

THE DEVELOPMENT OF A MULTIDIMENSIONAL MEASURE OF COHESION FOR ORGANIZATIONAL WORK TEAMS

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Abstract

The research aim was to develop a theoretically-grounded and psychometrically-sound measure of organizational work team cohesion. Carron, Widmeyer and Brawley's (1985) context-independent conceptual model capturing task, social, team and individual dimensions of cohesion was extended to include the context-dependent dimensions 'valued roles', 'unity of purpose', 'vertical' and 'horizontal' cohesion; identified from existing literature and a subject matter experts (SMEs) focus group. This extended model provided the a priori basis for development of the Multidimensional Team Cohesion Scale (MTCS). The MTCS was found to have good content validity with two samples of SMEs and work team representatives. Items were reduced from 219 to 103 using item analytic correlation methods ($N=204$). Psychometric properties of the MTCS were examined through reliability and construct validity analysis in work teams ($N=214$). MTCS subscales had excellent reliability $\alpha > .75$. Evidence of convergent and divergent validity was obtained through correlation analysis against the GEQ (convergent validity), Reichman's (1998) Team Performance Questionnaire (TPQ) and Cammann, Fichman, Jenkins and Klesh's (1983) Overall Job Satisfaction Scale (MOAQ-JSS) (divergent validity). MTCS subscales differentially correlated with team performance and job satisfaction (differential validity). A paired t test applied to a repeat sample ($N=90$) was used to test differences in cohesion before and after a major reorganization. Independent-sample t tests were conducted to examine differences according to individual- and team level characteristics. Subscale differences across age and position (team leader vs. team member) were identified. The factorial validity of the MTCS, examined using principal axis factoring (PAF) and oblimin rotation could not be established due to an insufficient sample size. A norm-referenced scoring mechanism was derived to support interpretation of MTCS scores. The comprehensive methodology adopted in this research and evidence of construct validity provides a sound basis for the continued validation of the MTCS and indicates its practical utility in occupational settings.

Preface

“Coming together is a beginning; keeping together is progress; working together is success.”

Henry Ford

Cohesion is often described as the ‘gel’ that binds teams together. Cohesion can be thought of as the ‘engine oil’ of teams that enables them to function smoothly. However, it must be controlled; too much or too little will impact on how teams function. As a psychological construct, an abstract theoretical variable, ‘cohesion’, has been used by researchers to explain a phenomenon of teams. It was a term discussed as early as 1893 by the French sociologist, Emile Durkheim, to describe teams who showed a higher level of solidarity and had a greater influence on its members. I first came across cohesion in the group dynamics literature as an undergraduate in psychology. After graduating from university, I took up a post as a research scientist in psychology at QinetiQ, a science and technology company. My research career began in military team working, particularly in the use of technology to support distributed team working. This work involved identifying how team processes (such as communication and collaboration) can be supported in technology to facilitate distributed team working. It was clear from the research that one of the most essential of these team processes that must be supported in military teams is ‘cohesion’. In military units, cohesion is vital where soldiers must fight together and protect one another. In order to do this they must have close ties, a common sense of purpose and a feeling that they are part of the team. However, the importance of cohesion is far reaching across many types of teams; where it does not exist, disorganization can prevail. Its prominence across a number of applied psychology areas, including military, sports and occupational psychology, stems from its relevance across all types of teams and its link to team outcomes. For example, in sports teams, the way players interact has an impact on their win/loss record. In an occupational setting, the importance of cohesion has led organizations to try to nurture it through training and team building to enhance team performance and profitability.

When reviewing the literature relating to cohesion I discovered that, surprisingly for such a ubiquitous concept, little consistency existed over its definition and measurement. As a complex phenomenon, researchers have struggled and continue to struggle to understand cohesion. One body of research that does stand out in the cohesion literature is that of Carron, Widmeyer, and Brawley (1985) and Carron, Brawley, and Widmeyer (2002a). Their work attempted to provide a conceptual basis for understanding the basic nature of cohesion, its properties and manifestations. From this theoretical framework, they then

developed a measure of cohesion. The strength of their research lies in their theory-driven approach contrasting with the raw empiricism 'shot-gun' approach that has typically been adopted by researchers in cohesion. However, their work was conducted and validated in a sports team context. It also fails to operationalise cohesion outside of this context. Measures that do exist, including Carron et al.'s (1985) Group Environment Questionnaire (GEQ), were also found to be of varying quality with no one measure accepted as standard in the field. Despite these shortcomings, Carron et al.'s (1985, 2002a) work sets some good ground work in the field that will be taken forward in this research, but little progress has been made since it was conducted to determine how this can be applied to other contexts. In fact, recent reviews on the state of the cohesion research (e.g. Casey-Campbell & Martens, 2009; Chiocchio & Essiembre, 2009) confirm that the field has not moved forward in terms of pinning down some consistency of what cohesion is within and across contexts and how it should be measured. This shows that need for the research conducted in this thesis is still as important now as it was when I began it six years ago. However, researchers continue to investigate its relationship to other team variables.

Due to my career background, the original focus of this research was military teams. However, access issues to sufficient numbers of military personnel in order to conduct this research proved an insurmountable challenge. The shift in focus to non-military organizational work teams was not merely an opportunistic re-direction but considered of equal importance. In fact, it is a context that has received even less attention in the cohesion literature. With an 'outcome' focus, organizations emphasise the need to enhance team cohesion for business improvement and management consultancies offer 'team cohesion' training but with little theoretical and empirical background. If there are no means of adequately measuring the impact of interventions to improve cohesion, it will be hard for organizations and indeed training providers to assess the effects of their acts, limiting their ability to tailor training to specific needs in order to get the best outcomes that are aspired to.

As with any psychological construct, cohesion is a latent variable that is not directly observable. In developing an accurate measure of cohesion, establishing its construct validity is therefore of paramount importance. Unfortunately, this is an issue that has been severely neglected in the development of any existing measure of cohesion. The development of a sound measure is an arduous and lengthy process which requires considerable long term investment of effort. As a result shortcuts in the development and validation of cohesion measures have been the norm. This has implications for the validity of conclusions reached using these measures and has done little for clarifying the

meaning of cohesion or how it should be measured. This led me to question the worth of existing measures of cohesion as theoretically and psychometrically-grounded tools that can provide any practical benefit. This is the question that has formed the basis of this thesis, with the specific objective of addressing the need for conceptual consistency in the field as well as a psychometrically sound measure that can be applied in industry. This does not mean that existing measures do not provide any useful operationalisations of cohesion that must be discarded; in fact many provide a useful start-point for this research that can be taken forward in a more rigorous approach to scale development. Without sound measurement, theoretical progress in the field will be difficult. This thesis therefore provides an important step in moving the field forward by presenting a solid foundation for a theoretically-grounded and psychometrically sound measure of cohesion for organizational work teams. This measure will not only provide organizations with a tool for the effective measurement of cohesion, but also to provide a clearer understanding of 'team cohesion' in occupational settings so that it can be better explained to managers.

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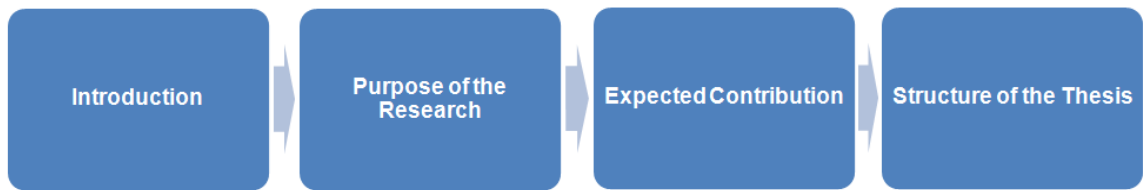
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1 Introduction



This chapter introduces the area of research presented in this thesis focusing on what cohesion is, why it should be studied and why more adequate measures of the construct are required. The purpose and expected contribution of the research is described which concentrates on instilling some consistency in the definition and understanding of cohesion by extending Carron et al. (1985) context-independent conceptual model of cohesion to include context-dependent aspects of cohesion and developing a psychometrically sound measure of cohesion for organizational work teams. An overview of the structure of the thesis is also provided.

One of the most prominent team variables considered fundamental to teams and team functioning is 'cohesion' (e.g. Lott & Lott, 1965; Carron & Loughhead, 2000). In fact cohesion has been described as a defining characteristic of a team (Hackman, 1992), even an essential team characteristic (Golembiewski, 1962). Traditionally, cohesion was considered to be unidimensional comprising only one aspect, most frequently referred to as 'attraction to the team'. However, what has become to be accepted at least, is the view that cohesion is a more complex psychological construct with a multidimensional structure (i.e. it consists of multiple aspects that taken together form cohesion). In terms of Input-Process-Output (IPO) models of team effectiveness, cohesion can be considered a 'process' that is affected by team inputs (e.g. organizational context and leadership style) and that in turn affects team outputs (such as productivity and innovativeness) (Landy & Conte, 2007). One of the reasons why cohesion is considered important and enjoys continued research interest is due to its link with important team outcomes such as team success and performance. This link has been found in many team contexts including sports teams (Carron, Colman, Wheeler, & Stevens, 2002b) and military teams (e.g. Tziner, 1982a).

In organizational settings, cohesion has been considered to be an important determinant of work team outcomes such as enhancing job satisfaction and improving organizational productivity and performance (Mullen & Cooper, 1994; Nelson & Quick, 2007). In fact the vast majority of team cohesion research that has been conducted in an industrial-organizational context has mainly focused on the positive relationship between cohesion

and other variables such as performance and organizational commitment (e.g. Wech, Mossholder, Steel, & Bennett, 1998), team conflict (e.g. Tekleab, Quigley, & Tesluk, 2009), diversity (e.g. Harrison, Price, & Bell, 1998; Webber & Donahue, 2001), and work team culture (Sanchez & Yurrebaso, 2009). Since teams provide a fundamental building block of organizations, playing a vital role in their success, the importance of cohesion in organizations is unsurprising. Organizations place great importance on teams and team working. Organizations seek to recruit individuals who possess good team working skills investing both time and money in activities and strategies to enhance team working; from team building events to implementing organizational restructures. This importance is industry wide and spans across all countries (Huczynski & Buchanan, 2007). This is not surprising given the benefits that teams provide organizations. These include rapid delivery of products and services and promotion of innovation through cross-fertilisation of ideas. As a result teams and team effectiveness have become important research areas not just in psychology but also increasingly in occupational and management domains. However, teams also place challenges on managers, such as in areas of how teams should be composed, how they should be trained, motivated and evaluated. This highlights the importance of adequate measures of team processes such as cohesion to help overcome some of these challenges (Landy & Conte, 2007). The recency with which some of the research has been conducted on the relationship between cohesion and work team outcomes highlights the continued focus and importance placed on understanding the impact of cohesion on team functioning and outcomes in organizations. However, caution should be applied in the interpretation of conclusions drawn on the relationship between cohesion and other variables due to “unclear measures of cohesion” being used to assess these relationships (Chiocchio & Essiembre, 2009, p6).

An accurate understanding of the impact of cohesion on team functioning and outcomes relies on a clear understanding of what cohesion is, how it is defined, and how it can be measured. If organizations are to make appropriate and effective decisions about how to improve team functioning and team outcomes then adequate understanding and measurement of cohesion in context is imperative. Despite the wealth of research on cohesion and its long research history, stemming back to the early-to-mid 1900s, researchers have struggled to reach any agreement on how cohesion is defined and how it is structured. As a result, the inconsistency and confusion that has plagued the research literature over the years (Mudrack, 1989a, 1989b; Cota, Evans, Dion, Kilik, & Longman, 1995; Dion, 2000) regarding what is meant by ‘cohesion’ still hasn’t been fully resolved. This lack of consistency stems in part from the domains (e.g. sociology, psychology) and contexts (e.g. sports, military, psychotherapy) in which the definition of cohesion has been investigated. This has resulted in different dimensions of cohesion

being identified. Further, inadequate attention has been paid to distinguishing cohesion from its causes (antecedents) or consequences. Many reviews of the inconsistencies in the cohesion literature have been conducted, most recently by Casey-Campbell and Martens (2009). These are useful in highlighting the limitations of such inconsistencies in making generalisations, replicating or drawing comparisons between studies. However, as often merely summaries of the literature, they do little to resolve these issues to improve the understanding and measurement of cohesion. This is the central driver of this thesis.

Following much research attention on what the dimensions of cohesion might be, there has also now emerged some (albeit limited) agreement that the definition and conceptual model developed by Carron (1982) and Carron et al. (1985) provides a good foundation for the consistent definition and measurement of team cohesion (Cota et al., 1995; Mudrack, 1989a, 1989b). Their definition and conceptual model, examined in detail later in the thesis, has two clear strengths. Firstly, Carron et al.'s (1985) multidimensional conceptual model has been empirically tested in a number of studies supporting its validity. However, this has mainly been in a sports and exercise team context. Secondly, it is regarded to represent the most agreed upon dimensions of cohesion, most consistently identified across team contexts – task and social cohesion as well as individual and team attitudes. The distinction between individual and team attitudes reflects Carron et al.'s (1985) belief that cohesion is an attribute of individuals and teams that can be measured through an individual's perceptions of their relationship with the team and the relationship between other team members. As such, cohesion has cognitive elements reflecting the thoughts and judgements about their shared experiences with other team members and how other team members relate to one another. Cohesion also has an affective element reflecting the feelings individuals have about their own interactions within the team.

Cota et al. (1995) see Carron et al.'s (1985) four dimensions of cohesion as important due to their relevance across different team contexts. This suggests that they are context-independent. Carron et al. (1985) and Carron et al. (2002a) recognise that these aspects may not be the only aspects that are part of cohesion but do not clarify this position. Cota et al. (1995) explicitly asserted that cohesion may consist of primary dimensions relevant to all team contexts and secondary dimensions relevant to specific team contexts. This suggests that cohesion may have both context-independent and context-dependent dimensions (i.e. the other aspects of cohesion that Carron et al. (1985) allude to); yet existing research has not attempted to clarify this assertion. This has implications for its measurement.

Without clarifying whether cohesion has both context-independent and context-dependent dimensions and what these are, adequate measures of the construct cannot be developed. Existing measures of cohesion reflect either a unidimensional or multidimensional view depending on when they were developed. As described, unidimensional approaches are inadequate and oversimplify the nature of cohesion. Measures reflecting a multidimensional structure contain a variety of different dimensions considered by their developers to be part of cohesion. Further, these measures are of varying psychometric quality having in many cases only limited reliability and validity, as discussed in Chapter 3. Although, Carron et al.'s (1985) conceptual model is considered to be a good theoretical foundation, and is one of the only conceptual models of cohesion to be developed, it has rarely been used for the basis of the development of any of the existing measures that follow it. This may be because it has been developed in a sports team context and is viewed as being relevant to this context only. Perhaps it has been considered as an inadequate conceptualisation of cohesion in other contexts simply because a lack of explicit distinction has been made between context-independent and context-dependent dimensions. With a lack of standard accepted measurement tool, it is apparent that the studies conducted in the industrial-organizational context investigating the impact of cohesion on other team variables have made the implicit assumption that the definitions and measures they employ are 'fit for purpose' and can be directly applied to the context under study.

The Group Environment Questionnaire (GEQ) developed by Carron et al. (1985) for sports and exercise teams and based on their conceptual model is the most 'psychometrically-sound' measure of cohesion currently available, although the types of validity that have been tested has been limited. This raises questions over its construct validity. The GEQ is a self-report measure based on a 7-point Likert scale. The items written for the GEQ are based on the context-independent dimensions included in Carron et al.'s (1985) conceptual model but worded relevant to a U.S. sports and exercise team context. As an 18-item instrument that has been reduced from a much larger pool of items for use in sports teams, it is likely that these 18 items written by the test developers are biased to this context. It has had little extension to wider contexts, although it has received limited testing in an Australian work team context by Carless and De Paola (2000) but with only minor re-wording. This very basic approach fails to consider how cohesion manifests in organizational work teams. A comprehensive approach to scale development that returns to first principals (e.g. analysis of the existing literature, item writing, content validity) it is vital for understanding what aspects of cohesion are important in an organizational setting.

1.1 Purpose of the Research

This research makes the assumption that team-based structures in organizations provide an appropriate form of work-design. However, it is also recognised that the importance of teams will vary in different organizational contexts. It is not the intention of this research to determine the conditions in which teams are most appropriate, but to improve understanding and measurement of a fundamental team variable that affects team functioning where teams are considered important to organizational functioning. This research will therefore be carried out in a setting where good team functioning is considered important to successful outcomes.

The purpose of this research is to attempt to address the lack of psychometrically-sound measure of team cohesion for organizational work teams, specifically in a U.K. context. In agreement with Casey-Campbell and Martens (2009), there was considered to be little utility in developing yet another entirely new definition of cohesion either in general or for the specific context of organizational work teams, since this only serves to add to confusion about the construct. Instead, the intention of this research is to instil some consistency in the definition and understanding of cohesion through building on the definition and conceptual model developed by Carron et al. (1985). Since there is at least some agreement that the conceptual model reflects the important dimensions of cohesion relevant across team contexts, this research aims to extend this model to include context-dependent dimensions of cohesion relevant to organizational work teams. In addition to validating the relevance of the context-dependent dimensions defined in this research for organizational work teams, the context-independent aspects defined in Carron et al.'s (1985) model will be *re-tested* in this research to determine its sufficiency and relevance in organizational work teams. Due to the lack of research on cohesion in this context, it will be necessary to revisit the literature on how cohesion has been defined and measured in all contexts and evaluate their applicability to organizational work teams and to ensure all relevant dimensions have been captured. This extended conceptualisation will provide further clarity on the nature of team cohesion and how measures of cohesion can and should be adapted for other contexts. This extended conceptualisation is then used to develop a psychometrically sound measure of team cohesion for organizational work teams. It is intended that this measure will be easily adaptable to other team contexts that share similar characteristics to organizational work teams.

