nil	51	-1.58	5.46				
		B-nil	49	0.78	5.12	2.35	2.22	98	0.03
personal consequences	c-b	A-nil	51	-0.62	1.82				
		B-nil	47	0.26	2.42	0.87	2.03	96	0.05
case	c-b	A-nil	53	-0.33	2.16				
		B-nil	51	0.46	1.53	0.79	2.15	102	0.03
urban intent	d-c	A-urban	54	0.28	1.38				
		B-rural	49	-0.40	0.87	-0.68	-2.94	101	0.004
self concept	d-c	A-urban	54	-1.93	3.20				
		B-rural	50	-0.10	4.35	1.83	2.45	102	0.02
positive affect	d-a	A-all	57	0.12	5.94				
		B-all	53	2.23	5.06	2.10	1.99	108	0.05

*equal variance not assumed

Part 2: The strength of association between RI score and the RIQ for the neutral SES sub-group

Introduction

The neutral Situational Expectation Score (SES) sub-group was that third of students who did not score highly enough on the SES to be deemed 'strong rural,' or low enough to be deemed 'strong urban.' It was postulated that this neutral SES sub-group was less committed to either extreme, and may have had a less well formed attitudinal belief structure. These weaker and less consistent beliefs would therefore be less predictive of their less well-developed, or 'unauthenticated,' situational intentions. The strength of association between the beliefs and intention would be weaker. If this were the case, it would be expected that regression models testing the ability of the RIQ to predict the RI score would be weaker for this sub-group than for the 'committed' sub-groups.

On this basis, it was postulated that they would be more likely to exhibit changes through the more cognitive stated situational intention items. While the RI score may fluctuate more in this group, and in that sense they may be considered 'floating voters' in the short term, this lability is in an unauthenticated 'belief,' that is, the belief that this is their intention. Their true intentions are not yet formed and the belief systems underpinning their attitudes are not yet authenticated. Therefore the association between their beliefs and intentions are not likely to be as strong as those of the committed sub-groups who would have more consistent, or 'fixed' ideas, and more definite plans.

Methods

SES sub-groups were formed for each survey dataset according to the SES at the time. As the data was not available in survey 2a to calculate the SES, the SES at survey 2b was used to split the data at survey 2a.

The recommended number of cases per independent variable for regression modelling is eight. In any case, the minimum recommended number of cases is 75 (Tabachnick BG & Fidell LS, 2001). As there were between 35 and 50 students in each of the SES sub-groups, numbers of cases for each sub-group were less than ideal for this statistical technique, the number of independent variables (IVs) was kept to a minimum by not including the professional consequences sub-index. Linear regression models were fitted for the dataset from each survey (2a to 2d). The dependent variable (DV) was RI score and the IVs were the remaining sub-indices: positive affect, negative affect, personal consequences, triandis score and subjective norm.

As the size of the sample may have been of concern, simple regression models for RI score were also fitted using the RIQ score as the IV. In this latter analysis the R-value is the Pearson's product-moment correlation coefficient between the RI score and the RIQ score. The RIQ score used for these analyses was the sum of TAS (positive affect - 0.5 negative affect),

ctot2 (square root personal consequences - .075 professional consequences), triandis score and subjective norm.

Results

The results of these analyses are presented in Table 115.

The characteristics of the regression models fitted for the sub-indices using data from each survey split by SES sub-group are presented in the left-hand columns. These include the R, adjusted R², F statistic, degrees of freedom and the significance level. None of the regression models fitted for the neutral SES sub-group reached statistical significance. Except for one instance, the model for the strong urban group in survey 2c, all models for the 'committed' sub-groups were highly statistically significant.

In order to support the validity of these results despite the relatively small numbers, the Pearson correlation coefficients testing the relationship between the RIQ score and the RI score were calculated by fitting simple regression models. These calculations are not dependent on large sample sizes. These are presented in the right-hand columns of Table 115. They paralleled the R-values of the regression models based on the sub-indices. Again, the neutral SES sub-group data failed to show statistically significant correlations between the RI score and the RIQ score for all surveys. Both committed sub-groups did have statistically significant correlations for all survey datasets. The adjusted R² represents proportion of the variance in the RI score that can be explained by the model. In all surveys, this was much greater for the committed sub-groups than for the neutral sub-group.

Table 115 Strength of association RI score (DV) and RIQ (IV): Regression model for sub-indices and for RIQ score: SES sub-groups

survey/SES sub-group	<u>IVs: sub-indices*</u>					<u>IV: RIQ score*</u>		
	R	Adjusted R Square	F	df	Sig.	R	Adjusted R Square	Sig
survey 2a								
strong urban	0.64	0.34	6.03	5,44	0.001	0.55	0.29	0.001
neutral	0.38	0.01	1.11	5,33	0.376	0.31	0.07	0.054
strong rural	0.76	0.52	10.67	5,39	0.001	0.65	0.41	0.001
survey 2b								
strong urban	0.54	0.22	4.15	5,50	0.003	0.47	0.21	0.001
neutral	0.23	-0.09	0.36	5,34	0.870	0.00	-0.03	0.983
strong rural	0.64	0.35	6.75	5,48	0.001	0.61	0.36	0.001
survey 2c								
strong urban	0.40	0.07	1.70	5,44	0.156	0.36	0.11	0.010
neutral	0.47	0.08	1.59	5,28	0.195	0.30	0.06	0.085
strong rural	0.56	0.24	3.93	5,42	0.005	0.48	0.21	0.001
survey 2d								
strong urban	0.62	0.32	6.06	5,49	0.001	0.52	0.26	0.001
neutral	0.32	-0.03	0.80	5,36	0.558	0.29	0.06	0.063
strong rural	0.60	0.28	4.77	5,43	0.001	0.52	0.25	0.001

* DV: RI score

Discussion

Although the small sample size may have been of concern for the regression models, the sample size was adequate for the calculation of the Pearson correlation coefficients. The results from these two models, one measuring the predictive strength of the sub-indices for the RI score, and the other measuring that of the RIQ score were very similar. It could therefore be argued that these analyses provided a valid estimate of the relative strengths of association between the sub-indices (IVs) and the RI score (DV).

The students in the neutral SES sub-group in survey 2b were not all the same individuals as those in survey 2c or 2d; however the neutral sub-group in all three surveys consisted of the students in the mid tertile of Situational Expectation Scores at that time. This study did not seek to measure the progress of the undecided sub-group as determined by the SES at survey 2b throughout the year, but tested whether the sub-group that was 'undecided' at the time had a less well-formed belief system than their more 'committed' counterparts.

The hypothesis that the beliefs of the neutral sub-group, as estimated by the attitudinal sub-indices and the RIQ score, would have a weaker association with the stated intention items than was the case for the committed sub-groups was proven. This is additional evidence, based on the constructs and the underlying behavioural theory, in support of the validity of the instrument.

Part 3: Effect of repeated exposure on strength of intention

Introduction

Repeated exposure to a questionnaire such as the RIQ was likely to increase the respondents familiarity with it. This cohort had been asked to complete the RIQ on six occasions over an eighteen-month period. It may be that responses become more 'automatic,' that is, that less thought would go into each response. This should not be an issue for this instrument, and others like it, as the initial response is actually what is sought.

Of more concern is the possibility that respondents did not read the questions fully after several completions, as they may have assumed that they remembered what the question asked. If they had forgotten the meaning of the question, or, more importantly, subconsciously substituted their own meaning, the instrument would have become less valid and less reliable with use. This was especially important when strong external influences such as those associated with cognitive dissonance played a role (see discussion of Part 1b: Sub-groups based on SES at survey 2d, above).

A third influence on the reliability of the instrument was the result of discussion between respondents on the meaning of items between surveys. It was unlikely that students would have had this level of involvement in the RIQ and the associated research. If it did exist, it would do so in the sub-group more interested in the subject, namely, the strong-rural sub-group. A superficial glance down the correlation (R) columns of Table 115 gives the impression that the

R-values for the strong rural sub-group may have decreased over the year. It was decided to test whether this pattern was common to the whole-group and to other sub-groups.

Methods

In order to evaluate the changes of the strength of association between the RIQ and the RI score over the year, regression models were fitted for the whole-group, females, local students, Cohort A and Cohort B. These groups each had enough members to allow valid regression modelling. The dependent variable (DV) for these models was the RI score, and the independent variables (IVs) were the sub-indices, positive affect, negative affect, personal consequences, professional consequences, triandis score and the subjective norm. The exercise was also performed for the male and international sub-groups, although these results would be less reliable due to the smaller sample size.

In addition, simple regression models were fitted for all groups with the RI score as the dependent variable and the RIQ score as the independent variable. The R-values for simple regression models are the same as the Pearson product-moment correlation coefficient. The RIQ score was calculated as it was in the preceding section.

Results

The characteristics of the regression models are presented in Table 116 for the whole year group, Table 117 for sub-groups determined by sex, Table 118 for sub-groups determined by international/local status, and Table 119 for Cohort A and Cohort B. The R-values presented in Table 116 (whole-group) represent the weighted means of the equivalent R-values of the two sub-groups in each of the three tables that follow it. For example, the weighted mean of the whole-group R-value for survey 2a (0.71) is the weighted mean of the survey 2a R-value for males (0.76) and females (0.71), as it is for international students (0.57) and local students (0.75).

The strength of association of the RIQ score with the RI score is a measure of the criterion-related validity. As the two scores have been reduced to continuous variables, the appropriate statistic for their strength of association is the Pearson product-moment correlation coefficient (R-value). The R-values for the whole-group and the six sub-groups at each of the four data collection points are presented diagrammatically in Figure 49. The dotted lines join the R-values of the sub-groups, while the solid line represents the whole-group data. The sub-group data lines are clustered around the whole-group line with the exception of that of the international students. This, however, appears to increase toward the mean over the year.

The data in the tables suggest that there is a gradual increase in the sub-group R-values as the year progresses. The significance of the apparent increase in the predictive validity of the instrument over the year and between consecutive surveys was tested. The means and standard deviations of the R-values of the six sub-groups (male, female, international, local, Cohort A and Cohort B) were calculated for each of the survey data sets (Table 120). These described the

Table 116 Strength of association RI score (DV) and RIQ (IV): Regression model for sub-indices and for RIQ score: whole-group

survey	<u>IVs: sub-indices</u>					<u>IV: RIQ score</u>		
	R	Adjusted R Square	df	F	Sig.	R	Adjusted R Square	Sig.
2a	0.71	0.49	6, 156	27.13	0.001	0.70	0.48	0.001
2b	0.77	0.58	6, 159	38.30	0.001	0.75	0.57	0.001
2c	0.77	0.57	6, 143	34.25	0.001	0.75	0.57	0.001
2d	0.78	0.60	6, 158	41.82	0.001	0.76	0.57	0.001

Table 117 Strength of association RI score (DV) and RIQ (IV): Regression model for sub-indices and for RIQ score: sex sub-groups

survey/sub-group	<u>IVs: sub-indices</u>					<u>IV: RIQ score</u>		
	R	Adjusted R Square	df	F	Sig.	R	Adjusted R Square	Sig.
<u>male</u>								
2a	0.76	0.53	6, 49	11.36	0.001	0.72	0.51	0.001
2b	0.75	0.51	6, 48	10.31	0.001	0.72	0.51	0.001
2c	0.82	0.62	6, 40	13.57	0.001	0.79	0.62	0.001
2d	0.78	0.56	6, 48	12.42	0.001	0.73	0.52	0.001
<u>female</u>								
2a	0.71	0.47	6, 100	16.76	0.001	0.68	0.45	0.001
2b	0.82	0.65	6, 103	34.05	0.001	0.77	0.59	0.001
2c	0.76	0.55	6, 102	21.74	0.001	0.73	0.52	0.001
2d	0.80	0.62	6, 101	29.96	0.001	0.78	0.60	0.001

Table 118 Strength of association RI score (DV) and RIQ (IV): Regression model for sub-indices and for RIQ score: international/local sub-groups

survey/sub-group	<u>IVs: sub-indices</u>					<u>IV: RIQ score</u>		
	R	Adjusted R Square	df	F	Sig.	R	Adjusted R Square	Sig.
<u>internat'l</u>								
2a	0.57	0.20	6, 33	2.60	0.036	0.48	0.21	0.002
2b	0.68	0.37	6, 34	4.98	0.001	0.61	0.36	0.001
2c	0.64	0.32	6, 38	4.40	0.002	0.58	0.32	0.001
2d	0.72	0.45	6, 39	7.02	0.001	0.64	0.39	0.001
<u>local</u>								
2a	0.75	0.54	6, 155	24.30	0.001	0.73	0.52	0.001
2b	0.81	0.64	6, 115	36.17	0.001	0.79	0.63	0.001
2c	0.81	0.64	6, 98	32.08	0.001	0.81	0.64	0.001
2d	0.82	0.65	6, 111	36.76	0.001	0.80	0.63	0.001

Table 119 Strength of association RI score (DV) and RIQ (IV): Regression model for sub-indices and for RIQ score: cohorts A and B

survey/sub-group	<u>IVs: sub-indices</u>					<u>IV: RIQ score</u>		
	R	Adjusted R Square	df	F	Sig.	R	Adjusted R Square	Sig.
<u>Cohort A</u>								
2a	0.65	0.38	6, 77	9.56	0.001	0.64	0.40	0.001
2b	0.73	0.49	6, 80	15.00	0.001	0.70	0.48	0.001
2c	0.82	0.64	6, 77	24.01	0.001	0.81	0.65	0.001
2d	0.81	0.62	6, 77	23.89	0.001	0.73	0.53	0.001
<u>Cohort B</u>								
2a	0.80	0.61	6, 67	19.70	0.001	0.76	0.58	0.001
2b	0.84	0.69	6, 71	29.14	0.001	0.83	0.69	0.001
2c	0.77	0.55	6, 66	14.25	0.001	0.75	0.55	0.001
2d	0.80	0.61	6, 73	21.81	0.001	0.79	0.62	0.001

distribution of the strengths of association at each of the four survey points.

When the mean R-value at survey 2d was compared with that at survey 2a using paired t-tests, a significant rise over the year was detected. T-tests of consecutive pairs of means revealed that this rise was almost solely due to an increase in the predictive strength of the RIQ score for the RI score during the first semester rotations (surveys 2a, 2b) (see Table 121).

Discussion

The R-values for the international students, although highly significant at all data-points, was consistently lower than that of the local students. This was predicted in Section Three, as the RIQ score, although modified with input from international students, was based on the salient beliefs identified by local students. This suggests that the instrument, although etically sound for both sub-groups as the R-values were all significant, was not as relevant (emic) for the internationals as it was for local students (see Chapter Three for a discussion on the etic-emic dilemma.)

This weaker criterion-related validity for the international students may have been the result of a lower relevance to them of the RI score items, the RIQ score items, or both. The Situational Intent Score (SIS) was discussed in Chapter Ten, and found to be a better index of intention for the international students than the RI score. In these analyses, the RI score was used because one of the components of the SIS (undergraduate intention) was not included in survey 2a. This suggests that the RI score items were at least partly responsible for the lower strengths of association. This is plausible, as many international students had an obligation to work in rural areas after graduation, and their RI response options were therefore limited.

Table 120 Means of R-values of the six sub-groups for each of the four surveys

survey	Mean	N	Std. Deviation
2a	0.67	6	0.10
2b	0.74	6	0.08
2c	0.75	6	0.09
2d	0.75	6	0.06

Table 121 Paired t-tests comparing effects of the whole year and inter-survey intervals on the mean sub-group strength of association (R-value) between RI score and RIQ score .

surveys	Mean difference	Std. Deviation	t	df	Sig. (2-tailed)
b-a	0.07	0.04	3.93	5	0.01
c-b	0.01	0.07	0.28	5	0.79
d-c	0.00	0.06	0.00	5	1.00
d-a	0.08	0.05	3.51	5	0.02

This limitation, in turn, was somewhat determined by language issues. The RI items did ask them to consider working in the country after these obligations were met. The apparent increase in strength of association through the year for the international students, if real, may have reflected a better understanding of the questions with repeated responses.

Overall, the mean sub-groups R-values increased over the year, but this rise was small and largely restricted to the first semester rotations. This suggests that repeated survey completion did not continue to increase the validity of the instrument, nor that the instrument had had a clinically significant increase in power over the year. The small increase in power identified was unlikely to invalidate comparisons between surveys over the year.

The variance between the curves in Figure 49 seemed to reduce as the year progressed, that is, the dotted lines appeared to be closer together toward the end of the year than at the beginning. Indeed, the variance in R-values between sub-groups, as represented by the standard deviations in Table 120, was lower at the end of the year (survey 2d: 0.6) than at the beginning (survey 2a: 0.10). While these results are only indicative, they may represent an increase in vocational maturity in the students, as they explored the issues and the options available to them.

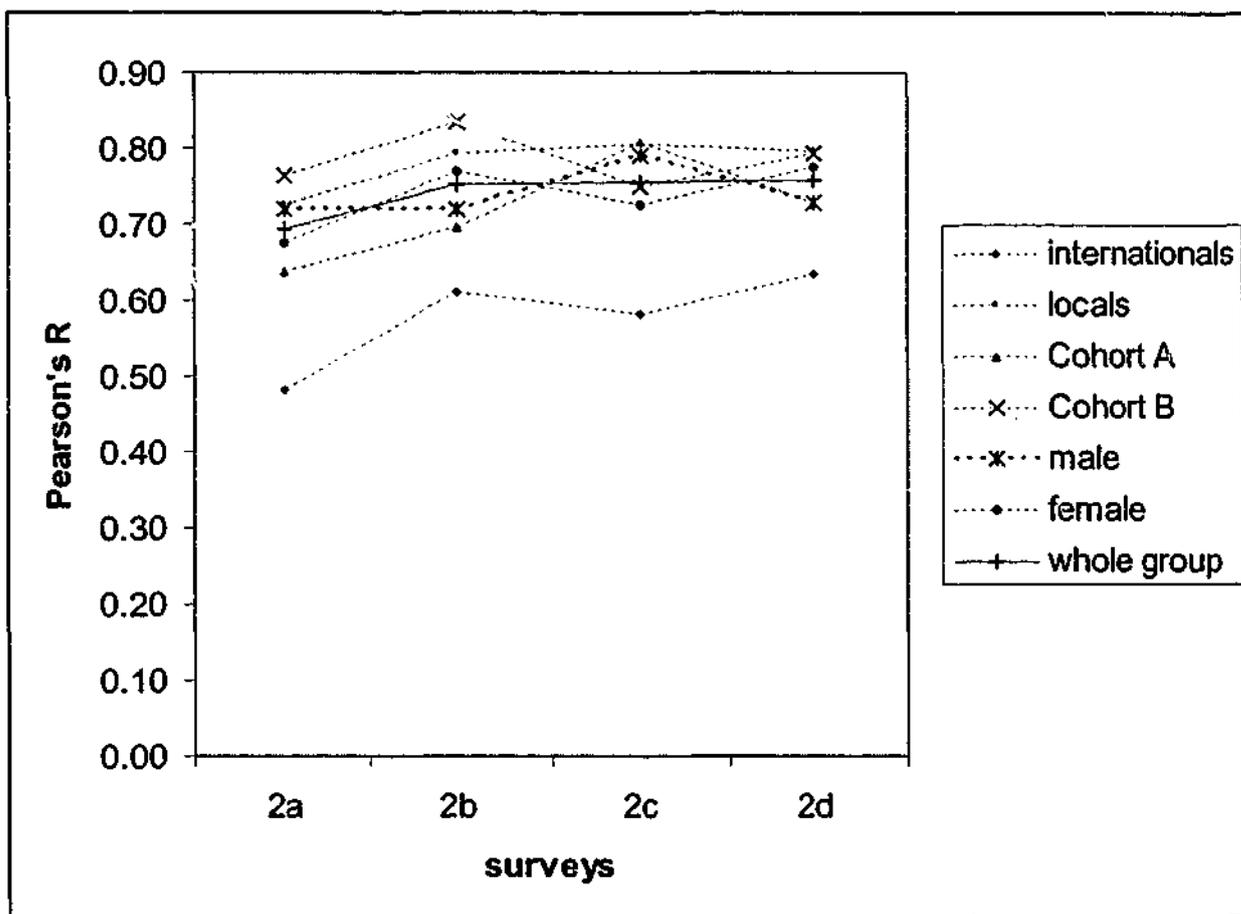


Figure 49 Progression of Pearson correlation coefficients through the surveys of 2003 for the whole group and various sub-groups. Summary of R-values presented in Table 116 to Table 119

Summary and Conclusions: indices and sub-indices

Table 122 on page 303 summarises all significant changes in the stated situational intention items, the RIQ score, its indices and sub-indices, and the SIS score described in this section of the thesis. This summary table is included as an aid to gain an overview of the large amount of data presented in this chapter. In order to enable a better understanding of the abbreviations used, the contents of the first two cells will be described.

Significant changes seen in the RI score during the first semester rotations (surveys 2b-2a) are presented in the first row of the column headed: first semester rotations (b-a). The abbreviation '4C-' means that there was a significant difference between programs (Cohort B-Cohort A) using only the data from students who answered the whole series-of-four surveys during the first semester rotations. The minus sign means that the change in Cohort A was greater than that of Cohort B. During the first semester, Cohort A was in the country, so the rural program had a significant and more positive effect on the RI score than did the urban program.

'rA+' means: the strong rural SES sub-group (r) of Cohort A (A) displayed an increase in RI score during their first semester rural rotation.

'kB-' refers to a significant decrease in RI score for the unknown (k) SES sub-group of Cohort B (B).

In the next column, 'A-' refers to the significant decrease in RI score for the whole of Cohort A seen during the interval between rotations.

'i+' means that the international sub-group of Cohort B had a more positive change than those of Cohort A during the interval. Note that if the capital C is present, or if no capital is present, the unit refers to the difference between Cohort B and Cohort A (Cohort B-A). Note also that this table cannot indicate in which cohort the greater change occurred.

'uA-' means that the urban SES sub-group of Cohort A had a significant decrease in RI score during the interval between rotations.

Timing of influence

It can be seen in Table 122 on page 303, that most changes have taken place during the second semester rotations. Significant changes in all variables except the negative affect sub-index have been identified throughout the year, and changes have occurred during every period.

The programs influenced the situational intention variables for most sub-groups during the second semester rotations, and only the strong rural sub-group attending the city during this time showed changes contrary to expectation. Otherwise, those attending the rural rotation during the second rotation semester tended to show a significant increase in rural intention, while those in the city moved in the opposite direction.

Although they did change according to expectations, only a few sub-groups showed significant changes in these variables during the first semester rotation. It seemed likely, then, that as the greater changes were seen during the second semester rotations, the overall effect of the year would be determined by the rotation that was attended at that time. It has also been suggested that an 'adjustment' occurred during the interval following the first rotations (surveys 2b, 2c) reducing their effect. The absence of a second posttest survey some time after completion of the second semester rotations meant that any potential adjustment during that time was not measured. Failing to measure this adjustment as part of the entire-year effect would heighten the influence of the second rotation.

Despite this apparent disparity in effect between the two rotations, only the neutral SES sub-group and the international students were influenced differentially according to the order in which they attended the rotations, or the entire-year effect. These were among the sub-groups that were most likely to show greater changes (Table 109 and Table 113), and were the sub-groups with the lowest strength of association between RI and RIQ scores (see Figure 49 and Table 115).

It is possible that part of the reason that the belief structure measured by the RIQ was less predictive of the RI score for them was that these sub-groups relied on stated situational intent as a belief more heavily than the attitudinal belief structure underpinning true self-direction. This may have been so for the neutral sub-group because they did not have a well-formed belief structure, and for the international students because the RIQ was less valid (emic) for them than the situational intention items.

As discussed earlier, (see Neutral or undecided SES sub-group at survey 2d on page 274) this allowed for more influence from social desirability pressures. Therefore, these more susceptible sub-groups were more influenced by their tutors, and this was more so during the second rotation. The entire-year differences presented in Table 122 were consistent with this.

Changes due to programs in the sub-indices were seen during all three intervals. The affect sub-indices were most influenced by the order in which the rotations were attended, and to a lesser extent, the second semester rotations. The social drivers including self-concept were most influenced during the second semester rotations and to a lesser extent during the interval between rotations and the entire-year program. The perceived consequences, on the other hand, were most influenced during the first semester rotations, and somewhat during the interval between rotations. Changes due to programs in the subjective norm, or important referents item only gained significance during the first rotations for the international students.

Relevance of components

Although the situational intent items were most influenced by the programs, only one of the RIQ variables, negative affect, did not show a significant difference in effect. As total affect score often showed greater changes than could be explained by changes in positive affect alone, it was likely that changes in the negative affect sub-index, although not reaching significance in their own right, contributed to this. This offers support for the validity of the instrument based on its content. There were no superfluous components.

Importance of creating sub-groups

While relatively few significant effects of the programs could be determined using whole-of-year data, splitting this according to sub-groups based on SES, sex and international status provided an array of useful information. By splitting data according to sub-groups, opposing influences, which tended to cancel each other out in whole-of group analyses, were identified. While rural rotations increased rural intent in those open to this (neutral and strong rural sub-

groups), it was less likely to do so for the strong urban sub-group. Indeed, there was evidence that the strong urban sub-group was more likely to 'over-adjust' after a rural rotation and become less willing to consider a rural career than before the rural rotation (see also Strong urban SES sub-group at survey 2d on page 272). The importance of a willingness to appraise one's beliefs in order to allow change is discussed as an 'existential crisis' in Chapter Eighteen. Use of this instrument will inform policy makers on the effect of sending unwilling students to rural areas. There is some political imperative to do this in Australia, as the Government requires Schools of Rural Health to ensure that 25% of medical students spend at least 50% of their undergraduate clinical training in rural areas. It is possible that this policy, designed to increase rural intention, may actually have the opposite effect on some students.