1.2 Expected Contribution

It is expected that the research presented in this thesis will make a theoretical, methodological and practical contribution to the group dynamics and occupational psychology literature, specifically:

- An extended conceptualisation of team cohesion representing both its context-independent and context-dependent dimensions relevant to organizational work teams. This will support an enhanced understanding of team cohesion.
- A psychometrically sound measure of cohesion for organizational work teams. This measure can then be consistently applied by practitioners or used in applied research programmes to gain an accurate understanding of the relationship between cohesion and other team variables and help inform areas of intervention for improving team cohesion and thus team functioning and outcomes.

1.3 Structure of the Thesis

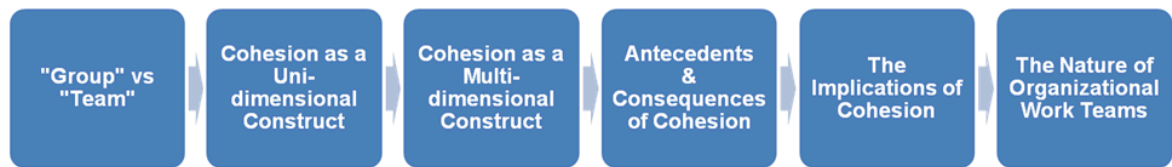
In addition to this chapter, **Chapter 1**, describing the introduction to the research, this thesis is split into eight main chapters. A brief overview of each chapter is presented below:

- **Chapter 2** provides a review of the existing literature on team cohesion with a focus on the definition and structure of cohesion from unidimensional to multidimensional definitions. The nature of organizational work teams and team working including the developmental lifecycle of teams, important for understanding cohesion as a dynamic team construct is also described. The antecedents and consequences of cohesion are identified and the implications of cohesion discussed.
- **Chapter 3** reviews how team cohesion has been measured, structured through adaptation of Burlingame, Fuhrman, and Drescher (1984) multidimensional classification system. Existing measures are evaluated against the unit of observation measured and analysed (WHO), the dimensions included in the measures and their operationalisations (WHAT), the type of measurement technique used (HOW), the measurement points chosen (WHEN), and the contexts in which the measures have been developed (WHERE).
- **Chapter 4** describes the extension of Carron et al.'s (1985) conceptual model of cohesion and construction of the Multidimensional Team Cohesion Scale (MTCS). A deductive approach to scale development is employed, capturing the theoretical dimensions of cohesion identified in the research literature. This is supplemented by an inductive approach, utilising the expertise of subject matter experts (SMEs) to generate themes that describe cohesion. Both approaches are used to develop a conceptual foundation for item development, extending Carron et al.'s (1985) cohesion model. The development of items is described as well as the design of the measurement scale. The face and content validity of the MTCS are also established by both a new sample of SMEs and representatives of organizational work teams.

- **Chapter 5** presents the results of the pilot study; the first empirical study conducted in this research for the purpose of item analysis and item reduction. The MTCS developed in Chapter 4 was administered to subjects representing three different work organizations. Correlation analysis was utilised for item analysis and reduction and an initial investigation of the factor structure of the MTCS was conducted using principal axis factoring (PAF).
- **Chapter 6** investigates the reliability and construct validity of the MTCS using new data obtained from two of the organizations described in Chapter 5. The relationship between the MTCS and an existing measure of cohesion (the GEQ) is tested to determine the convergent validity of the MTCS. Its divergent validity is also tested against Reichman's (1998) Team Performance Questionnaire (TPQ) and Cammann, Fichman, Jenkins, and Klesh (1983) Overall Job Satisfaction Questionnaire (MOAQ-JSS). The ability of the MTCS to differentially correlate with team performance and job satisfaction is tested along with its sensitivity to changes in levels of cohesion. This is important for its practical use. The factorial validity of the MTCS is also tested. The GEQ was adapted for a work team context and piloted to determine its content validity in this context. The psychometric properties of the existing measures were tested before examining the convergent and divergent validity of the MTCS. This included examining their reliability and whether their factor structures could be replicated in an organizational work team context. The validity of the MTCS was tested through correlation analysis, and PAF.
- **Chapter 7** defines a scoring system for the MTCS using a norm-referenced approach. To compile norm tables, the subjects obtained at the pilot and validity phase of the research were combined to increase sample size. Norm tables were compiled for the variables against which cohesion was found to differ: position (team leader & team member) and age. To aid interpretation, score descriptions are provided based on perceptions of high cohesion. The norm-referencing has practical significance for the MTCS as a tool that can be used by practitioners.

The results obtained in this research are discussed in **Chapter 8** along with suggestions for future research. The main conclusions of the research are presented in **Chapter 9** with discussion of its contribution to the academic community and occupational practitioners.

2 Definitions & Structure of Cohesion



Due to the lack of agreement on the definition and structure of cohesion, this chapter revisits the existing cohesion literature reviewing both the traditional unidimensional view and contemporary multidimensional view. As a result of the lack of research on definitions of cohesion in organizational work teams, this is aligned with a review of the nature of organizational work teams. The antecedents and consequences of cohesion along with the potential implications of cohesion are also discussed. Despite the general agreement that cohesion is a multidimensional construct, this Chapter has identified the need for an enhanced theoretical basis for the development of an adequate measure of organizational work team cohesion that provides a clear distinction between context-independent and context-dependent aspects of cohesion.

2.1 Introduction

As described in Chapter 1, the contemporary view generally regards cohesion as a multidimensional structure. The relationships between the different dimensions have often not been clarified in previous research. It is also stated in this Chapter that there is now some emerging agreement that Carron et al.'s (1985) definition and conceptual model of cohesion provides a good foundation for understanding the multidimensional nature of cohesion across team contexts (Cota et al., 1995; Mudrack, 1989a, 1989b). Carron et al. (1985) define cohesion as “a dynamic process reflected in the tendency for a group to stick together and remain united in the pursuit of instrumental objectives and/or the satisfaction of member affective needs” (p124). This definition reflects the task, social, individual and team aspects of cohesion identified independently by other researchers (e.g. Tziner, 1982a, 1982b) as important for understanding cohesion in many types of team. If, however, cohesion also has context-dependent dimensions as asserted by Cota et al. (1995), then a measure of cohesion based on these dimensions alone, such as the GEQ, is likely to be insufficient for an organizational work team context.

To address this issue, two strands of research will be reviewed. Firstly, given the limited amount of research that has been conducted on the definition and structure of cohesion in an organizational work team context, the general nature of organizational work teams must be discussed. Secondly, the conceptual and empirical research that has been

conducted on the definition and structure of cohesion across all contexts will be reviewed. This includes reviewing traditional unidimensional dimensions of cohesion that alone may be insufficient for understanding cohesion but may provide an insight to dimensions of cohesion relevant to an organizational work team context. Together, this analysis will enable the relevance of Carron et al.'s (1985) context independent dimensions of cohesion to an organizational work team context to be examined. Their relevance will also be empirically tested later in the thesis. In addition it will enable the context-dependent dimensions of cohesion to be identified. Further, in Chapter 4, this will support the development of an enhanced theoretical model of cohesion for organizational work teams and the development of indicators for each dimension of cohesion that will be included in the new measure.

Carron et al.'s (1985) definition is not just important because it reflects the consistently identified dimensions of cohesion, but it also captures the dynamic property of cohesion. They argue that cohesion is not a *trait* but a property of teams that changes over the lifecycle of the team. As a 'state', an individual's feelings and perceptions will change as a function of the situation or team context they are in at any given time; they will not endure over time (Marks, Mathieu, & Zaccaro, 2001). This is fundamental to understanding the nature of cohesion and how it should be measured. This aspect of cohesion is therefore further discussed in this Chapter. In addition, accurate measurement of a construct relies on adequate distinction between its antecedents and consequences. Discussion of both the antecedents and consequences of cohesion is not just important for reducing construct contamination but also for identifying appropriate variables that can be used to test the psychometric properties of the new measure. Although generally a positive team property, cohesion can have negative implications. Determining optimum levels of cohesion in teams is important for preventing negative outcomes. The issue will also be discussed in this Chapter. Although slightly tangential, for clarity a distinction should first be made between the terms 'group' and 'team', often used interchangeably in the research literature.

2.2 'Group' versus 'Team'

The terms 'group' and 'team' have been used interchangeably in the research literature, with the latter term more recently used, particularly by management consultants. It is also more frequently used in the organizational literature with the term 'group' used widely in psychology texts. Understanding the difference between the two terms and the characteristics of 'groups' versus 'teams', may provide some insight into why different dimensions of cohesion have been identified in different contexts.

A 'group' can be described as an informal collection of individuals (Moray 1994). The psychological group can be considered a collective characterised by a shared identity and who interact meaningfully. Individuals recognise the importance of group membership for realising their individual goals, goals that will be complementary with those of other individuals. Individuals will also have loose role structures, and they will abide by the rules and norms considered acceptable in the group. They are not simply aggregates of individuals who happen to have collected together at a particular time point (e.g. to catch a bus) or who can be defined by particular attributes (e.g. gender, age). To be a group, individuals must have a sense of awareness of one another and have opportunities for interaction. Groups are not of any particular size, although it has been suggested that to enable frequent interactions, groups will contain approximately 12 or fewer individuals, but a minimum of two (Huczynski & Buchanan, 2007). A key attribute that defines groups is *interdependence*, i.e. at least one person influences or is influenced by others (Lewin, 1948). The level of interdependence however, will depend on the size of the group, for example, a group may be so large that interdependence becomes minimal (Forsyth, 1990).

It has been suggested that groups transition into teams as they mature to the performing stage described in Tuckman and Jensen's (1977) developmental stages (described further later in this Chapter). This denotes the existence of a group-team continuum which would help to explain why the terms are used interchangeably. Many definitions of a team exist but one of the most frequently adopted has been proposed by Salas, Dickinson, Converse, and Tannenbaum (1992) describing teams as:

...a distinguishable set of two or more people who interact dynamically, interdependently towards a common and valued goal/objective/mission, who have each been assigned specific roles or function to perform, and who have a limited life span membership (p4).

Fitting with the definitions of 'group' and 'team', the latter has a defined purpose and a common goal requiring collaborative working to achieve them. Cohesion is therefore likely to be of greater importance to teams than groups. Individuals will have complementary skills and knowledge (Mills, Blendell, Henderson, & Rodden, 1999). A mix of technical or functional expertise, problem-solving and decision making skills, and interpersonal skills are required in a team. Success and failure in the team is shared. How the two terms are distinguished however, does have implications for how research findings are interpreted and the generalisations that can be made from research studies. This may have contributed to the lack of consistency in research findings in the cohesion literature. For the purpose of this research and in the interests of consistency, the term 'team' will be used. However, caution is applied in the use of the term in this research.

The use of the term 'group' will be limited to quotations or for referring to collectives that clearly do not possess the characteristics of teams as described in this section. Where this is unclear, the use of the term 'team' does not however, assume that conclusions drawn from previous research are relevant to 'teams'.

2.3 Cohesion as a Unidimensional Construct

Early definitions of cohesion in particular, especially research conducted in the 1950s and 1960s, viewed cohesion as a unidimensional construct that can be defined by a single dimension. The definition provided by Festinger, Schachter, and Back (1950) influenced the early literature on cohesion and was one of the first widely accepted definitions. They defined cohesion as “the total field of forces which act on members to remain in the group” (p.164) and viewed the forces that contribute to cohesion as the attractiveness of the prestige of the team, attractiveness of the members of the team, attractiveness of the activities of the team, and the ability of the team to help its members achieve their goals. ‘Attraction to the team’ has been reflected in many subsequent definitions of cohesion. Seashore (1954) noted that members in a cohesive team feel attracted to the team and will be more resistant to leaving the team. Roark and Sharah (1989) argued that team cohesiveness can be understood by averaging individual attractions to the team. In the context of the relationship between cohesion and team performance, cohesion has been described as an interpersonal liking for fellow team members (e.g. Back, 1950; Schachter, 1952). Cartwright (1968) defined cohesion as “the degree to which the members of the group desire to remain in the group” (p91). Another classical definition defined a cohesive team as “one that sticks together – one whose members are ‘bonded’ to one another and the group as a whole” (Mudrack, 1989a, p.39). Cohesion has also been described as liking one another, identifying with one another, and feeling comfortable with one another (McIntyre & Salas, 1995). Team cohesiveness has been described as “a condition which allows meaningful self-exploration, giving and receiving of potent interpersonal feedback and a more general feeling of being understood, valued, and accepted” (Bednar et al., 1974, p157).

The variable ‘attraction’ has been considered an important contributor to many team outcomes, including an increase in attendance (Yalom & Rand, 1966), willingness to participate in team discussions and self exploration (Truax, 1961). However, there has been disagreement between researchers over whether attraction to the team and team cohesiveness are separate but related variables (Evans & Jarvis, 1980), or whether they are essentially the same phenomenon (Cartwright & Zander, 1968; Frank, 1957). The definition as interpersonal attraction largely results from research conducted in small face-to-face teams where interaction is frequent and team members are physically co-located.

Therefore, it is likely to apply less to larger teams or teams where face-to-face interaction is not always possible, but where a high level of cohesiveness still exists. This needs to be taken into consideration in developing a measure of cohesion for teams that display such characteristics.

Festinger et al.'s (1950) 'field of forces' definition of cohesion however, has been criticised by researchers (e.g. Carron, 1982; Carron et al., 1985; Gross & Martin, 1952a, 1952b; Mudrack, 1989a) for not specifically addressing what keeps teams together. In response to this, Gross and Martin (1952a) proposed an alternative definition of cohesion: "the resistance of a group to disruptive forces" (p.553), reflecting that in a crisis, a team will remain united depending on the nature of the bonds between its members. Research conducted by Brawley, Carron, and Widmeyer (1988) is one of the few studies to empirically test this definition. Due to factors such as ethical issues, their study did not directly test the impact of external threats on team members but instead asked respondents to list actions and events that hypothetically would be disruptive to the team. A similar, later definition was proposed by Piper, Marrache, Lacroix, Richardsen, and Jones (1983) describing cohesion as a "basic bond or uniting force" (p.95).

Given the disagreement over whether 'attraction to the team' is a related but separate construct to cohesion and the fairly vague definitions described above, perhaps the most useful unidimensional definitions are those that have been developed in specific team contexts. From a clinical perspective, cohesion has been defined as "group connectedness, demonstrated by working together toward a common therapeutic goal, constructive engagement around common themes, and openness to sharing personal material" (Budman, Soldz, Demby, Davis, & Merry, 1993, p.202). In the context of teams in organizations, and considered as relevant to industrial work groups, Goodman, Ravlin, and Schminke (1987) defined cohesion as "the commitment of group members to the group task" (p.149). This focus on task-based cohesion only however, may under-represent the construct even in these types of team. For example, in some situations, members of the team may not be committed to the team task but are able to complete it because they perceive that it will be valuable to the team. In the family functioning literature, in which the family is viewed as a small group, cohesion has been defined as *"the emotional bonding members have with one another and the degree of individual autonomy a person experiences in the family system"* (Olson, Sprenkle, & Russell, 1979, p.5, italics in original). This definition developed by Olson et al. (1979) viewed family functioning along the two dimensions of autonomy and cohesion. As this definition was considered to inappropriately combine two distinct concepts, Olson later amended the

definition omitting 'degree of individual autonomy' (Olson, 1986, 1991; Olson, Russell, & Sprenkle, 1983; Thomas & Olson, 1993).

Taken alone, unidimensional definitions are likely to under represent cohesion, but this does not mean that they do not represent some of the dimensions that constitute cohesion. For example, Goodman et al.'s (1987) definition reflects task cohesion and operationalises this as commitment to the task. This is only one possible operationalisation of task cohesion but 'commitment' is one of the characteristics of a team described by Salas et al. (1992). Although, defined in a family context, affective or social aspects of cohesion have also been highlighted in unidimensional definitions of cohesion (Olson et al., 1979). Feelings of being valued and accepted (Bedner et al., 1974), and the ability of team members to remain united in a crisis (Gross & Martin, 1952a) also align with characteristics of organizational work teams and are reflected in multidimensional definitions described in the next section.

2.4 Cohesion as a Multidimensional Construct

2.4.1 Carron et al.'s (1985) Conceptual Model and the Dynamic Nature of Cohesion

Carron et al. (1985) provide the only multidimensional conceptual model of cohesion that has received some endorsement by other researchers, particularly Mudrack (1989a, 1989b) and Cota et al. (1995), as a good foundation for instilling consistency in its definition. This provides a fundamental move forward in cohesion research since these researchers have also been amongst those that have criticised the cohesion literature for being "dominated by confusion, inconsistency and almost inexcusable sloppiness with regard to defining the construct" (Mudrack, 1989a, p45). Carron et al.'s (1985) model is based on Carron's (1982) definition of cohesion stated in the introduction to this chapter. For clarity, and ease of reference it is restated here. Carron (1982) defined cohesion as "a dynamic process reflected in the tendency for a group to stick together and remain united in the pursuit of instrumental objectives and/or the satisfaction of member affective needs" (p.124). Carron (1980) also viewed cohesion as comprising interpersonal working relationships, the success attained by the team and personal forces that attract members to the team. Personal factors or 'motivational forces' (Bass, 1963) that contribute to a team's cohesiveness involve a desire to remain in the team for ego enhancements, the leadership opportunities that it may provide, or due to an attraction to fellow team members.