Studies on the ever-increasing cohort of international students, using a modified version of this instrument, may inform better development of programs for them. For many of them, the governments sponsoring their education (for example, Botswana and Malaysia) require them to work for some time in rural areas. It is essential, therefore, that if they are to enjoy this work, they have a positive attitude to rural life and work. Such studies will inform ongoing improvements to programs, and enable evaluation of such changes.

The Standards for Educational and Psychological Testing discuss analysis of differential strengths of association among sub-groups as a means of identifying bias when tests are used for prediction. The authors state,

Under one broadly accepted definition, no bias exists if the regression equations relating to the test and the criterion are indistinguishable for the groups in question. Some formulations may hold that not only regression slopes and intercepts but also standard errors of estimates must be equal.) (American Educational Research Association et al., 1999)¹³⁵

The regression models described in this and the previous chapter show considerable differences for sub-groups. This does not invalidate the instrument, but reflects expected differences. That the expected systematic bias is measurable provides further evidence in support of the validity of the instrument based on test-criterion relationships.

Increasing relevance as R^2 increases

The predictive validity of the sub-indices and the scale increased as the year progressed. This reflected increasing general and career maturity and exposure, especially but not restricted to the rotations. As students progress through the medical course, they clarify the type of work they would like to do, and where they would like to work. This is influenced to a large extent by feelings of self-efficacy (Burack et al., 1997; Kanagarajah, Page, & Heller, 1996; Musham & Chessman, 1994; Rabinowitz, 1990; Wiers-Jenssen & Aasland, 1999). As students become aware of the limitations associated with certain specialties and locales, they will change their career choices (Brown & Inouye, 1978). This is especially seen toward the end of the clinical

year, when the reality of restricted specialty training places is better understood. These issues are discussed in greater depth in Chapter Eighteen.

RIQ and RI

The findings presented in this chapter support the value of the RIQ and its components in furthering the understanding of changes in stated intent associated with undergraduate medical programs. Although it was shown in Section Three that the RIQ predicts situational intent, this analysis has suggested that the RIQ actually measures intention at a deeper level than the RI score does. It was shown that the situational intent items measured intention at a conscious level, which was subject to social desirability bias, especially in the strongly committed sub-groups who were subject to cognitive dissonance (Festinger, 1957).

The RIQ, on the other hand, sought to measure the beliefs that underpinned attitudes toward a career choice. Asking for factual statements on beliefs circumvented the need to directly challenge the emotive-attitudinal elements, which are subject to social desirability bias. This did not preclude an estimation of attitudes. The indices and sub-indices formed by summing the scores on the belief items were shown to have achieved this.

Changes in the RI score reflect changes in the 'self direction' to do something (see Chapter Three for a full discussion on intention). Therefore, this is a conscious state, and responds to external influences. The RIQ score, on the other hand, is the summation of attitudes. Attitudes do not change readily. Individual beliefs from within the belief structure underpinning attitudes, on the other hand, may be more susceptible to change. The RIQ measures these beliefs, and therefore is capable of measuring subtle attitudinal 'shifts' before the changes in the attitudes themselves are measurable.

Therefore, the indices, sub-indices and individual variables are likely to show change before changes in the RIQ score are measurable. The RI score measures what the subject believes to be his/her intention. It is a belief and is likely to share the changeability of other beliefs.

This changeability has led some to question the usefulness of intention as a predictor of behaviour. This can be circumvented by measuring the determinants of true intention, rather than the stated intention. Stated intention was used in this study as a 'gold standard' as there was no real alternative. Chapter Ten discussed the SES and the SIS as gold standards that are more reliable. It is true that beliefs change more readily than attitudes or intention itself; however, there are a great many beliefs, and many need to change, and change in a consistent pattern, before attitudes or intention start to change.

In the neutral or uncertain SES sub-group, the underlying belief system was not well established. Changes to these beliefs were likely to be less systematic, and therefore, less measurable. These students were more likely to change their RI score without changing the RIQ components because, as a separate belief, it could be 'brought to mind' and manipulated like any other belief. It did not have a strong belief structure to support it.

The usefulness of the RIQ depends on the validity of the underlying belief structure of the individuals. It was, therefore more stable than the RI score for this undecided group, and changed measurably only when several of its sub-indices changed, or when one of them changed dramatically.

It is here that self-efficacy becomes so important. A belief structure based purely on an external locus of control will have limited currency, as changes in self-efficacy will lead these high-achieving, self-directed medical students toward achievable goals and achievable career choices. This is especially seen toward the end of medical school, and in early residency, when many young graduates change from a specialty choice to a generalist choice. It is at this time that they realise that these lucrative and desirable career choices are not realistically available to them. Their intention genuinely changes, but not necessarily due to a change in affect, perceived consequences, or social drivers.

Summary of Section Four

Section Three of this thesis presented the reliability and the validity of the Rural Intent Questionnaire (RIQ), and developed the gold standards, the Situational Expectation Score (SES) and the Situational Intention Score (SIS). This section has presented an in-depth analysis of the utility of the instrument. The abbreviated version (RIQ2003) was used for these analyses, and was found to be as reliable and valid as the longer RIQ2001. It is likely, however, that the longer version will have stronger explanatory powers than to the more parsimonious RIQ2003. The first two chapters of this section presented the changes seen in the SIS over a two-year period, during which two rural rotations and one urban rotation were experienced by the students. Chapter Sixteen analysed changes in the belief structure that underpinned the observed changes in SIS. This chapter showed that analysis of the changing belief structure does help explain changes in intention, and that an instrument such as the RIQ can inform the evaluation of programs that influence career choice.

Section Five of this thesis offers a summary of the major findings presented in this thesis and discusses the importance of these findings. It will outline strengths and weaknesses of this research and will explore opportunities for research stemming from it. Section Five also presents a discussion on the central role of beliefs in both self-concept and career decision-making, and how this relates to the utility of the Rural Intent Questionnaire.

Table 122 Summary of all significant differences in situational intent and RIQ variables discussed in Section Four. Lower case refers to data groups, upper case refers to Cohort analysed. +: increase, -, decrease. (example: aB+ means that no sub-groups were used, Cohort B showed a significant increase in this variable)

	first semester rotations (b-a)	interval between rotations (c-b)	second semester rotations (d-c)	entire year (d-a)	LEGEND data/series used
RI score	4C-,rA+,kB-	A-,i+,uA-	a+,B+,kB+,nB+,rB+,uA-,nA-, rA+,C+,n4C+,u+,n+,m+,ft+,i+	n+,nC+,i+	only data from series-of-four' 4 all available data a
urban intent	rA-		B-,kB-,nB-,uA+,nA+,n4C-, C-,n-,f-,l-	n-,nC-	Cohort A A Cohort B B Difference B-A* nil or C
rural intent	l-	A-,uA-	a+,B+,kB+,nB+,uA-, rA+, C+,u+,n+,m+,i+	n+,nC+,i+	sub-groups: unknown k urban u neutral n rural r
positive affect		ft+,l+	C+,k+	C+,k+,ft+,l+a+	male m female f
negative affect		l+	k+,i+	C+,n+,i+	local l international i
total affect score (TAS)		C+,r+,l+			scores increased + scores decreased -
personal consequences	r-		n+		
professional consequences	u+				
total consequences score (TCS)	u+,r-,m-				
triandis score			C+,k+,u+,ft+,i+	C+,ft+,i+	
subjective norm	i+				
social driver score (SDS)			C+,k+,u+,ft+,i+	ft+,i+	
ease		C+,u+,ft+,l+		C+	
self concept		m-	C+,u+,ft+,l+		
RIQ score		r+	C+,k+,u+,ft+,i+	C+,i+	
Situational Intention Score (SIS)			n+		

* Cohort A had a rural rotation in the 1st semester, urban in the 2nd semester. "Difference B-A" refers to an opposite order of rotations in the two semesters

Section Five

Discussion and conclusions

Introduction to Section Five

Section five consists of two chapters. Chapter Seventeen seeks to pull together the significant findings of the research presented in this thesis, discusses strengths and weaknesses of the research, offers suggestions for the future development of research into this field. Chapter Eighteen provides a conclusion to the thesis. It extends the theoretical framework upon which this approach to the measurement of attitudes toward a rural career choice was based into the context of educational and career development theory.

Chapter Seventeen

Summary, discussion and conclusions

Introduction to Chapter Seventeen

This chapter will discuss the main findings of the thesis in terms of:

1. Summary of significant results

The three objectives of this thesis were presented in Chapter One:

- To design, develop and test for validity and reliability an instrument, based on the theories of interpersonal and planned behaviour of Triandis and Fishbein and Ajzen, capable of measuring the intention of medical students to work in a rural environment for a period of time after training is completed.
- To test the utility of this instrument in the evaluation of programs designed to increase rural intent, specifically in relation to the first two rural rotations undertaken by a cohort of medical students at Monash University, Australia.
- To explore the relationship between the belief system underpinning attitudes and intention, and the belief system involved in the formation of self-concept and career decision-making.

This chapter will show that the first objective was met by addressing the six hypotheses, and that the second objective was met by addressing the five research questions. These hypotheses and research questions were all presented in Chapter One. The third objective is the subject of Chapter Eighteen.

2. Strengths and weaknesses of the research

Issues relating to the development of the RIQ, the gold standards against which it was evaluated, sample cohorts and research design will be discussed.

3. Future research opportunities uncovered by this thesis

This thesis presents and discusses a great deal of quantitative data. There is scope for this research to be extended, and for a qualitative approach that can support and help explain some of the findings. Some possibilities for future research will be discussed.

Summary of significant results

Hypotheses

Six hypotheses were presented in Chapter One. A discussion on each of these was presented in Chapter Twelve. It was necessary to first develop a gold standard against which the instrument could be tested.

Such a 'gold standard' for the likelihood of choosing a rural career was presented in Chapter Ten. This was based on published research (Rabinowitz et al., 2001) and included variables that estimated intention to choose a rural career (RI), intention to generalise (GP), intention to seek additional undergraduate rural experience (UG), self-efficacy (Ease) and rural background (YR). The close relationship between these variables was presented in Chapter Ten. Each of the four last variables ('guy' scale) made a similar independent contribution to a regression model fitted with RI Score as the DV and the remaining 'guy' variables as IVs (see Table 50 on page 163). These five variables comprised the Situational Expectation Score (SIS) which was used as a more reliable index of rural intent than RI.

The following part of this chapter presents a summary of the results that supported the hypotheses listed in Chapter One.

Reliability

Internal consistency

Hypothesis 1:

That each of the indices will have good internal consistency.

Test:

The Cronbach's Alpha of each of the components of the index will exceed 0.7.

Comment:

Cronbach alpha values for individual indices in RIQ2001 were collated from Chapter Eight, for the indices of the RIQ2003 from Chapter Eleven and for the RIQ2003 as a whole from Chapter Twelve. The Alpha for all indices and sub-indices were greater than .7 and most were greater than .8. Hypothesis 1 is supported and the test for internal consistency was found to be adequate for both versions of the instrument.

Temporal stability

Hypothesis 2:

That the instrument remains stable over a two-week period.

Test:

The average correlation coefficient between a response and its repeated response two weeks later will exceed 0.9.

Comment:

There were two occasions on which the test-retest reliability, or temporal stability of the instrument were tested. The versions tested were the RIQ2000 and the RIQ2003. On both occasions the analyses were severely limited by small sample size. The results are summarised here for completeness.

The mean correlation coefficient for the seven students who completed the RIQ2000 on two occasions was .91 (95% confidence interval: .87, .96).

Five students repeated the RIQ2003. Correlation coefficients were calculated separately for each section of the instrument. The mean correlation coefficient for the 63 sections was: .85 (95% CI: .81, .89). Despite the small numbers, these results appear adequate.

Validity

Construct Validity

Hypothesis 3:

That the variables, sub-indices and indices are structurally aligned with the expectations of the theoretical frameworks on which they are based.

Tests:

1. The variables will be factorially related according to the Triandis dimensions of affect, perceived consequences and social factors.
2. The Fishbein and Ajzen construct of subjective norm will make an independent contribution to the model.

Comments:

1. Principal components analysis (PCA) of the RIQ2001 indices revealed that the affect index consisted of two components in keeping with the theory underpinning the PANAS scale (Chapter Eight). The perceived consequences index had three components, as presented in Chapter Eight and discussed in Chapter Eighteen: personal, professional supports and community support. The ten referents of the subjective norm index formed a single component. The Triandis social factors index had two components, one relating to self efficacy and the other to normative beliefs.

Analysis of the RIQ2003 again found two components of the affect index, positive and negative affect. The perceived consequences index contained two main components, personal issues and professional issues. Each of these components could be further divided into likelihood items and importance items. The Triandis social factors index again had two components, self-efficacy and normative.

When PCA was performed on all 29 variables of the RIQ2003, five plausible components were identified. When a two-component solution was sought, only the six negative affect items loaded onto the negative component. PCA of the six sub-indices of the RIQ2003 revealed two components, positive and negative. Only the negative affect sub-index loaded strongly onto the negative component. This was consistent with the two-component solution found when all 29 items were entered.

Therefore, the longer RIQ2001 and the briefer RIQ2003 shared a common internal structure which was consistent with the theoretical frameworks upon which they were based.

2. Sequential regression modelling presented in Chapter Twelve revealed that the addition of referent approval, that is, the Fishbein and Ajzen estimate of subjective norms, to the model

resulted in a small but significant increase in the adjusted R^2 . These results were presented in Table 80 on page 210.

Analysis of changes in the semipartial correlations revealed that the independent contributions to the combined model were similar for the Triandis and the Fishbein and Ajzen social drivers components. This supports the hypothesis that both components play an independent role, and that both should be included in the instrument. Hypothesis 2 is supported by both tests.

Predictive Validity

Hypothesis 4:

That the index will predict which students are likely to have a higher stated intention to work in the country. Students with higher stated intent, as determined by the Situational Intent Score (SIS) will score higher on the components of the index than students with lower stated intent.

Test:

The strength of association between the index and the SIS will be high. The adjusted R^2 for a fitted regression model will be greater than 0.5.

Comment:

Regression models were fitted for data from the RIQ2001 and the RIQ2003 surveys, using the respective Situational Intent Scores (SIS) as the Dependent Variables (DVs) and individual and groups of sub-indices as the Independent Variables (IVs). Results from these analyses are presented in Chapters Eight, Eleven and Twelve.

The indices and the RIQ as a whole had a very strong association with SIS in both the longer RIQ2001 version and the briefer 2003 version. Both versions were able to predict up to 73% of the variance in Situation Intent. Hypothesis 4 was supported.

Cultural distinctiveness

Hypothesis 5:

That there is a cultural distinctiveness evident in the questionnaire responses from the following groups of students:

local-international, male/female, high, intermediate and low SES.

Test:

There will be different patterns of regression weights on the affect, perceived consequences and social drivers for the comparator groups.

Comment:

This hypothesis was tested in Chapter Twelve and a summary of differences in patterns of regression weights (Beta values) was presented in Table 74 on page 200. This revealed, as predicted by Triandis, that culturally distinct sub-groups of respondents gain influence in decision-making from different determinants. For example, international students seemed more influenced by important referents and less by personal consequences than local students. Local

males seemed more driven by the triandis social factors and less by important referents than were the local females. These findings are plausible, and they support Hypothesis 5.

Level of commitment

Hypothesis 6:

That the more 'committed' students with high or low Situational Expectation Scores (SES) will display a greater strength of association between their beliefs and stated intention (SIS) than the less 'decided' students with a neutral SES.

Test:

The Adjusted R^2 for regression models fitted for the high and low SES subgroups will be greater than that for models fitted for the neutral SES subgroup.

Comment:

It was postulated that the students who were neutral with regard to rural career likelihood, that is, those who fell in the mid group of SES would be less decided in their rural career choice. If this were the case, the strength of association between the variables that have been shown in this thesis to predict rural intention (see Hypothesis 4) should be lower than that of the more committed groups.

This hypothesis was tested in Chapter Twelve, and the findings were summarised in Table 77 on page 206. The Adjusted R^2 for the neutral subgroup was about half that of both of the more committed groups, and of the indices, only social drivers made a contribution to the regression model. These findings support Hypothesis 6 and support the separation of respondents into subgroups according to SES.

Summary of hypothesis testing

The testing of the six hypotheses summarised in this section supported the reliability and validity of the RIQ in both its brief and its longer formats. It was shown to be reliable and to have very strong predictive properties. Its structure was consistent with that described in the theoretical frameworks of Triandis and of Fishbein and Ajzen on which it is based and these sub-structures were able to separate culturally distinct groups. Chapter Thirteen presented a structured argument in favour of the validity of the instrument.

Such an instrument should be a valuable adjunct to the selection and training of medical graduates for a rural career. This postulation was tested in Section Four of the thesis, and a summary of the main findings is presented in the following pages.

Research questions

A controlled crossover trial was set up to test the utility of the instrument that was tested for reliability and validity in Section Three. The research design was discussed in Chapter Fourteen. As the variables and indices of the instrument had been shown to predict rural intention,

observed changes in these variables were used to explain changes that occurred in Rural Intent (RI) throughout the trial. The instrument was used to find the answers to five research questions:

- a) Was there a global change in intention to work in the country over the whole year group during 2003?

Preliminary analysis of the global trends in RI over the 2003 period failed to find any significant overall change in rural intent when the year-group was considered as a single cohort, although a small increase may have occurred during the second semester. (See Figure 35 on page 234).

- b) Was there a measurable change in intention associated with the urban and rural rotations? Using the effect of the urban rotation as a control, was there an effect of the rural rotation?

When data were divided according to which rotation (rural or urban cohorts) had been attended, the main changes in rural intent were seen in those attending a rural placement in the second semester. Although there was not a significant increase in RI observed in the group attending the rural rotation in first semester, there was a rebound decrease seen in this group in the interval between rotations (see Figure 35 on page 234).

When the cohort in the city was used as a control for the cohort in the country, the latter were found to have a relative increase in the RI score (see Table 87 on page 241).

- c) Did the order in which rotations were attended affect the effectiveness of the program?

There was no order effect of the rotations when the year-group was treated as a single cohort. There seemed to be a delayed reversal effect for some groups, in which changes that were observed during interventions returned toward the pre-intervention levels over the following months. So, when data were analysed separately according to SES, the neutral SES group had an overall pro-rural effect if they were in the country for the second rotation, and a pro-urban effect if they were in the city. This was felt to be due to the most recent influence on this undecided SES group, and it is possible that a second post-test survey may have seen a return to pretest levels. In that case, the observed order effect would no longer be seen.

- d) Were certain sub-groups of students more likely to show change in intention than others?

As discussed in the previous paragraph, the neutral SES group were the most responsive to the effects of the rotations. The pro-urban SES group tended to increase its rural intent irrespective of the rotations. The pro-urban SES subgroup that started the year with a higher rural intent had a reduction in RI over the year, while that group with an already low RI remained unchanged. This latter may have been a "floor" effect due to this low level (see Figure 43 on page 255).

- e) Were there changes in the belief system, as measured by the Rural Intent Questionnaire (RIQ), associated with the rotations? Did the changes in beliefs offer a plausible explanation for the effects of rotations on intention?

Chapter Sixteen presented the changes in individual RIQ2003 variables and indices observed over the trial. These were consistent with the changes in RI, and helped explain shifts in intent. These changes in belief consistent with the changes suggested by Webster as discussed in

Chapter Eighteen. They offer a plausible mechanism of action of changes to RI, and a methodological opportunity for educators to evaluate their programs.

Analysis of small homogenous sub-groups resulted in more useful results. When mixed groups were considered important changes in minority groups were lost. Such 'blunting' of results also made it more difficult to ascribe meaning to changes, or lack of them, seen in the larger groups.

This summary of the main results has focussed on those results that support the development of a reliable and valid instrument that was useful in the evaluation of programs designed to influence the intention of medical students toward a rural career choice. It was not the purpose of this thesis to evaluate the rural and urban placements described in Section Four, although it was clear that data from this instrument could be used to do so. It was more the intention to show the utility of the instrument, so these results have not been presented in this summary.

Strengths and weaknesses of the research

Research design

As discussed in the introduction to Chapter Fourteen, research on educational programs can be problematic (Norman, 2002). The programs, teachers and students change and a comparison of two programs may be impossible. Norman urged for an approach grounded in theory, and this study has been based on a wide variety of behavioural, sociological, career-development and educational theory.

An attempt was made to design the research along the principles of a controlled crossover trial. This was done in order to maximise opportunities for causal inference. As predicted by Norman, the two arms of the trial were not identical and allowances were made for this weakness in the design. Nevertheless, valuable inferences were made, and the utility of the instrument was demonstrated.

Limitations of the research design were discussed in Chapter Fifteen under Discussion on research design and instruments on page 259. The likelihood that the second semester interventions would be stronger than the first semester interventions was discussed. The effect of prior experience may also have sensitised students to the second interventions. These effects may have been responsible for the greater changes seen over the second semester.

Gold standards

Three gold standards were developed in this thesis in order to benchmark the RIQ. Of these, The Situational Expectation Score (SES) was really a measure of likelihood rather than intention. It was useful in the assignment of students to likelihood groups, but not as a measure of intention. The Rural Intent Score (RI) was the subtraction of stated urban intent from stated rural intent. As true intention is likely to be a latent variable, each of these stated intent items might be considered a belief. Therefore, the RI score may have been a belief measure, and prone to the fluctuations seen in unauthenticated beliefs.

The third gold standard, Situational Intent Score (SIS) had stronger scale characteristics and was the product of seven items that reduced to the RI Score, generalist intent and self-efficacy. The self-efficacy (perceived ease) item may have overlapped with perceived consequences, but correlation between these was not strong. So the SIS was the best of the three gold standards.

This thesis describes the development of the RIQ, and subsequent iterations of the instrument were used for the various surveys. While the components of the SIS were available in the RIQ2001 and in the RIQ2003, they were not available in the first survey in the crossover trial. The RI score was used in the crossover trial, while it would have been preferable to have used the SIS. Nevertheless, consistent and plausible changes in intention were identified, and these correlated with appropriate changes in beliefs.

Contamination effects

Another limitation alluded to in the discussion on Research Question c), in the previous section, relates to the likelihood of 'contamination' during the interval between interventions, and the concurrent return of RI score towards pre-intervention levels. This had two implications: firstly, that a second posttest survey, some months following the second intervention, was required to measure this tapering of effect and secondly, that the effect of rotations may be short-lived, and that these transient changes in stated intention may not impact on future career choice likelihood. A stronger research design would have included a second posttest survey, but time did not allow for this. The issue of whether the effect is short-lived is interesting. If the process of belief authentication discussed in Chapter Eighteen has taken place during the intervention, and this process continues afterwards, the beliefs were challenged and adjusted during the rotation, and these newly adjusted beliefs were then subject to challenge when the students return to campus. It was discussed that the RI Score is the sum of two situational intention beliefs. It would be expected therefore, that as the process of existential crisis continues, fluctuations in these beliefs occur, but that this results in more authenticated beliefs. If the rural rotations contributed in a positive way toward this process, the initial changes seen during the rotations reflect this. It is likely that, although the measured effects on stated intention diminished after further challenges, the increased vocational maturity acquired through the process enabled a more authenticated stated intention. Therefore, a lesser overall increase in RI measured by a second posttest survey would reflect a more valid estimate of future actions, as it is based on better authenticated beliefs.

The greater 'knee-jerk' response in stated intention seen shortly after the intervention then, is an indicator of an effect of the program on a belief. The effect of the program on true intention may not be reflected in stated intention (the RI score) until the belief system has stabilised. The RIQ instrument measures a broad range of the beliefs that are the determinants of true intention. Therefore, it measured the background authentication process and therefore had fewer changes than the RI Score.

Sample

It is uncommon for researchers to not be concerned about sample size, and this is not an exception. While that part of the study that showed the reliability and validity of the RIQ2003 was performed on 530 responses, this was still not ideal for some of the principal components analyses and some of the regression modelling. The most informative analyses in this study were performed on smaller homogenous groups of students. Ideally, a larger cohort may have yielded greater numbers in these small but interesting groups.

Analysis of the RIQ2001 was performed on a smaller sample, and this was of greatest concern when dealing with the large perceived consequences section. It was reassuring, however, to find similar results in the perceived consequences sections of RIQ2000, RIQ2001 and the RIQ2003. The three components identified were personal, professional and community, and that these were also identified in the literature added strength to the findings (Burack et al., 1997; Malcolm P. Cutchin, 1997).

Another possible concern relating to the sample was that the cohort on which the RIQ2000, RIQ2001 and the RIQ2003 were tested included the students entering Monash Medical School in 2000. It is possible that the repeated measurement of the attitudes of the same group of students could cause unidentified correlations that may have influenced the outcome. Nevertheless, the main analysis of the RIQ2003 was performed on year one, year two and year four students, providing a reasonable cross-section of the early years of the medical course.

Future research opportunities uncovered by this thesis

The instrument developed and validated in this research offers an opportunity for educators to evaluate their programs using an approach that is grounded in proven theory. The gold standards and the two versions of the RIQ can contribute to a systematic approach to the rural workforce undersupply. Larger national and perhaps international studies are required to gain a deeper understanding of how medical students make career choices. It has been argued that seeking the opinions of experienced rural practitioners may not be enough in this changing vocational environment. The expectations of the current generation of graduates are unlikely to match those of the incumbent rural practitioners.