Carron's (1982) definition of cohesion led to the development of their conceptual model (Carron et al., 1985) to capture the interrelationship between the task, social, individual and team aspects of cohesion captured in the definition. The model is presented in Figure 2.1:

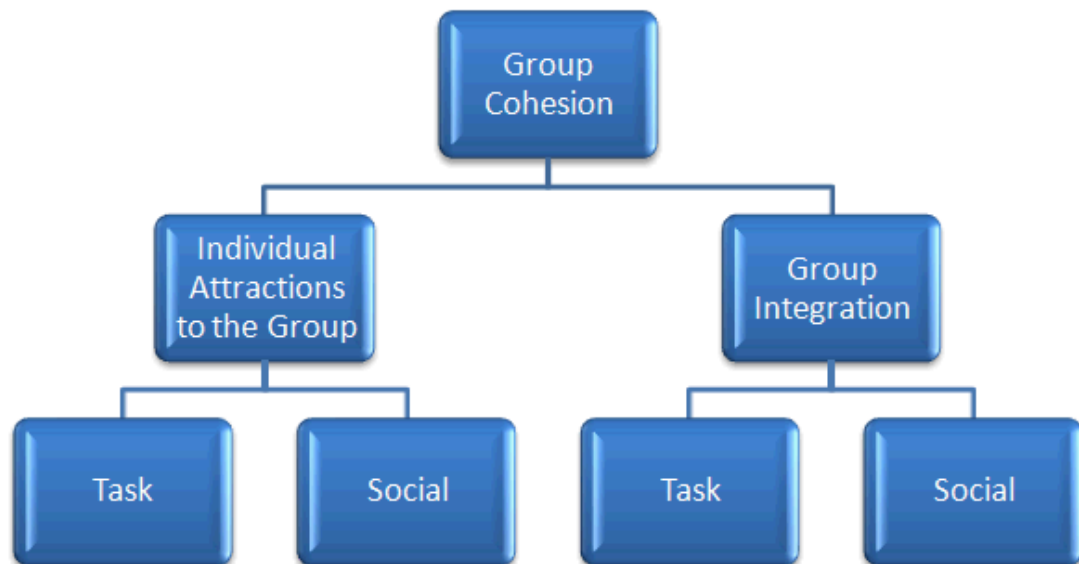


Figure 2.1: Carron et al.'s (1985) conceptual model of cohesion¹

They view the major variance in team cohesion as due to four dimensions: individual attractions to the group-task (ATG-T), individual attractions to the group-social (ATG-S), group integration-task (GI-T) and group integration-social (GI-S). These are defined by Carron et al. (2002a) as follows (p10):

- ATG-T: "Individual team member's feelings about his or her personal involvement with the group's task, productivity, and goals and objectives".
- ATG-S: "Individual team member's feelings about his or her personal acceptance with social interactions with the group".
- GI-T: "Individual team member's feelings about the similarity, closeness, and bonding within the team as a whole and around the group's task".
- GI-S: "Individual team member's feelings about the similarity, closeness, and bonding within the team as a whole and around the group as a social unit".

This view was based on the following fundamental assumptions:

1. Cohesion, as a team property, can be assessed through the perceptions of individual team members (fitting with Lewin's (1935) early notion of cohesion). This is based on the following five propositions. Firstly that a team has clearly observable properties, for example organizational structure and role and status relationships. Secondly,

¹ Reproduced from Carron, A.V., Brawley, L.R., Widmeyer, N.W. (2002). The Group Environment Test Manual. Morgantown: Fitness Information Technology, Inc.

members of the team experience the social situation of their team, are socialised into it and as a result, develop a set of beliefs about it. Thirdly, the set of beliefs that are formed by team members are similar to other social cognitions in that they are a product of the members' selective processing and their own personal integration/perceptions of team-related information. Fourthly, team members' perception of the team as a whole provides a reasonable estimate of aspects of unity. Finally, social cognitions can be measured. It is therefore not a construct that can be measured by external observers such as managers (Chiocchio & Essiembre, 2009).

2. Team members develop perceptions of the level of unity/bonding within the team as a whole (i.e. perceptions formed in terms of 'we' and 'us') as well as the way the team satisfies their personal needs and objectives (i.e. perceptions formed in terms of 'my', 'I', and 'me').
3. Team members perceptions of cohesion within the team as a whole and of the team as a forum for the satisfaction of personal needs and objectives will be related to the team tasks (i.e. task cohesion), and the social relationships within the team (i.e. social cohesion).

A key strength of the conceptual model is that it provides a theory-driven approach to understanding cohesion. It captures how the four dimensions inter-relate. That is, there is an interaction between task and social cohesion as perceived by team members. The assumptions of the model start to capture the properties of cohesion that can be used to inform how it should be measured. It also captures what are considered to be the primary or context-independent dimensions of cohesion. The task, social, individual and team aspects of cohesion identified by the model have however, also been identified independently by other researchers (e.g. Tziner, 1982a, 1982b) across team contexts. Although Carron et al.'s (1985) conceptual model has been tested in a number of empirical studies (e.g. Brawley et al., 1988; Brawley, Carron, & Widmeyer, 1993; Carron, Widmeyer, & Brawley, 1988; Spink & Carron, 1992; Westre & Weiss, 1991; Williams & Widmeyer, 1991) these have primarily been conducted in a sports team context. The context-independent nature of the dimensions suggests that they will also be relevant to organizational work teams allowing this model to be capitalised on in this research. However, its validity in an organizational work team context must be tested empirically. In fact the review of the literature shows that many of the other multidimensional definitions of cohesion described in the next section reflect both task-based and social-based aspects.

Implicit in the model, but captured in Carron's (1982) definitions of cohesion is the notion that cohesion is a 'dynamic' construct that will shift/change over time, rather than being

static like a *trait*, implying that once cohesion has been achieved in a team, it will remain cohesive (Budge, 1981). Cohesion is a property that is present in all teams but exists on a continuum depending on factors such as level of interaction, internal and external threats to the team (such as conflicts and tensions), type of team and nature of the task (Steiner, 1972). The development and maturation of cohesion can be linked to the team developmental cycle. Team cohesion emerges at what Tuckman (1965) termed the 'norming' stage of team development in his model of development stages. A number of forms of this model exist; one of the most comprehensive and useful for understanding the nature of cohesion is Morgan, Salas, and Glickman's (1986) and Morgan, Glickman, Woodard, Baliwes, and Salas' (1994) Team, Evolution and Maturation (TEAM) model shown in Figure 2.2:

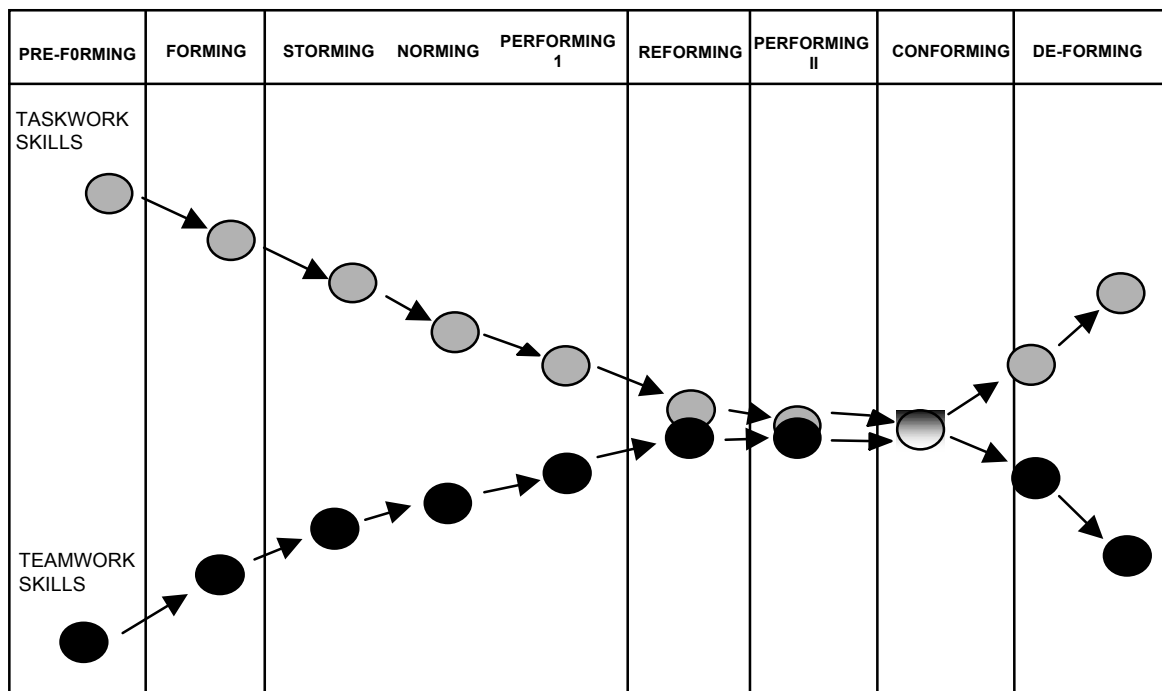


Figure 2.2: Morgan et al.'s (1986, 1994) Team, Evolution, and Maturation (TEAM) model.

At the norming stage, following the initial formation of the team, the intermember conflict that defines the 'storming' phase is replaced by cohesiveness. A heightened sense of unity and camaraderie emerges and team members develop a greater sense of identity and belonging to the team. These are aspects that have been found to be important for team functioning (Gillespie, 1991). Team members will begin to feel that they share similar characteristics to one another such as similar personal qualities and common goals and will protect the team from outside criticism and attack. The growth of cohesion at the norming stage acts to stabilise and regulate the team's internal dynamics leading to a higher level of member retention. This is reflected in both Goodman et al.'s (1987) and Cartwright's (1968) unidimensional definitions of cohesion reflecting that cohesion will

increase an individual's commitment and desire to remain in the team. Cohesion at this stage has also been found to increase satisfaction and enjoyment (Darley, Gross, & Martin, 1951; Hare, 1976; Stokes, 1983a; and Wheelless, Wheelless, & Dickson-Markham, 1982). Cohesion will continue to develop and mature as the team transitions through the 'performing' stage until it disbands at the 'deforming' stage. Cohesion is likely to be highest at the performing stage. The developmental stages are not sequential but instead different teams will move through them in different ways and at different speeds. For example, members of virtual teams are likely to take longer to establish trust and confidence in one another due to lack of face-to-face contact, characteristics of the forming stage. Intragroup conflict will be harder to resolve and ultimately the growth of cohesion will be slower. Cohesion may be lower in these types of teams than those that are co-located.

Morgan et al.'s (1986, 1994) model also includes a 'reforming' stage that highlights how effective teams will try to establish new ways of working to seek additional performance benefits. This can serve to enhance cohesion or temporarily reduce current levels as the team establishes effective working practices. Other team models that are not considered as so linear as Tuckman's (1965) team developmental stages or Morgan et al.'s (1986, 1994) TEAM model also support the premise that cohesion levels will alter. For example, Gersick's (1991) Punctuated Equilibrium Model suggests that teams alternate between periods of inactivity where they make little progress towards achieving the goals of the team punctuated by periods of intense activity and accelerated change where the team develops and conducts the majority of its work. Therefore cohesion levels are likely to fluctuate according to periods of inactivity and activity.

Morgan et al. (1986, 1994) also overlaid a teamwork track and a taskwork track on the TEAM model that co-develop over the maturation period of the team. These two tracks distinguish two categories of behaviour: teamwork or people-orientated behaviours that support coordination and interactions between team members (which are likely to include aspects of social cohesion), and taskwork behaviours that relate to the execution and achievement of team goals (aligning with task-based aspects of cohesion). Although the two tracks start widely separated, they need to become increasingly integrated as the team matures in order to achieve successful team functioning and performance. A further assumption of Carron et al.'s (1985) conceptual model is that not all dimensions of cohesion will be equally prominent or all present throughout the developmental stages of a team. For example, in work teams consisting of individuals who have not previously met, task cohesion is likely to be most salient, at least at the early stages of the team's development. In high performance teams that are characterised by time constraints, high

workload and complex tasks (such as decision-making teams), task cohesiveness is likely to be more prominent than social cohesion. Therefore, the prominence of cohesion dimensions and levels of cohesion will depend on the type of work team, the nature of their tasks and their stage of team development. If a measure is to be an effective diagnostic tool, it must be able to detect differences in levels of cohesion across time, context or team. Therefore, in developing the new measure of cohesion for organizational work teams, a number of implications for its validation must be considered in the design of the empirical study including:

- Selecting teams that are likely to display some levels of cohesion (i.e. selection of teams across the development lifecycle). Team cohesion does take some time to build so sampling only at the beginning of a team's development would be insufficient.
- Forming appropriate hypotheses about how the various dimensions of cohesion relate to other team constructs.

2.4.2 Other Multidimensional Views of Cohesion

Larkin (1972) describes cohesive teams as those in which members are bound emotionally to the task as well as to each other, where greater stability is ensured and cooperative diversity is enhanced. Eisman (1959) empirically investigated the dimensionality of cohesion through examining the intercorrelations among five measures of cohesion reflecting "the attraction of a group for its members" (p.183). The measures were chosen either because they were widely used among researchers (e.g. a sociometric measure instructing subjects to list their best friends) or that their conceptual basis was developed from Festinger et al.'s (1950) model (e.g. the average number of reasons that members gave for belonging to their team). Eisman's (1959) study used members from 14 student teams and used individual member's response as the unit of analysis. However, the magnitude of the intercorrelations was found to be too small to be consistent with the theoretical viewpoint. Hagstrom and Selvin (1965) conducted a similar empirical study conducting a factor analysis² of 19 indexes of cohesion, instead using the team as the unit of analysis as opposed to the individual. Results of the factor analysis indicated that two factors corresponding to Festinger et al.'s (1950) model contributes to cohesion – social satisfaction and sociometric cohesion. Stokes (1983a, 1983b) identified risk taking, instrumental value of the team and attraction of one team member to another as elements of cohesion and empirically demonstrated these as independent from one another. Newcomb, Turner, and Converse (1965) argued that there are three major dimensions of cohesion, terming them mutual attraction, structural integration and normativeness. Feldman (1968) identified similar dimensions - interpersonal integration

² Factor analysis is a data reduction technique and is further described in Chapter 3, section 3.2.6.

(representing liking or attraction), functional integration (co-ordinated or interdependent task behaviour) and normative integration (shared beliefs or normative consensus).

In a U.S. military context, through empirical studies conducted at the Walter Reed Army Institute of Research (WRAIR), Griffith (1988) developed seven subscales of cohesion using factor analysis. These were administered to 93 companies of American soldiers. The study identified two dimensions of military unit cohesion. The first dimension 'direction' includes vertical aspects of cohesion existing between superiors and subordinates and horizontal aspects of cohesion existing between peers. Vertical cohesion can be conceptualised as "the member's faith and fairness and competence of their leaders and the sense that the leaders care about their welfare" (McClure & Broughton, 2000 p.475). Horizontal cohesion can be conceptualised as "the confidence each member has in the others' confidence and the mutual caring and affection in their relationships" (McClure & Broughton, p.475). The second dimension of cohesion, 'functions', includes both instrumental aspects of cohesion (relating to task performance) and affect aspects of cohesion (relating to interpersonal support). In a sport psychology context Yukelson, Weinberg, and Jackson (1984) identified four dimensions of cohesion: 'quality of teamwork' relating to team discipline, conflict resolution and altruism; 'attraction to the group' relating to satisfaction with and attraction to team membership; 'unity of purpose' tapping team norms and goals; 'valued roles' reflecting whether players feel that their role is valued by team mates and coaches.

Multidimensional definitions of cohesion offer a more comprehensive understanding of cohesion as a complex psychological construct. However, there are two major limitations with the research that has been conducted. Firstly, despite the research being conducted in a variety of team settings, few studies provide a clear understanding on how context affects the relevance of cohesion dimensions. Secondly, a large proportion of the research has relied on a solely empirical approach to determining dimensions of cohesion. These issues will be discussed in turn below.

A critical examination of both unidimensional and multidimensional definitions of cohesion led Cota et al. (1995) to propose that cohesion is a multidimensional construct that has primary and secondary dimensions. Their work was motivated by studies that showed that aspects of cohesion differed across teams. For example, Stokes (1983a, 1983b) found that the relevance of the three dimensions of cohesion he identified - risk taking, instrumental value of the team, and attraction, differed across types of therapy groups. They describe primary dimensions as those that are context-independent and so are relevant across most types of teams. Cota et al. (1995) view Carron et al.'s (1985) task,

social, individual and team dimensions of cohesion as primary dimensions. They also consider team resistance to disruption (Brawley et al., 1988; Gross & Martin, 1952a), and normative aspects of cohesion (Feldman, 1968; Yukelson et al., 1984; Hagstrom & Selvin, 1965) to be relevant to all teams. In contrast, secondary dimensions are context-dependent and will be relevant to only certain types of teams. Cota et al. (1995) put forward that secondary dimensions include Griffith's (1988) 'vertical' dimension of cohesion identified as relevant to military teams, 'risk taking' identified in the clinical psychology literature (Stokes, 1983a, 1983b; Stokes, Fuehrer, & Childs, 1983), and 'valued roles', relevant to sport teams (Yukelson et al., 1984). It is suggested that some secondary dimensions of cohesion may not be limited to only one team type, but may be also relevant to other types of teams that share similar characteristics. For example, Griffith's (1988) vertical dimension of cohesion is likely to be relevant to teams that are hierarchically organised such as organizational work teams. Equally, the valued roles dimension will also be relevant to teams that have clear role structures. Again, this dimension is likely to be relevant to organizational work teams that share this characteristic. A measure of cohesion must have sufficient breadth to measure the multidimensional aspects of the construct for the context in which it is to be applied.

Although their work is notional and has not been empirically tested, their intention was to provide clarity that the underlying properties of cohesion as a construct do not differ across contexts but rather that there may be additional or specific manifestations of it within particular contexts. However, they do not attempt to establish how primary and secondary dimensions are inter-related. As acknowledged by Cota et al. (1995), their perspective will allow more accurate definitions and measures of cohesion to be developed for particular contexts. Yet, since it has been proposed, their perspective does not seem to have been taken forward to improve understanding of cohesion. This gap will be addressed in Chapter 4. As a solid foundation defining the primary dimensions of cohesion, Carron et al.'s (1985) conceptual model will be further developed to include the richer context-dependent aspects relevant to organizational work teams. Further, the inter-relationship between the primary and secondary dimensions of cohesion in this context will be determined. This will contribute to an improved understanding of cohesion in industrial-organizational settings and the development of a more accurate measure of cohesion in this context. In addition, it will aid more accurate understanding of how cohesion is related to other psychological constructs in an organizational setting.

Much of the research on multidimensional aspects of cohesion has been driven empirically (Cota et al., 1995). However, examining cohesion or any construct from solely an empirical data driven approach is little more than a 'shotgun' approach (Nunnally,

1978). A combined conceptual and empirical approach is standard for improving understanding of the dimensionality and properties of constructs (Nunnally, 1978). This is the approach that is adopted in this thesis. The purely data driven approach may have been a product of the lack of adequate or accepted conceptual foundation to support a theory driven approach, but it has only served to produce inconsistency. Given the wealth of research that now exists, some theoretical conclusions about the nature of cohesion can be drawn. Typically, researchers have tended to construct a set of items that they feel represent cohesion without first developing a clear idea of what the dimensions of cohesion are and how they are inter-related. Instead, they use techniques such as factor analysis to determine the dimensions of cohesion based on how these items 'cluster' together. This approach has a number of limitations. Firstly, without an adequate conceptual basis, the choice of items may be too wide including aspects extraneous to cohesion that tap related but distinct constructs. In fact, the extent to which the antecedents and consequences of cohesion have been adequately distinguished from cohesion in previous research is unclear. These are reviewed in section 2.5 to ensure they are adequately distinguished in this research. Conversely, the number of items developed may be too small and too narrow to represent the full richness of the construct. Conclusions drawn about the nature of cohesion will be misleading. The use of factor analysis itself can lead to different numbers of dimensions being identified due to, for example, different criteria being applied for retaining factors or different factor analytic techniques being employed. This can make it difficult for researchers to replicate results (Cota et al., 1995). These issues are further analysed in Chapter 3 in relation to the strengths and weaknesses of existing measures of cohesion.

2.5 Antecedents & Consequences of Cohesion

Identifying the antecedents (i.e. causes) and consequences of cohesion is important for developing a measure of cohesion that is free from construct contamination and for designing studies to test the divergent validity of the new measure. For example, items constructed for the new measure of cohesion in organizational work teams found to correlate more highly with measures of related but distinct concepts, that are in themselves reliable and valid measures of that construct should be removed from the measure.

2.5.1 Antecedents

Relatively little of the research literature that has examined the relationship between cohesion and other variables has focused on the antecedents of cohesion. Casey-Campbell and Martens (2009) make two suggestions why this is the case. Firstly, they suggest that one reason for this is due to Gross and Martin's (1952a) change in emphasis

of Festinger et al.'s (1950) definition from the "*total field of forces* which act on group members to remain in the group" (p.164 emphasis added) to the "*resultant field of forces*". The second reason they provide is due to the fact that most studies measuring the relationship between cohesion and other variables only reflect more mature teams where a certain level of interaction between team members has already taken place. This has supported research on the consequences of cohesion but made it difficult for researchers to identify variables that affect levels of cohesion. This has implications for developing a measure of team cohesion. It makes it difficult to identify clear antecedents of cohesion which can be employed in a validity study to determine the sensitivity of a new measure to expected variations in levels of cohesion. Those that have been suggested which affect levels of cohesion include: environmental factors such as physical proximity and contractual responsibilities; team factors such as team size (Carron, Eys, & Burke, 2007) and type of task and role; individual factors such as personality (e.g. extraversion) and demographic characteristics (e.g. gender); leadership factors such as leadership style (Carron, 1982; Carron et al., 2007). Perhaps in an organizational work team setting perceptions of cohesion may differ depending on whether the individual is a team member or team leader. Carron et al. (2002b) found that gender moderates the relationship between cohesion and team performance, with the association greater in female sports teams. Levels of cohesion have also been found to differ depending on type of sport (Carron et al., 2007). It may also be the case that levels of cohesion differ depending on type of organization. An adequate understanding of the individual and team characteristics that cause differences in perceptions of cohesion, such as those described above, is also important for the development of norms to properly understand the meaning of cohesion scores derived from a measure.

Although conducted in a sports team context, Widmeyer, Brawley, and Carron (1990) research found that task cohesion was greatest in teams of size three and social cohesion was most optimal in team sizes of six. Since taskwork requires co-ordination and collaboration, it is unsurprising that smaller teams achieve higher levels of task cohesion. Since this is not the only study to have identified team size as a variable which affects levels of cohesion, it appears to provide a good variable against which to test the sensitivity of the new measure of team cohesion. In terms of leadership style, transformation leadership (i.e. where change envisioned by the leader occurs only with the commitment of the team) has been found to have a positive relationship with laboratory teams (Hoyt & Blascovich, 2003), light infantry platoons (Bass, Jung, Avolio, & Berson, 2003), fire rescue personnel (Pillai & William, 2004) and Korean workgroups (Jung & Sosik, 2002). In a sports team context a democratic leadership style (i.e. where the leader involves team members in decision-making activities) has been found to lead to

higher levels of team cohesion over an autocratic style (i.e. one in which the leader makes all decisions with no delegation) (Gill & Williams, 2008). Role aspects refer to role clarity (how well the role is defined), role acceptance (the extent to which team members comply with role requirements) and role performance (how well team members conduct their role responsibilities). The role aspect shown to have most influence on cohesion is role acceptance (Dawe & Carron, 1990). Social loafing (i.e. when one or more of the team members become idle within the team, relying on the efforts of others) has also been shown to influence cohesion where increased social loafing results in lower team cohesion (Nelson & Quick, 2007).

Work team diversity (i.e. differences among individuals) has also been identified as an antecedent of cohesion (Harrison et al., 1998; van Knippenberg & Schippers (2007). Research results on the effect of diversity on cohesion are mixed. However, Harrison et al. (1998) suggest that this is in part due to only the more easily measurable overt demographic differences being studied (such as gender and age). In their study they found that over time, as team members interact more frequently, demographic or surface-level dimensions as they refer to them become less important on the cohesiveness of the team than attitudinal or deep-level dissimilarities. This is supported by other previous research since Widmeyer, Brawley, and Carron (1992) found that social and racial characteristics had only a minimal effect on cohesion with a greater impact reported from personality and attitudes, such as self-disclosure (Stokes et al., 1983) and satisfaction with the team (Williams & Widmeyer, 1991).

Cultural variables of a team have also been found to determine the degree of team cohesion. Actual team culture (i.e. the content, meanings and topics of interactions), ideal team culture (the norms, values or behaviours that team members think will enhance performance and satisfaction) and the culture gap (i.e. the difference between actual and desired beliefs and norms) have been found to have a positive influence on cohesion (Sanchez & Yurrebaso, 2009). Cohesion has also been found to be related to gender issues, discussion methods, conflict and resolution, and team structure (Cragan & Wright, 1990). Friendliness, dominance, and acceptance of authority have also been found to have a positive impact on team cohesion (Copeland & Straub, 1995).

2.5.2 Consequences

Much of the literature on team cohesion has focused on cohesion and its consequences, particularly studies that have been conducted in a work team context, despite the lack of adequate measures of the construct. Cohesion has been most frequently linked to team performance and productivity but also other variables such as trust and individual well-

being. The fact that cohesion has been found to be positively related to important team outcomes is partly responsible for the continued interest in the construct. Research indicates that highly cohesive teams achieve their output goals more often than those which are less cohesive (Haslam, 1991; Brannick, Roach & Salas, 1993) and have members that show more frequent and effective co-ordination (Tannenbaum, Beard, & Salas, 1992). It is also generally believed that cohesive task-groups are more productive, both in laboratory and applied settings. However, it has been argued that there is a large discrepancy between what is believed to be the case and the existing evidence available on cohesion (Druckman & Swets, 1988). Empirical research reports mixed results. Hare (1976) cited 14 studies indicating a positive relationship between cohesion and performance. Lott and Lott (1965) reported 20 studies showing a positive relationship, and 15 studies showing a zero or negative relationship. Stodgill (1972) reported 12 studies indicating a positive relationship and 20 supporting no association between cohesion and team performance. Nieva, Fleishman, and Rieck (1978) cited eight studies showing a positive relationship and six reporting no effect or a negative effect. Strupp and Hausman (1953) found a positive correlation between cohesiveness and the productivity of aircraft maintenance crews. In a three-person land surveying task, Terborg, Castore, and DeNinno (1976) found that liking had no effect on team performance. A meta-analysis of 66 studies was conducted by Mullen and Copper (1994) examining the effects of team cohesiveness on performance. Although some of the studies involved groups that would not qualify as teams, a positive relationship between cohesion and performance was found. This was more evident in smaller teams and found to be caused by team members' commitment to the task more than interpersonal attraction or team pride.

Studies also exist that indicate that cohesiveness may even degrade team performance. For example, Weick and Penner (1969) found that in laboratory teams, interpersonal attraction inversely related to performance. More recently Chiocchio and Essiembre (2007) found that in project teams the nature of the relationship between cohesion and performance depends on the type of team and type of performance measure used, i.e. either behavioural or self-report measures. The latter tend to result in a stronger relationship between cohesion and performance being identified, perhaps because of common method bias. Failure of meta-analytic studies to show a clear relationship between cohesion and team performance is also likely to, in part, be due to different operationalisations of cohesion used in the studies. Improved measurement of cohesion is important for supporting a clearer understanding of the consequences of cohesion.

Due to the inconsistency of the research examining the relationship between cohesion and team performance, research turned to identifying moderator variables that, in part,

contribute to the relationship between cohesion and performance and determine the direction of cohesion effects on performance. Cohesion has been shown to be positively related to performance when teams establish high performance goals and norms that encourage productivity, but negatively related to performance when low performance goals and norms for productivity are established (Schachter, Ellertson, McBride, & Gregory, 1951; Seashore, 1954). The relationship is illustrated in Figure 2.3:

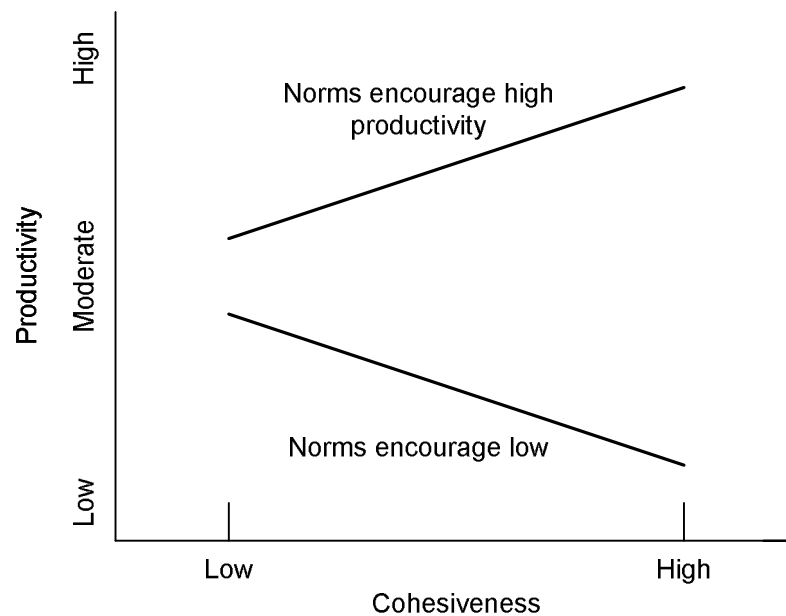


Figure 2.3: The cohesiveness / productivity relationship (Forsyth, 1990).

Stodgill (1972) and Greene (1989) argued that team drive, defined by Stodgill as “the intensity with which members invest expectation and energy on behalf of the group” (p.27), has a moderating effect on the cohesion-performance relationship. They found that cohesion only has a positive effect on performance when there is a high group drive. Leadership style has also been found to have an effect on the relationship between team cohesion and team performance. For example, in a military context, Tziner and Vardi (1983) reported that the performance of Army tank crews was highest when (a) there was high cohesion within the team and the leadership style reflected both a task and people orientation, and (b) when there was low team cohesion within the team and the leadership style reflected a people orientated style. This shows that team performance can still be high even when there is low cohesion in the team.

Studies show that the relationship between cohesion and performance may also depend on the specific nature of the cohesiveness. Task cohesion has been found to be most closely related to work performance than social cohesion (Mullen & Copper, 1994; Zaccaro & Lowe, 1988; Zaccaro, 1991; Chang & Bordia, 2001). Zaccaro and Lowe (1988)

found that task-cohesion is positively related to performance on an additive task (where individuals perform the same job and performance is the sum of individual efforts (Steiner, (1972)), but interpersonal cohesion had a negative effect. Zaccaro and McCoy (1988) found that performance scores were highest in teams that had both high levels of task and interpersonal cohesion. However, they also found that there was no difference in performance effectiveness between teams that were high on one type of cohesion and low on the other, and teams that were low on both. Zaccaro (1991) found that task cohesion and interpersonal cohesion had different effects on individual performance and absenteeism in student cadet groups. Despite the mixed results obtained on the relationship between cohesion and performance, the most research has been conducted on this variable, including how it differentially relates to different dimensions of cohesion. This makes 'team performance' one of the most appropriate consequence variables to validate a new measure of cohesion against. The differential relationship between team performance and task and social cohesion provides a way of determining the differential validity of a new measure of cohesion and will be taken forward as an approach in this research. It should also be noted however, that cohesion is not the only factor that influences work team performance. Other factors include team composition, the nature of team goals and leadership aspects (Guzzo & Dickson, 1996).

Other consequences of cohesion include length of membership within the team, co-operation and participation (Casey-Campbell & Martens, 2009). Team cohesion can also increase job satisfaction (Nelson & Quick, 2007). Roark and Sharah (1989) found a strong correlation between team cohesiveness and empathy, self-disclosure, acceptance and trust. They argued not only that cohesion could lead to an increase in empathy, self-disclosure, acceptance and trust, but also that an increase in these factors could lead to an increase in cohesion. They also found that the different types of teams have different levels of cohesiveness. Amongst the teams that they studied were personal growth groups and psychotherapy groups. Cohesive teams have also been found to report more positive self-esteem, increased levels of security and lower levels of anxiety (e.g. Myers, 1962; Pepitone & Reichling, 1955).

2.6 The Implications of Cohesion

The fact that only positive outcomes of team cohesion were discussed in the previous section is of no coincidence. Cohesion has been found to be primarily a positive team attribute and this is why research on cohesion can facilitate understanding of why some teams function effectively and others do not. Due to poor measurement of the construct it is important that a psychometrically-sound measure is developed that will provide a more robust test of the importance of cohesion. However, cohesion can also have some

negative implications. It is possible that too much cohesion can result in an inability for teams to adapt to the environment. The cohesiveness of teams is threatened by conflicts such as goal conflicts and domination of subgroups within the team. Uniformity in norms and perceptions may result in routine behaviours being developed for interacting with one another and the environment which may not fit with changes in the environment (Klein, 2000). Without appropriate integration into the larger organization, teams may develop norms and goals of their own that will undermine those of the larger organization of which they are part. High levels of cohesion may not always result in more effective performance, but instead dysfunctional processes such as groupthink and risky shift effects (Sundstrom, De Meuse, & Futrell, 1990). However, without a minimum level of cohesion a team would drift apart (Forsyth, 1990).

Groupthink has been defined as:

a quick and easy way to refer to a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when members' strivings for unanimity override their motivation to realistically appraise alternative courses of action...Groupthink refers to a deterioration of mental efficiency, reality testing, and moral judgement that results from group pressures (Janis, 1972, p.9).

Unlike the performance research, the groupthink hypothesis argues that too much cohesion in a team is detrimental to the free-thinking of team members and therefore impacts decision-making. Janis (1977) argues that a cohesive team displays eight groupthink symptoms: illusions of invulnerability, belief in inherent team morality, rationalisation, isolationism, self-censorship, direct pressure, mind guards and unanimity illusions. He argues that a "high degree of group cohesiveness is conducive to a high frequency of symptoms of groupthink which, in turn, are conducive to a high frequency of defects in decision-making" (Janis, 1972, p.199). Members in highly cohesive teams are less likely to disagree with other members and will try to avoid arguing with them. Disagreements in highly cohesive teams are more likely to lead to being ostracised from the team than in non-cohesive teams (Cartwright, 1968; Schachter, 1951). Isolation, leadership and decisional stress can also result in groupthink.