Therefore it is necessary to perform the research on the current and possibly even the future medical students. This instrument is likely to be of value when studying high school students' career aspirations. Neither is its usefulness likely to be restricted to medical personnel. The issues facing other health professionals considering a rural career are unlikely to be significantly different to those of the medical students. Indeed, with some changes, an instrument like this may have generic qualities applicable to any group of workers who are in an undersupply in rural areas.

It may even be possible to extend this concept further. One objective of most educational programs for professionals is to develop in the students attributes appropriate for that profession.

These attributes mainly relate to the belief structure of the student. An approach based on the measurement of beliefs may enable the evaluation of this aspect of these programs. Further, an approach based on decision-making theory and cognisant of career choice and educational theory might generally enable a more theory-based approach to questionnaire design and educational program evaluation.

These concepts are worthy of further consideration, and would form the basis for useful further research.

Chapter Eighteen

An extension of the theoretical framework afforded by this thesis

Introduction to Chapter Eighteen

This chapter addresses the third objective of the thesis as listed in the introduction to Chapter One. It will “explore the relationship between the belief system underpinning attitudes and intention, and the belief system involved in the formation of self-concept and career decision-making.” In doing this it will highlight the importance of an instrument that not only can measure changes in the intention of medical students to choose a rural career, but can also explain and measure changes in the intermediate determinants of this choice.

An instrument that can measure changes in intention to work in the country may enable an evaluation of programs designed to influence situational career choice. This chapter discusses how a measure of attitudes toward a rural career, like the RIQ, based on the belief structure of the individual and grounded in theory of planned behaviour is more than an instrument that can estimate intention to choose a rural career. It can measure changes in self concept and the alignment of this changing self-concept with vocational choice.

The need for a grounded approach

The geographical maldistribution of medical practitioners has been described in many countries, and approaches to the management of this problem have been presented in Section One of this thesis. While there is some evidence that certain programs have been associated with an increase in the recruitment and retention of rural doctors, the mechanism of action of these programs remains obscure. In part, this is because research in this field relies on the outcome behaviour, that is, whether graduates actually take up a rural career, often many years after the intervention. Further, little of this research is grounded in proven theories (Meurer et al., 1996) and for these two reasons, causation inferences can usually not be drawn.

There is pressure to put programs in place that are believed to be associated with an increase in the number of rural-oriented graduates, although the causation, strength of effect and mode of action are unclear (Wearne & Wakerman, 2004). Further, the evaluation of these programs relies on effects that are measured many years later. This not only limits the usefulness of this evaluation for the purposes of quality improvement, but also for the estimation of the very effectiveness of the programs in the first place.

A recent review of the Australian and international literature of influences on medical career choice (AMWAC, 2002) grouped these influences into two groups, intrinsic and extrinsic, largely on the basis of work reported by Funkenstein in 1978 (Funkenstein, 1978). Intrinsic factors included the students' characteristics at entry to medical school, termed bioscientific if interested mainly in the science underpinning medicine, and biosocial, if more interested in using the science of medicine to help people. Other intrinsic factors include the values and lifestyle of the student. Extrinsic factors were the medical school experience and societal factors, especially the economic viability of the various careers (Funkenstein, 1978).¹³⁶ The 2002 AMWAC literature review concluded,

The capacity to influence medical graduates choice of career is dependent upon a wide range of factors, intrinsic and extrinsic. Using this paradigm, evidence suggests that there is little likelihood of intrinsic factors being able to be altered or influenced, however the nature of extrinsic factors potentially allows for an interventionist approach (AMWAC, 2002).¹³⁷

This thesis describes the background, development and evaluation of the Rural Intent Questionnaire (RIQ), an instrument, grounded in the behavioural theories of Triandis and of Fishbein and Ajzen. In earlier chapters of this thesis, the RIQ was shown to be capable of measuring the belief structure underpinning attitudes, which, in turn predict intention and ultimately behaviour. It will be argued in this chapter that this instrument is capable of measuring intrinsic factors, and that the nature of these intrinsic factors allows for them to be influenced through an interventionist approach. Indeed, this discussion will claim that the mechanism of action of both the intrinsic and the extrinsic factors is through the belief system. Changes in this belief structure reflect the effect of the programs, and can be measured concurrently with the delivery of the programs. Such a measure not only provides an estimate of the effectiveness of the program, but is timely enough to inform the quality improvement cycle. Its sensitivity and specificity allow its use in studies that are capable of proving causation. Although this instrument was based on principles derived from research on a great variety of behaviours, it was designed to be applicable to locational career choice.

This chapter discusses how career decision-making is heavily dependent upon identifying one's self-concept and matching that 'self' with an occupational role (Donald E Super, Savickas, & Super, 1996). This self-concept is dependent on the belief system of the individual. This chapter discusses how the career decision-making process is moderated by self-efficacy, or one's perceived ability to successfully fulfil the requirements of that occupational role (A Bandura, 1997). It will be argued, therefore, that an instrument such as the RIQ that measures the belief structure of an individual can also provide insight into both self-concept and optimal career choice.

The quest for the authentication of one's self-concept is life-long (Donald E Super et al., 1996). Self-concept and even more so, self-efficacy, are affected by variables that are often outside

¹³⁶ Funkenstein 1978, p10

¹³⁷ AMWAC 2002 Executive Summary p1

one's personal control. Therefore, self-concept has some degree of inconstancy. It is determined not only by the current belief structure, but also by how one relates to this belief structure (Webster RS, 2004), and both of these are moderated by external factors, both real and perceived.

Beliefs are informed by knowledge. Programs that are designed to influence medical students' career aspirations toward a rural career should seek to increase the student's knowledge base so that favourable beliefs can be formulated and supported. These beliefs must be based on fact, for they must subsequently be able to withstand challenge. As well as determining attitudes toward a rural career, these beliefs are the basis of one's self-concept. Such programs enable the development of a self-identity that is consistent with that of a rural doctor.

This chapter describes a self-authentication process. It uses the theories of 'educational existential crises' and 'experiential place integration' to explain recruitment and retention in rural medical practice within the context of the self-concept and self-efficacy theories. The concept of alignment between self-concept and vocational roles is developed. The chapter goes on to explain how the instrument developed in the earlier chapters of this thesis is capable of measuring an individual's beliefs. This allows for an estimate, not only the traits of students at point-of-entry into medical school, but also the changes in self-concept caused by educational programs. The measurement of these changes will inform the quality improvement cycle of programs seeking to increase recruitment to and retention in rural areas.

Finally, this chapter argues that there is a need for a redefinition of the characteristics of rural primary care to more closely match the aspirations of the next generation of graduates. The RIQ can be used to help identify the characteristics of a rural medical career that match the self-concept of the young people entering medical schools. This will inform the changes in primary health care service delivery that are required to ensure the sustainability of health care for rural communities.

Purpose of the RIQ

Undergraduate rural rotations, rural medical mentoring and undergraduate rural clubs have been instituted with the intention that they will support and strengthen the intention of medical students to work in rural areas. As discussed in Chapter Two, the measurement of these effects through behavioural outcomes has been problematical. The lengthy time lag, multiple intervening programs, continuously changing programs, the changing nature of medical students and the changing nature of medical careers all serve to confound longitudinal research findings (Meurer et al., 1996).

It is widely accepted that rural training has an impact on rural career choice (Wearne & Wakerman, 2004), and there is some empirical evidence to support this (Hays RB et al., 1995; Rabinowitz HK et al., 2000; Rabinowitz, Diamond, Hojat et al., 1999; Rabinowitz et al., 2001; Verby et al., 1991); however, there is little evidence to inform the evaluation of programs

designed to affect career outcomes despite government imperatives to determine where the tax dollar is most effectively spent (Department of Finance, 1994).

The RIQ was grounded in behavioural theory (Ajzen, 1991; Ajzen & Fishbein, 1970; H.C. Triandis, 1971) and associated supportive research (Davidson AR et al., 1986; Warshaw & Davis, 1985a, 1985b), which show that intention is the prime predictor of behaviour, and that the attitudes that predict behaviour can be estimated by measuring the belief systems underpinning these attitudes. These beliefs are the determinants of the decision-making process; they determine the self-direction to take a certain line of action.

Meanwhile, career development theories have progressed along lines parallel to those of the behavioural theories described above. They support the importance of these belief systems in determining self-concept and the role that self-concept plays in determining vocational career choice (D.E. Super, 1963). These beliefs are under constant review by the individual, and this process can be accessed by educators (Webster RS, 2004). The individual can be provided with opportunities to increase the authenticity of his/her belief systems through increased knowledge, experience, dialogue and personal reflection. The measurement of changes in the belief systems that underpin self-concept in relation to a rural career choice will inform the evaluation of programs influencing career choice, just as they predict changes in intention and outcome behaviours.

The RIQ instrument presented in this thesis was designed to measure the belief structure of medical students in relation to a rural career choice and has been shown to be capable of measuring changes in beliefs and attitudes brought about by rural programs. It is also possible, however, that the completion of the questionnaire alone forced students to consider their beliefs, and contributed to some extent to the review of beliefs. Feedback from students did confirm that the questionnaire did make them think deeply about the issues relating to a rural career.

It is unlikely, however, that changes occurred during the time required to complete the short questionnaire. The instrument may have provided a framework within which the respondent could subsequently anchor some of his/her beliefs. While it was not the purpose of the instrument to influence the outcome, it was not necessarily a bad thing if it had contributed in this way. Nevertheless, if completion of the questionnaire, per se, did contribute to the benefits caused by the program under investigation, the questionnaire will have overestimated the benefits of the program itself, and this effect should be considered during the evaluation of the program.

The RIQ then, measures the belief systems that underpin attitudes toward working in a rural environment. These belief systems relate to the individual's affect toward, understanding of the consequences of, and the effect of social drivers on a rural career choice. It will be shown in the following pages that it is the same belief system that determines the individual's self-identity in relation to locational career choice. A measure of changes in these beliefs offers insight into the decision-making process.

Self-concept

So, if the RIQ measures self-direction to choose a rural career through the analysis of the belief systems that predict intention and vocational choice, how does intention relate to vocational development? The following section describes some of the theories that link self-concept to vocational role choice. These theories form the basis for the argument that the self-direction that the RIQ seeks to measure relies on the same self-concept constructs (beliefs) as those that determine rural career choice. An instrument that measures these beliefs, then, is equally grounded in vocational theory as it is in behavioural theory.

Vocational development: self-concept and recruitment

The role of self-concept in theories of vocational development has been discussed for many decades. One of the seminal authors on this topic in the United States of America was Donald Super (1910-1994), who wrote, in 1963,

In expressing a vocational preference, a person puts into occupational terminology his idea of the kind of person he is; that in entering an occupation, he seeks to implement a concept of himself; that in getting established in an occupation he achieves self-actualization (D.E. Super, 1963)¹³⁸.

Vocational maturity occurs when the individual develops a clear and stable alignment between self-concept and vocational identity. Self-concept is a subjective construct wherein the individual "concentrates on the personal meaning of abilities, interests, values and choices, as well as how they coalesce into life theme."¹³⁹ Vocational identity is an objective construct, referring to the individual's goals and abilities in relation to feedback from others around him/her.

Vocational identity can be measured on interest and ability inventories, such as the Specialty Choice Inventory (Sci45) developed by Gale and Grant (Gale & Grant, 2002). This produces an objective picture of occupationally relevant traits which are determined to be so by others. It was designed to identify traits best suited for specific medical specialties, and to assist in the vocational counselling of medical graduates seeking to choose which specialty best 'fits' them. The Sci45 consists of 130 items, each measuring an aspect of vocational identity. These consist of two types, those relating to specialty characteristics such as, main patient types served, range and types of disease treated, hours worked, and those of personal attributes such as manual dexterity, team working, and communication skills. These profile the respondent's scores as normal distributions on twelve sub-scales, such as coping with uncertainty, working with children and academic orientation. Such a profile can provide an objective perspective on the individual's vocational profile (Donald E Super et al., 1996)¹⁴⁰.

On the other hand, the definition and measurement of the subjective vocational self-concept remains problematic. Super built into his earlier theory the concept that the continuing

¹³⁸ Super 1963, p1

¹³⁹ Super 1996 p137

¹⁴⁰ Ibid, p137

transformation of the vocational identity was a lifelong process. This theory is known as the 'life-span, life-space approach to careers'. He believed that the cycles of choices and changes made at various stages of the life-span were predictable; that they could be explained through a "developmental perspective on an individual's career and work role" (Donald E Super et al., 1996)¹⁴¹. In this approach, Super discussed five cycles, or 'life stages': growth, exploration, establishment, maintenance and disengagement, which the individual undergoes at least once during each of the four 'ages': adolescence, early adulthood, middle adulthood, and late adulthood. So the quest for occupational meaning is an evolving process with recognisable stages experienced in cycles.

The Lego-block medieval castle wall model, first introduced in Section One, represented one's self-direction to perform a behaviour. It consisted of many 'belief blocks' that were continuously being re-evaluated. During this process of reappraisal, the colour of some of the blocks (beliefs) is changed, resulting in an altered appearance of the model. This model supports a gradual change in the 'appearance' of the 'intention'. Super's theory would suggest that the reappraisal of blocks in this model is cyclical, and that each cycle has recognisable stages.

Many authors accept that people do not have a single self-concept, but rather, have many (Betz N E, 1994; Donald E Super et al., 1996). In this case, it is likely that each of these 'selves' is continuously being re-evaluated, and that the most appropriate one for the current situation gains salience. In the Lego castle wall model, the notion of multiple selves would require that each individual 'self' should be represented by its own castle wall, and that each person may have several of these on 'stand-by'.

This approach had similarities with that of Burack et al. (1997) who described the process of deciding whether to choose a primary care (PC) or a non-primary care (NPC) medical specialty as,

...a socially constructed process of 'trying on possible selves' (i.e. projecting oneself into a hypothetical career and personal roles) (Burack et al., 1997).

In this situation, instead of individual beliefs being challenged one-by-one, the student tries on a whole 'castle wall' of beliefs, or an entire 'self' at the one time. The form of this self may well be provided by a role model. Role models and mentors were described by Funkenstein as extrinsic factors in medical career choice (Funkenstein, 1978), but it can be seen that their influence is a direct one on self-concept. The student then tests these beliefs against the information provided during the experience and against his/her hitherto-accepted belief structure. Burack found that a medical student's 'personal fit' into a specialty choice depended on the discovery and comparison of information relating to these careers on three domains:

- one's self,
- the others in the specialty, and
- the content of that specialty.

¹⁴¹ Super 1963, p130

They found that most students who moved from being uncertain to either a PC or a NPC career, or those who did not change, "took the self as given," and sought an answer to the question, "What fits me?" This is more consistent with the confirmation of an objective vocational identity.

Students who changed their minds, however, and switched completely, from a NPC to a PC choice, or vice versa, did come to a changed understanding of their 'selves.' They asked, instead, "Where do I fit?" This approach is more subjective, and exploratory, with students showing a willingness to open up and to risk their self-conceptions. While these students did not believe that they had changed their priorities or inclinations, they reported having "erroneous initial perceptions, later corrected by experience." They had allowed their beliefs to be challenged, and they developed better authenticated purposes. Their self-concept and vocational development had 'matured'. These 'switchers,' then, may well have experienced an existential crisis, as described by Webster (see below).

Burack et al. identified three processes involved in finding the best specialty fit:

- "confirmation," when students had their early beliefs in self, others and content reinforced and did not change career choice,
- "inclusion," when students formerly chose a NPC sub-specialist career, but realised that their interests were broader and changed to a PC choice, and
- "elimination," when formerly PC students identified areas of no interest, and excluded these from their options until they found the NPC sub-specialty of their choice.

These processes were likely to have played a role in situational career choice for the three SES sub-groups, as described in Section Four of this thesis. The 'strong urban' sub-group rarely changed, and become progressively more pro-urban. The 'strong rural' sub-group became more pro-rural regardless of the program that they experienced. These students may have undergone the process of 'confirmation'. It is likely that such a process would explain the findings of Rabinowitz et al., who noted that completion of their undergraduate rural support program (PSAP) was the only independent predictor of increased retention in rural areas (Rabinowitz et al., 2001). While confirmation does not seem to alter recruitment, it may affect retention.

On the other hand, the 'undecided' sub-group changed according to the most recent (salient) experience, and there were small numbers of students who did change from the strong rural sub-group to the strong urban sub-group and vice versa. It is difficult to determine whether inclusion or elimination processes were at play for these students, but their experience during the rotation may have allowed them to challenge their self-concept (see existential crises below).

Successful programs that seek to influence the vocational development of medical students, then, are likely to exert their influence, at least in part, through self-concept. That is, if an educator wants to influence the future behaviour of a student, this may be achieved through changing that student's self-concept, so that the student believes him/herself to be the sort of person who would behave in that particular way. This beliefs-based approach to behavioural theory is

supported in the literature by researchers, including Triandis and Fishbein and Ajzen, whose theories have been discussed in Section One of this thesis, and which underpin this current research.

Self-concept then, is a subjective understanding of one's strengths and weaknesses and how these are valued by the individual. Vocational identity is how one evaluates oneself as a potential resource for one's community. Vocational maturity occurs when these two align. The process, however, does not remain static. The ongoing re-evaluation of self-concept, and changes in the external world that alter one's capacity to fulfil the chosen vocational role break the equilibrium and the process continues to revolve. Super held, however, that the stages of this reappraisal and adaptation of work role are predictable. It is the duration of stability between cycles that determines the retention of rural doctors, and will be discussed in the following section.

Experiential place integration: self-concept and retention

While the recruitment of graduates to a rural career was the focus of Burack's study, Cutchin argued that not enough emphasis has been placed on the retention of doctors in rural areas (Malcolm P. Cutchin, 1997; M. P. Cutchin, 1997). He described the importance of integration of the self and the community as a determinant of retention, calling this "experiential place integration." Cutchin expressed the importance of self-concept in relation to place clearly when he wrote,

The perspective of retention as experiential place integration creates a focus on the connection and interaction between physicians and their local settings...

To forego place integration is to forego our humanity, to undo our social nature, responsibility and needs...integration is a type of progress that builds bonds with place, that in turn encourage retention...

The actual process that generates the continuing basis for making the decision to stay or to leave a rural practice setting is based in the quality of human experience in place (M. P. Cutchin, 1997).

So what are the domains that determine successful spatial integration? In 1997, Cutchin reported a case study approach to an in-depth qualitative analysis of retention issues as described by 14 primary care physicians and 21 key informants in Kentucky, United States of America. He identified three important domains of the integration process. He called these,

- the physician's self,
- local community-at-large, and
- local medical community.

Section Two of this thesis described the principal components analysis of the perceived consequences items of the RIQ2000 and the RIQ2001. In both versions of the instrument, three components were identified as domains of the consequences of working in a rural setting. They related to family and social issues, community respect, and professional networks.

A 1988 study of final-year medical students from Melbourne University and Monash University also identified three factors that determined the students' career choices. These were professional, family and community (Silagy & Piterman, 1991). As mentioned above, Burack

identified one's self, the others in the specialty and the content of that specialty as the three domains relevant to specialty career choice. He included family and friends under his heading of one's self. If the 'content of the specialty' in rural practice is in fact community medicine, or 'community,' the three domains were again very much the same. So, the domains identified as important recruitment issues by the Australian second-year (2001) and final-year (1988) medical students and by Burack's USA graduates were very similar to those identified as important retention domains for the established rural doctors interviewed in the United States of America. While Cutchin's study focussed on retention of rural medical practitioners, these issues have many similarities with those of recruitment.

Super claimed that the stages in the career development cycle were predictable. During the re-evaluation of one's career in later life, even to the extent of planning retirement, these stages follow the same pattern as those experienced in earlier career choices. So the stages of the process that determine retention are similar to the stages that determine recruitment. The similarity of the domains across Super's "ages" in the life-span, as discussed above, suggests that not only the process, but that also the context of the cycles is the same for recruitment and retention when self-concept is accepted as the determinant of career choice.

In terms of Super's vocational theory, Cutchin's findings can be interpreted as: the better one integrates with the community, the better would be the alignment between the subjective self-concept, and the objective vocational identity, and the more stable would be the career development cycle. However, should instability occur, and the cycle be recommenced, a predictable process, and a predictable three-domain context would be involved. This approach requires further evaluation, and may lead to a fruitful re-evaluation of the way that the retention of rural doctors is handled by policy-makers.

So, if recruitment domains are similar to retention domains, how does self-concept theory assist in the understanding of the mechanism of action of rural undergraduate programs? It is likely that rural rotations, rural mentor programs and rural undergraduate clubs exert their influence on situational career choice via 'confirmation' and 'experiential place integration'. Increasing the understanding of the rural medical workplace and of rural communities enables the students/graduates to understand and resolve areas of potential conflict between self, professional, and community issues. In this way, these extrinsic factors have a direct effect on self-concept.

For some, the self-concept as 'urban' people or 'rural' people will be confirmed and strengthened, increasing long-term retention prospects (Glasser, Sarnowski, & Sheth, 1982). For less committed individuals, there may be a change, resulting in altered recruitment prospects. Similar findings have been presented in Chapter Fifteen of this thesis, when the response of 'decided' and 'undecided' medical students as determined by the Situational Expectation Score (SES) were compared. These insights into self-concept can be used by educators to challenge the students' self-concept as rural doctors/inhabitants through a process referred to as

"educational existential crises" (Webster RS, 2004). As a result the belief system underpinning this self-concept may move toward or away from a rural career, but in any case, through dialectic, becomes more authentic. This theory of existential crisis and how it relates to undergraduate rural programs is explained in the following section.

Education through existential crises: changes in self-concept

Webster (2004) employed an existential perspective to develop his argument (Webster RS, 2004). He called upon the theories of Kierkegaard, Nietzsche, Heidegger, Sartre and Morris to support his call for the use of 'existential crises' as an educational tool. Simply put, by this he meant that self-concept can be developed and matured through self-reappraisal.

He argued that, "...truth for the individual refers to how one relates to what one understands." He claimed that personal identity is not the sum of one's beliefs (the *what*), but *how* the individual values and relates to these beliefs. He called this latter the 'subjective view of truth' as opposed to the objective view that relates to the 'what' of one's being. Super's career self-concept theory supports this subjective approach to enable an understanding of facts and experiences in terms of internal purposes, not of externally derived traits. This represents the internalisation of Funkenstein's extrinsic factors (Funkenstein, 1978)¹⁴². Subjective congruence, according to Super, matches personal purposes to the available possibilities, while objective congruence compares the individual's traits to those of others in the target occupations (Donald E Super et al., 1996)¹⁴³.

The Sci45 measures objective congruence, in that it measures externally imposed traits, and groups them according to the expectations of others in the specialty (Gale & Grant, 2002). Such an instrument seeks to measure the beliefs and attempts to interpret them in an objective sense, but must leave it to the individual to personalise their meaning, and match them to his/hcr true purpose. The Sci45 serves as an objective screening instrument, which can identify objective dissonance, and thereby warn the young doctor of possible conflict.

Webster acknowledged that a risk of the subjective view is that an individual's beliefs or purposes can become so relative that they may become arbitrary. He offered two characteristics that enable them to be better grounded. In keeping with theories of cognitive congruence (Festinger, 1957), he argued that personal meanings and purposes have a holistic nature; they are interrelated and have a degree of internal consistency.

Through Existentialism it is identified that meaningful principles on which to base all of one's purposes are gained authentically, although it is acknowledged that individuals more often live their lives inauthentically. Authenticity, in this context, is simply understood to be the individual becoming *aware* [his italics] of her or his meanings and purposes, and choosing them to be hers or his own. That is, one is simply 'choosing oneself.' Through authenticity a unity of all of one's meanings and purposes is able to be recognised. Therefore, an important aim of education (and mission in life) is to develop a meaningful sense of coherence as all of one's purposes are inextricably linked to each other and to how one understands life (Webster RS, 2004).

¹⁴² Funkenstein 1978, p10

¹⁴³ Super 1996, p139

He argued that the second characteristic that enables meanings and purposes to be better grounded is that they have a "potentially hermeneutical nature." By this, he means that they are strengthened by debate and exchanges of opinion with other individuals, which he calls the "existential encounter," and are therefore buffered, to some extent, by the prevailing understandings of the society with which the individual relates.

While this societal influence serves to provide the individual with a constellation of 'acceptable' beliefs, these beliefs are not necessarily the ones that the individual will eventually ascribe to. In 1954, Ausubel described two crises in ego development. The first is during childhood, when the child accepts his/her dependence on others and conforms to their standards and expectations. A second crisis in ego development occurs during adolescence and early adulthood, when more authentic purposes and meanings are developed (Ausubel, 1954).

The concept of lifelong learning and the acceptance of the mid-life vocational crisis, where a particular 'career' chosen in adolescence is no longer expected to last a life-time, suggest that this second crisis may no longer be confined to youth. Indeed this process of self-authentication is ongoing, and is consistent with Super's life-span life-space theory (Donald E Super et al., 1996).

Webster argued that meanings and purposes will be better grounded if they are more authentic. That is, if they are true for the individual, that s/he is aware of them, and has decided to accept the responsibility of making them her/his own. He argues that greater authenticity can be facilitated by, and may often only be achieved through "existential crises."

An existential crisis challenges whether the meanings of society that have been accepted inauthentically as 'givens,' offer real significance for one's own experiences. Through this, one recognises what is of most significance for one's life and allows one to prioritize the things that matter in order of their importance (Webster RS, 2004).