Team members tend to be disliked and assigned undesirable roles if they go against the consensus of the team (Schachter, 1951). Cohesiveness can also decrease the quality of team performance, increase hostility, scapegoating and interpersonal rejection (French, 1941; Pepitone & Reichling, 1955). A team will exert direct interpersonal influence, including persuasion, bargains, promises and even the threat of rejection in an attempt to turn a nonconformist into a conformist (Forsyth, 1990). Organizations can be viewed as

consisting of a number of smaller teams. Thus, it is likely that in this view, teams will compete for resources in order to achieve their own objectives (Sapolsky, 1972). This competitive element between teams provides one reason why team members will overvalue their own team and devalue other teams (Le Vine and Campbell, 1972). Individuals who have membership of more than one team may serve to reduce this divide between teams (Likert, 1961; Heiskanen, 1967).

2.7 The Nature of Organizational Work Teams

In order to determine the relevance of the definitions and operationalisations of cohesion in an organizational work team context, a full understanding of the nature of organizational work teams is necessary. The nature of organizational work teams is therefore reviewed in this section.

An important understanding of the human aspects of organizations has been provided by the Human Relations approach to management. This approach developed from the Hawthorne studies conducted in the 1920's and 1930's at the Hawthorne Plant of the Western Electric Company in Cicero, Illinois by Elton Mayo, Fritz Roethlisberger, and William Dickson. The Hawthorne studies were conducted to examine the effect of illumination, room temperature and humidity on productivity to promote the sale of light bulbs in workplaces that were typically lit by natural daylight or candles at that time (Gillespie, 1991). The conclusions drawn from the Hawthorne experiments that led to the Human Relations approach to management captured that successful organizational management and outcomes relies on individuals and their motivations but that it is the interactions between these individuals acting as teams that is important. The teams to which individuals belong exert strong influences over their work habits and attitudes and their membership to a team fulfills their needs for belonging and recognition. It also provides individuals with an identity. An important aspect is the manager's role in instilling cohesion in teams through collaboration. In addition to Mayo, Likert (1961) also argued that organizations should be viewed as teams not individuals as it is these entities that satisfy the needs of individuals and increase their productivity. Likert recognised that individuals can be members of more than one team simultaneously. This gave rise to his 'linking pins' model where a leader of one team is also a member of another team in which they are managed, and that manager is a member of another team up the hierarchy and so on. An organization contains overlapping team structures. This may have implications for team cohesion if individuals do not identify with a distinct team. The linking pins have a responsibility to maintain unity in the team and instil a sense of belonging. Thus vertical as well as horizontal co-ordination is important in team functioning. This indicates that cohesion between the team members and team leader is important for team functioning.

There are many different types of work teams such as advice teams, project teams, production teams, self-managed teams, cross-functional teams, and virtual teams. The purpose and nature of these types of teams differ. For example, advice teams may be set up in organizations as a committee of experts to make recommendations on improvements that should be made in the organization. They tend to have little or no collaboration with work teams in the organization other than management. Project teams consist of individuals holding the necessary skills (e.g. specialist knowledge) to conduct a specific task (e.g. a research project or to develop a product) to be completed in a specified period of time. These types of teams are one of the most prevalent in organizations and in which cohesion has been found to have particular importance (Chiocchio & Essiembre, 2007). Project teams are very often cross-functional to meet the demands of the task. For example, a project might require the skills of a software engineer, psychologists and product designers in order to deliver a technology solution. Cross-functional teams are beneficial to organizations as they increase the range of tasks that an organization can undertake, increasing their competitiveness and attracting a wider range of customers. In terms of cohesion, cross-functional teams can place more difficulties on its development and maintenance since by their nature individuals are likely to be members of different departments within the organization to which they are allied. Intra-organizational boundaries that exist between different departments can provide a source of tension where they have their own resourcing and financial targets to meet and are measured on their own success. Cross-functional teams are also likely to be brought together at short notice requiring members to rapidly develop effective working relationships. Knowing how to support the development of cohesion is therefore vital. Once the task has been completed, the project team is either assigned a new task or it is disbanded (Huczynski & Buchanan, 2007).

Virtual teams are becoming increasingly more common in organizations due to new working practices (e.g. working at home or from different sites) and increasing availability of technologies that can support distributed collaborative working (such as desktop video conferencing). These types of team can be described as an organizational form since other types of team such as project teams and production teams can also be virtual in nature. This provides organizations with the benefit of being able to access more diverse expertise, enhancing their competitiveness (Nelson & Quick, 2007). It also provides an optimal way of working where there are time constraints, where required resources are distributed, and where there is increasing dependence on knowledge-based input. In virtual teams increasing importance is placed on competency, communication, and establishment of good relationships, requiring individuals to work with a wide range of

individuals, from different departments, organizations, cultures or nationalities (Grenier & Metes, 1995).

Although the flexibility afforded by virtual teams is increasing their popularity in organizations, important social, psychological, technical and organizational factors such as cohesion and the technology required to support it in such teams, are often not taken into account (Proctor, Williams, Carletta, & McKinley, 2000). Virtual teams that cross organizational, cultural and national boundaries place more constraints on the development and maintenance of team cohesion. It is possible that team members are more likely to feel a loss of individuality and sense of self (Aram, 1998). Further, low individual commitment, role overload, role ambiguity, absenteeism and social loafing are more pronounced in physically co-located teams (O'Hara-Deveraux & Johansen, 1994). Geographical distribution has been found to negatively affect both team cohesion and team performance (Inzana, Kass, & Willis, 1994). Research suggests that norms and social relationships found in cohesive teams may take more time to develop in virtual teams (Sudweeks & Allbritton, 1996). One reason for this is that technology can actually block social interactions, which may impair team performance in some types of tasks (Carletta, Anderson, & McEwan, 1999). This suggests a need for carefully designed technologies and strategies to support team working in this context.

Teams are important for meeting the aims and objectives of an organization, and are important for ensuring that organizations maintain a competitive edge. They are also vital for providing the range of expertise and skills required to respond to complex and constantly changing demands of the work environment. Teams that function effectively accept and understand the tasks and goals of the team and have members who are participative and listen to one another. A team environment is fostered that allows team members to express their ideas, thoughts and feelings (Nelson & Quick, 2007). The importance of teams has not gone un-criticised. Instead of providing the vital building block for organizational success, Allen and Hecht (2004) suggest that they are used because they have psychological and social benefits. That is they provide the impression that individuals have a unique role to play in an organization and that their contribution is important. They also give a sense of empowerment and sense of belonging, increasing an individual's sense of satisfaction and well-being. However, it is these aspects of teams that are important for team cohesion and team functioning. Although they highlight a lack of empirical support for the link between teams and organizational performance and effectiveness (suggesting that teams may not be more beneficial than individuals) they do acknowledge that for some types of work tasks and for some types of organizational contexts, a team-based structure is appropriate. For example, teams are important where

cross-functional skills are required to complete tasks (e.g. multidisciplinary project teams, surgical teams and fire fighting teams). In fact cohesion has been found to be particularly important in project teams for enhancing performance (Chiocchio & Essiembre, 2009).

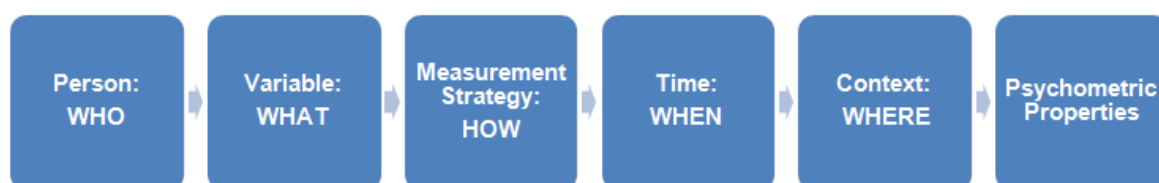
2.8 Summary

Following decades of research the structure of cohesion is now regarded as multidimensional in structure. There is also now some agreement that cohesion consists of the task, social, individual and team dimensions identified in Carron et al.'s (1985) conceptual model, as these have been consistently identified across different types of teams. However this conceptual model has not been widely validated outside of a sports team context. Cohesion is also regarded as a dynamic construct that changes over time as teams develop and mature. As such, the salience of the different dimensions of cohesion will change over time as too will its relationship with other variables (e.g. team performance). However, inconsistencies still exist in the research literature in the dimensions identified by researchers. When comparing empirical studies, this lack of consistency has resulted in uncertainty over whether the same concept is being studied. There has also not been a clear delineation between what causes cohesion, what cohesion is itself, and what the effects or outcomes of cohesion are (Drescher, Burlingame, & Fuhrman, 1985). This must be taken into consideration in the development of the new measure to avoid construct contamination.

The inconsistency in the research literature has largely been a result of the contexts in which cohesion has been examined and lack of adequate measure. This fits with the notional perspective that cohesion has both context-independent (primary) and context-dependent (secondary) dimensions (Cota et al., 1995). The richness and complexity of cohesion in part stems from its specific manifestations within particular contexts. However, this perspective has not been adequately captured in any definition or conceptual model of cohesion that can be used to inform the adequate measurement of cohesion in context. As such, it is likely that existing measures of cohesion reflect the inconsistency reflected in the definitions of the construct. The extent to which previous measures have captured all primary aspects of cohesion identified by Carron et al. (1985) must be examined. Their psychometric properties should also be examined to determine their relevance in informing the measurement of cohesion in organizational work teams. This is also important for identifying adequate measures to assess the validity of the new measure of cohesion against. This will be examined in Chapter 3. An enhanced theoretical basis of cohesion distinguishing context-independent and context-dependent dimensions must also be developed. Identification of context-dependent dimensions

should be aligned to research on the nature of organizational work teams to ensure relevance. This will be further investigated in Chapter 4.

3 The Measurement of Cohesion: Framework of Analysis



The purpose of this Chapter is to identify and critically analyse the strengths and weaknesses of existing measures of cohesion in their ability to adequately measure team cohesion. This is imperative for informing the development of a new measure of team cohesion that draws on the strengths of previous measures but strives to overcome their limitations. This Chapter includes analysis of the dimensions of cohesion that have been included in the measures, the nature of the measurement scale employed, how they have been validated in relation to the dynamic properties of cohesion, the context in which they have been developed and the extent of their psychometric properties. Existing measures were found to vary in their psychometric quality raising concerns over their adequacy for measuring cohesion. The most psychometrically sound measure of cohesion is the Group Environment Questionnaire (GEQ) (Carron et al., 1985, 1988) but this has been developed and validated primarily in a U.S sports team context. Further as it is based on Carron et al.'s (1985) conceptual model it reflects only the primary dimensions of cohesion. This highlights the lack of standard, benchmark measure of cohesion for use in validation research.

3.1 Introduction

As a result of the lack of agreement on the definition and structure of cohesion, the construct has been operationalised in a number of ways and multiple measures of cohesion exist. Moreover, many definitions of cohesion are too vague to apply measurement techniques (Drescher et al., 1985). Consequently, there is no single measure of cohesion that is accepted as standard in the field (Cota et al., 1995). The fact that many measures of cohesion have been developed is not itself a problem but the majority have been criticised for being developed on an inadequate theoretical basis. As discussed in Chapter 2, a purely empirical approach has been relied upon to identify dimensions of cohesion (Cota et al., 1995). Therefore, it is debatable whether existing measures adequately reflect the primary dimensions identified in Carron et al.'s (1985) conceptual model, i.e. task and social dimensions of cohesion as well as individual aspects denoted by 'I and my' and team aspects denoted by 'we and our'. Further, the

dynamic nature of cohesion reflected in Carron, Brawley, and Widmeyer (1998) definition of the construct will have implications for its measurement, particularly 'snap shot' measurements of team cohesion (Baker, 1999) that do not take adequate account of how levels of cohesion change over the lifecycle of a team. This can result in misleading conclusions about the nature of the construct and its relationship with other variables. This also has implications for the design of studies conducted to develop and validate measures of cohesion. This must be taken into consideration in this research to ensure the development of a measure that is sensitive to changes in levels of cohesion. Analysis of the strengths and limitations of existing measures of cohesion will provide an important part of ensuring the development of a valid measure of cohesion for organizational work teams. Addressing the limitations of these measures will provide an important step in enhancing the measurement of the construct and ultimately an understanding of its nature. Only once an adequate measure has been developed and a team has been identified as cohesive, can cohesion then be manipulated experimentally as a variable (e.g., Kirshner, Dies, & Brown, 1978; Liberman, 1970; Shipley, 1977), and can be shown to be related statistically to other variables (e.g. Dailey, 1978; Kirshner et al., 1978; Schlenker & Miller, 1977; Seashore, 1954). Development of a theoretically and psychometrically-sound measure for organizational work teams will enable researchers and practitioners to systematically compare studies in which team cohesion is either the cause or effect under consideration.

3.2 A Framework of Analysis for Examining Existing Measures of Cohesion

Given the implications of poor measurement for theory development or adequately assessing the relationship between cohesion and other team variables, described in Chapter 2, analysis of existing measures is vital to avoid their pitfalls. The results of this analysis can then be used to support the development and validation of the new measure of cohesion which will be developed in this research. It will also support the development of advice for its administration and practical use.

A multidimensional classification system proposed by Burlingame et al. (1984) provides an apt framework for structuring analysis of existing measures of cohesion. The classification system was developed in response to a lack of adequate methods that allow for a thorough analysis of small group processes. It has been applied by Drescher et al. (1985) to analyse empirical studies of cohesion. Drescher et al.'s study reviewed small group studies of cohesion published over the twenty years previous to 1985 focusing only

on therapy, encounter, and analogue³ groups, including, to a limited extent, an analysis of the measurement techniques employed in these studies. The multidimensional classification system therefore has utility in providing a framework for facilitating the in depth analysis of existing measures of cohesion. The benefit of the multidimensional classification system is that it provides defined boundaries within which the varied approaches to measuring cohesion can be compared.

The classification system enables analysis to be categorised along four dimensions: the Person, the Variable, Measurement Strategy, and Time. The Person dimension represents the unit of observation (what the researcher observes) and unit of analysis (what the research statistically manipulates) being used in the research and these may be the individual team member, the leader of the team, relational subgroups or the team as a whole. The element used for the unit of observation and analysis may or may not be the same. The Person dimension can therefore be described as the 'WHO' in the analysis. The Variable dimension reflects 'WHAT' is under study. This dimension in Burlingame et al.'s (1984) classification system was used to discuss studies in which cohesion is seen as an antecedent or consequence variable. However, as antecedents and consequences of cohesion have been fully discussed in Chapter 2, for the purposes of this research, it will be used to examine what dimensions existing measures of cohesion encompass and how these have been operationalised. Measurement Strategy forms the third variable representing 'HOW' the variable is observed and quantified. The three dimensions described above move through the final dimension of the system, 'Time', reflecting 'WHEN' the variable is measured. The time dimension is an important aspect in the study of cohesion due to the influence of team development on cohesion.

As acknowledged by Drescher et al. (1985), the classification system does not give consideration to construct validity. For example, the assessment of similarities between definitions and operationalisations of cohesion and the psychometric properties of cohesion measures are not addressed. Nor does it take adequate account of the design of studies to assess cohesion. For the purposes of this study, the classification system will therefore be extended to assess the construct validity as well as other psychometric properties of existing measures of cohesion. It will also include a fifth dimension, 'WHERE', identified later by Dies (1985) which, in this research, will reflect the context in which existing measures of cohesion have been developed.

³ Analogue groups are artificial groups which have a limited life span.

3.2.1 The Person: WHO

Definitions of cohesion that have included 'members' attraction to the team', 'members' attraction to each other' or 'mutual positive attitudes' (e.g. Likert, 1961; Roark & Sharah, 1989; Newcomb, Turner, and Converse, 1965) have been criticised for focusing on individuals at the expense of the team. Indeed Evans and Jarvis (1980) argue that this is the most common definition of cohesion. It has been argued that although these are easier to operationalise and therefore measure, they fail to entirely capture the concept of 'team' cohesiveness (Roark & Sharah, 1989). As a result most studies and measures of cohesion have used the individual member of the team as the unit of observation but typically focused on the team as the unit of analysis. This may also be partly due to a lack of agreement in the research literature over whether cohesion is an individual or team property or inconsistency between definition and measurement. For example, the Gross Cohesiveness Scale (GCS) (Gross, 1957) is based on Festinger et al.'s (1950) definition of cohesion, reflecting cohesion as a team property, but using the individual as the unit of observation and the team as the unit of analysis. Similarly, the Group Attitude Scale (GAS) developed by Evan and Jarvis (1986) and Seashore's (1954) cohesion scale, were developed on the notion that cohesion reflects attraction to the team and measure cohesion through the perceptions of individuals but provide a team-level analysis. Such measures of cohesion typically provide a rating of the cohesion of the team as a whole through computing the cumulative average of the ratings provided by each individual within the team. Bollen and Hoyle's (1990) Perceived Cohesion Scale (PCS) uses the individual as both the unit of observation and analysis as they measure cohesion through an individual's own sense of belonging and morale in the team. However, since they argue that it may be desirable to produce a score for the team as a whole, they suggest that this can be achieved through collating and aggregating these individual responses.