He argued that without challenging one's belief system, one remains largely inauthentic. Educators can help students achieve authenticity by causing them to analyse their belief systems, and even to doubt them. Only then can they re-evaluate them and explore alternatives, daring to risk their 'subjective' status quo. For any change to occur, he argues, individuals need to be willing to reconsider and justify the basis for determining that certain purposes are good. Then individuals can 'make a stand' for the purposes that they believe are worthwhile, and can support these with reasons for doing so. These purposes will then be more authentic.

It is easy to recognise this process in Burack's process of confirmation referred to above. It also explains the mechanisms of his processes of inclusion and elimination, and may explain Gottfredson's concepts of circumscription and compromise discussed in the next section (Gottfredson, 1996).

It is this process of continuous self-appraisal and review that the medieval castle wall model seeks to embody. Each Lego block is analysed periodically, and may be polished or replaced with a block of a similar or different colour. Indeed, the replacement of blocks may result in structural changes to the model. For example, the main gate/drawbridge section may become

narrower or broader. In this situation, certain 'attitudinal' structures transform to better match the purposes of the individual. The belief structure that underpins the intention to take up a rural career is not dissimilar to the meanings and purposes discussed by Webster. He argues further, that it is part of the role of the educator to enable this refinement of the student's belief system through the attainment of new knowledge, through dialogue, challenge and self-reflection. So while the educator is one of Funkenstein's extrinsic factors, his/her effect is through self-concept.

During this discussion on self-concept and vocational development, the modifying role of external limiting factors has been alluded to. Ideally, the individual who has an authenticated self-concept that closely matches a preferred vocational role should have an easy passage through career choice. However, the world is not constructed in a way to enable all of one's wishes to come to fruition. External barriers and the realities of life leave individuals with personal attributes not suited to the attainment of some goals. Competition and scarce resources frequently force compromise in the career decision-making process. An understanding of the need to allow for these limitations, whether real or otherwise, and the perceived necessity to readjust one's aspirations based on them, is referred to as self efficacy. The role of self-efficacy on career development is the subject of the next section.

Self-efficacy: Self concept and control

While the actual limitations to achieving one's career aspirations, such as intelligence and dexterity may be readily measurable, and their effects on behavioural likelihood determined, the effects of perceived behavioural control, or self-efficacy, are not as direct. When the perception of one's limitations is accurate, perceived control may approximate actual control, but this is often not the case. So rather than referring to the actual limitations to the choice of a career, self efficacy refers to the perceived ease or difficulty that one attributes to fulfilling that vocational role, and to some extent, to the likelihood one sees of successfully achieving it.

Albert Bandura is one of the seminal authors on self-efficacy. In his book, *Self-efficacy: The Exercise of Control*, he wrote,

A substantial body of research shows that beliefs of personal efficacy play a role in career development and pursuits. The higher the perceived efficacy to fulfill educational requirements and job functions, the wider the range of career options people seriously consider pursuing and the greater the interest they have in them. Efficacy beliefs set the slate of options for serious consideration. People rapidly eliminate from consideration entire classes of vocations on the basis of perceived efficacy, whatever benefits they might hold (A Bandura, 1997)¹⁴⁴.

and

[Self-efficacy] predicts the scope of career options seriously considered, occupational interests and preferences, enrollment in courses of study that provide the knowledge and skills needed for various careers, perseverance in difficult fields, and even the choice of cultural milieu in which to pursue one's occupational career. This independent contribution is verified in stringent empirical tests that

¹⁴⁴ Bandura 1997, p 423

control for the effects of actual ability, prior preparation and achievement, and level of interest (A Bandura, 1997)¹⁴⁵

So self-efficacy affects career decision-making on several levels, not just by prevention of the final implementation of the career plan. These effects will be further explored.

Bandura referred to one study that found that international students who chose to remain and work in the host country, as well as those who returned home, were more influenced in this decision by self-efficacy than by the cultural milieu they chose to work in¹⁴⁶. It was more important for them that they thought that they were capable of succeeding in whichever environment, than whether that environment was native to them. It is possible, then, that self-efficacy plays an equally large role in the locational career decision-making of students of rural or urban origin. Even more than their rural origin, it is whether they believe that they will succeed in the country that is important. While it is often likely that rural origin students will believe that they will be happier and more successful in the country, this is not always the case. This relationship was tested in this thesis. Chapter Ten : Gold standards, described the development of the Situational Expectation Score (SES), which included perceived ease to live/work in the country (Ease, self-efficacy), years lived in the country (YR), intention to generalise (GP) and intention to seek additional undergraduate training (UG), and stated rural intent (RI). When a multiple regression model was fitted against RI (dependent variable), entering the other four variables as independent variables, self-efficacy was found to make an independent contribution to the model, even after YR had been allowed for. This was seen in the whole of group as well as when data from international students and local students were analysed separately.

A recent study used the Fishbein and Ajzen Theory of Planned Behaviour to test the importance of self-efficacy in the career decision-making process. It concluded that self-efficacy was the most important predictor of males' intentions to pursue careers normally described as 'female occupations,' such as nursing and pre-school teaching (Giles M & Rea A, 1999)¹⁴⁷.

Reduced self-efficacy can also "debilitate subsequent performance through motivational, cognitive and emotional effects" (Brown & Inouye, 1978). If self-efficacy has effects on behavioural likelihood through affect and perceived consequences (cognition) as well as through motivation, the Triandis model may be more valid than the Ajzen Theory of Planned Behaviour (Ajzen I, 2002). Triandis, in addition to measuring self-concept, deals with motivation as a moderator in the behavioural likelihood equation, and measures affect and perceived consequences separately in the intention equation, enabling the several secondary effects of self-efficacy to also be determined. It may not be adequate to treat self efficacy simply

¹⁴⁵ Bandura 1997, p 427

¹⁴⁶ Ibid, p 426

¹⁴⁷ Giles 1997, p396

as an additional linear independent variable in the intention regression model as proposed by Ajzen.

Students with a more 'internal' locus of control, that is, they are generally less influenced by perceived external barriers, tend to have greater vocational maturity (Lokan, Boss, & Patsula, 1982). Vocationally undecided college students in the United States were found more likely to have an external locus of control (Taylor, 1982). This locus of control is more an enduring trait than a context-specific belief, and an internal locus of control can act as a buffer against the effect of the more variable self-efficacy beliefs on career decision-making.

If self-concept is the subjective interpretation of one's vocational wishes, self-efficacy is the subjective understanding of the likelihood of the realisation of these wishes. To some extent, these are related to the differences between behavioural expectation and behavioural intention. Gottfredson's theory of circumscription and compromise sheds light onto the differences. As the individual starts to gain vocational maturity, he/she identifies career paths of interest and he/she rejects alternatives that are inconsistent with his/her vocational self-concept. Gottfredson referred to this process as one of "circumscription." She went on to describe "compromise" as the later abandoning of some of even the most preferred alternatives due to perceived external barriers (Gottfredson, 1996). The former, then, is the generation and refinement of occupational roles based on self-concept, and the latter adds the pragmatism of self-efficacy to reduce these to what is perceived as achievable.

A true understanding of the occupational roles and the achievability of such roles may result from role modelling by successful or unsuccessful rural practitioners, or may be described positively or negatively by their urban counterparts. In large part, role models have an effect through self-efficacy. Brown and Inouye (1978) wrote,

Self-efficacy inferences may also be drawn from observing others work hard at a task and fail. ... Vicariously based helplessness is most likely to occur when observers witness a model whom they perceive to be of similar competence consistently fail at a task despite high expenditure of effort... it is the cognition of "uncontrollability" rather than the experience of uncontrollability itself, that is critical in producing helplessness effects (Brown & Inouye, 1978).

The risk of 'learned helplessness' in the rural career choice setting may result from the attachment of a student with a preceptor in rural general practice, for example, who is not coping in his/her role. The student may see the practitioner as someone with a great many more medical skills than he/she has or may be capable of gaining. Despite these skills and a great deal of effort, the practitioner is seen not to be coping as a rural medical practitioner. The student, in this situation, may perceive that the successful achievement of such a career is, and by inference always will be, beyond his/her grasp.

This highlights the importance of 'badmouthing' (Fromm B et al., 1985; B. A. Kamien et al., 1999) and poor role modelling (Block, Clark-Chiarelli, Peters, & Singer, 1996). If, as seems more commonly the case, the rural mentor is not happy in his/her position, and is not succeeding to align his/her self-concept with a vocational role, the student, who almost always sees him/herself as less competent than the practitioner, rapidly comes to the understanding that

they too, will not survive a similar situation. Not only does this reduce the intention to take up a rural career, but "is believed to debilitate subsequent performance through motivational, cognitive and emotional effects." (Brown & Inouye, 1978).

Positive role-modelling, however, enables the student to see that people with a level of skills similar to what they expect to achieve are capable of successfully carrying out their preferred vocational role. The capacity for experienced rural doctors to influence medical students' career choice through mentoring and role modelling was discussed in a paper emanating from this research (Somers et al., 2001). This paper concluded that successful rural GPs have adapted to fit the role, and can show students how they too can do so in a way that does not compromise too many of their beliefs.

The 2002 version of the Rural Intent Questionnaire (RIQ) was seen to measure behavioural expectation rather than behavioural intention. The RIQ seeks to measure intentions, that is, the self-direction to carry out a behaviour. Vocational maturity occurs when self-concept becomes congruent with vocational identity and vocational self-direction becomes authentic (Lokan & Biggs, 1982). Despite evidence that behavioural expectation and behavioural intention share predictive qualities of subsequent behaviour (Warshaw & Davis, 1985a), behavioural expectation may not have the same level of congruence with 'self'. Its relation to the personal belief system is not as direct because it is more strongly mediated by real as well as perceived barriers.

Self-efficacy moderates motivation as well as intention, and therefore affects behavioural outcome through routes other than through intention (Brown & Inouye, 1978). If one believes that a task is not achievable, then one does not persist at it, nor put in as much effort. The influence of self-efficacy on the determinants of behaviour as described by the Triandis Theory has been discussed in Chapter Three. In order to minimise the confounding effect of self-efficacy on behavioural expectation, the RIQ2003 was reworded to more closely reflect a measure of intention, that is, self-direction to choose a rural career and self-efficacy was measured on a separate item, 'perceived ease of living and working in a rural area'.

Summary of self-concept

In childhood, during Ausubel's first crisis of ego development, the individual accepts as 'givens' the values and expectations of his/her societal elders, usually parents (Ausubel, 1954). These values are questioned, during a second crisis during adolescence and early adulthood. It was argued, above, that the struggle for an authentic belief structure persists throughout life, but, perhaps, at no time as acutely or painfully, as during adolescence and early adulthood.

This process of exploring and evaluating individual beliefs, often with a degree of angst, has been described as a series of "existential crises." It is not only what the individual believes that is then under investigation, but how these beliefs integrate and coalesce to form a socially acceptable, cohesive and internally consistent self-concept (Webster RS, 2004).

If this system of beliefs and values is continuously being challenged and reviewed, based on a broader framework proffered by society, it can be said to have some validity. Further, if it has internal consistency, that is, it is holistically congruent, even though some beliefs may change periodically, it will be reliable. These attributes will offer some stability for the individual, as he/she approaches vocational maturity.

Supported by such a belief system, the individual can explore the universe of occupational opportunities. Influenced, however, by a growing understanding of internal and external limitations (self-efficacy) (A Bandura, 1997), these opportunities will rapidly be narrowed down to a relative few. As Super writes,

Life-span, life-space theory conceptualises occupational choice as implementing a self-concept, work as a manifestation of selfhood, and career development as a continuing process of improving the match between self and situations (Donald E Super et al., 1996)¹⁴⁸.

Throughout medical school and postgraduate training, medical trainees, if given the impetus, will re-evaluate their career options. They will seek to authenticate their belief systems and will develop a holistic and integrated self-concept that is consistent with that of important referents from their own society. They will be circumscriptive as they seek to align the occupational role they have chosen with their self-concept. As their vocational maturity increases, and as limiting factors such as the availability of training posts in certain specialties become evident, they will compromise, excluding some of their preferred options.

Their desire to work in a rural environment is subject to influence from educators at these two levels. Circumscription occurs as the generic beliefs and attitudes that constitute the individual's self-concept are challenged through a process of existential crisis, and are thereby authenticated. This will enable them to decide on a career path that is 'right' for them and appropriate to the wishes of their salient referents. Role models can offer a template of beliefs for the individual to 'try on for size' and have the experience and knowledge to support the alignment of the individual's self-concept with a rural vocational role. The second level of influence, through the process of compromise, arises from an increased awareness of the intrinsic and extrinsic limitations to the successful achievement of the role (Funkenstein, 1978).

The pivotal roles played in career choice by self-concept and its moderator, self-efficacy have been discussed in this section. The next section discusses the role of the RIQ in evaluating the alignment of self-concept and vocational roles, and how it can inform the development, evaluation and improvement of educational programs that influence rural career choice.

Choosing a rural career: the alignment of self-concept and vocational roles

The RIQ estimates the intention, or self-direction, to choose a rural career. This self-direction is the end-point of the processes discussed in the previous section, where the authenticated self-

¹⁴⁸ Super 1996, p139

concept is aligned with the optimal vocational role, subject to the limitations imposed by self-efficacy. So the RIQ, whilst measuring the beliefs that underpin self-concept, seeks to estimate the career choice of the individual at a particular time. Changes in RIQ over time reflect advances in vocational maturity, as the respondent works toward an authenticated vocational self-concept that he/she will choose as a career.

A recent literature review concluded,

The literature suggests that there is little likelihood of being able to alter or manipulate career choice determinants intrinsic to medical graduates, such as the appeal that a particular discipline holds for the individual or the psychological needs that motivate them... On the other hand, extrinsic factors potentially allow for intervention (AMWAC, 2002)¹⁴⁹.

The foregoing discussion has outlined the mechanism of action of both intrinsic and extrinsic factors through the belief structure of the individual. The following discussion will expand on this, to offer some examples of how both intrinsic and extrinsic factors can be modified to increase the rural career choice likelihood of medical students and graduates. Three approaches to aiding the alignment of the individual's self-concept with a rural-based medical vocational role will be discussed. The utility of the RIQ, grounded in behavioural and vocational theory, as a 'snap shot' of this alignment will be considered, in relation to the evaluation of each of these approaches.

The selection of medical students

Post-graduate training streams in general practice are undersubscribed throughout Australia, despite one-third of places being filled with international medical graduates (IMGs) (Coote W, 2003). The situation for rural training posts is even worse. The crisis in rural health is not being adequately addressed by current means. Why then, do local graduates not choose generalist specialties, and choose not to work in a rural practice? Part of the problem lies in the selection process.

In 1978 Funkenstein reported on the career decision-making of Harvard medical graduates from 1958 to 1976. While this research is now dated, and many influences have changed, his observation that there are two broad categories of medical careers, the bioscientific and the biosocial, still stands (Funkenstein, 1978)¹⁵⁰. Each of these attracts students with different aspirations and attributes. He claimed, from his study, that bioscientific students were more interested in the basic sciences and sub-specialty practice. These students were more likely to be highly skilled in the pure sciences. The biosocial students were more likely to be attracted to a primary care specialty, such as general practice, general paediatrics or internal medicine. These students were interested in using the science of medicine to help people, but their primary focus was on helping people. They were more adept at interpersonal communication, and less likely to

¹⁴⁹ AMWAC 2002, p26

¹⁵⁰ Funkenstein 1978, p5

excel in the pure sciences. According to Funkenstein, these attributes are recognisable at entry into medical school.

As outlined in Section One, some effort has been made to select students into medical schools who are more likely to choose a rural career on graduation. Currently, medical students in Australia with a rural background have a preferential entry into some medical courses. Most, if not all medical course entry tests in Australia include the Undergraduate Medicine and Health Sciences Admission Test (UMAT), which tests for a broader range of skills and aptitudes than the ability to obtain an excellent grade in high school, resulting in a high Equivalent National Tertiary Entry Rank (ENTER). The ENTER is the major hurdle to entry into universities. Many Universities also use a semi-structured interview process in the selection of students, with an emphasis on interpersonal communication skills. Some, like Monash University, Australia, include a consumer on this interview panel.

Despite the interviews, UMAT and preferential treatment for rural students, the majority of candidates who are selected for medical school fall in the top 2-3% of the ENTER. In many Universities, it is also an entry requirement to have also obtained a 'reasonable' mark in Chemistry, or similar pure science subject. In order to achieve an ENTER of 98+, such a student would have needed an almost perfect score for Chemistry and is therefore more likely to have a bioscientific orientation than a biosocial orientation. Therefore, the selection process favours students who are less likely to choose a career in primary health care (Funkenstein, 1978)¹⁵¹ (Nieman, Holbert, & Bremer, 1986; Senf et al., 1997).

An insight into educational development may increase an understanding of this point. Biggs described three dimensions of learning (Lokan & Biggs, 1982), although he has subsequently reduced this to two (Biggs, Kember, & Leung, 2001). The superficial learner learns for fear of failure, and uses strategies such as rote learning to get by; the deep learner has an intrinsic interest in the subject matter and learns to maximise meaning; the achieving learner is motivated by the achievement of the highest mark, and strategically uses space and time effectively. The achieving learner uses both superficial and deep learning strategies, but learns for the sake of achieving the highest possible mark, not necessarily for an understanding of the subject matter (Biggs et al., 2001; Lokan & Biggs, 1982). The highest achievers use this approach as it results in the best ENTER. It is intuitive that an achieving approach will suit bioscientific students better, while a deep learning approach better suits the needs of biosocial students.

An Australian study showed that if the ENTER cut-off was 99, there would be no rural students selected, however, a cut-off of 90 would include the correct proportion of rural/urban students according to the number of applicants (Powis & Bristow, 1993). This was still only seven percent, far below a true reflection of the population distribution. In another study, the same

¹⁵¹ Funkenstein 1978 p8

authors found no correlation between excellence in a pure science subject and success in medical school, nor the need for such a high ENTER (Neame et al., 1992).

A large component of the income of medical faculties, and indeed of universities, is derived from bioscientific research, and a steady supply of high-achieving bioscientific medical graduates is therefore desirable. The extent to which this broader selection process is likely to be effective depends on government pressures and the social responsiveness of universities (Kamien M, Boelen C, & Heck JE, 1999). This approach, then, to select more students with a biosocial perspective and rural background, seeks to manipulate Funkenstein's intrinsic factors.

A recent study from the United Kingdom concluded that,

Relatively few doctors rejected general practice (GP) after giving it serious consideration...The decline [in interest in GP] must therefore represent an increase in the number of doctors who had never seriously considered it as a long-term career choice (Lambert, Davidson, Evans, & Goldacre, 2003).

This supports the premise that too few students are being selected who have an interest in general practice. The study refers to graduates, however, and it is likely that many who did have an interest on entry into medical school, moved away from a primary care career during the years at medical school. So, even if a more biosocial cohort were selected into medical schools, the culture within the schools (an extrinsic factor) is likely to favour the advancement of the more bioscientific among them (Block et al., 1996).

Nieman et al. found that students with a biosocial orientation were at an earlier stage of their career decision-making. This is consistent with Ausubel's theory, discussed above, which states that after the first ego crisis in childhood, the individual accepts the expectations and values of their elders. These are likely to be more aligned with a caring role. During the second crisis in adolescence, these values are questioned, changed and authenticated. At this stage, the influence of prestige and income, and of the medical school culture are likely to play a part. If students who enter medical school with a biosocial orientation have less vocational maturity, they may be more vulnerable to these influences. Lambert's findings suggest that the biosocial students who confirm their general practice orientation before graduation rarely reject it. This supports the important role played by programs that support the biosocial perspective at medical school. These programs represent extrinsic factors with a clear mode of action through the self-concept belief system, and will be further discussed in the next section.

So, the first approach to increasing rural medical output involves the selection of students who are more likely to eventually take up a rural career (Martini, Veloski, Barzansky, Xu, & Fields, 1994). Rabinowitz identified rural origin, generalist intention, rural intention, those who take up rural training posts and male gender as independent predictors of a rural choice (Rabinowitz et al., 2001). All except one are present at entry into medical school, and these characteristics can assist in the selection of medical students.

Similarly, this research has identified intention to seek additional undergraduate or postgraduate rural training and the perceived ease of living and working in the country (self-efficacy) as

additional predictors to rural intent. These, in addition to stated rural intent, stated generalist intent and years lived in the country form the Situational Expectation Score (SES) described in Chapter Ten. The SES is a useful instrument to aid in the selection of medical students, based on the proven predictors of rural recruitment.

It is especially important to be able to identify students with the appropriate attitudes toward and likelihood for a rural career for those medical school places that have been specifically created for rural students. While it is expected that students could easily claim to have the attributes required for a high SES, this current research has shown that the SES can be predicted by the RIQ. As it is easier for social desirability bias to have an effect through the SES than the RIQ, it is more valid to utilise elements of the RIQ in the selection process. Further, while the long RIQ2001 and the briefer RIQ2003 were both shown to be valid instruments, it is likely that a large bank of valid alternate items could be developed and tested, and a few of these used in any year. This would further help to prevent the understandably high risk of social desirability bias.

Adjusting self-concept to match rural careers

The second approach to increasing the number of graduates who consider themselves as potential rural medical practitioners has already been covered at some length in the discussion on self-concept. This involves the support of medical students with programs that may help them to 'confirm' a rural career if they already feel they are the sort of person who would be a good rural doctor. Students who are unsure and who are willing to challenge their current self-concept may be guided through a process of 'trying on different selves' as modelled by their rural mentors. Perhaps just as importantly, those students who are committed to choosing an urban career need not be made to feel besieged by their rural educators. This current research has shown that such pressure antagonises these students, and adds an overlay of guilt, irritability and anger toward rural careers (Chapter Sixteen).

As discussed, this approach should be facilitated by educators with an understanding of the concept of the 'existential crisis.' Increasing the knowledge about rural health services provision and the characteristics of a rural life, especially in small communities, forms a relatively small part of the student's personal and professional training. Successful rural GPs are well placed to provide this information and perspective, but are not likely to be trained in existential crisis management. It is not the acquisition of this knowledge, but what students do with it that is important (Webster RS, 2004). This knowledge informs the refinement of an authentic belief system, which enables the development of valid attitudes toward a rural career.

Programs such as the PSAP of Rabinowitz et al. (Rabinowitz et al., 2001) and the PRCC at Flinders University (Worley et al., 2000) increase retention times. They enable the authentication of the self-concept in a safe and structured environment prior to making a final career choice. In this way, issues that challenge one's self-efficacy are dealt with, enabling a more stable self-concept, and often, a greater duration before the vocational choice is again challenged.

This is also important for the committed urban students, who must be supported in their career choice. Not all students should be convinced that it is their destiny to live and work in a rural setting. Students should be given every opportunity to authenticate their own self-concept, and this often requires an active approach (Webster RS, 2004). It is clearly inappropriate to try to convince a student that he/she wants to work in the country when they really do not. If students inauthentically see themselves as rural, perhaps just because they have a rural background, and follow the rural training path, they are likely to remain in the country only for a short period. This leads to wasted opportunity costs, as these scarce rural programs could have been offered to more appropriate students.

The RIQ was shown to be a useful aid to the identification of students who fall into strong-rural, strong-urban and undecided/neutral sub-groups. This study also showed that students move from one sub-group to another, although mostly to adjacent sub-groups. This was based mainly on the Situational Intention Score (SIS), which was more sensitive to change than the SES. The RIQ was closely correlated with the SIS (and the SES) and offered meaning to the changes associated with rural programs. It was shown to be useful in tracking students with all levels of rural interest over the duration of several programs.

Programs designed to increase rural career choice are usually geared toward the generalist specialties, especially family medicine, as most of rural practice is in primary health care. If for no other reason, this is because there are not large hospitals in rural communities. Mentors and role models play an important part in the formation of self-efficacy beliefs. Therefore, if there is a perception that there is an antagonism to primary care career choice from within medical faculties, students will be negatively influenced.

According to the authors of a study of 2293 academics and students in the USA, reported in 1996, a major barrier to primary care career choice is the "professional prejudice" held by academics against the primary health care sector. Block and Feldman wrote,

...negativity toward primary care goes beyond benign professional rivalry and is deeply rooted in the culture of medicine...represents a barrier to primary care career choice and education and compromises the quality of professional life for primary care-oriented students, residents and faculty (Block et al., 1996).

Just as it is important to measure the effect of positive programs, the effect of negative programs needs also to be taken into account during the quality improvement cycle. The RIQ was shown to be capable of measuring negative effects as well as positive effects. This is a field for possible future research. When changes to the belief system underpinning intention are studied over the course of rural programs, the mode of action of these programs can be better identified. Positive effects can be reinforced, negative effects can be countered and better programs will be developed. The effects of poor role modelling and badmouthing can also be assessed. These analyses need not be restricted to programs seeking to increase the rural output of medical schools.

The selection of students and the effects of their education have been discussed, but it is likely that the current model of a primary care specialty in Australia will not be attractive to the majority of medical students. It is likely, based on studies of postgraduate rural general practice training posts, that this situation is worse in rural areas. The next section will look at the feasibility of restructuring of general practice to be more closely aligned with the aspirations and self-concepts of current medical students.

Adjusting careers to match self-concept

The third approach to increasing the number of graduates who choose a rural career is to better align the career opportunities offered in rural medical practice to the aspirations and expectations of the graduates. This falls clearly into the extrinsic factor construct discussed by Funkenstein (Funkenstein, 1978). While programs, have been put in place that seek to improve the attractiveness of rural practice, they are almost all targeted at the retention of incumbent rural doctors (see Chapter Two). A publication from research carried out during the production of this thesis has shown that the current generation of predominantly female students hold as important a different range of workplace and lifestyle issues to that held by the predominantly male rural GPs who are, on average, thirty years their senior (Somers et al., 2001). Programs designed to increase the retention of existing rural GPs may not resolve issues salient for the current generation of students.

Despite this, the three domains of experiential place integration described above were similar for students, graduates and experienced rural doctors, in both Australia and the USA (Burack et al., 1997; M. P. Cutchin, 1997; Silagy & Piterman, 1991; Somers et al., 2001). These were, generally speaking, 'personal', 'professional support' and 'community' issues, where 'community' was the rural generalist's equivalent of 'specialty content.' Nevertheless, as the process of authenticating the self-concept is such a personal one, the issues salient to the individual need to be addressed. Because these are often idiosyncratic, whole-of-cohort studies often fail to identify them (W. K. Davis, Bouhuijs, Dauphinee, McAvoy, & et al., 1990). It is therefore important to deal with the aspirations of individual students rather than of groups.

So, while several studies emphasise the importance of personality in career choice (Senf et al., 1997), this approach to self-concept/vocation alignment can be reversed. A redefinition of primary health care, including the role of the GP within this is required so that these vocational roles more closely match the personalities and aspirations of the current generation of medical students and graduates.

This first requires an assessment of what it is that influences generalist/specialist career choice. Much work has been done in this field all over the world (Chandarana, Loncke, & Conlon, 1989; Elebute, Pearson, & Kale, 1986; P. C. Pan, Lee, & Lieh-Mak, 1990; R. J. Pan et al., 1999; Tandeter & Granek-Catarivas, 2001; Velliet & Verbist, 1992). Most, however, emanates from the United States of America, where inadequate numbers candidates for the generalist

specialties, especially in rural areas, persist despite efforts over the past several decades (United States General Accounting Office, 2003).

The most commonly quoted issues include prestige, being at the cutting edge, intellectual stimulation, exciting workplace and colleagues, procedures (surgery) leadership, research opportunities, and respect from esteemed colleagues (M. A. Bowman, Haynes, Rivo, Killian, & Davis, 1996; DeForge, Richardson, & Stewart, 1993; DeWitt, Curtis, & Burke, 1998; Fincher, Lewis, & Jackson, 1994; Fox, Cole, & Lieberman, 1984; Lieu, Schroeder, & Altman, 1989; Lynch, Newton, Grayson, & Whitley, 1998; Newton, Grayson, & Whitley, 1998; Schubiner & Mullan, 1990; Solomon & DiPette, 1994). Disincentives for primary care included time demands, income, chronic conditions/patients, red tape, poor faculty acceptance, poor morale and unsatisfied role models (Del Mar, Freeman, & Van Weel, 2003; DeWitt et al., 1998; Oldroyd et al., 2003; Schwartz, Linzer, Babbott, Divine, & Broadhead, 1991).

While it may be that many of the established procedural rural GPs see their careers as exciting and full of challenge, it is possible that the same criteria for these descriptors are not salient for the 18-year old females entering medical school. It is in these early stages of the medical career, and even before entry to medical school, that vocational self-identity is being established. It is therefore imperative that these young high achievers be offered an exciting, prestigious and well-remunerated primary care career pathway to consider, if they are to match this with an authenticated self-concept. It is unlikely that the majority of medical students see the primary health career currently on offer as matching their aspirations, and a great deal of work would be required to remedy this. This need is supported by a recent study in the United States of America which concluded,

Solutions to rural health personnel problems can only be successfully addressed through multifaceted approaches. No vision of the future of rural health can come to fruition if it does not promote stable, rewarding, and fulfilling professional and personal lives for rural health care providers (Hart, Salsberg, Phillips, & Lishner, 2002).

This is a task for a concerted effort by a great many people, and well beyond the scope of this thesis. However, the RIQ offers insight into the aspirations of medical students and young graduates, and can equally be applied to established GPs. It can inform the development of new models of primary health care that will appeal to new and incumbent medical practitioners. Further, it may be useful as a tool to test any proposed new models of primary health care, as this necessary process of restructuring proceeds.

Summary of Chapter Eighteen

This Chapter addressed the third objective of this thesis. It discussed the importance of the belief structure of the individual as the basis for self-concept. The beliefs that are the determinants of intention to choose a rural career parallel closely those that form self-concept.

The Rural Intent Questionnaire (RIQ) measures these beliefs.

The process of career development involves the authentication of self-concept beliefs, and career maturity increases as the self-concept beliefs of the individual align with the beliefs that

define the optimal career for that individual, the vocational identity. Super described this as a process of "self-actualisation" (D.E. Super, 1963).

'Experiential place integration' was introduced as a process essential for sustainable recruitment of medical staff to rural area. Through an experience of rural life and work, individuals can authenticate their beliefs relating both to their understanding of the realities encountered, and to how they personally could or could not adapt to those conditions.

This discussion was extended to the theory of educational existential crisis, which espoused the deliberate but controlled creation of doubt within individuals. Educators would create a safe and informed environment within which students could reappraise their beliefs and thus, authenticate them. The outcome for rural medical educators may be similar to that of experiential place integration, as individuals develop an authenticated self-concept and vocational identity with respect to a rural career. As these align, career maturity develops.

The importance of self-efficacy in this process was highlighted (A Bandura, 1997). It is likely that positive role models exert their influence by showing how rural careers can be consistent with the personal requirements of the individual.

Chapter Eighteen then outlined three approaches to medical training that may increase the likelihood of graduates to work for some time in a rural environment. These are based on the principles of self-concept and career development presented in this chapter and their effectiveness can be measured with the RIQ.

Conclusion

The current approach to the rural medical workforce shortage seems based on research that has sought an association between certain programs and an increase in recruitment or retention. Much of this research fails to identify which component of the program, and in cases where several programs have been instituted concurrently, which program, has had the desired effect. There are many reasons for this, but one that is often cited is that this research is not based within a theoretical framework that allows an explanation for the associations observed (Meurer et al., 1996; Pathman, 1996; Pathman & Agnew, 1993; Pathman et al., 2002). This thesis has described the validity, reliability and psychometric characteristics of an instrument (RIQ) that is capable of measuring the intention of students and graduates to work in a rural environment. This instrument is based on the behavioural theories of Triandis (H.C. Triandis, 1971), and of Fishbein and Ajzen (Ajzen, 2002; Ajzen I, 2002; Ajzen I & Fishbein M, 1980). It is supported by the career development theories of Super (D.E. Super, 1963; Donald E Super et al., 1996), and Gottfredson (Gottfredson, 1996), the self-efficacy theory of Bandura (A Bandura, 1997), and the existential crisis theory of Webster (Webster RS, 2004). When used in the context of the self-concept and the vocational identity theoretical frameworks, it helps to explain the mechanism of action of the intrinsic and extrinsic influences on medical career choice described by Funkenstein (Funkenstein, 1978).

Chapter Eighteen outlined the importance of the alignment of self-concept with a vocational role identity. Medical educators must not only provide knowledge about career options and the issues related to them, but must seek to inform and influence the belief systems of their students. This will require students to be willing to take risks with their belief systems, highlighting the need for a safe environment and informed approach. These belief systems are the basis upon which career decisions are made and are subject to pressure from both intrinsic and extrinsic influences.

This approach to medical career choice is an important innovation, but is still at its developmental stage. This thesis offers an opening discussion and an instrument with which to further probe this fascinating field. Both have been developed only to the stage where they are worthy of scrutiny and critical analysis. They offer the foundation of a new but theory-based approach to a long-term problem that has been poorly understood and which remains resistant to resolution.

Bibliography

- Agnew CR. (1998). Modal versus individually-derived beliefs about condom use: measuring the cognitive underpinnings of the Theory of Reasoned Action. *Psychology and Health, 13*, 271-287.
- AIHW. (2002). *Australia's Health 2002*.
<http://www.aihw.gov.au/publications/index.cfm?type=detail&id=7637> (accessed 15-Sept-2003).
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior & Human Decision Processes, 50*(2), 179-211.
- Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology, 52*, 27-58.
- Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology, 32*(4), 665-683.
- Ajzen I. (2002, September 2002). *Constructing a TpB Questionnaire: Conceptual and methodological considerations*. Retrieved 02-09-2003, 2003, from <http://www-unix.oit.umass.edu/~aizen/pdf/tpb.measurement.pdf>
- Ajzen I, & Fishbein M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Ajzen, I., & Fishbein, M. (1969). The prediction of behavioral intentions in a choice situation. *Journal of Experimental Social Psychology 5*(4) 1969, 400-416 Academic Press, US.
- Ajzen, I., & Fishbein, M. (1970). The prediction of behavior from attitudinal and normative variables. *Journal of Experimental Social Psychology Vol 6*(4) Oct 1970, 466-487 Academic Press, US.
- Ajzen, I., & Fishbein, M. (1972). Attitudes and normative beliefs as factors influencing behavioral intentions. *Journal of Personality & Social Psychology Vol 21*(1) Jan 1972, 1-9 American Psychological Assn, US.
- Ajzen, I., & Fishbein, M. (1973). Attitudinal and normative variables as predictors of specific behavior. *Journal of Personality & Social Psychology Vol 27*(1) Jul 1973, 41-57 American Psychological Assn, US.
- Allport GW. (1935). Attitudes. In F. M (Ed.), *Readings in Attitude Theory and Measurement (1967)* (pp. 1-13). New York: Wiley.
- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1999). *Standards for educational and psychological testing*. Washington: American Educational Research Association.
- AMWAC. (2002). *Career decision making by doctors in their postgraduate years: A literature review. AMWAC Report 2002.1*. Sydney: Australian Medical Workforce Advisory Committee.
- AMWAC, & AIHW. (1997). *The characteristics of students entering Australian medical schools 1989 to 1997* (No. 1997.7). Sydney: Australian Medical Workforce Advisory Committee and Australian Institute of Health and Welfare.
- AMWAC, & AIHW. (1998). *Medical Workforce Supply and Demand in Australia: A discussion paper. AMWAC Report 1998.8*: Australian Medical Workforce Advisory Committee, Australian Institute of Health and Welfare.
- Anderson J. (31-10-2000). *Question time*. Paper presented at the Hansard p10279, House of Representatives, Canberra.
- Anderson J, & Wooldridge M. (2000). *Regional Health Strategy: More Doctors, Better Services*. In. Canberra: Department of Health and Aged Care, Commonwealth of Australia.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology, 40*(4), 471-499.
- Australian National Audit Office. (1997). *Audit Report No. 3. Program evaluation in the Australian public service*. Available at www.anao.gov.au/WebSite.nsf. Canberra: Australian National Audit Office.
- Ausubel, D. (1954). *Theory and problems of adolescent development*. New York: Grune & Stratton, Inc.

- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122-147.
- Bandura, A. (1997). *Self-efficacy: the exercise of control*. New York: W.H. Freeman.
- Basco, W. T., Jr., Buchbinder, S. B., Duggan, A. K., & Wilson, M. H. (1998). Associations between primary care-oriented practices in medical school admission and the practice intentions of matriculants. *Academic Medicine*, 73(11), 1207-1210.
- Battig, W. F. (1962). Parsimony in psychology. *Psychological Reports*, 11(2), 555-572.
- Betz N E. (1994). Self-concept theory in career development and counseling. *The Career Development Quarterly*, 43(1), 32.
- Biggs, J., Kember, D., & Leung, D. Y. (2001). The revised two-factor Study Process Questionnaire: R-SPQ-2F. *British Journal of Educational Psychology*, 71(1), 133-149.
- Block, S. D., Clark-Chiarelli, N., Peters, A. S., & Singer, J. D. (1996). Academia's chilly climate for primary care. *JAMA*, 276(9), 677-682.
- Blue, A. V., Donnelly, M. B., Harrell-Parr, P., Murphy-Spencer, A., Rubeck, R. F., & Jarecky, R. K. (1996). Developing generalists for Kentucky. *Journal of the Kentucky Medical Association*, 94(10), 439-445.
- Bowman, M. A., Haynes, R. A., Rivo, M. L., Killian, C. D., & Davis, P. H. (1996). Characteristics of medical students by level of interest in family practice.[comment]. *Family Medicine*, 28(10), 713-719.
- Bowman, R. C., & Penrod, J. D. (1998). Family practice residency programs and the graduation of rural family physicians. *Family Medicine*, 30(4), 288-292.
- Boyd, B., & Wandersman, A. (1991). Predicting undergraduate condom use with the Fishbein and Ajzen and the Triandis attitude-behavior models: Implications for public health interventions. *Journal of Applied Social Psychology*, 21(22), 1810-1830.
- Bridgeman P, & Davis G. (2000). *The Australian Policy Handbook* (2nd ed.). St Leonards: Allen & Unwin.
- Brown, I., & Inouye, D. K. (1978). Learned helplessness through modeling: The role of perceived similarity in competence. *Journal of Personality & Social Psychology*, 36(8), 900-908.
- Burack, J. H., Irby, D. M., Carline, J. D., Ambrozy, D. M., Ellsbury, K. E., & Stritter, F. T. (1997). A study of medical students' specialty-choice pathways: trying on possible selves. *Academic Medicine*, 72(6), 534-541.
- Campbell D T, & Fiske D W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56, 81-105.
- Carter, R. G. (1987). The relation between personal characteristics of physicians and practice location in Manitoba. *CMAJ Canadian Medical Association Journal*, 136(4), 366-368.
- Chandarana, P. C., Loncke, M., & Conlon, P. (1989). Factors influencing medical students' intentions to choose psychiatry as a career. *Canadian Journal of Psychiatry - Revue Canadienne de Psychiatrie*, 34(5), 425-429.
- Clarke, L. (1989). *An analysis of the health status of rural people*. Paper presented at the Crisis in Rural Health and Welfare: Myth or Reality?, Charles Sturt University, Riverina.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*.: Erlbaum.
- Colditz, G. A., & Munro, J. G. (1980). Voluntary attachments of preclinical medical students to rural practitioners in Queensland. *Medical Education*, 14(2), 130-135.
- Commonwealth Dept. of Health and Aged Care. (2000). *Policy Framework. Commonwealth Regional Health Services Program*. Canberra: Commonwealth Department of Health and Aged Care.
- Comrey, A. L. (1988). Factor-analytic methods of scale development in personality and clinical psychology. *Journal of Consulting & Clinical Psychology*, 56(5), 754-761.
- Converse J, & Presser S. (1986). *Survey questions: handcrafting the standardized questionnaire*. Beverley Hills CA: Sage.
- Coote W. (2003, 11-12 July, 2003). *The Australian Graduate Doctor Supply: GPET*. Paper presented at the Rural Workforce Agency Victoria Statewide Forum, Carlton, Victoria. Australia.
- Coyte, P. C., Catz, M., & Stricker, M. (1997). Distribution of physicians in Ontario. Where are there too few or too many family physicians and general practitioners?[comment]. *Canadian Family Physician*, 43, 677-683, 733.

- Cronbach LJ. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334.
- Culhane, A., Kamien, M., & Ward, A. (1993). The contribution of the undergraduate rural attachment to the learning of basic practical and emergency procedural skills. *Medical Journal of Australia*, 159(7), 450-452.
- Cutchin, M. P. (1997). Community and self: Concepts for rural physician integration and retention. *Social Science & Medicine*, 44(11), 1661-1674.
- Cutchin, M. P. (1997). Physician retention in rural communities: the perspective of experiential place integration. *Health & Place*, 3(1), 25-41.
- Davidson AR, Jaccarand JJ, Triandis HC, Morales ML, & Diaz-Guerrero R. (1986). Cross-cultural model testing: towards a solution of the etic-emic dilemma. *International J Psychology*, 11(1), 1-13.
- Davies, P. (1994). A comparison of rural and non rural RACGP training program trainees. Royal Australian College of General Practice. *Australian Family Physician*, 23(7), 1330-1333, 1336.
- Davis, F. D., & Warshaw, P. R. (1992). What do intention scales measure? *Journal of General Psychology*, 119(4), 391-407.
- Davis, W. K., Bouhuijs, P. A., Dauphinee, W., McAvoy, P. A., & et al. (1990). Medical career choice: Current status of research literature. *Teaching & Learning in Medicine*, 2(3), 130-138.
- Dawes RM. (1972). *Fundamentals of Attitude Measurement*. New York: John Wiley & Sons.
- De Vaus DA. (1995). *Surveys in social research* (4th ed.). St Leonards: Allen and Unwin.
- DeForge, B. R., Richardson, J. P., & Stewart, D. L. (1993). Attitudes of graduating seniors at one medical school toward family practice.[comment]. *Family Medicine*, 25(2), 111-113.
- Del Mar, C. B., Freeman, G. K., & Van Weel, C. (2003). "Only a GP?": is the solution to the general practice crisis intellectual? *Medical Journal of Australia*, 179(1), 26-29.
- Dempsey, P., Wilson, D., Taylor, A., & Wilkinson, D. (2003). Self-reported patterns of health services utilisation: an urban-rural comparison in South Australia. *Australian Journal of Rural Health*, 11(2), 81-88.
- Department of Finance. (1994). *Doing Evaluations: a Practical Guide*. Canberra: Australian Government Printing Service.
- Department of Primary Industries and Energy & Department of Human Services and Health. (1994). *Rural, remote and metropolitan areas classification: 1991 census edition*. Canberra: Australian Government Printing Service.
- DeVellis RF (Ed.). (1991). *Scale development: theory and applications* (Vol. 26). Newbury Park, California: Sage Publications.
- DeWitt, D. E., Curtis, J. R., & Burke, W. (1998). What influences career choices among graduates of a primary care training program? *Journal of General Internal Medicine*, 13(4), 257-261.
- Doolan, T. (1997). Foreword. In *Prospectus; Australian College of Rural and Remote Medicine*. (pp. iv). Brisbane: Australian College of Rural and Remote Medicine.
- Easterbrook, M., Godwin, M., Wilson, R., Hodgetts, G., Brown, G., Pong, R., et al. (1999). Rural background and clinical rural rotations during medical training: effect on practice location.[comment]. *CMAJ Canadian Medical Association Journal*, 160(8), 1159-1163.
- Elebute, O., Pearson, C. A., & Kale, O. A. (1986). Choice of general practice for postgraduate training among medical graduates and undergraduates in Nigeria. *Medical Education*, 20(4), 349-353.
- Epstein, R. (1984). The principle of parsimony and some applications in psychology. *Journal of Mind & Behavior*, 5(2), 119-130.
- Fatovich, B. (1991). General practitioners' views of students: students' views of general practitioners. *Medical Journal of Australia*, 155(4), 249-251.
- Fazio RH, & Zanna MP. (1981). Direct experience and attitude-behavior consistency. In *Advances in Experimental Social Psychology* (Vol. 14, pp. 161-202): Academic Press.
- Feeley, T. H. (2003). Using the theory of reasoned action to model retention in rural primary care physicians. *Journal of Rural Health*, 19(3), 245-251.

- Ferguson, E. (1996). Predictors of future behaviour: A review of the psychological literature on blood donation. *British Journal of Health Psychology*, 1(Part 4), 287-308.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, California: Stanford University Press.
- Fincher, R. M., Lewis, L. A., & Jackson, T. W. (1994). Why students choose a primary care or nonprimary care career. The Specialty Choice Study Group.[comment]. *American Journal of Medicine*, 97(5), 410-417.
- Fishbein M, & Ajzen I. (1975). *Belief, attitude, intention and behavior*. Reading Mass.: Addison-Wesley.
- Five Year Curriculum Committee. (2003). *Five-Year MBBS: Study Guide. Rural Attachment*. Melbourne: Monash University, Faculty of Medicine, Nursing and Health Sciences.
- Fortune, R., & Dimino, M. J. (1998). Educating medical students for Alaska. *International Journal of Circumpolar Health*, 57(Suppl 1), 79-82.
- Fox, T. G., Cole, D. R., & Lieberman, J. A., 3rd. (1984). Three generations of family medicine: a comparison of social identities. *Social Science & Medicine*, 18(6), 481-486.
- Fromm B, Konen JC, & Bosca RB. (1985). Exposures leading to the selection of family medicine and rural practice. *Fam Pract Res J*, 5, 127-136.
- Funkenstein, D. (1978). *Medical students, medical schools, and society during five eras: factors affecting the carer choice of physicians, 1958-1976*. Cambridge, Massachusetts: Balinger.
- Gale, R., & Grant, J. (2002). Sci45: the development of a specialty choice inventory. *Medical Education*, 36(7), 659-666.
- General Practice Strategy Review Group. (1998). *General Practice: Changing the future through partnerships*. Canberra: Commonwealth Department of Health and Family Services.
- Giles M, & Rea A. (1999). Career self-efficacy: An application of the theory of planned behaviour. *Journal of Occupational and Organizational Psychology*, 72(3), 393-398.
- Gill, D., & Tonks, J. (1996). Paddock to campus: rural high school and medical undergraduate programs in South Australia. *Australian Journal of Rural Health*, 4(2), 111-116.
- Glasser, M., Sarnowski, A., Jr., & Sheth, B. (1982). Career choices from medical school to practice: findings from a regional clinical education site. *Journal of Medical Education*, 57(6), 442-448.
- Godin, G., & Gionet, N. J. (1991). Determinants of an intention to exercise of an electric power commission's employees. *Ergonomics*, 34(9), 1221-1230.
- Godin, G., Maticka Tyndale, E., Adrien, A., Manson Singer, S., & et al. (1996). Cross-cultural testing of three social cognitive theories: An application to condom use. *Journal of Applied Social Psychology*, 26(17), 1556-1586.
- Gottfredson, L. S. (1996). Gottfredson's theory of circumscription and compromise. In Brown, Duane; Brooks, Linda (1996) *Career choice and development (3rd ed) The Jossey-Bass management series and The Jossey-Bass social and behavioral science series (pp 179-232) xviii, 544pp (3rd ed.)*.
- Gravelle, H., & Sutton, M. (2001). Inequality in the geographical distribution of general practitioners in England and Wales 1974-1995. *Journal of Health Services & Research Policy*, 6(1), 6-13.
- Grayson, M. S., Newton, D. A., & Whitley, T. W. (1996). First-year medical students' knowledge of and attitudes toward primary care careers. *Family Medicine*, 28(5), 337-342.
- Hart, L. G., Salsberg, E., Phillips, D. M., & Lishner, D. M. (2002). Rural health care providers in the United States. *Journal of Rural Health*, 18(Suppl), 211-232.
- Hays RB, Nichols A, Wise A, Adkins P, Craig M, & Mahoney M. (1995). Choosing a rural practice in Queensland. *Aust J. Rural Health*, 3(4), 171-174.
- Hays, R. B., Veitch, P. C., Cheers, B., & Crossland, L. (1997). Why doctors leave rural practice. *Australian Journal of Rural Health*, 5(4), 198-203.
- Health Workforce Unit. (2002). Responsibilities of the Health Workforce Unit. Canberra, Available (26 Sept 2003) at <http://www.health.gov.au/workforce/index.htm>: Commonwealth Department of Health and Ageing.

- Hickner, J. M. (1991). Training for rural practice in Australia 1990. *Medical Journal of Australia*, 154(2), 111-118.
- Humphreys, J. S. (2000). Health and the 1999 Regional Australia Summit. *Australian Journal of Rural Health*, 8(1), 52-57.
- Humphreys JS, & Rolley F. (1991). *Health and health care in rural Australia*. Armidale NSW: Dept. of Geography and planning University of New England.
- Johnston, G., & Wilkinson, D. (2001). Increasingly inequitable distribution of general practitioners in Australia, 1986-96. *Australian & New Zealand Journal of Public Health*, 25(1), 66-70.
- Kamien, B. A., Bassiri, M., & Kamien, M. (1999). Doctors badmouthing each other. Does it affect medical students' career choices?[comment]. *Australian Family Physician.*, 28(6), 576-579.
- Kamien, M. (1996a). A comparison of medical student experiences in rural specialty and metropolitan teaching hospital practice. *Australian Journal of Rural Health*, 4(3), 151-158.
- Kamien, M. (1996b). Rural student clubs and the social responsibility of medical schools. *Australian Journal of Rural Health*, 4(4), 237-241.
- Kamien M. (1987). *Report of the Ministerial Inquiry into the Recruitment and retention of Country Doctors in Western Australia*. Perth: Western Australian Health Department.
- Kamien M. (1998). Staying or leaving rural practice: 1996 outcomes of rural doctors' 1986 intentions. *Med J Aust*, 169(6), 318-321.
- Kamien M, Boelen C, & Heck JE. (1999). Measuring the social responsiveness of medical schools. *Education for Health*, 12(1), 9-19.
- Kanagarajah, S., Page, J. H., & Heller, R. F. (1996). Changes in job aspirations during physician training in Australia. *Australian & New Zealand Journal of Medicine.*, 26(5), 652-657.
- Kassebaum, D. G., & Szenas, P. L. (1995). Specialty intentions of 1995 U.S. medical school graduates and patterns of generalist career choice and decision making.[comment]. *Academic Medicine.*, 70(12), 1152-1157.
- Kassebaum, D. G., Szenas, P. L., & Schuchert, M. K. (1996). Determinants of the generalist career intentions of 1995 graduating medical students.[comment]. *Academic Medicine.*, 71(2), 198-209.
- Lambert, T. W., Davidson, J. M., Evans, J., & Goldacre, M. J. (2003). Doctors' reasons for rejecting initial choices of specialties as long-term careers.[comment]. *Medical Education.*, 37(4), 312-318.
- Laven, G. A., Beilby, J. J., Wilkinson, D., & McElroy, H. J. (2003). Factors associated with rural practice among Australian-trained general practitioners. *Medical Journal of Australia*, 179(2), 75-79.
- Lieu, T. A., Schroeder, S. A., & Altman, D. F. (1989). Specialty choices at one medical school: recent trends and analysis of predictive factors. *Academic Medicine.*, 64(10), 622-629.
- Lokan, J. J., & Biggs, J. B. (1982). Student characteristics and motivational and process factors in relation to styles of career development. *Journal of Vocational Behavior*, 21(1), 1-16.
- Lokan, J. J., Boss, M. W., & Patsula, P. J. (1982). A study of vocational maturity during adolescence and locus of control. *Journal of Vocational Behavior*, 20(3), 331-342.
- Lynch, D. C., Newton, D. A., Grayson, M. S., & Whitley, T. W. (1998). Influence of medical school on medical students' opinions about primary care practice. *Academic Medicine.*, 73(4), 433-435.
- Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. *Personality & Social Psychology Bulletin*, 18(1), 3-9.
- Makkai T. (1995). *Origins and destinations: Geographical mobility of medical practitioners from 1996 till 1993*. Canberra: Australian National University.
- Manstead A S. (1995). Evaluating and extending the theory of planned behaviour. In Stroebe W & Hewstone M (Eds.), *European Review of social psychology* (Vol. 6, pp. 69 - 95): John Wiley & Sons.
- Martini, C. J., Veloski, J. J., Barzansky, B., Xu, G., & Fields, S. K. (1994). Medical school and student characteristics that influence choosing a generalist career. *JAMA*, 272(9), 661-668.