Despite early recognition at the Centre for Group Dynamics⁴ by Lewin and his colleagues (1939) that cohesion involves both individual-level processes (individual team members' relationship with other team members) and team-level processes (the 'we-feeling' that joins the members together as a single unit), it is only more recently that research has adequately captured this in both definition and measurement. Evans and Jarvis (1980) argue that the whole team should be considered when defining cohesion, reflecting the need for a broader definition of cohesion. This aligns with Carron et al.'s (1985) view that both individual and team aspects should be measured. This also fits with Yalom (1975) and Slavson's (1964) view that member-member, member-team, and member-therapist relationships should be included in definitions of cohesion, although the latter could

⁴This was formally part of the Massachusetts Institute of Technology (MIT) but is now part of Social Research at the University of Michigan.

equally reflect member-leader relationships relevant in organizational contexts. Therefore, the individual, the team and any relevant subgroups should be considered as both the unit of observation and analysis. Research conducted by Carron et al. (1985) attempted to address this limitation through the development of their conceptual model that defined cohesion as including individual and team level aspects. In their Group Environment Questionnaire (GEQ), manifestations of cohesion were measured through both an individual's perceptions of their own interactions within the team and also their perceptions of the team as a totality. This approach enables both individual-level scores and team-level scores to be determined. The measurement of individual perceptions of relationships at the subgroup level (e.g. member-leader relationships) would expand Carron et al.'s (1985) view. This measurement of cohesion as an individual and team property has also been adopted in McClure and Broughton's (2000) Military (MFI) Base Cohesion measure, the Coaching Staff Cohesion Scale (CSCS) developed by Martin (2002), the Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) and the Team Cohesion (TC) Scale (Carless & De Paola, 2000). The latter two measures were based on Carron et al.'s (1985) conceptual model.

Only one of the measures reviewed has tested any unit of observation or analysis other than the individual or team as a whole. Gruber and Gray (1981, 1982) also tested subgroups (starters and reserves) as the unit of analysis through the use of their Cohesiveness Questionnaire. However, they did not test the 'team' and 'subgroup' as the unit of observation; their questionnaire items did not reflect member-team and member-subgroup perceptions. They also did not test the 'individual' as the unit of analysis. This analysis has highlighted the need to improve the operationalisation and measurement of cohesion at the member-team and member-subgroup level to enable a fuller understanding of the internal dynamics of the team. Measuring cohesion at these levels will also improve understanding of how to improve team cohesion to enhance team outcomes. Table 3.1 summarises existing cohesion measures by the 'Person' dimension, showing that the majority of measures have typically used the individual as the unit of observation but aggregated results to the team level for analysis.

Table 3.1:
Cohesion measures summarised by the ‘Person’ dimension

Measurement Instrument	Person			
	Individual	Leader	Subgroup	Team
Group Environment Questionnaire (GEQ) (Carron et al., 1985; 1988)	O, A	–	–	A
Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000)	O, A	–	–	A
The Cohesiveness Questionnaire (Gruber & Gray, 1981, 1982)	O	–	A	A
Group Attitude Scale (GAS) (Evans & Jarvis, 1986)	O, A	–	–	–
Perceived Cohesion Scale (PCS) (Bollen & Holyle, 1990)	O, A	–	–	A
The Gross Cohesiveness Scale (GCS) (Gross, 1957)	O	–	–	A
Measure of Military (MFI) Base Cohesion (McClure & Broughton, 2000)	O	–	–	A
The Harvard Community Health Plan Group Cohesiveness Scale (HCHP- GCS) (Budman et al., 1987)	O	–	–	–
Team Cohesion (TC) Scale (Carless & De Paola, 2000)	O	–	–	A
Coaching Staff Cohesion Scale (CSCS) Martin, 2002)	O	–	–	A
Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984)	O, A	–	–	–
Measure of Interpersonal Attraction (Aitken, 1992)	O, A	–	–	–
Group Cohesion Scale-Revised (GCS-R) (Treadwell et al., 2001)	O	–	–	A
Cohesion Scale (Seashore, 1954)	O	–	–	A
Measurement of Group Cohesion in U.S. Army Units (Griffith, 1988)	O	–	–	–

Note: O = Unit of Observation; A = Unit of Analysis.

3.2.2 The Variable: WHAT

The debate on the structure of cohesion has resulted in measures of the construct that reflect either the unidimensional or multidimensional view of cohesion. The Gross Cohesiveness Scale (GCS) (Gross, 1957) has been described as one of the most widely used measures in the cohesion literature (Stokes, 1983) and is based on Festinger et al.'s (1950) unidimensional definition of cohesion. The GCS is "a simple patient-related appraisal indicating group members' subjective impressions of the attractiveness of the group" (Budman et al., 1993, p.200). The GCS was subsequently modified by Yalom, Houts, Zimmerberg, and Rand (1967) and Stokes (1983b), and re-examined by Cota, Dion, and Evans (1993). Aiken (1992) consolidated the GCS into a single question by linking cohesiveness to interpersonal attraction. Similarly the Group Attitude Scale (GAS) (Evans & Jarvis, 1986) is a unidimensional measure also operationalising cohesion as 'interpersonal attraction', based on Evans and Jarvis' (1980) definition of attraction, defining attraction as 'an individual's desire to identify with and be an accepted member of the group'. However, it has been argued (Carron, 1982; Carron et al., 1985; Gross & Martin, 1952a, 1952b; Mudrack, 1989a) whether Festinger et al.'s (1950) 'field of forces' can be operationalised at all and whether operationalisations of this element of the definition as interpersonal attraction are indeed adequate.

To reflect the more contemporary view, more recent measures have operationalised cohesion as multidimensional. Bollen and Hoyle (1990) developed a measure of cohesion based on a two-dimensional view. They argue that "perceived cohesion encompasses an individual's sense of belonging to a particular group and his or her feelings of morale associated with membership in the group" (p482). Carron et al.'s (1985) GEQ also reflects a multidimensional approach to cohesion. The GEQ and subsequent modification of the scale – the PAGEQ (Estabrooks & Carron, 2000), are based on the four subscales in Carron et al.'s (1985) model. Although Carron et al. (1985) reviewed other dimensions of cohesion in their paper they included only those they believed accounted for the greatest variance among teams.

Gruber and Gray's (1981, 1982) Cohesiveness Questionnaire lends further support for cohesion as a multidimensional construct, i.e. that it is more than simply attraction to a team and its members. They provide a six dimensional measure of cohesion tapping team performance satisfaction, task cohesion, affiliation cohesion, self-performance satisfaction, desire for recognition and value of membership. The dimensions identified by Yukelson et al. (1984) described in Chapter 2 and represented in their Multidimensional Sport Cohesion Instrument (MSCI), are similar to those identified by Gruber and Gray (1981, 1982). The two fundamental dimensions of cohesion identified by Griffith (1988)

'direction' and 'functional' aspects are captured in his measure of cohesion in U.S. Army units. The measures discussed above all reflect both task and social aspects of cohesion. However, they also capture additional distinct dimensions such as valued roles, desire for recognition and horizontal and vertical aspects. What they don't capture however, is how the dimensions are inter-related. For example, in Griffith's (1988) measure it is not clear how vertical and horizontal aspects relate to task and social dimensions of cohesion. What these measures do highlight is that cohesion is not limited to task and social dimensions but can also have other manifestations. This fits with Cota et al.'s (1995) view that there will be additional specific manifestations of cohesion in context (i.e. secondary dimensions) adding to the richness of its structure. This is also highlighted below in Treadwell, Lavertue, Kumar, and Veeraraghaven (2001) measure developed for therapy groups.

Slightly different dimensions are measured by Treadwell et al.'s (2001) Group Cohesion Scale-Revised (GCS-R) and The Harvard Community Health Plan Group Cohesiveness Scale (HCHP-GCS) developed by the Harvard group therapy research team within the Harvard Community Health Plan Mental Health Research Program (Budman et al., 1987). The first measure reflects five dimensions: interaction and communication (including domination and subordination), member retention, decision-making, vulnerability among team members and consistency between team and individual goals. The HCHP-GCS provides a measure of cohesion using the bipolar extremes: withdrawal and self-absorption versus interest and involvement, mistrust versus trust, disruption versus cooperation, abusiveness versus expressed caring, unfocused versus focused and fragmentation versus cohesion. The latter subscale provides a global measure of cohesion.

The varied dimensions reflected in existing measures are summarised in Table 3.2. As the majority of measures capture the primary dimensions of task cohesion the items written to measure these dimensions may provide some use in informing the development of the new measure of cohesion. As they also provide other additional dimensions, the operationalisation of those identified as relevant to organizational work teams may also provide a foundation for the development of the new measure.

Table 3.2:**Cohesion measures summarised by the 'Variable' dimension**

Measurement Instrument	Variable		
	Structure	Underlying Definition	Dimensions Measured
GEQ (Carron, Widmeyer & Brawley, 1985; 1988)	M	Carron (1982)	Attraction to Group-Task (ATG-T) Attraction to Group-Social (ATG-S) Group Integration-Task (GI-T) Group Integration-Social (GI-S)
PAGEQ (Estabrooks & Carron, 2000)	M	Carron (1982)	Attraction to Group-Task (ATG-T) Attraction to Group-Social (ATG-S) Group Integration-Task (GI-T) Group Integration-Social (GI-S)
The Cohesiveness Questionnaire (Gruber & Gray, 1981, 1982)	M	Carron (1980); Festinger (1968)	Team Performance, Task Cohesion Affiliation, Self-Performance Satisfaction, Desire for Recognition, Value of Membership
GAS (Evans & Jarvis, 1986)	U	Jarvis (1999)	Attraction
PCS (Bollen & Hoyle, 1990)	M	Bollen & Hoyle (1990)	Sense of Belonging, Feelings of Morale
GCS (Gross, 1957)	U	Festinger et al., (1950)	Interpersonal Attraction
MFI Base Cohesion (McClure & Broughton, 2000)	M	Buckner (1988)	We-ness, continuation & Co-operation, Perceptions of cliquishness & gossip directed at outsiders
HCHP-GCS (Budman et al., 1987)	M	Not specified	Withdrawal and Self-Absorption versus Interest and Involvement Mistrust versus Trust Disruption versus Co-operation Abusiveness versus Expressed Caring Unfocused versus Focused Fragmentation versus Cohesion
Team Cohesion (TC) Scale (Carless & De Paola, 2000)	M	Carron (1982)	Task cohesion, Social cohesion, Individual Attraction to the Group

CSCS (Martin, 2002)	M	Carron et al. (1985)	Staff Attraction (SA), Staff Unity (SU), Shared Valued (SV)
MSCI (Yukelson et al. (1984)	M	Carron et al. (1985)	Attraction to the Group, Unity of Purpose, Quality of Teamwork, Valued Roles
Measure of Interpersonal Attraction (Aitken, 1992)	U	Not specified	Interpersonal Attraction
GCS-R (Treadwell et al., 2001)	M	Not Specified	Interaction & Communication, member retention, decision-making, vulnerability, consistency between team and individual goals.
Cohesion Scale (Seashore, 1954)	U	Not specified	Interpersonal Attraction
Measurement of Group Cohesion in U.S. Army Units (Griffith, 1988)	M	Not Specified	Direction (vertical & horizontal, functional (instrumental & affective)

Note: U = Uni-dimensional; M = Multi-dimensional

3.2.3 Measurement Strategy: HOW

Two different types of measurement strategy have generally been used in the measurement of team cohesion. The first of these techniques is observational methods. Observational techniques used to measure team cohesion have included observing intermember distance (Shiple, 1977), number of friendships formed within a particular team (Dunphy, 1972) and the composition of the team regarding stranger vs. acquaintances (Flowers, 1977). The HCHP-GCS (Budman et al., 1987) is used by trained clinical observers to rate the cohesiveness through videotapes of actual group therapy sessions. Observational techniques have been used in conjunction with other methods of indexing levels of cohesiveness. For example, in the context of therapy groups, Liberman (1977) used the Interaction Process Analysis (Bales, 1950) and the Sign Process Analysis (Miller, 1951) in conjunction with a sociometric questionnaire. Non reactive observational techniques have been used to measure how frequently team members' wear clothing that links them to that team or use pronouns. Those who use 'we' are assumed to be closer to their team members than those who use 'they' or 'I' (Cialdini et al., 1976, Experiment 1). The absence of words such as 'we' and 'us' from the team's vocabulary may indicate a low level of cohesiveness in the group.

Early measures of cohesion included the sociometric study. This method was developed to measure the social relationships that link team members and involved asking subjects questions about their fellow team members. In particular, team members were asked which member they liked the most, to elicit information on interpersonal choices. The second phase of sociometric study involves the development of a sociogram that diagrammatically represents the relationships between team members, the configurations of the team and the structural position of team members. This method was used by Festinger et al. (1950) to measure cohesion amongst residents of the same court of a housing project. The residents were asked to provide a list of their friends. Festinger and his colleagues then calculated the ratio of in-court choices and out-side-court choices where the higher the ratio of in-court choices, the greater the cohesiveness of the court. This is a relatively simplistic method that only captures a very narrow definition of affective or social cohesion. Not only does it under-represent social cohesion but it also under-represents the rich complex nature of cohesion as a whole. Further, this type of measurement does not facilitate understanding of why either in-court choices or outside-court choices of friendship were made.

By far the most common technique used in the measurement of cohesion is the self-report questionnaire. This is unsurprising given the nature of cohesion. As described by Carron et al. (1985, 2002a) cohesion is a team property that can be assessed through the perceptions of individuals. This is because it is the individual members of a team that experience the social situation of the team and develop beliefs and feelings about it. The self-report method therefore provides the most appropriate and only accurate method for capturing these beliefs and feelings. As noted previously in the thesis, it cannot be measured through external observers. Researchers using self-report measures present individual team members with a set of questions regarding their involvement in the team (Dawes & Smith, 1985) to investigate their personal perceptions of the team's unity and cohesion. Seashore's (1954) Index of Group Cohesiveness provides an early example of a self-report measure asking three forced-choice questions to measure the level of cohesiveness of industrial work teams, for example (p36-37):

1. Do you feel you are really part of your work group?
 - a. Really a part of my work group.
 - b. Included in most ways.
 - c. Included in some ways but not others.
 - d. Don't feel I really belong.
 - e. Don't work with any one group of people.

In the majority of self-report questionnaires, the Likert rating scale developed by Likert (1932) has typically been used as the measurement scale. The Likert scale provides a number of response options ranging from 'strongly disagree' to 'strongly agree' reflecting 'high' and 'low' levels of cohesion. Typically between five and nine response options are used. Presented with these scales, subjects are required to agree or disagree to some extent with a number of statements such as "I do not like being a part of the social activities of this team" (Carron et al., 2002a, p49), "There are feelings of unity and togetherness among the group members" (Treadwell et al., 2001, p4) and "In general I feel my contribution to the team is not valued by my team-mates" (Yukelson et al., 1984, p108). However, over-time the term 'Likert scale' has become used to describe scales that depart from the original meaning of the term, reflected in the use of the term *Likert-type* scales. The variation in the number of response options and different labels used as anchors in existing measures of cohesion has implications for the reliable measurement of cohesion and drawing comparisons between cohesion studies. As argued by Lewis (1993), the greater the number of points, the more statistically reliable the data that can be gained from Likert scales, with reliability peaking at about 11-points. A greater number of points also provide a wider number of response options for subjects to choose from and so allow a greater variation in response. This helps to address the problem with the 'closed response' nature of Likert scales where respondents are forced to choose a response option that may not adequately reflect their view or opinion since no alternative exists. The nature of the scales used in existing measures therefore merits further discussion.

Existing measures of cohesion have used rating scales between 4 and 11 points and a variety of labels to represent scale intervals. Using a list of team members, the one-item consolidated version of the GCS (Aiken, 1992) required members to rate on a 7-point Likert scale how much they liked interacting with fellow team members. In comparison, the 18-item GEQ (Carron et al. 1985), the 21-item PAGEQ (Estabrooks & Carron, 2000), the 12-item TC Scale (Carless & De Paola, 2000), and the one-item GAS (Evans & Jarvis, 1986) require members to rate the cohesiveness of the team on a 9-point Likert scale, ranging from either 'very strongly' or 'strongly disagree' to 'very strongly' or 'strongly agree'. A mid-point of either neutral or neither agree nor disagree is also used. The 25-item GCS-R used only a 4-point scale but similarly worded anchors: strongly disagree, disagree, agree, and strongly agree. The PCS (Bollen & Hoyle, 1990) also used similarly worded anchors but on a 10-point Likert scale. Gruber and Gray's (1981, 1982) Cohesiveness Questionnaire asks team members to rate cohesiveness on a 9-point Likert scale but uses different interval labels ranging from not good at all (1), starting to develop (3), about average (5), fairly good most of the time (7), to exceptionally good, no

complaints (9). Yukelson et al.'s (1984) 11-point scale used anchors ranging from 1 (no sense of pride) to 11 (sense of pride). Although employing the use of Likert scales, many researchers do not specify the exact design of their scales. For example, the original one-item GCS used a 7-point Likert scale but the anchors were not specified in the researcher paper. The rating scale of the MFI Base Cohesion developed by McClure and Broughton (2000) was not specified at all.

When they were developed (Likert, 1932), Likert scales were originally intended to be multi-item scales, not single item as in the GCS (Gross, 1957) and consolidated version of the GCS (Aitken, 1992). Response levels were also designed to be anchored with both consecutive integers and verbal labels that represent approximately evenly spaced intervals that are symmetrical about a mid-point. Further, Likert (1932) intended that the scale measured attitudes in terms of agreement/disagreement. He argued that taken together these characteristics enable attitudes to be 'scientifically' measured using an appropriate metric scale. Scales such as Gruber and Gray's (1981, 1982) Cohesiveness Questionnaire and Yukelson et al.'s (1984) MSCl do not entirely conform to this original meaning therefore they depart to some degree in providing this 'scientific' measure as intended.

Like all measures, self-report measures have both strengths and weaknesses. Firstly they rely on knowing what questions to ask team members. Questions must also be worded adequately to enable responses to be interpreted. However, measurement scales are prone to individual differences in interpretation. For example, although two individuals may have the same feelings and view of a phenomenon, they may rate this feeling slightly differently on a scale – one person's 'agree' is another person's 'strongly agree'. Self-report measures will fail to provide useful data if participants do not wish to express their feelings, perceptions and attitudes. It is also possible that individuals will rate the team as cohesive simply because they like their fellow team members, reflecting personal liking rather than cohesiveness per se. Unlike with observational research, previously unnoticed variables cannot easily be included in the survey. They may also remain unnoticed in self-report methods. However, such measures can be used to tap variables that may otherwise be difficult to assess and can enable the researcher to draw specific conclusions about the relationships among variables (Forsyth, 1990). A summary of existing cohesion measures by Measurement Strategy is provided in Table 3.3.

Table 3.3:**Cohesion measures summarised by the 'Measurement Strategy' dimension**

Measurement Instrument	No. of Items	Type of Scale	Technique
GEQ (Carron et al., 1985; 1988)	18	9-Point Likert	SQ
PAGEQ (Estabrooks & Carron, 2000)	21	9-Point Likert	SQ
The Cohesiveness Questionnaire (Gruber & Gray, 1981, 1982)	13	9-Point Likert- type 9-Point Likert- type	SQ
GAS (Evans & Jarvis, 1986)	20		SQ
PCS (Bollen & Hoyle, 1990)	6	10-Point Likert 7-Point Likert- type	SQ
GCS (Gross, 1957)	7		SQ
MFI Base Cohesion (McClure & Broughton, 2000)	19	Not specified	SQ
HCHP-GCS (Budman et al., 1987)	-	10-point bipolar scale	OB
TC Scale (Carless & De Paola, 2000)	12	9-Point Likert	SQ
CSCS (Martin, 2002)	22	7-point Likert	SQ
MSCI (Yukelson et al., 1984)	22	11-point Likert	SQ
Measure of Interpersonal Attraction (Aitken, 1992)	1	7-Point Likert	SQ
GCS-R (Treadwell et al., 2001)	25	4-point Likert	SQ
Cohesion Scale (Seashore, 1954)	3	Forced-Choice	SQ
Measurement of Group Cohesion in U.S. Army Units (Griffith, 1988)	Not reported	5-Point Likert	SQ

Note: SQ = Self-Report Questionnaire; OB = Observations; the term *Likert-type* is used to denote scales that depart of its original meaning

3.2.4 Time: WHEN

In investigating cohesion, measures have been administered in two ways. In some studies, researchers have administered measures at a measurement point decided by the researcher, although a number of measurement points may be chosen to reduce sampling error. Gruber and Gray's (1981, 1982) Cohesiveness Questionnaire for example, was administered by the researchers at only one measurement point prior to a practice session during the last third of a basketball season. Many measures have only been administered at the dissolution stage of the team, for example the GCS (Gross, 1957), the PCS (Bollen & Hoyle, 1990), and McClure and Broughton's (2000) measure of the

cohesion of military communities. This method however, assumes that cohesion holds constant over time and is likely to make it difficult to capture differences that occur between individuals in the team or that occur across the treatment conditions being investigated in the study. As a dynamic construct that varies over the lifecycle of a team, these measures fail to take account of any significant changes in the level of cohesion at an individual or team level (Budge, 1981).

Researchers that do regard cohesion as dynamic construct have administered measures at various stages in the team's development. The HCHP-GCS was used by Budman et al. (1993) to rate the cohesion of 12 time-limited outpatient psychotherapy groups at three stages of group development – during early, middle and late group sessions. Similarly, the GAS (Evans & Jarvis, 1986) has been administered at the beginning, middle and end of the team's development (Evans, 1978), towards the end of the team's development (Evans, 1981), and at the beginning, middle, three-quarters point and end of the team life span (Simultis, 1983). As Carron et al. (1998) have suggested measuring the level of cohesiveness of a team at various stages of development is essential as different dimensions of cohesion will be relevant to different types of teams and at different stages of their development. In exercise classes, for example, individuals may initially be attracted to the class for task reasons (i.e. due to the desire to exercise), and later become attracted to the team socially providing additional motivation for adherence. This reflects the importance of administering measures of cohesion at various stages of the team's development.

Administering measures of cohesion at various stages of a team's development is important for enabling team facilitators or leaders to make more informed interventions to improve team outcomes (Evans & Jarvis, 1986). This method of measuring cohesion however, is complex in that the researcher must decide when to make measurements and how many measurements should be taken as such decisions will affect the results of the research. A further challenge arises in attempting to draw comparisons between studies that investigate cohesion within teams that have a relatively short life span with those that have developed and formed over a much longer period of time. Conclusions could however be formed from such studies on how cohesion initially develops within teams. It will also be difficult to compare studies that use different measurement points or studies that use the same measurement point (e.g. at the 12th hour of the teams development) but use teams that have different life spans (Drescher et al., 1985). The different time points at which measures have been applied is also likely to have contributed to differences in conclusions drawn about the dimensions relevant to any given type of team if their relevance or importance changes over the lifecycle of the team. Furthermore, the

conclusions drawn about the relationship between cohesion and other team variables is also likely to change over time. The dynamic property of cohesion has important implications for the development of a measure of cohesion for organizational work teams. The dimensions of cohesion included in the measure must be tested and validated across all stages of a team's development. If it is to be of any practical use, the measure must also be sensitive to changes in cohesion. Table 3.4 below highlights the relatively few measures that have given adequate consideration to the dynamic nature of cohesion and how it changes over the lifecycle of a team.

Table 3 4:
Cohesion measures summarised by the 'Time' dimension

Measurement Instrument	Researchers' Measurement Point	Team Life Cycle					
		Prior	Beginning	Early	Middle	Late	End
GEQ (Carron et al., 1985; 1988)	-	-	X	X	X	X	X
PAGEQ (Estabrooks & Carron, 2000)	X	-	-	-	-	-	X
The Cohesiveness Questionnaire (Gruber & Gray, 1981, 1982)	-	X	-	-	-	X	-
GAS (Evans & Jarvis, 1986)	-	-	X		X	-	X
PCS (Bollen & Holyle, 1990)	Not specified	-	-	-	-	-	-
GCS (Gross, 1957)	Not specified	-	-	-	-	-	-
MFI Base Cohesion (McClure & Broughton, 2000)	Not specified	-	-	-	-	-	-
HCHP-GCS (Budman et al., 1987)	-	-	X	-	X	-	X
TC Scale (Carless & De Paola, 2000)	X	-	-	-	-	-	-
CSCS (Martin, 2002)	Not specified	-	-	-	-	-	-
MSCI (Yukelson et al., 1984)	Not specified	-	-	-	-	-	-
Measure of Interpersonal Attraction (Aitken, 1992)	-	-	X	-	X	-	X
GCS-R (Treadwell et al., 2001)	-	-	-	-	X	-	X
Cohesion Scale (Seashore, 1954)	Not specified	-	-	-	-	-	-
Measurement of Group Cohesion in U.S. Army Units (Griffith, 1988)	Not specified	-	-	-	-	-	-

3.2.5 The Context: WHERE

The majority of measures that have been developed to measure team cohesion have been developed for a sports team context. This is one of the most researched areas in team cohesion. The challenge in developing a measure of cohesion that is useful across organizational settings will be in determining the relevance of these existing measures to draw together all important aspects that must be represented in the new measure. Many of the existing measures have been developed for very specific types of sport teams. For example, Yukelson et al.'s (1984) MSCI was developed for intercollegiate basketball teams, and similarly Gruber and Gray's (1981, 1982) Cohesiveness Questionnaire was specifically developed for male varsity basketball players. Estabrooks and Carron's (2000) PAGEQ was developed for exercise teams. This places questions over whether they include manifestations of cohesion applicable to an organizational work team context. Although also developed for a sports team context, Carron et al.'s (1985) measure was developed as a more general measure for this context, based on a solid theoretical foundation as described in Chapter 2. Although their conceptual model has wider applicability reflecting the primary dimensions of cohesion – task, social, individual and team aspects, many of the items written as indicators of these dimensions for relevance in sports teams do not. For example, "I am not happy with the amount of playing time I get", "Our team would like to spend time together in the off season", and "I do not like the style of play on this team" (Carron et al., 2002a p49-51). As with the majority of measures reviewed, this measure was also developed in North American teams, reflecting a U.S. style lexicon.

The GEQ was adapted for organizational work teams in the Australian retail sector by Carless and De Paola (2000), making only minor modifications to the wording of items. However, developing specific indicators for a work team context is not simply a matter of adapting GEQ items but also requires generating a large pool of items that can be content validated in this context. The GEQ has been reduced to an 18-item measure from a much larger pool of 345 items through extensive theoretical and statistical item reduction techniques (Carron et al., 1985). As this reduction was based on items considered important to a sports team context, it is likely that the resulting 18-item version is biased towards this context and does not include all relevant indicators important to organizational work teams, particularly U.K. work teams. Therefore, the development of an adequate measure for an organizational setting is not simply a matter of modifying an existing measure that displays the most psychometric qualities. Instead, development must begin with the first principals of the generation of a large pool of items based on a defined theoretical basis that can then be validated.

Many measures have also been developed for therapy or counselling groups and military teams. For example, the GAS developed by Evans and Jarvis (1986) and the HCHP-GCS (Budman et al., 1987) were developed for counselling and therapy groups. As the GAS only measures attraction to the group and the HCHP-GSC is an observational measure, they have limited applicability to organizational work teams. Those developed for a military context however, are likely to share some characteristics with organizational work teams. In particular, Griffith's (1988) measure of cohesion in U.S. Army units includes indicators for both peer and subordinate-superior relations. This vertical and horizontal distinction can be adapted to an organizational work team context but requires indicators to be developed that are specifically relevant to U.K. work teams. Table 3.5 below summarises the cohesion measures by the context in which they have been developed highlighting the breadth of measures available, the varied contexts in which they have been developed and how the majority have been developed in U.S. teams.

Table 3.5

Cohesion measures summarised by the 'context' in which they have been developed

Measurement Instrument	Context
GEQ (Carron et al., 1985; 1988)	Sports teams (U.S.)
PAGEQ (Estabrooks & Carron, 2000)	Older adult exercisers (U.S.) and university undergraduate students part of exercise classes and activity programs.
The Cohesiveness Questionnaire (Gruber & Gray, 1981, 1982)	Male varsity basketball players (U.S.)
GAS (Evans & Jarvis, 1986)	Growth groups part of a master's level course in counselling, assertion-training groups, groups in a community health class, and therapy groups
PCS (Bollen & Holyle, 1990)	U.S. students at a small college campus and residents of a mid-sized U.S. city.
GCS (Gross, 1957)	University male undergraduates, psychotherapy groups, counselling groups, and self-help groups (U.S. and Canada)
MFI Base Cohesion (McClure & Broughton, 2000)	Military Communities (U.S.)
HCHP-GCS (Budman et al., 1987)	Non-psychotic outpatients in therapy groups for depression, anxiety and social isolation (U.S.)
TC Scale (Carless & De Paola, 2000)	Organizational work teams in a public sector retail outlet (Australia).

CSCS (Martin, 2002)	Coaching staff of sports teams (U.S)
MSCI (Yukelson et al., 1984)	Intercollegiate basketball teams (U.S)
Measure of Interpersonal Attraction (Aitken, 1992)	Freshman seminar classes, church groups, sports teams, and psychotherapy groups (nationality unknown, U.S. presumed)
GCS-R (Treadwell et al., 2001)	Students in experimental training courses in the use of cognitive and psychodramatic techniques (nationality unknown)
Cohesion Scale (Seashore, 1954)	Male work teams at Midwest (U.S. organization)
Measurement of Group Cohesion in U.S. Army Units (Griffith, 1988)	U.S. Army units

3.2.6 Psychometric Properties

One of the most important parts of ensuring accurate measurement is determining whether the proposed measure consistently and accurately measures what it is intended to measure (i.e. its reliability) and that it is a valid measure of the intended construct. The concerns over the theoretical basis of existing measures of cohesion together with their varying qualities discussed in this chapter, raises questions over the validity and reliability of the measures. This section therefore provides an analysis of the extent of their psychometric properties as foundations for the development of a measure for organizational settings. Definitions of reliability and types of validity are first discussed.

3.2.6.1 Reliability

It is important that measurement instruments are shown to consistently measure what they attempt to measure, i.e. that they are *reliable*. Reliability is necessary for validity and is therefore a critical issue in measure development. Reliability has two meanings. Firstly, reliability refers to determining whether the measure is stable over time, that it produces a consistent score from one occasion to another. This is referred to as *test-retest reliability*. It is suggested that a measure should have a minimum test-retest reliability of .8 (Kline, 2000). The second meaning refers to *internal consistency reliability*. To be a valid measure of construct, all items within the measure should measure the same construct. That is, the measure should have high internal consistency reliability. A minimum internal consistency of .7 is considered acceptable (Nunnally, 1978; Kline, 2000).

Although there are a number of tests of internal consistency, the most frequently used in the development of cohesion measures is the reliability coefficient, Cronbach's alpha.

Cronbach's alpha is a single-administration method (i.e. it is computed on scores obtained from one administration of the measure) and considered the best measure of internal consistency (Nunnally, 1978; Kline 2000). It overcomes many of the drawbacks with other indexes of internal consistency reliability such as the *split-half* method. Split-half reliability provides only a rough estimation of reliability because it is computed through correlating scores obtained on two halves of the measure. Since the measure can be split into two in various ways, different estimates are likely to be obtained. Cronbach's alpha however, provides a reliability coefficient which is equivalent to having conducted all the possible split halves avoiding arbitrarily splitting items into two halves and so will not underestimate reliability. When the items on a measure are binary or dichotomous (yes/no, correct/incorrect) the alternative to Cronbach's alpha is the Kuder-Richardson 20 (KR20) method (Kline, 2000). Test-retest reliability is assessed following two administrations of a measure at two different time points. Typically, the Pearson product moment correlation is used to assess the degree of association between the sets of scores obtained on the two different occasions. Reliability is a property of measure scores. As such estimates will change for different scores (Kline, 2000).

The internal consistency reliabilities of the measures reviewed varied in value. All reported reliabilities were considered by the researchers to be acceptable even though for three of the measures, the reliability values fell short of the minimum acceptable criteria of .70. Reliability values for the GCS-R (Treadwell et al., 2000) ranged between .48 to .90 across the different time points and teams tested. The poor reliability values obtained is likely to have been due to the unacceptable sample sizes of less than 20 used in each team. In fact, one team tested only contained eight subjects. It is argued that a minimum of 100 subjects should be used to test internal consistency reliability to minimise statistical error (Kline, 2000). This measure was also the only multidimensional measure reviewed that failed to test the internal consistency of each dimension. It therefore cannot be concluded that the items in each dimension measure the same aspect. Low reliability values may also indicate that the measure is too broad. However, too high (e.g. >.9) and it could indicate that the measure could be too narrow to be theoretically useful (Kline, 2000). The HCHP-GCS (Budman et al., 1987) obtained reliabilities for each observer ratings, one of which fell short of the minimum acceptable level despite the researchers reporting good reliability. Despite the only researchers stating the minimum criteria for internal consistency reliability, Carron et al. (1985) reported acceptably high levels of reliability for their GEQ. However, two of their four subscales did not meet this minimum criterion. The GEQ (Carron et al., 1985) has been extensively tested independently by other researchers. However, mixed results have been reported on subscale reliabilities where not all subscales have found to have acceptable reliability (e.g. Paskovich, 1995

and Salminen & Luhtanen, reported in Carron et al., 2002a). Acceptable reliabilities could also not be obtained in other contexts, such as work teams (Carless & De Paola, 2000). Although the GEQ modified for an exercise context – the PAGEQ (Estabrooks & Carron, 2000) was found to have acceptable reliabilities, this was not calculated for its modification to work teams (Carless & De Paola, 2000). No measure calculated test-retest reliability. This is unsurprising given the dynamic nature of the construct. However, this justification was only overtly reported by Carron et al. (1985).

3.2.6.2 Validity

Reliability is necessary but not sufficient for validity. Put simply, to be valid, an instrument must measure what it purports to measure and be able to predict something useful and have practical use (Cook, 2004). Assessing the validity of a measure is a long process and one that is by no means straightforward. As such, validity is a matter of degree, not a property that a measure either has or doesn't. Testing the validity of a measure also requires large, representative samples. There are a number of different forms of validity, each carrying their own challenges. These are described in turn below.

Face and Content Validity

To have face validity, a measure must be seen as relevant, applicable and acceptable to individuals who are representative of the intended population. In terms of developing a measure of cohesion it is important that the participants the measure is administered to do not misperceive the nature of the measure or misunderstand the items within it. The drawback of face validity can be that subjects become aware of what is being tested and behave accordingly, distorting the results of the research (Clark-Cater, 1998; Kline, 2000). In measuring cohesion (as with many other variables), this can result in subjects providing more favourable ratings, a socially desirable response to items than reflects actual reality. For example, in an organizational setting, individuals may not want to report negative perceptions about the cohesiveness of their team in case the results are used against them by higher managers. In addition, an instrument must measure a representative sample of items that are considered to be part of the construct (content validity). Determining content validity is less easy where there is a lack of agreement on the manifestations of a construct. A number of approaches to determining content validity will therefore be required (through the use of both SMEs and representatives of organizational work teams).