- McInerney, D. M. (1990). The determinants of motivation for urban Aboriginal students: A cross-cultural analysis. *Journal of Cross Cultural Psychology*, 21(4), 474-495.
- McInerney, D. M. (1991). The Behavioral Intentions Questionnaire: An examination of face and etic validity in an educational setting. *Journal of Cross Cultural Psychology*, 22(2), 293-306.
- Meurer, L. N., Bland, C. J., & Maldonado, G. (1996). The state of the literature on primary care specialty choice: where do we go from here? *Academic Medicine*, 71(1), 68-77.
- Musham, C., & Chessman, A. (1994). Changes in medical students' perceptions of family practice resulting from a required clerkship.[comment]. *Family Medicine*, 26(8), 500-503.
- Neame, R. L., Powis, D. A., & Bristow, T. (1992). Should medical students be selected only from recent school-leavers who have studied science? *Medical Education*, 26(6), 433-440.
- Neill, J., & Taylor, K. (2002). Undergraduate nursing students' clinical experiences in rural and remote areas: recruitment implications. *Australian Journal of Rural Health*, 10(5), 239-243.
- Newton, D. A., Grayson, M. S., & Whitley, T. W. (1998). What predicts medical student career choice? *Journal of General Internal Medicine*, 13(3), 200-203.
- Nieman, L. Z., Holbert, D., & Bremer, C. C. (1986). Career preferences and decision-making habits of first-year medical students. *Journal of Medical Education*, 61(8), 644-653.
- Norman, G. (2002). Research in medical education: three decades of progress. *BMJ*, 324(7353), 1560-1562.
- Norman, G. (2003). RCT = results confounded and trivial: the perils of grand educational experiments.[comment]. *Medical Education*, 37(7), 582-584.
- Nunnally JC. (1970). *Introduction to psychological measurement*. (International Student Edition ed.). New York: McGraw-Hill.
- Nunnally JC. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Oldroyd, J., Proudfoot, J., Infante, F. A., Powell Davies, G., Bubner, T., Holton, C., et al. (2003). Providing healthcare for people with chronic illness: the views of Australian GPs.[see comment]. *Medical Journal of Australia*, 179(1), 30-33.
- Oppenheim AN. (2000). *Questionnaire design, interviewing and attitude measurement (new edition)*. London: Pinter Publishers Ltd.
- Pallant, J. (1998). *Development and evaluation of a multidimensional, multidomain inventory to measure perceived control of internal states*. Unpublished PhD, Monash University (PhD thesis), Melbourne.
- Pallant, J. (2001). *SPSS Survival Manual. A step by step guide to data analysis using SPSS*. Crows Nest. New South Wales: Allen and Unwin.
- Pan, P. C., Lee, P. W., & Lieh-Mak, F. F. (1990). Psychiatry as compared to other career choices: a survey of medical students in Hong Kong. *Medical Education*, 24(3), 251-257.
- Pan, R. J., Clark-Chiarelli, N., Peters, A. S., & Block, S. D. (1999). Intention to practice primary care by pediatric residents: nature or nurture? *Clinical Pediatrics*, 38(8), 473-479.
- Pathman, D. E. (1996). Medical education and physicians' career choices: are we taking credit beyond our due?[comment]. *Academic Medicine*, 71(9), 963-968.
- Pathman, D. E., & Agnew, C. R. (1993). Querying physicians' beliefs in career choice studies: the limitations of introspective causal reports.[comment]. *Family Medicine*, 25(3), 203-207.
- Pathman, D. E., Konrad, T. R., & Agnew, C. R. (2003). Predictive accuracy of rural physicians' stated retention plans. *Journal of Rural Health*, 19(3), 236-244.
- Pathman, D. E., Konrad, T. R., Williams, E. S., Scheckler, W. E., Linzer, M., Douglas, J., et al. (2002). Physician job satisfaction, dissatisfaction, and turnover. *Journal of Family Practice*, 51(7), 593.
- Pathman, D. E., Steiner, B. D., Jones, B. D., & Konrad, T. R. (1999). Preparing and retaining rural physicians through medical education. *Academic Medicine*, 74(7), 810-820.
- Portfolio Budget Statements 1999-2000. (1999). *Outcome 5: Rural Health Care. Budget Related Paper No. 1.11*. Canberra: Federal Department of Health and Aged Care.

- Powis, D. A., & Bristow, T. (1993). Improving access to medical courses in Australia for students from geographically isolated areas. *Medical Journal of Australia*, 159(6), 429.
- Practice Incentives Program. (1999). *An Outline of the Practice Incentives Program*. Canberra: Health Insurance Commission.
- Rabinowitz, H. K. (1988a). Evaluation of a selective medical school admissions policy to increase the number of family physicians in rural and underserved areas. *New England Journal of Medicine*, 319(8), 480-486.
- Rabinowitz, H. K. (1988b). The relationship between medical student career choice and a required third-year family practice clerkship. *Family Medicine*, 20(2), 118-121.
- Rabinowitz, H. K. (1990). The change in specialty preference by medical students over time: an analysis of students who prefer family medicine. *Family Medicine*, 22(1), 62-63.
- Rabinowitz, H. K. (1993). Recruitment, retention, and follow-up of graduates of a program to increase the number of family physicians in rural and underserved areas.[comment]. *New England Journal of Medicine*, 328(13), 934-939.
- Rabinowitz, H. K. (1999). The role of the medical school admission process in the production of generalist physicians. *Academic Medicine*, 74(1 Suppl), S39-44.
- Rabinowitz HK, Diamond JJ, Veloski JJ, & JA., G. (2000). The impact of multiple predictors on generalist physicians' care of underserved populations. *Am J Public Health*, 90(8), 1225-1228.
- Rabinowitz, H. K., Diamond, J. J., Hojat, M., & Hazelwood, C. E. (1999). Demographic, educational and economic factors related to recruitment and retention of physicians in rural Pennsylvania.[comment]. *Journal of Rural Health*, 15(2), 212-218.
- Rabinowitz, H. K., Diamond, J. J., Markham, F. W., & Hazelwood, C. E. (1999). A program to increase the number of family physicians in rural and underserved areas: impact after 22 years. *JAMA*, 281(3), 255-260.
- Rabinowitz, H. K., Diamond, J. J., Markham, F. W., & Paynter, N. P. (2001). Critical factors for designing programs to increase the supply and retention of rural primary care physicians. *JAMA*, 286(9), 1041-1048.
- Rabinowitz, H. K., Xu, G., Veloski, J. J., Rattner, S. L., Robeson, M. R., Hojat, M., et al. (2000). Choice of first-year residency position and long-term generalist career choices. *JAMA*, 284(9), 1081-1082.
- RACGP. (2000). *The Royal Australian College of General Practitioners Training Program Handbook 2000*. Melbourne: RACGP.
- Randall, D. M., & Wolff, J. A. (1994). The time interval in the intention-behaviour relationship: Meta-analysis. *British Journal of Social Psychology*, 33(4), 405-418.
- Reid M, & Solomon S. (1992). *Improving Australia's rural health and aged care services. Chapter 3: Community classification and service description*. Canberra: Department of Health Housing and Community Services.
- Review of General Practice Training. (1998). *General Practice Training: The way forward*. Canberra: General Practice Branch, Commonwealth Department of Health and Family Services.
- Ricketts C, Johnson-Webb KD, & Taylor P. (1998). *Definitions of Rural: A Handbook for Health Policy Makers and Researchers*. Retrieved Nov. 2003, from www.shepscenter.unc.edu/research_programs/rural_program/wp.html
- Rolfe, I. E., Pearson, S. A., O'Connell, D. L., & Dickinson, J. A. (1995). Finding solutions to the rural doctor shortage: the roles of selection versus undergraduate medical education at Newcastle. *Australian & New Zealand Journal of Medicine*, 25(5), 512-517.
- Royal Australian College of General Practitioners. (1997). *The Advanced Rural Skills Curriculum*. South Melbourne: Royal Australian College of General Practitioners.
- Rucker, L., Morgan, C., Ward, K. E., & Bell, B. M. (1991). Impact of an ambulatory care clerkship on the attitudes of students from five classes (1985-1989) toward primary care. *Academic Medicine*, 66(10), 620-622.
- Rural Undergraduate Steering Committee. (1998a). *The Current State of Undergraduate medical education for rural practice*. Canberra: Comm. Dept. of Health and Family Services.

- Rural Undergraduate Steering Committee. (1998b, July, 1998). *Report of the Third National Undergraduate Rural Health and Curriculum Conference*. Paper presented at the Third National Undergraduate Rural Health and Curriculum Conference, Philip Island.
- Rural Workforce Agency of Victoria. (2002). *RWAV Annual GP and Practice survey: 2002*. Melbourne: Rural Workforce Agency Victoria.
- Schieberl, J. L., Covell, R. M., Berry, C., & Anderson, J. (1996). Factors associated with choosing a primary care career. *Western Journal of Medicine*, 164(6), 492-496.
- Schubiner, H., & Mullan, P. (1990). Medical student interest in combined internal medicine-pediatrics. *Journal of General Internal Medicine*, 5(3), 225-228.
- Schwartz, M. D., Linzer, M., Babbott, D., Divine, G. W., & Broadhead, E. (1991). Medical student interest in internal medicine. Initial report of the Society of General Internal Medicine Interest Group Survey on Factors Influencing Career Choice in Internal Medicine. *Annals of Internal Medicine*, 114(1), 6-15.
- Schwarz, M. R. (1979). The WAMI program: a progress report. *Western Journal of Medicine*, 130(4), 384-390.
- Senf, J. H., Campos-Outcalt, D., Watkins, A. J., Bastacky, S., & Killian, C. (1997). A systematic analysis of how medical school characteristics relate to graduates' choices of primary care specialties. *Academic Medicine*, 72(6), 524-533.
- Shadish WR, Cook TD, & Campbell DT. (2002). *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. Boston: Houghton Mifflin.
- Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1988). The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research*, 15(3), 325-343.
- Silagy, C. A., & Piterman, L. (1991). Attitudes of senior medical students from two Australian schools towards rural training and practice. *Academic Medicine*, 66(7), 417-419.
- Solomon, D. J., & DiPette, D. J. (1994). Specialty choice among students entering the fourth year of medical school. *American Journal of the Medical Sciences*, 308(5), 284-288.
- Somers GT, & Strasser R. (2002, 30 April 2002). *Do rural mentors, rural undergraduate clubs and rural rotations increase the medical student's intention to practise in the country?* Paper presented at the The Australian College of Rural and Remote Medicine Scientific Forum, Melbourne.
- Somers GT, Young AE, & Strasser R. (2001). *The medical student's intention to practice in rural Australia: a questionnaire*, from <http://www.ruralhealth.org.au/sixthconf>
- Somers, G. T., Young, A. E., & Strasser, R. (2001). Rural career choice issues as reported by first year medical students and rural general practitioners. *Australian Journal of Rural Health*, 9(Suppl 1), S6-13.
- South Australian Health Commission, Royal Australian College of General Practitioners (SA), & Australian Medical Association (SA). (1992). *Review of general medical practice in South Australia. Third report: country general practice*. Adelaide: South Australian Health Commission, Royal Australian College of General Practitioners(SA) Australian Medical Association(SA).
- SPSS. (2002). SPSS for Windows: Release 11.5.0: LEAD Technologies Inc.
- Strasser R. (1992). *A study of the attitudes of Victorian rural General Practitioners to country practice and training*. Melbourne: Department of Community Medicine Monash University.
- Strasser R. (1997). *Models of rural practice: Keynote address*. Paper presented at the Second World Rural Health Congress, Durban, South Africa.
- Strasser R, Hays R, Kamien M, & Carson D. (1997). *National rural general practice study*. Moe: Monash University Centre for Rural Health.
- Strasser, R. P., Hays, R. B., Kamien, M., & Carson, D. (2000). Is Australian rural practice changing? Findings from the National Rural General Practice Study. *Australian Journal of Rural Health*, 8(4), 222-226.
- Streiner DL, & Norman GR. (1995). *Health measurement Scales: a practical guide to their development and use*. New York: Oxford University Press.
- Super, D. E. (Ed.). (1963). *Self-concepts in vocational development*. New York: College Entrance Examination Board.

- Super, D. E., Savickas, M. L., & Super, C. M. (1996). A life-span, life-space approach to career development. In *Brown, Duane; Brooks, Linda (1996) Career choice and development (3rd ed) The Jossey-Bass management series and The Jossey-Bass social and behavioral science series (pp 121-178) xviii, 544pp (3rd ed.)*. San Francisco: Jossey-Bass Inc.
- Tabachnick BG, & Fidell LS. (2001). *Using multivariate statistics* (Fourth ed.). Needham Heights: Allyn and Bacon.
- Tandeter, H., & Granek-Catarivas, M. (2001). Choosing primary care? Influences of medical school curricula on career pathways. *Israel Medical Association Journal: Imaj.*, 3(12), 969-972.
- Taylor, K. M. (1982). An investigation of vocational indecision in college students: Correlates and moderators. *Journal of Vocational Behavior*, 21(3), 318-329.
- Todd R, Sibthorpe B, & Todd C. (1998). *Profile of Divisions of General Practice: 1995/96*. Canberra: National Centre for Epidemiology and Population Health.
- Triandis H. (1977). *Interpersonal Behavior*. Monterey CA: Brooks/Cole.
- Triandis, H. C. (1971). *Attitude and attitude change*. New York: John Wiley & Sons Inc.
- Triandis, H. C. (1972). *The analysis of subjective culture*. New York: Wiley-Interscience.
- Triandis, H. C. (1994). *Culture and social behavior*. New York: McGraw-Hill.
- United States General Accounting Office. (2003). *Physician Workforce: Physician supply increased in metropolitan and nonmetropolitan areas but geographic disparities persisted*. Washington DC: Committee on Health, Education, Labor and Pensions, US Senate.
- Valois, P., Desharnais, R., & Godin, G. (1988). A comparison of the Fishbein and Ajzen and the Triandis attitudinal models for the prediction of exercise intention and behavior. *Journal of Behavioral Medicine*, 11(5), 459-472.
- Velliet, C., & Verbist, J. P. (1992). [Medical students facing their future career: a survey in Lille]. *Cahiers de Sociologie et de Demographie Medicales.*, 32(1), 79-110.
- Verby, J. E., Newell, J. P., Andresen, S. A., & Swentko, W. M. (1991). Changing the medical school curriculum to improve patient access to primary care. *JAMA*, 266(1), 110-113.
- Warshaw, P. R., & Davis, F. D. (1985a). The accuracy of behavioral intention versus behavioral expectation for predicting behavioral goals. *Journal of Psychology*, 119(6), 599-602.
- Warshaw, P. R., & Davis, F. D. (1985b). Disentangling behavioral intention and behavioral expectation. *Journal of Experimental Social Psychology*, 21(3), 213-228.
- Watson D, Clark LA, & Tellegen A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.
- Wearne, S. M., & Wakerman, J. (2004). Training our future rural medical workforce.[comment]. *Medical Journal of Australia*, 180(3), 101-102.
- Webster RS. (2004). Changing pre-service teachers' purposes of education through existential crises. *Australian Journal of Education*, 48(1), 82-94.
- Weller, S. C., & Romney, A. K. (1988). *Systematic data collection: (1988)*. 96pp.
- Wiers-Jensen, J., & Aasland, O. G. (1999). [Changes in career plans of medical students during the first half of medical school]. *Tidsskrift for Den Norske Laegeforening.*, 119(19), 2858-2864.
- Wilkinson, D., Beilby, J. J., Thompson, D. J., Laven, G. A., Chamberlain, N. L., & Laurence, C. O. (2000). Associations between rural background and where South Australian general practitioners work. *Medical Journal of Australia*, 173(3), 137-140.
- Wilkinson, D., Laven, G., Pratt, N., & Beilby, J. (2003). Impact of undergraduate and postgraduate rural training, and medical school entry criteria on rural practice among Australian general practitioners: national study of 2414 doctors. *Medical Education*, 37(9), 809-814.
- Willis E. (1995). *The sociological quest: an introduction to the study of social life* (2nd ed.). St Leonards. NSW: Allen & Unwin Pty Ltd.
- Woloschuk, W., & Tarrant, M. (2002). Does a rural educational experience influence students' likelihood of rural practice? Impact of student background and gender. *Medical Education*, 36(3), 241-247.

- WONCA. (1995). *Wonca Policy on Training for Rural Practice*. Traralgon Vic.: Monash University School of Rural Health.
- WONCA. (2002). *Melbourne Manifesto*. Paper presented at the 5th Wonca World Rural Health Conference, Melbourne, Australia.
- Wonca Working Party on Rural Practice. (2001). *Policy on Rural Practice and Rural Health*. Traralgon, Victoria: Monash University School of Rural Health.
- Wooldridge M. (2000, 11/11/00). Rural Health Plan. *Herald Sun* p50.
- Wooldridge M. (2001). *Budget 2001 - 2001 Fact Sheet. Building on the Regional Health Strategy*. Available at: www.ruralhealth.gov.au/policy/budget.htm Accessed 26 Sept. 2003. Canberra: Commonwealth Department of Health and Aged Care.
- Worley, P., Silagy, C., Prideaux, D., Newble, D., & Jones, A. (2000). The parallel rural community curriculum: an integrated clinical curriculum based in rural general practice.[comment]. *Medical Education.*, 34(7), 558-565.
- Yang, B., Blunt, A., & Butler, R. S. (1994). Prediction of participation in continuing professional education: A test of two behavioral intention models. *Adult Education Quarterly*, 44(2), 83-96.

Appendix One

The RIQ2000

Explanatory Statement (Page 2)

You have been allocated a code number which we ask you to enter on Page 1. Only the researchers will have access to the code. It is likely that there will be at least one follow-up questionnaire in future years. The code will enable us to match future responses whilst assuring individual anonymity. The code list will be kept secure by the Manager of the Centre for Rural Health for the duration of the study. This work may be published in academic journals, as well as in the Masters/PhD theses, but only collective results will be considered. Individual results will not be identifiable.

A group of you has volunteered to discuss strengths and weaknesses in the questionnaire, to test its validity and reliability, and to enable improvement. If you would like to share your thoughts on the survey, or if you have any queries, please contact me directly.

Once again, may we express our sincere thanks for your support and effort.

Dr. George T. Somers

(Student researcher)

Emerald Medical Centre, Murphys Way

Emerald Victoria 3782

Prof. Roger Strasser

Monash University

Centre for Rural Health

A/Prof. Marilyn Liddell

Chair, Evaluation S/C

5Yr Curriculum Committee

[Redacted]

Should you have any complaint concerning the manner in which this research (Project No:2000/427) is conducted, please do not hesitate to contact The Standing Committee on Ethics in Research Involving Humans at the following address:

The Secretary,

The Standing Committee on Ethics in Research Involving Humans

PO Box 3A.

Monash University.

Victoria 3800

[Redacted]

**Questionnaire:
Influences on medical students' intention to practice in rural Australia.**

It is important that your medical course enables you to make an informed decision about your future career pathway. This survey will be used to assess the effect of the current and new curricula on medical students' view of a rural or urban career path. We hope you will help us improve your course through such an assessment.

Completion, or otherwise of this survey will not influence your progress through the medical course in any way. Your teachers and examiners will have no access to your individual responses. As it is planned to repeat this study later in your course, we ask that you enter the code number we have allocated you in the space below. Only the researchers will have access to the code. It will not be used for any other purpose.

George Somers

Please Enter your Code Number:

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Section 1 In this section, we are interested in whether you plan to work in the city or in the country. Please mark one square in each question.

1 It is my intention to work in a rural setting following the completion of my studies.

True	
False	
Undecided	

2 I currently think that, after university and postgraduate training, the furthest I will ever work from the CBD of a Capital City is:

Suburbs of Capital City:

in an inner suburb (<10Km)	
in an outer suburb (10-30Km)	
in a fringe suburb (>30 Km)	

Rural areas:

close (<50 km)	
intermediate(50-100km)	
distant (101-200 km)	
remote (201-350 km)	
very remote (>350km)	

3 I believe that, after university and postgraduate training, I will work in a capital city

almost all of my career	90-100%	
most of my career	60-90%	
about half of my career	40-60%	
part of my career	10-40%	
almost none of my career	0-10%	

4 I believe that, after university and postgraduate training, I will work in the country

almost all of my career	90-100%	
most of my career	60-90%	
about half of my career	40-60%	
part of my career	10-40%	
almost none of my career	0-10%	

5 I am most likely to become a:

G.P.	
Specialist	
Researcher	
Other	
Undecided	

Section 2. In this section we are interested in how you feel when you consider working in a rural community. Please consider the following pairs as extremes of opposing emotions. For each pair, please circle the number which is closest to the point on the spectrum which best describes your feelings. Then, please circle the number corresponding the level of importance such an emotion holds for you.

Working in a rural community would make me feel:

1 | Calm | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Anxious

In choosing a career setting, this is:

unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | important

2 | Happy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Sad

In choosing a career setting, this is:

unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | important

3 | Confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Insecure

In choosing a career setting, this is:

unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | important

4 | Negative | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Positive

In choosing a career setting, this is:

unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | important

5 | Supported | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Alone

In choosing a career setting, this is:

unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | important

Section 3 Each item in the following section depicts a possible consequence of your career choice. We are interested in how important each consequence is for you. We are also interested in how likely you believe either a city choice or a country choice would result in the consequence depicted. Please circle one number in all three parts of each question (i.e. three responses per question).

A Physical Location

1 An attractive living environment

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

2 Access to the theatre, concerts, shows etc.

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

3 Access to community facilities/shopping

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

4 Access to recreational facilities

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

5 A reasonable cost of living

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

Section 3 Each item in the following section depicts a possible consequence of your career choice. We are interested in how important each consequence is for you. We are also interested in how likely you believe either a city choice or a country choice would result in the consequence depicted. Please circle one number in all three parts of each question (i.e. three responses per question).

6 Crime and safety concerns

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

B Family and Social Environment

7 Ensuring my own health

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

8 Separation from my family and friends

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

9 Opportunities for my partner/spouse

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

10 Childcare facilities

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

11 A good primary school for my children

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

12 A good secondary school for my children

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

13 The need to send my children to boarding school

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	Unlikely	1	2	3	4	5	6	7	likely
Country	Unlikely	1	2	3	4	5	6	7	likely

14 A great environment to raise my children

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

C Work Conditions

15 Reasonable working hours

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

Section 3 Each item in the following section depicts a possible consequence of your career choice. We are interested in how important each consequence is for you. We are also interested in how likely you believe either a city choice or a country choice would result in the consequence depicted. Please circle one number in all three parts of each question (i.e. three responses per question).

- 16 **Availability of annual and other leave**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
- 17 **A good income**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
- 18 **Availability of locums**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
- 19 **Access to continuing medical education**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
- 20 **Access to non-medical education relevant to my practice**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |

D Community Issues

- 21 **A strong sense of community**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
- 22 **A leading role in my community**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
- 23 **A supportive community**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
- 24 **A sense of being needed**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
- 25 **Intrusion of work into my social/private life**
- | | | | | | | | | | |
|---------------------|----------|---|---|---|---|---|---|------------------|--------|
| Totally unimportant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Vitaly important | |
| City | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |
| Country | unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | likely |

Section 3 Each item in the following section depicts a possible consequence of your career choice. We are interested in how important each consequence is for you. We are also interested in how likely you believe either a city choice or a country choice would result in the consequence depicted. Please circle one number in all three parts of each question (i.e. three responses per question).

26 Direct input into the provision of broad health services for my community

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

27 In-depth personal knowledge of my patients

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

E Services Provided and Style

28 The use of a wide range of skills

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

29 The treatment of a wide variety of conditions

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

30 Practicing preventative medicine

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

31 Providing continuity of care for my patients

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

32 Inpatient care and access to hospital facilities

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

33 A sense of professional independence

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

34 Reliance on my own skills

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

F Professional and Peer Support

35 Being a solo practitioner

Totally unimportant	1	2	3	4	5	6	7	Vitally important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

Section 3 Each item in the following section depicts a possible consequence of your career choice. We are interested in how important each consequence is for you. We are also interested in how likely you believe either a city choice or a country choice would result in the consequence depicted. Please circle one number in all three parts of each question (i.e. three responses per question).

36 Availability of specialists

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

37 Professional support

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

38 Nursing/allied health back-up

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

39 Isolation from large hospital support

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

40 Access to the latest technology

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

G Professional Acceptance

41 Being respected by my rural colleagues

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

42 Being respected by my urban colleagues

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

43 Being respected by rural Medical Educators

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

44 Being respected by urban Medical Educators

Totally unimportant	1	2	3	4	5	6	7	Vitaly important	
City	unlikely	1	2	3	4	5	6	7	likely
Country	unlikely	1	2	3	4	5	6	7	likely

Section 4 Please circle one number from the box below.

Considering all things, how strongly do you believe that working in a rural environment would be easy or difficult for you?

Very Easy	1	2	3	4	5	6	7	Very Difficult
-----------	---	---	---	---	---	---	---	----------------

Section 5 We would like to know what effect other people may have on your decision making with respect to career choice.

Firstly, we would like you to consider: how likely is it that most of the important people in your life would prefer you to work in the country. Please circle the one number which most closely represents your level of agreement with the following statement:

- 1 Most people who are important to me think I should work for some period of time in the country.

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

Please circle the number corresponding to how strongly you agree or disagree with each of the following statements. If you cannot imagine what that person might prefer you to do, please circle Box 4. (For example, if you cannot imagine what your (future) children might prefer, circle 4.) Then, please indicate how much you would like to comply with the wishes of the individuals listed below. Please tick the appropriate box.

- 1 My mother thinks I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what your mother thinks you should do?

Not at all	
Slightly	
Moderately	
Strongly	

- 2 My father thinks I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what your father thinks you should do?

Not at all	
Slightly	
Moderately	
Strongly	

- 3 My partner/spouse thinks I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what your partner/spouse thinks you should do?

Not at all	
Slightly	
Moderately	
Strongly	

- 4 My children think I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what your children think you should do?

Not at all	
Slightly	
Moderately	
Strongly	

Section 5 Please circle the number corresponding to how strongly you agree or disagree with each of the following statements. If you cannot imagine what that person might prefer you to do, please circle Box 4. (For example, if you cannot imagine what your (future) children might prefer, circle 4.) Then, please indicate how much you would like to comply with the wishes of the individuals listed below. Please tick the appropriate box.

5 Other family members think I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what other family members think you should do?

Not at all	
Slightly	
Moderately	
Strongly	

6 My friends think I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what your friends think you should do?

Not at all	
Slightly	
Moderately	
Strongly	

7 My favourite teacher thinks I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what your favourite teacher thinks you should do?

Not at all	
Slightly	
Moderately	
Strongly	

8 My spiritual mentor thinks I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what your spiritual mentor thinks you should do?

Not at all	
Slightly	
Moderately	
Strongly	

9 My medical mentor thinks I ought to spend part of my career in the country

Disagree strongly	1	2	3	4	5	6	7	Agree strongly
-------------------	---	---	---	---	---	---	---	----------------

In general, how much do you want to do what your medical mentor thinks you should do?

Not at all	
Slightly	
Moderately	
Strongly	

Section 6 What is appropriate for medical students in general? Please circle one number for each question.

1 I believe it would be appropriate for medical students to plan to work (after graduation) for some period of time in the country.

agree strongly	1	2	3	4	5	6	7	disagree strongly
----------------	---	---	---	---	---	---	---	-------------------

2 Medical students in general believe that it would be appropriate to plan to work (after graduation) for some period of time in the country.

agree strongly	1	2	3	4	5	6	7	disagree strongly
----------------	---	---	---	---	---	---	---	-------------------

Section 7. We are interested in whether you feel you should spend time in either the country or the city. That is, do you think it is something you ought to do? Please circle one number for each question.

1 I feel an obligation to spend part of my career in the country

1	2	3	4	5	6	7
---	---	---	---	---	---	---

I do not feel any obligation to spend part of my career in the country

2 I feel an obligation to spend my entire career in the city

1	2	3	4	5	6	7
---	---	---	---	---	---	---

I do not feel any obligation to spend my entire career in the city

Section 8. Here we investigate whether you feel you have made some agreement (spoken, written or understood) to work either in the City or in the country. Please circle one number for each of the four questions.

1 I have made some sort of agreement with someone to spend part of my career in the country

agree strongly	1	2	3	4	5	6	7	disagree strongly
----------------	---	---	---	---	---	---	---	-------------------

How bound do you feel by this agreement?

Not really bound	1	2	3	4	5	6	7	Strongly bound
------------------	---	---	---	---	---	---	---	----------------

2 I have made some sort of agreement with someone to spend the whole of my career in the City.

agree strongly	1	2	3	4	5	6	7	disagree strongly
----------------	---	---	---	---	---	---	---	-------------------

How bound do you feel by this agreement?

Not really bound	1	2	3	4	5	6	7	Strongly bound
------------------	---	---	---	---	---	---	---	----------------

Section 9. Now some questions about how you see yourself. Please circle the most appropriate number.

1 I am the sort of person who could fit comfortably in a rural community.

agree strongly	1	2	3	4	5	6	7	disagree strongly
----------------	---	---	---	---	---	---	---	-------------------

2 I am the sort of person who needs the things only a large city can provide.

agree strongly	1	2	3	4	5	6	7	disagree strongly
----------------	---	---	---	---	---	---	---	-------------------

3 I am the sort of person who would be happy working in a rural environment.

agree strongly	1	2	3	4	5	6	7	disagree strongly
----------------	---	---	---	---	---	---	---	-------------------

Section 10. Here we offer you a chance to have your say!

Are there factors that we have not asked you about that you believe have or will influence your intention to undertake a career in a rural area? If so, please provide details.

.....

.....

.....

.....

.....

.....

Section 11. Some final questions about you.

22 Over the past 12 months, has your mind changed about where you wish to practice medicine? In what way? (Please tick one only)

- Towards a rural career
- Away from a rural career
- No Change (rural)

23 Over the past 12 months, has your mind changed about how you wish to practice medicine? In what way? (Please tick one only)

- Towards General Practice
- Away from General Practice
- No Change (General Practice)

24 Please list briefly (a few words each) up to three factors (in order of importance) which have contributed towards this change.

- 1.....
- 2.....
- 3.....

The following is a list of four possible barriers to medical graduates entering rural practice. Please think about these, and circle the number indicating the degree of importance of each factor.

25 Societal negative attitudes towards the country	Extremely Unimportant	1	2	3	4	5	6	7	Extremely Important
26 'Learned helplessness' picked up in medical school. (Dependence on specialists etc.)	Extremely Unimportant	1	2	3	4	5	6	7	Extremely Important
27 Negative attitude in medical school to general practice	Extremely Unimportant	1	2	3	4	5	6	7	Extremely Important
28 Negative attitude in medical school to the country	Extremely Unimportant	1	2	3	4	5	6	7	Extremely Important

Thank you very much for taking the time to complete this task. Let me assure you again of the confidentiality of your responses, and the important part they will play in the evaluation of the medical course.

George Somers.

Appendix Two

The RIQ2001

Medical students' intention to practise in country areas

Dear Final Year Medical Student,

I am aware that you are coming up to your final exams, and that you are likely to be under considerable pressure. I ask that you read this note, and if you can find the time, complete the attached questionnaire, pop it in the reply paid envelope, and send it back to me.

I am currently undertaking my Ph.D. supervised by Prof. Roger Strasser and Dr. Amanda Young at the School of Rural Health, Monash University. I am interested in whether or not health professional students (e.g. Doctors, Nurses, Dentists) plan to practice in the country. I am developing a questionnaire to measure students' current intention to spend part of their career in the country. This instrument can then be used in the evaluation of the medical course.

The questionnaire has been tested on the year 2000 intake last year, and again this year. Some questions seem to be less well understood by the First Year students, so we need your input on the value of the questions to senior students. Your teachers and examiners will have no access to your individual responses. Only group responses will be reported in my Ph.D. thesis and in any publications resulting from this work.

Most people can answer the questionnaire within 20-30 minutes. It is your first thoughts that are wanted, so please do not deliberate over questions. There are no right and wrong answers. We are interested in what you think, not what you know. At the end of the questionnaire, there is the opportunity to comment on its readability, comprehensibility, relevance and completeness.

Your participation in this study is completely voluntary and completion of this survey will not influence your progress through the medical course in any way. Your response is very important to us, whether or not you plan to work in the country and we thank you very much for agreeing to assist in this research, especially at this crucial time of the year. Any queries can be directed to Dr Somers at the below address. Good Luck with the exams!!

Dr. George T. Somers
MBBS, BMedSci, DRANZCOG, GradDipClinEpid
Monash University
School of Rural Health
PO Box 424R
Traralgon 3844.



First, some General Instructions:

In this survey we are interested in whether you intend to spend some time working in the country after you have completed all of your formal training. We would be grateful if you would consider what you currently intend to do. Most students will be unsure of where they will practice, or in what field, so even if you have only the slightest inclination one way or the other, please indicate this. The first section of the questionnaire allows you to tell us how strongly you hold this view (intention).

Whilst Section 1 of the questionnaire also asks some questions about where you would like to train. In all other sections we ask you to only consider work after completion of your formal training. At times throughout this questionnaire we ask you to make comments about city and country areas. When making these distinctions, we would like you to use the following definitions:

City = a capital city and its metropolitan suburbs, and
Country = the rest of the nation in which you will work.

In some cases the phrases 'a period of time' and 'some time' are used. When using this phrase, we are referring to a total period of at least 6 months at any time in your career after completing your training.

Should you have any complaint concerning the manner in which this research (Project No:2000/427) is conducted, please do not hesitate to contact The Standing Committee on Ethics in Research Involving Humans at the following address:

The Secretary,
The Standing Committee on Ethics in Research Involving Humans
PO Box 3A,
Monash University,
Victoria 3800

As it is planned to compare these responses to the questionnaire most of you completed last year, and to repeat this study later in your course, please enter the code number provided on the coloured piece of paper into the space, and your name onto that coloured piece of paper.

Please enter your **Code Number** from the numbered piece of coloured paper.

			2001/2 A
--	--	--	----------

Please enter your **Name** onto that numbered piece of coloured paper.

Section 1. In this section we are interested in whether or not you intend to spend part of your training or career in the country. Please mark clearly the number/position on the line that best reflects how strongly you currently feel, using the scale from one to ten.

1. Do you have any intention to apply for any extra undergraduate rural experience?

Definitely not
(Go to Q2)
Yes, or possibly

2. Do you have any intention to apply for any extra postgraduate rural experience?

Definitely not
(Go to Q3)
Yes, or possibly

3. Do you have any intention to work for any time in the country after all your formal training?

Definitely not
(Go to Q4)
Possibly so

How **strong** is your intention to do so?

10 maximal

1 minimal

How **strong** is your intention to do so?

10 maximal

1 minimal

How **strong** is your intention to do so?

10 maximal

1 minimal

4. If you have answered 'Definitely not' to any of the questions above, is there something that makes it difficult for you to work in the country? In a few words, please outline this, and then go on to complete the questionnaire.

.....

.....

.....

Section 2, In this section we are interested in how the country, and working in the country for some time, makes you feel right now. Please indicate your current thoughts and feelings even if you think they may change in the future. The following scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. For example, if you feel extremely nervous about working in the country, you would put a 5 next to item 15.

Indicate to what extent the thought of working in the country for a period of time makes you feel this way right now, that is, at the present moment.

- | 1 | 2 | 3 | 4 | 5 |
|-----------------------------|----------|-----------------------|-------------|----------------------|
| very slightly or not at all | a little | moderately | quite a bit | extremely |
| 1. _____ interested | | 8. _____ hostile | | 15. _____ nervous |
| 2. _____ distressed | | 9. _____ enthusiastic | | 16. _____ determined |
| 3. _____ excited | | 10. _____ proud | | 17. _____ attentive |
| 4. _____ upset | | 11. _____ irritable | | 18. _____ jittery |
| 5. _____ strong | | 12. _____ alert | | 19. _____ active |
| 6. _____ guilty | | 13. _____ ashamed | | 20. _____ afraid |
| 7. _____ scared | | 14. _____ inspired | | |

Section 3 In this section we ask you to consider some possible consequences of working in the country. Each item asks how likely it is that such a consequence would follow if you made a decision to work for a period of time in the country. Scores 5 and 6 are "only just unlikely/likely." We then ask how important that outcome is for you from 1=unimportant to 10=the most important. Remember, we are interested in what you think more than what you know. Please circle a number in both parts of every question.

A Physical and Social Environment

1 If I worked in the country, I would be living in my preferred environment

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is living in your preferred environment to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

2 If I worked in the country, I would be able to keep up to date with the theatre, concerts, shows

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is keeping up to date with the theatre, concerts, shows to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

3 If I worked in the country, I would have adequate access to all the shopping needs of my family

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is access to all the shopping needs of your family to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

Section 3 In this section we ask you to consider some possible consequences of working in the country. Each item asks how likely it is that such a consequence would follow if you made a decision to work for a period of time in the country. Scores 5 and 6 are "only just unlikely/likely." We then ask how important that outcome is for you from 1=unimportant to 10=the most important. Remember, we are interested in what you think more than what you know. Please circle a number in both parts of every question.

4 If I worked in the country, I would have great access to outdoor/wilderness recreational facilities
 unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is access to outdoor/wilderness recreational facilities to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

5 If I worked in the country, I could afford a great house, school, lifestyle
 unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is being able to afford a great house, school, lifestyle?

unimportant 1 2 3 4 5 6 7 8 9 10 important

6 If I worked in the country, I would live in a safe and secure place to bring up children
 unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is it to you, to live in a safe and secure place to bring up children?

unimportant 1 2 3 4 5 6 7 8 9 10 important

7 If I worked in the country, I could ensure that my own health needs are met
 unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is it to you to ensure that your own health needs are met?

unimportant 1 2 3 4 5 6 7 8 9 10 important

8 If I worked in the country, I would have adequate access to my family and friends
 unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is access to your family and friends to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

9 If I worked in the country, there would be adequate work opportunities for my (future) partner/spouse
 unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important are work opportunities for your (future) partner/spouse to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

10 If I worked in the country, there would be a place for my (future) partner/spouse
 unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is a place for your (future) partner/spouse to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

Section 3 In this section we ask you to consider some possible consequences of working in the country. Each item asks how likely it is that such a consequence would follow if you made a decision to work for a period of time in the country. Scores 5 and 6 are "only just unlikely/likely." We then ask how important that outcome is for you from 1=unimportant to 10=the most important. Remember, we are interested in what you think more than what you know. Please circle a number in both parts of every question.

11 If I worked in the country, I would have adequate access to childcare facilities

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is access to childcare facilities to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

12 If I worked in the country, there would be adequate schools for younger children (<10 y.o.).

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important are adequate schools for younger children to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

13 If I worked in the country, there would be adequate schools for older children (>14 y.o.).

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important are adequate schools for older children to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

14 If I worked in the country, there would be a great social environment in which to raise children

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is a great social environment in which to raise children?

unimportant 1 2 3 4 5 6 7 8 9 10 important

B Work Conditions

15 If I worked in the country, I would have control over the number of hours I work

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is control over the number of hours you work to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

16 If I worked in the country, I would have the support and flexibility to bring up a family.

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is the support and flexibility to bring up a family to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

17 If I worked in the country, I would be able to get away for regular holidays

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is being able to get away for regular holidays to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

Section 3 In this section we ask you to consider some possible consequences of working in the country. Each item asks how likely it is that such a consequence would follow if you made a decision to work for a period of time in the country. Scores 5 and 6 are "only just unlikely/likely." We then ask how important that outcome is for you from 1=unimportant to 10=the most important. Remember, we are interested in what you think more than what you know. Please circle a number in both parts of every question.

18 If I worked in the country, my income would be higher than similar doctors in the city

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is a high income to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

19 If I worked in the country, I would have the availability of relieving doctors to ensure flexible work hour /holidays

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is the availability of relieving doctors to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

20 If I worked in the country, I would be able to keep up to date with the latest medical advances

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is being able to keep up to date with the latest medical advances to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

21 If I worked in the country, I would have a great opportunity for training in practical skills

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is the opportunity for training in practical skills to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

22 If I worked in the country, I would have no difficulty getting back into a city job

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is being able to get back into a city job to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

C Community Issues

23 If I worked in the country, I would be a leader in my community

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is being a leader in your community to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

24 If I worked in the country, I would have a supportive community

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is a supportive community to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

Section 3 In this section we ask you to consider some possible consequences of working in the country. Each item asks how likely it is that such a consequence would follow if you made a decision to work for a period of time in the country. Scores 5 and 6 are "only just unlikely/likely." We then ask how important that outcome is for you from 1=unimportant to 10=the most important. Remember, we are interested in what you think more than what you know. Please circle a number in both parts of every question.

25 If I worked in the country, I would be a valued member of my community

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is being a valued member of your community to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

26 If I worked in the country, I would really make a difference in an underserved community

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is really making a difference in an underserved community to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

27 If I worked in the country, I would have the risk of intrusion of work on my family life

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is protection from the risk of intrusion of work on your family life to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

28 If I worked in the country, I could play a major role in the development of health services for my community

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is playing a major role in the development of health services for your community to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

29 If I worked in the country, I would understand my patients in the context of their community

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is understanding your patients in the context of their community?

unimportant 1 2 3 4 5 6 7 8 9 10 important

D Services Provided and Style

30 If I worked in the country, I would have frequent use of a wide range of practical skills

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is the frequent use of a wide range of practical skills to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

31 If I worked in the country, I would be exposed to an interesting variety of conditions every day

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is having an interesting variety of conditions to treat?

unimportant 1 2 3 4 5 6 7 8 9 10 important

Section 3 In this section we ask you to consider some possible consequences of working in the country. Each item asks how likely it is that such a consequence would follow if you made a decision to work for a period of time in the country. Scores 5 and 6 are "only just unlikely/likely." We then ask how important that outcome is for you from 1=unimportant to 10=the most important. Remember, we are interested in what you think more than what you know. Please circle a number in both parts of every question.

32 If I worked in the country, my skills and knowledge would be wasted

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is the use of your full range of skills and knowledge to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

33 If I worked in the country, my patients would follow my advice on adopting a healthy lifestyle.

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is being able to practice preventative medicine effectively?

unimportant 1 2 3 4 5 6 7 8 9 10 important

34 If I worked in the country, I would have the opportunity to provide continuous on-going care for my patients and their families

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is providing continuous on-going care for your patients and their families?

unimportant 1 2 3 4 5 6 7 8 9 10 important

35 If I worked in the country, I would be able to care for my own patients in a hospital

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is being able to care for your own patients in a hospital?

unimportant 1 2 3 4 5 6 7 8 9 10 important

36 If I worked in the country, I would have freedom from interference in the practice of medicine

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is the risk of interference in the practice of medicine to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

37 If I worked in the country, I would be expected to confidently rely on my own skills

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is needing to confidently rely on your own skills to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

E Professional and Peer Support

38 If I worked in the country, I would be able to work in a group practice

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is working in a group practice?

unimportant 1 2 3 4 5 6 7 8 9 10 important

Section 3 In this section we ask you to consider some possible consequences of working in the country. Each item asks how likely it is that such a consequence would follow if you made a decision to work for a period of time in the country. Scores 5 and 6 are "only just unlikely/likely." We then ask how important that outcome is for you from 1=unimportant to 10=the most important. Remember, we are interested in what you think more than what you know. Please circle a number in both parts of every question.

39 If I worked in the country, I would have an adequate range of Specialist colleagues nearby

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important to you is having a range of Specialist colleagues nearby?

unimportant 1 2 3 4 5 6 7 8 9 10 important

40 If I worked in the country, I would have professional support from medical organisations

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is professional support from medical organizations to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

41 If I worked in the country, I would have adequate access to nurses and allied health professionals (physiotherapists etc)

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is access to nursing and allied health support to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

42 If I worked in the country, I would have adequate access to a large hospital

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is having access to a large hospital to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

43 If I worked in the country, I would have adequate access to the latest technology

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is having access to the latest technology to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

F Professional Acceptance

44 If I worked in the country, I would be respected by my patients

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is respect from your patients to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

45 If I worked in the country, I would be respected by the community generally

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is respect from the community generally, to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

Section 3 In this section we ask you to consider some possible consequences of working in the country. Each item asks how likely it is that such a consequence would follow if you made a decision to work for a period of time in the country. Scores 5 and 6 are "only just unlikely/likely." We then ask how important that outcome is for you from 1=unimportant to 10=the most important. Remember, we are interested in what you think more than what you know. Please circle a number in both parts of every question.

46 If I worked in the country, I would be respected by other health professionals (non-doctors)

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is respect from other health professionals to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

47 If I worked in the country, I would be respected by my peers

unlikely 1 2 3 4 5 6 7 8 9 10 likely

How important is respect from your peers to you?

unimportant 1 2 3 4 5 6 7 8 9 10 important

Section 4 In the next two sections we would like to know what effect other people may have on your decision-making with respect to working for some time in the country. Firstly, we would like you to consider how strongly you believe MOST of the important people in your life would or would not approve of you working for some time in the country. Please circle the number that most closely represents your level of agreement or disagreement with the following statement:

1 Most people who are important to me would disapprove/approve of me working in the country.

just disapprove ↓ ↓ just approve
disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly

No idea

Section 5 We now focus on whether certain individuals approve or disapprove of you working in the country. Please consider the individual named and circle the number representing how strongly they would approve or disapprove. Then, please indicate how much you would normally be influenced by the wishes of that individual. Please circle the number nearest your response. If you have no idea, circle that box, and if the type of individual is not relevant for you, please circle the N/A box. Remember, we are interested in what you think, not what you know.

1 My mother would disapprove/approve of me working in the country.

just disapprove ↓ ↓ just approve
disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your mother thinks you should do?

not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

2 My father would disapprove/approve of me working in the country.

just disapprove ↓ ↓ just approve
disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your father thinks you should do?

not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

Section 5 We now focus on whether certain individuals approve or disapprove of you working in the country. Please consider the individual named and circle the number representing how strongly they would approve or disapprove. Then, please indicate how much you would normally be influenced by the wishes of that individual. Please circle the number nearest your response. If you have no idea, circle that box, and if the type of individual is not relevant for you, please circle the N/A box. Remember, we are interested in what you think, not what you know.

3 My (future) partner/spouse would disapprove/approve of me working in the country.

disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your (future) partner/spouse thinks you should do?

not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

4 My (future) children would disapprove/approve of me working in the country.

disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your (future) children thinks you should do?

not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

5 My other family members would disapprove/approve of me working in the country.

disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your other family members think you should do?

not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

6 My friends would disapprove/approve of me working in the country.

disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your friends think you should do?

not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

7 My medical mentor would disapprove/approve of me working in the country.

disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your medical mentor thinks you should do?

not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

8 My spiritual mentor would disapprove/approve of me working in the country.

disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your spiritual mentor thinks you should do?

not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

Section 5 We now focus on whether certain individuals approve or disapprove of you working in the country. Please consider the individual named and circle the number representing how strongly they would approve or disapprove. Then, please indicate how much you would normally be influenced by the wishes of that individual. Please circle the number nearest your response. If you have no idea, circle that box, and if the type of individual is not relevant for you, please circle the N/A box. Remember, we are interested in what you think, not what you know.

9 My rural medical educators and colleagues would disapprove/approve of me working in the country.

disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your rural medical educators and colleagues think you should do?
not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

10 My city medical educators and colleagues would disapprove/approve of me working in the country.

disapprove strongly 1 2 3 4 5 6 7 8 9 10 approve strongly No idea N/A

In general, how strongly are you influenced by what your city medical educators and colleagues think you should do?
not influenced at all 1 2 3 4 5 6 7 8 9 10 influenced very strongly

Section 6 Next, we are interested in what you believe is appropriate for medical students and doctors? Please circle a number for each question. These statements do not necessarily reflect our opinions.

1 Medical graduates owe it to the community to give something back after all the support they had during medical school.

I disagree strongly 1 2 3 4 5 6 7 8 9 10 I agree strongly

2 It is not the medical profession's responsibility to ensure that all Australians have access to medical services.

I disagree strongly 1 2 3 4 5 6 7 8 9 10 I agree strongly

3 All medical students should develop the skills necessary to work in the country after completing their training.

I disagree strongly 1 2 3 4 5 6 7 8 9 10 I agree strongly

4 Doctors should be willing to live and work where they are needed most, at least for some period of time.

I disagree strongly 1 2 3 4 5 6 7 8 9 10 I agree strongly

5 All medical graduates should consider working for some period of time in the country after completing their training.

I disagree strongly 1 2 3 4 5 6 7 8 9 10 I agree strongly

6 If country people want the best services, they should move to the city

I disagree strongly 1 2 3 4 5 6 7 8 9 10 I agree strongly

7 Women cannot be real rural doctors because they have to take care of their families

I disagree strongly 1 2 3 4 5 6 7 8 9 10 I agree strongly

Section 7. We are interested in where you personally feel you ought spend your time working. Do you feel you owe it to someone (e.g. your children, relatives, community) to work for some time in the country. Do you feel you owe it to someone to work your whole career in the city? Please circle one number for each question.

1 Personally, I really feel I ought to work a while in the country 1 2 3 4 5 6 7 8 9 10 I do not feel any obligation at all to work in the country

2 Personally, I really feel I ought to spend my entire career in the city 1 2 3 4 5 6 7 8 9 10 I do not feel any obligation at all to spend my entire career in the city

Section 8. Here we investigate if you feel you have made some sort of agreement (spoken, written or understood) to work either in the city or in the country. Please circle one number for each question.

1 I feel as if I have made some sort of agreement with someone to spend the whole of my career in the City. agree strongly 1 2 3 4 5 6 7 8 9 10 disagree strongly

2 I feel as if I have made some sort of agreement with someone to spend some time working in the country agree strongly 1 2 3 4 5 6 7 8 9 10 disagree strongly

Section 9. Now some questions about how you see yourself. Please circle the most appropriate number.

1 I am the sort of person who could really enjoy living in a rural community. agree strongly 1 2 3 4 5 6 7 8 9 10 disagree strongly

2 I am the sort of person who constantly needs the things only a large city can provide. agree strongly 1 2 3 4 5 6 7 8 9 10 disagree strongly

3 I am the sort of person who could be really happy practising medicine in a rural environment. agree strongly 1 2 3 4 5 6 7 8 9 10 disagree strongly

4 I am the sort of person who could become a really good rural doctor agree strongly 1 2 3 4 5 6 7 8 9 10 disagree strongly

Section 10. Please circle one number for the following question:

Considering all things, how easy do you believe that working in a rural environment would be for you?

extremely easy 1 2 3 4 5 6 7 8 9 10 extremely difficult

Section 11. Here we offer you a chance to have your say!

Are there factors that we have not asked you about that you believe have or will influence your intention to undertake a career in a rural area? If so, please briefly list them.

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Appendix Three

The RIQ2002

Medical students' intention to practise in country areas

Dear third year medical student,

I am currently undertaking my Ph.D. supervised by Prof. Roger Strasser and Prof. Brian Jolly at the Monash University School of Rural Health. We are developing a questionnaire to measure medical students' intention to practice in the country. This instrument can then be used in the evaluation of medical training. Most of you have already completed earlier (much longer) versions of this questionnaire. It is through your support that it now is about one quarter of its original size! We are again asking for your help to evaluate the questionnaire.

Your response is very important to us whether or not you plan to work in the country. Most people can now answer the questionnaire within 10 minutes. We do appreciate the effort required and are very grateful. There are no right or wrong answers. We are interested in what you think, not what you know. Please use the opportunity provided at the end of the questionnaire to comment on its readability, comprehensibility, relevance and completeness. This will help us to improve later versions.

We ask that you again supply your name on the separate piece of numbered coloured paper, and that you copy that number into the space provided on the questionnaire. In this way, your name will be kept separate from your response and we will be able to match your response with that of earlier years. Confidentiality can then be assured.

Only group responses will be reported in the Ph.D. thesis and in any publications resulting from this work. Your teachers and examiners will not have access to your individual responses. Your participation in this study is completely voluntary and will not influence your progress through the medical course in any way. This year there may be further opportunities to participate after lectures/tutorials, but there will not be a follow-up by mail.

We are interested in whether you intend to spend some time working in the country, at some stage during your career, after you have completed all of your formal training. While this intention is likely to vary throughout your training, we are interested in what you currently intend to do. The first section of the questionnaire allows you to tell us whether or not you have any plans to work in the country, and how strong your intention is, one way or the other.

If you have a legal obligation to work in the country, (for example, it may be a governmental requirement or a condition of your scholarship), we are interested in what you intend to do after this obligation has been fulfilled.

Some Definitions: (for this survey)

- 'rural' and 'country':
anywhere other than a Capital City and its metropolitan suburbs.
(For example, 'rural' here includes Geelong but not Dandenong).
- 'a period of time' and 'some time':
a total period of at least 6 months, over any time in your career, after completing your training.
(This need not be for a continuous period).

Please consider the above definitions carefully, because all questions in this survey refer to this concept of working in the country. We have deliberately kept these definitions simple.

Thank you very much, once again, for your time and support,

George Somers

Please enter the number on the attached coloured piece of paper here, and your name onto that piece of paper.

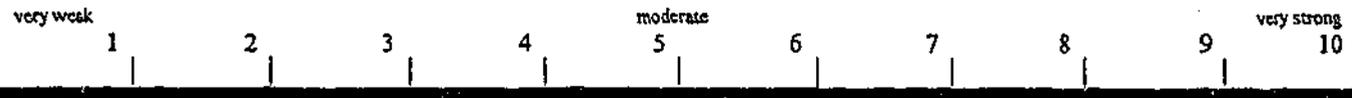
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Section 1. In this section we are interested in where you intend to practise after all your training and any legal/scholarship requirements have been met.

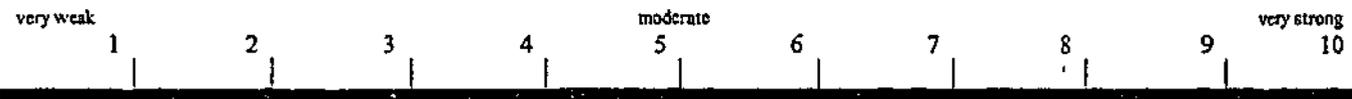
1. Is it your current intention to work in the country for more than about 6 months at any time throughout your career, after all your formal training, and after all your legal obligations are met? (e.g. rural-bonded or government scholarships). Please circle one box.

- Definitely not (Go to Q3)
 Possibly so (Go to Q2)

2. How strong is your intention? Please circle the one number on the following scale which most closely reflects your strength of intention to work in the country for some period of time. (Then go to Q4)



3. How strong is your intention not to work in the country? Please circle the one number on the following scale which most closely reflects your strength of intention not to work in the country.



4. If you have scored 9 or 10 in either Q2 or Q3, is there a really strong reason for this? If so, please outline this briefly, and then please go on to complete the questionnaire.

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Section 2. In this section we are interested in how the thought of you actually working in the country makes you feel. Please indicate your current feelings even if you think they may change in the future. The following list consists of nine words that can describe different feelings and emotions. Please rate them according to the scales provided. Please circle one number next to each emotion.

The thought of me working in the country, makes me feel (right now):

1. excited	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
2. guilty	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
3. determined	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
4. apprehensive	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
5. ashamed	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
6. proud	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
7. irritable	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
8. scared	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
9. jittery	Not at all	1	2	3	4	5	6	7	8	9	10	extremely

Section 3. In this section we ask you to carefully consider some possible consequences of working in the country. We ask how likely it is for you that such a consequence would follow a decision to work for some time in the country. We then ask how important that consequence is in your decision making. Remember, we are interested in what you think will be the outcome for you. Please circle a number in both parts of every question.

1 If I worked in the country, I would be living in my preferred physical environment
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important is living in your preferred physical environment to you?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

2 If I worked in the country, I could afford a really great lifestyle (house, car, holidays, furniture, clothes etc)
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important to you is being able to afford a really great lifestyle?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

3 If I worked in the country, I would have easy access to my family and friends
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important to you is having easy access to your family and friends?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

4 If I worked in the country, I believe that the needs of my (future) partner/spouse could be well catered for
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important to you is it that the needs of your (future) partner/spouse are well catered for?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

5 If I worked in the country, I believe that I would have access to suitable schools for my (future) children
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important to you is the availability of suitable schools for your (future) children?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

6 If I worked in the country, I would have the support and flexibility in the workplace needed to bring up a family.
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important to you is workplace support and flexibility, adequate to bring up a family?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

7 If I worked in the country, I would live and work in a supportive community
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important is living and working in a supportive community to you?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

8 If I worked in the country, I could really make a difference in an under serviced community
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important is making a difference in an under serviced community to you?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

9 If I worked in the country, my religious and cultural needs would be met
 totally unlikely 1 2 3 4 5 6 7 8 9 10 virtually a certainty

How important to you is having your religious and cultural needs met?
 not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

Section 6. Here we offer you a chance to have your say!

1 Are there factors that you believe have or will influence your intention to undertake a career in a rural area that we have not asked you about? If so, please briefly list them.

.....
.....
.....
.....

2 Do you have any final comments on the readability, comprehensibility, relevance and completeness of the questionnaire?

.....
.....
.....
.....

Thank you very much for taking the time to complete this task. Let me assure you again of the confidentiality of your responses, and of the important part they will play in the evaluation of the medical training.

George Somers.

If you have any questions about this work, please contact me at:
Monash University, School of Rural Health
PO Box 424R
Traralgon VIC 3844.
Phone 0417 135 966
Email george.somers@med.monash.edu.au

Should you have any complaint concerning the manner in which this research (Project No:2000/427) is conducted, please do not hesitate to contact The Standing Committee on Ethics in Research Involving Humans at the following address:

The Secretary,
The Standing Committee on Ethics in Research Involving Humans
PO Box 3A.
Monash University.
Victoria 3800



Appendix Four

The RIQ2003

Situational Intent Questionnaire

Section 2. We are interested in how you feel about working in a rural area. Please indicate your current feelings even if you think they may change in the future. Please circle one number for each emotion.

The thought of me working in a rural area rather than in the city makes me feel:

1. jittery	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
2. proud	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
3. irritable	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
4. apprehensive	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
5. ashamed	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
6. determined	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
7. scared	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
8. guilty	Not at all	1	2	3	4	5	6	7	8	9	10	extremely
9. excited	Not at all	1	2	3	4	5	6	7	8	9	10	extremely

Section 3. Please consider the following consequences which may or may not result from working in a rural area. How likely are they for you, and how important are they in your choice of where to work? Please circle a number in both parts of every question.

1. If I worked in the country, I could more easily keep in touch with my family and friends

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is having easy access to your family and friends?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

2. If I worked in the country, the things that I want for a really great lifestyle would be more affordable

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is being able to afford a really great lifestyle?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

3. If I worked in the country, I would be living in the surroundings that I prefer

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is living in your preferred physical environment?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

4. If I worked in the country, I think that the needs of my (future) partner/spouse could be better met

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is it that the needs of your (future) partner/spouse are well catered for?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

Please go on to Page 3

Situational Intent Questionnaire

Section 3. Here are just two more possible consequences of working in the country. Remember, we are interested in what you think will be the outcome for you. Please circle a number in both parts of every question.

5 If I worked in the country, I believe that my (future) children would have a better schooling.

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is the availability of the most suitable schools for your (future) children?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

6 If I worked in the country, I would have better workplace support and flexibility to bring up a family.

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is workplace support and flexibility, needed to bring up a family?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

7 If I worked in the country, the community in which I live and work would better appreciate my efforts and needs

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is living and working in a supportive community?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

8 If I worked in the country, I would be more likely to be able to really make a difference

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is being able to really make a difference?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

9 If I worked in the country, my religious and cultural needs would be met

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is having your religious and cultural needs met?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

10 If I worked in the country, I would have more autonomy in my living and work conditions

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is having a sense of control over your living and work conditions?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

11 If I worked in the country, I could better understand my patients in the context of their community

totally unlikely 1 2 3 4 5 6 7 8 9 10 a certainty

How important in your decision-making is understanding your patients in the context of their community?

not important at all 1 2 3 4 5 6 7 8 9 10 extremely important

Please go on to Page 4

Appendix Five

A brief literature search for influences on Rural Intent

Literature search for a list of rural variables

The following table presents the issues reported in 30 articles that identified factors affecting the selection of either a rural career, or a generalist career. These papers were found using the Ovid Medline and PsycINFO search engines. The list was not intended to be exhaustive, but rather to provide an extensive cross-section of issues in order to assess whether there were any obvious omissions to the list of perceived consequences. There was no attempt to quantify the effects. The study was carried out to inform the 2000 version of the RIQ, so only articles up to that date were included.

The references were entered into the three 'effect' columns of the table according to whether the reported study found that particular issue to have a positive effect on the choice to be a generalist and/or choose a rural career, to have no effect, or to have a negative effect. Some studies reported that some issues had aspects with opposing effects such as badmouthing, income, and opportunities for spouse. For example, badmouthing against specialists was found to increase rural career choice (21), but badmouthing against rural GPs reduced rural career choice (9, 21)

There was a great degree of overlap between issues affecting generalist choice and urban/rural choice. This was expected, as most rural doctors are generalists. No study was found that reported an issue that had a positive effect on generalist career choice and a negative effect on rural career choice. Therefore, these issues have not been separated.

Issues are listed under headings relating to the various stages of medical training and career. Issues 27 to 53 were those identified by Strasser et al. and are presented in the order of importance ascribed by them. Other references that identified issues with meanings similar to those identified by Strasser were grouped with that Strasser issue in the table. While all other variables in the table are grouped according to the stage of development to which they refer, they are presented within the group in no particular order.

For formatting reasons and for ease of interpretation, this appendix has utilised the Vancouver style for citations, rather than the style of the journal "American Psychologist," adopted for the body of the thesis.

Compilation of factors affecting medical career choice. Papers are listed according to the direction of effect reported. The stages of training/career affected are listed in the column headed, Subjects.

	Situational intention issues	Pro-rural effect	No effect	Anti-rural effect	Subjects
	Intake				
1	Premedical recruitment	(1, 2)			Generalist and rural student intent
2	Public school ownership	(1, 3)	(4)		Generalist and rural student intent
3	Generalists on admission Committee		(1)		Generalist and rural student intent
4	Preferential admission for generalists	(2, 5)	(1, 4, 6)		Generalist and rural student intent
5	Generalist chair of Adm. committee		(1)		Generalist and rural student intent
6	Generalist mission statement	(7)	(4, 5)		Generalists
7	Faculty role models	(2, 5, 8, 9)			Generalists
8	Rural origin	(3, 4, 6, 8-16)	(17)		Rural GPs Rural trainees Generalists
9	Special programs for primary care	(4, 16)			
10	'Male'	(7)	(6)	(4, 9)	GPs, rural family physicians, generalists
11	Sense of 'social responsibility'/helping people	(4, 5, 9)			Generalists
12	Socio-economic background		(14)		GPs
13	Older at intake	(9, 14, 18)			GPs, Primary care students
14	Specialist intent			(14)	GPs
15	Early interest in rural/generalist career	(3, 4, 8, 9, 16)			Rural Physicians Generalists
	Undergraduate Training				
16	Pre-clinical rural rotation	(2, 19, 20)	(4, 11, 16)	(6)	Rural GPs Medical students
17	Late rotations	(2, 4, 6, 16)			Rural Generalists
18	Non-specific rotations	(12, 20)	(3)		Medical students Urban origin Physicians
19	Small community skills	(3)			Physicians
20	Badmouthing	(21)		(9, 21)	Medical students
21	Rural student clubs		(22, 23)		
	Postgraduate Training				
22	Rural rotation	(2, 3)	(7, 11)		Rural GPs, Rural family physicians
23	Rural Matching		(24, 25)		
24	Procedural emphasis	(7)			
	Recruitment/Retention				
25	Sense of Professional Independence (sole responsibility)	(19, 26) (27) (25)		(19, 28)	Medical students Rural GPs
26	Availability of annual or other leave			(29)	
27	Providing continuing care (total patient care)	(28, 30) (19, 27)			Rural GPs
28	Opportunities for children			(26, 27)	Rural GPs

Compilation of factors affecting medical career choice. Papers are listed according to the direction of effect reported. The stages of training/career affected are listed in the column headed, Subjects.

	Situational intention issues	Pro-rural effect	No effect	Anti-rural effect	Subjects
	Recruitment/Retention				
29	Using a wide range of skills	(9, 26, 28, 30)			Rural GPs Primary care students
30	Opportunities for spouse/partner	(26)		(15, 26, 27)	Rural GPs
31	Number of hours worked each week			(19, 26, 27)	Medical students, Rural GPs
32	Availability of continuing medical education			(10, 19, 26-28)	Rural GPs Medical students
33	Privacy			(26, 27)	Rural GPs
34	Inpatient care and access to hospital facilities	(27)		(26) (27, 29)	Rural GPs
35	Availability of suitable housing				
36	Environment	(28, 30)			Rural GPs
37	Sense of Community	(19, 27, 28, 30)			Rural GPs Medical students
38	Practising preventative medicine	(9)		(29)	
39	Availability of specialists			(19, 26, 27, 29)	Rural GPs Medical students
40	Professional support			(10, 19, 26-29)	Rural GPs Medical students
41	Income	(26)		(26)	Rural GPs
42	Recreational opportunities	(27)			Rural GPs
43	Crime and safety issues	(25)			
44	Access to social/family networks			(19, 27, 29)	Medical students
45	Availability of other health and human services			(26) (27, 29)	Rural GPs
46	Community facilities/shopping			(27)	
47	Availability of Locum			(10, 26-29)	Rural GPs
48	Cost of living				
49	Access to health care for your own needs				
50	Availability of non-medical education				
51	Practising public health			(29)	
52	Variety of practice/interesting work	(10, 19, 26, 27, 30)			Rural GPs Medical students
53	Total Patient care	(19, 27, 30)			Medical students
54	Personal knowledge/relationships with patients	(19, 30) (28)			Medical students, Rural GPs
55	Rural lifestyle	(6, 19, 26, 27)			Medical students
56	Interruption to family life			(27)	Rural GPs
57	Travel/Public transport (closeness to home)	(27)		(19, 27, 29)	Rural GPs
58	Business interests	(26, 27)			Rural GPs
59	'Career Change'			(26)	Rural GPs

References:

1. Basco WT, Buchbinder SB, Duggan AK, Wilson MH. Associations between primary care-oriented practices in medical school admission and the practice intentions of matriculants. *Academic Medicine* 1998;73(11):1207.
2. Rabinowitz HK, Diamond JJ, Markham FW, Hazellwood CE. A program to increase the number of family physicians in rural and underserved areas: Impact after 22 years. *JAMA* 1999;281(3):255-260.
3. Pathman DE, Steiner BD, Jones BD, Konrad TR. Preparing and retaining rural physicians through medical education. *Acad Med* 1999;74(7): 810-820.
4. Kassebaum DG, Szenas PL, Schubert MK. Determinants of the generalist career intentions of 1995 graduating medical students. *Academic Medicine* 1996;71(8):813-814.
5. Martini CJ, Veloski JV, Barznaski B, Xu G, Fields SK. Medical school and student characteristics that influence choosing a generalist career. *JAMA* 1994;272:661-668.
6. Rolfe IE, Pearson SA, O'Connell DL, Dickinson JA. Finding solutions to the rural doctor shortage: the roles of selection versus undergraduate medical education at Newcastle. *Aust. NZ J Med* 1995;25:512-517.
7. Bowman RC, Penrod JD. Family practice residency programs and the graduation of rural family physicians. *Family Medicine* 1998;30(4):288-292.
8. Blue AV, Donnelly JB, Harrell-Parr P, Murphy-Spencer A, Rubeck RF, Jarecky RK. Developing generalists for Kentucky. *Kentucky Medical Association Journal* 1996;94:439-445.
9. Schieberl JL, Covell RM, Berry C, Anderson J. Factors associated with choosing a primary care career. *Western Journal of Medicine* 1996;164(6):492-496.
10. Colditz GA, Elliott CJP. Queensland's rural practitioners: background and motivations. *Med J Aust* 1978;2:63-66.
11. Easterbrook M, Godwin M, Wilson R, Hodgetts G, Brown G, Pong R, et al. Rural background and clinical rural rotations during medical training: effect on practice location. *Canadian Medical Association Journal* 1999;160(8):1159.
12. Fromm B, Konen JC, Bosca RB. Exposures leading to the selection of family medicine and rural practice. *Fam Pract Res J* 1985;5:127-36.
13. Hays RB, Nichols A, Wise A, Adkins P, Craig M, Mahoney M. Choosing a rural practice career in Queensland. *Aust J. Rural Health* 1995;3(4):171-174.
14. Makkai T. Origins and destinations: Geographical mobility of medical practitioners from 1996 till 1993. Canberra: Australian National University; 1995.
15. Piterman L, Silagy C. Hospital interns' and residents' perceptions of rural training and practice in Victoria. *Med J Aust* 1991;155(9):630-3.
16. Senf JH, Campos-Outcalt D, Watkins AJ, Bastacky S, Killian C. A systematic analysis of how medical school characteristics relate to graduates' choices of primary care specialties. *Academic Medicine* 1997;72:524-533.
17. Davies P. A comparison of rural and non-rural RACGP training program trainees. Royal Australian College of General Practitioners. *Aust. Fam Physician* 1994;23(7):1330-3, 1336.
18. Xu G, Veloski JJ, Barzansky B. Comparison between older and usual-aged medical school graduates on the factors influencing their choice of primary care specialties. *Academic Medicine* 1997;72(11):1003-1007.
19. Colditz GA, McGarvey C, Wainwright L. Voluntary vacation attachments to rural general practitioners: experience with preclinical medical students. *Aust Fam Physician* 1978;7:5 577-9.
20. Fatovich B. General practitioners' views of students: students' views of general practitioners. *Med J Aust* 1991;155(4):249-51.

21. Kamien BA, Bassiri M, Kamien M. Doctors badmouthing each other: does it effect medical students career choices? *Aust. Fam. Physician* 1999;28(6):576-579.
22. Gill D, Tonks J. Paddock to campus:rural highschool and medical undergraduate programs in South Australia. *Australian Journal of Rural Health*. 1996;4:111-116.
23. Kamien M. Rural student clubs and the social responsibility of medical schools. *Aust J Rural Health* 1996;4:237-241.
24. Hobbs J, DuPre C, White C, Benjamin J, Halstead G. Increasing recruitment contacts between generalist residents at the Medical College of Georgia and rural and underserved communities. *Academic Medicine* 1999;74(1(suppl)):S131-S132.
25. Strasser R, Kamien M, Hays R, Carson D. Quality of Life. In: *National Rural General Practice Study*. Melbourne: Monash University; 1997.
26. Kamien M. Staying or leaving rural practice: 1996 outcomes of rural doctors' 1986 intentions. *Med J Aust* 1998;169(6):318-21.
27. Strasser R. A study of the attitudes of Victorian rural General Practitioners to country practice and training. Melbourne: Department of Community Medicine Monash University; 1992.
28. Hamilton IJ, Gillies J, Ross S, Sullivan F. Attitudes of general practitioners who practice in remote island communities. *Health Bull (Edin)* 1997;55(2):103-8.
29. South Australian Health Commission, Royal Australian College of General Practitioners (SA), Australian Medical Association (SA). Review of general medical practice in South Australia. Third report: country general practice. Adelaide: South Australian Health Commission, Royal Australian College of General Practitioners(SA) Australian Medical Association(SA); 1992.
30. Wilson J, Hallett J. Students' attitudes toward a career choice: a family practice perspective. *Journal of Medical Education* 1985;60(1):56-58.

Appendix Six

List of publications resulting from this research

List of publications generated from this research

Title of paper	The Application of Behaviour Theory to the Selection of Educational Programs for Rural Health Professionals
Author(s) and estimated contribution (%) of candidate	George Somers (100%)
Name of journal/conference proceedings	Proceedings: ANZAME: Association for Health Professional Education Annual Conference, Perth 2000
Status (submitted, accepted, published)	Published

Title of paper	The medical student's intention to practice in rural Australia: a questionnaire
Author(s) and estimated contribution (%) of candidate	Somers, GT, (70%) Young AE, Strasser R.
Name of journal/conference proceedings	6 th National Rural Health Alliance Conference 2001: Abstracts Handbook
Status (submitted, accepted, published)	Published

Title of paper	"Measuring your influence on the student's intention to practice in the country."
Author(s) and estimated contribution (%) of candidate	Somers GT (80%) Strasser R
Name of journal/conference proceedings	ANZAME: Association for Health Professional Education Annual Conference, Wellington NZ 2001
Status (submitted, accepted, published)	Published

Title of paper	Rural career choice issues as reported by first year medical students and rural general practitioners
Author(s) & estimated contribution (%) of candidate	George T. Somers (60%), Amanda E. Young Roger Strasser
Name of journal/conference proceedings	Australian Journal of Rural Health, also presented as ACRRM Scientific forum 2001
Status (submitted, accepted, published)	Published

Title of paper	Do rural mentors, rural undergraduate clubs and rural rotations increase the medical student's intention to practise in the country?
Author(s) & estimated contribution (%) of candidate	George Somers (80%) Roger Strasser
Name of journal/conference proceedings	Proceedings of The Australian College of Rural and Remote Medicine Scientific Forum 2002.
Status (submitted, accepted, published)	Published

Title of paper	Are medical students specializing themselves out of a rural career?
Author(s) and estimated contribution (%) of candidate	George Somers (70%) Brian Jolly Roger Strasser
Name of journal/conference proceedings	Proceedings: Third Health Services and Policy Research Conference (HSRAANZ), Melbourne 2003.
Status (submitted, accepted, published)	Published

Title of paper	Vertically integrated support for medical students: a "House" model.
Author(s) and estimated contribution (%) of candidate	Somers GT (80%) Holt T-A Jones, K., Fox, J.
Name of journal/conference proceedings	Conference Proceedings, ANZAME Conference, June 24-27 2004,
Status (submitted, accepted, published)	Published

Title of paper	A sense of rural background, years of rural upbringing and medical students' intention to work in a rural environment
Author(s) and estimated contribution (%) of candidate	George Somers (70%) Brian Jolly Roger Strasser
Name of journal/conference proceedings	RACGP Annual Scientific Convention Melbourne 2004
Status (submitted, accepted, published)	submitted

Title of paper	The Situational Expectation Score (SES): a simple scale to predict who is likely to work in rural areas
Author(s) and estimated contribution (%) of candidate	George Somers (70%) Brian Jolly Roger Strasser
Name of journal/conference proceedings	RACGP Annual Scientific Convention Melbourne 2004
Status (submitted, accepted, published)	accepted