Criterion-Related Validity - Concurrent and Predictive Validity

Once items have been developed for a measure, they must be shown to measure the construct that it intends or claims to measure, not any other distinct construct. A measure has concurrent validity if it correlates moderately to highly, or *converges*, with another test measuring the same construct that is administered at the same time. Establishing the concurrent or convergent validity of a new measure of cohesion will be challenging due to the lack of a standard accepted benchmark test. Therefore, only moderate correlations between the existing and new measure will be expected. Testing convergent validity is still important but due to the nature of cohesion measures it highlights the need to obtain other evidence of validity (Kline, 2000). Criterion-related validity can also be investigated through examination of the relationship between cohesion and other related variables such as team performance that are measured at the same time. Related to this is divergent validity. A test must also demonstrate that it *diverges* or has a lower correlation with tests that measure distinct constructs (such as job satisfaction), administered at the same time.

The measure should also be able to predict something useful, such as other team processes or behaviours related to the construct. Establishing validity is important for demonstrating the effectiveness and usefulness of a measure. However, it is not simple to ascertain due to difficulties obtaining a clear criterion for prediction. Using criterion variables such as team performance in establishing the predictive validity of cohesion measures is not clear cut due to the other variables moderating the relationship between cohesion and performance such as leadership style and performance standards (as described in Chapter 2). This will confound results obtained. Given the lack of consistency over the relationship between cohesion and other team variables such as team performance on which to define adequate hypotheses for establishing predictive validity, it was the only form of validity not tested in this research.

Differential Validity

Differential validity can be considered a special form of validity (Kline, 2000). A measure can be said to have differential validity if it differentiates between subjects or its subscales differentially correlate with some criterion. Establishing this form of validity is important for determining the sensitivity of a measure of cohesion to detect expected differences. For example, as described in Chapter 2, task and social dimensions of cohesion have been found to differentially correlate with team performance. A new measure of cohesion should therefore be able to detect this pattern of relationship. It should also be able to

detect differences in levels of cohesion that result from individual differences (e.g. gender).

Construct Validity

For psychological variables such as cohesion where there is no standard benchmark test, where inconsistencies exist over the dimensions that define the construct and lack of clear criterion variables for prediction, establishing some types of validity can be very difficult. A measure of cohesion cannot simply be validated against an existing instrument that purports to measure the same thing as there is no adequate one that exists. Further, although some agreement exists over the primary dimensions of cohesion such as team and social cohesion, there are still questions over how these should be measured. There is also no existing measure of cohesion that captures the secondary dimensions of cohesion relevant to organizational work teams. This indicates that testing only certain forms of validity such as convergent and content validity can provide some supporting evidence for validity but are clearly not sufficient (Nunnally, 1978). To overcome this, Cronbach and Meehl (1955) introduced construct validity. Essentially, construct validity involves conducting a number of studies that together provide evidence for the validity of the measure. A set of hypotheses are generated derived from the nature of the psychological construct being measured that test the different types of validity described in this section, as deemed applicable. This approach will be crucial in developing a psychometrically-sound measure of cohesion for organizational work teams. This should include showing what the test does not measure, i.e. divergent validity (Kline, 2000). This approach to establishing the validity of a measure is particularly important in the development of a measure of team cohesion.

Construct validity also includes testing the *factorial validity* of the measure, that is testing a hypothesis about the structure of the measure in accordance with the definition of the construct. Factor analysis is a data-reduction technique that collapses the number of items into a smaller set of factors based on the intercorrelation among them. It is a popular technique in the social sciences since it enables structures to be identified that are not directly observable in themselves but that can be observed through measurable indicators. Factor analysis identifies clusters of indicators that represent underlying dimensions that can be used to explain some more complex phenomena. The instrument can be said to have construct validity when the factors reflect the constructs in the proposed hypothesis (i.e. a theory-driven approach). In order to demonstrate this validity for a new measure of cohesion, it is vital to not only take care in appropriate application of factor analysis but also to define a clear theoretical basis for the construction of the

measure. Construct validity also includes testing the sensitivity of the measure, for example that the measure detects the expected individual differences in levels of the construct or expected changes in scores due to some intervention. Some hypotheses may test the same types of validity in order to build convincing evidence. If support is found for all hypotheses, the researcher can conclude that the construct validity of the measure is supported. Establishing construct validity involves an element of subjective judgement. Therefore a clear rationale is required to justify the hypotheses derived (Kline, 2000).

The Validity of Existing Measures

The measures reviewed in this research have varying degrees of validity, with many having surprisingly low validity despite good reliability. This low validity stems mostly from only one or two types being tested and/or only partial support being obtained. For example, only factorial validity was tested for the GCS (Gross, 1957), the CSCS (Martin, 2002), and the MSCl (Yukelson et al., 1984). Only two forms of validity have been tested for the Cohesiveness Questionnaire – differential and factorial validity (Gruber & Gray, 1981, 1982), the GAS – concurrent and predictive (Evans & Jarvis, 1986), the PCS – differential and factorial (Bollen & Hoyle, 1990), and Griffith's (1988) Measure of Group Cohesion for U.S. Army Units – concurrent and predictive validity. Further, only partial support was found for the factorial validity of the Cohesiveness Questionnaire and the concurrent validity of Griffith's measure. These studies raise a number of important implications for establishing the validity of measures of cohesion. First, and foremost as described previously, there are difficulties in establishing types of validity for cohesion measures such as predictive validity where there is no clear criterion for prediction or convergent validity where there is no benchmark test. It is therefore important to conduct a number of validity studies that assess a number of types of validity using hypotheses about the nature of the construct – construct validity. Only support for all of the derived hypotheses would provide evidence for the validity of a measure. These types of validity studies have generally not been conducted.

Secondly, factorial validity has been the most frequently assessed form of validity, in many cases the only form of validity tested. As a large sample technique, accuracy of results in factor analysis relies on obtaining a large sample size. Recommendations on how large a sample size needs to be differ between researchers. Sample size for factor analysis relates to both total N as well as the subject to item ratio. The most frequently cited recommendation is provided by Comrey and Lee (1992) who regard a sample size of 50 as very poor, 100 as poor, 200 as fair, 300 as good, 500 as very good and 1000 as

excellent. Kline (2000) argues that a sample size of 200 is required to reduce the standard error of measurement (the extent to which the mean of a given set of scores differs from the true mean of the whole population) to acceptable proportions, but states that an absolute minimum of 100 subjects must be used. Tabachnick and Fidell (1996) recommend that at least 300 subjects should be used. However, for statistical reasons the subject to item ratio must also be taken into account. It is not simply sufficient to obtain a large sample size, particularly if the measure contains a large number of items. To obtain meaningful results from factor analysis, the number of subjects must exceed the number of items in the measure (Kline, 2002). Kline argues that at least a 3:1 subject to item ratio should be used. Tabachnick and Fidell (1996) argue that where only a small number of factors are expected and strong correlations have been obtained, a smaller sample size can be tolerated. In addition, where there are several items that load $>.80$ on factors (marker variables that are used to identify and name factors), smaller sample sizes are acceptable.

Most of the studies examined that have used factor analysis do not explicitly address sample size for factor analysis or subject to item ratio. However, calculation of the ratio of subjects to items reveals that at least a 5:1 ratio has been obtained. However, as less than 200 subjects have been used in the development of some measures, such as the PAGEQ (Estabrooks & Carron, 2000), the TC Scale (Carless & De Paola, 2000) and the PCS (Bollen & Hoyle, 1990), results obtained are likely to be subject to measurement error. This limits the generalizability of the results and offers another reason as to why inconsistent findings have been reported in the cohesion literature. For example, Carless and De Paola's failure to replicate Carron et al.'s (1985) four factor structure may be due to their insufficient sample size. If they repeated their study on a new, larger sample, it is possible that they would obtain different results. Further, Osborne and Costello (2005) report that smaller subject to item ratios result in less accurate factor structures, where only 10% accuracy is achieved with a 2:1 ratio, 40% accuracy with a 5:1 ratio, 60% accuracy with a 10:1 ratio and 70% accuracy where a 20:1 ratio has been achieved. Only two studies reviewed achieved a subject to item ratio $>20:1$ – Gruber and Gray's (1981, 1982) Cohesiveness Questionnaire (39:1) and Martin's (2002) CSCS (22:1).

The inconsistent conclusions reported in cohesion research and difficulty comparing studies also results from the choice of factor analytic technique used. The techniques that have most commonly been used are principal components analysis (PCA) and principal axis factoring (PAF). These two techniques differ in their underlying theoretical assumptions that have implications for their use. PCA was developed by Spearman (1904) who designed the technique to detect a dominating underlying general factor (in

accordance with his finding of a dominant general or *g* factor of intelligence) accounting for as much of the total variance as possible with a number of less important factors. If the researchers underlying theoretical notion of a construct fits with this assumption of the technique then PCA is appropriate. However, as the research literature agrees that team cohesion is composed of at least four dimensions, social, task individual and team cohesion as described in Chapter 2, PCA may not provide the most appropriate technique. In contrast PAF reflects Thurstone's (1947) theory of multiple factors and his opposition to the *g* factor of intelligence, allowing for a more balanced extraction of factors. PCA and PAF can yield similar results in terms of the number of factors to extract and their nature. However, this will not necessarily be the case.

In validating the GEQ in a work team context, PCA was used to test the factorial validity of the TC Scale (Carless & De Paola, 2000). Due to the different techniques, it is difficult to determine whether the structure of cohesion differs in a work team context or whether the structure is simply a product of the technique used. Furthermore, different rotation methods have been used to interpret factors. The purpose of rotation in factor analysis is to simplify the structure obtained for ease of interpretation. There are two methods to achieve this goal. Firstly, orthogonal methods (e.g. varimax rotation) simplify structure based on the notion that the factors are uncorrelated. In comparison oblique methods (e.g. direct oblimin rotation) produce correlated factors (Kline, 2000). Orthogonal rotation methods have been used in the development of cohesion measures (e.g. the development of the MSCI, Yukelson et al., 1984). However, it is unlikely that dimensions of cohesion are uncorrelated and are entirely independent of one another. Where factors are uncorrelated, orthogonal and oblique methods produce very similar results, but where they are truly correlated, orthogonal methods will result in a loss of information and a less accurate result that is more difficult to reproduce (Costello & Osborne, 2005).

Adequate justification of methods, the reporting of criteria used for item reduction or factor analysis is remiss in the research literature. Adequate justification of criteria is important for replicating results. The only consistency between measures appears to be in the establishment of content validity. Although only Carron et al.'s (1985) GEQ and its derivative measures, i.e. the PAGEQ (Estabrooks & Carron, 2000) and the TC Scale (Carless & De Paola, 2000) were based on a conceptual model. The majority of measures have developed items based on a review of previous literature and measures. In most cases, these items were then content validated by experts and representatives of the target population. Using representatives of the target population as 'active agents' is important for reducing investigator bias and ensuring the use of participants own language and concepts that they understand. The use of clear criteria has also frequently been

used for item development such as frequency of appearance in the research literature, clarity in writing, amount of ambiguity and duplication.

The most extensively validated measure is Carron et al.'s (1985) GEQ. The GEQ has undergone extensive validation by both its developers and independent researchers at various stages of team development. As a result, the concurrent, predictive and factorial validity of the GEQ has been tested widely in sports and exercise teams but with some mixed results (see Carron et al., 2002a). Mixed results in factorial validity can be due to a number of reasons. Firstly, the factor analysis technique used may produce different results. Secondly, the sample sizes used in factor analytic studies have often been inadequate for obtaining accurate results. Finally, since cohesion is not a trait and changes over the lifecycle of a team, the existence and extent to which dimensions are present in a team at any given time point is likely to change. For example Carless and De Paola (2000) failed to replicate the four factor structure of the GEQ in work teams but only measured cohesion at a time point determined by the researchers, not necessarily reflecting a team developmental stage. Without adequate reporting of when measurements of cohesion have been conducted with respect to a team's development, drawing comparisons between studies is difficult. Further, without the ability to make accurate comparisons between studies, it is not simple to conclude that the underlying conceptual model on which the measure is based (if indeed such a theoretical foundation has been employed) is incorrect. Unless cohesion is assessed across types of teams and across the range of developmental stages, it will not be possible to obtain a full understanding of the nature of cohesion in teams, whatever the context (Carron et al., 2002a). This is also important in assessing any form of validity since the relationship between cohesion and other variables is likely to change over time. Research must test the validity and structure of cohesion over specific periods of time (e.g. beginning, middle, and end of a team lifecycle) or in samples that represent a broad range of length of team membership (e.g. 1 month to 40 years). This highlights the importance of a theory-driven approach to scale development and examining dimensionality as opposed to reliance on a data-driven approach in which structure is determined purely through statistical techniques such as a factor analysis.

Table 3.6 summarises the varying levels of reliability and validity of existing measures of cohesion:

Table 3.6:**Cohesion measures summarised by 'level of reliability and validity'**

Measurement Instrument	Reliability	Validity
GEQ (Carron et al., 1985; 1988)	Inadequate internally consistency reliability for some subscales (P)	Content/face validity (YM) Concurrent validity (M) Predictive validity (M) Factorial validity (M)
PAGEQ (Estabrooks & Carron, 2000)	High internal consistency reliability for each subscale (Y)	Content validity (YS) Concurrent validity (YS) Predictive validity (P) Differential validity (YS)
The Cohesiveness Questionnaire (Gruber & Gray, 1981, 1982)	High internal consistency reliability (calculated for each item) (Y)	Differential validity (YS) Factorial validity (P)
GAS (Evans & Jarvis, 1986)	High internal consistency reliability (Y)	Concurrent validity (YS) Predictive validity (YS)
PCS (Bollen & Holye, 1990)	NR	Differential validity (YS) Factorial validity (YS)
GCS (Gross, 1957)	High internal consistency reliability (Y)	Factorial validity (YM)
MFI Base Cohesion (McClure & Broughton, 2000)	High internal consistency reliability across subscales (Y)	Concurrent validity (YS) Differential validity (YS) Factorial validity (YS)
HCHP-GCS (Budman et al., 1987)	High reliability across observers (Y)	NR
TC Scale (Carless & De Paola, 2000)	NR	Concurrent validity (YS) Differential validity (YS) Factorial Validity (P)
CSCS (Martin, 2002)	High internal consistency reliability across subscales (Y)	Factorial validity (YS)
MSCI (Yukelson et al., 1984)	High internal consistency reliability across subscales (Y)	Factorial validity (YS)
Measure of Interpersonal Attraction (Aitken, 1992)	NR	NR
GCS-R (Treadwell et al., 2001)	Inadequate internal consistency reliability tested across samples (P)	Differential validity (YS)
Cohesion Scale (Seashore, 1954)	NR	NR

Measurement of Group Cohesion in U.S. Army Units (Griffith, 1988)	High internal consistency reliability across subscales (Y)	Concurrent validity (P) Predictive validity (YS)
<i>Note:</i> YS = Yes, Single Study; YM = Yes, Multiple Studies; P = Partial Support; M = Mixed results (where multiple studies); N = No; NR = Not Reported		

3.3 Summary

For the analysis of existing measures of cohesion, it is clear to see that they reflect the inconsistency of definitions identified in Chapter 2; reflecting a unidimensional or multidimensional view of cohesion. A variety of different dimensions have also been included in existing measures of cohesion. Although many measures include the primary dimensions task and social cohesion, the indicators that have been written to measure these dimensions reflect the context in which they were developed. In developing a measure relevant for organizational settings it is therefore vital to return to first principals in psychometric development to not only develop relevant dimensions but appropriate indicators for them in this context. The vast majority of existing measures have a low level of validity. The most frequently used measure of cohesion – the Group Environment Questionnaire (GEQ) - has been subject to the most validation. However, only limited forms of validity have been tested. Issues such as a lack of standard benchmark cohesion measure or clear criterion variables for prediction pose considerable challenges for establishing the different types of validity described in this chapter. This calls for a different approach to validity to be adopted in this research and indeed cohesion research in general. Instead, a set of hypothesis derived from what is known about the nature of the construct should be generated to test the construct validity of cohesion measures. It is only taken together that the results of these hypotheses provide evidence of validity. This is vital for ensuring accurate measurement of the construct. This approach has rarely been adopted in cohesion research.

The analysis conducted in this chapter also highlights that the need for improved measurement of cohesion includes the measurement of member-subgroup perceptions. This is in addition to the member-member and member-team perceptions outlined in Carron et al.'s (1985) conceptual model described in Chapter 2. This has particular relevance in an organizational setting characterised by hierarchical structures where relationships also exist between team members and team leaders. Most measures of cohesion have focused on measuring only member-member perceptions providing an aggregated score to capture overall 'team' cohesiveness. However, such approaches do not take account of changes in the level of cohesion at an individual or team level. Even fewer studies have considered changes in the levels of cohesion in leaders or subgroups.

The use of the self-report measure, based on the Likert scale, is the most widely used method employed in the measurement of cohesion. Given the nature of cohesion as a property of teams that can be assessed through the perceptions of individuals (i.e. because individuals experience the social situation of the team and develop beliefs about it) it provides the most appropriate measurement method. To ensure the reliable measurement of cohesion, the properties and design (appropriately labelled anchors) of the Likert scale used should however conform to the use originally intended by Likert (1932).

The challenge in this thesis will be to draw together the strengths of existing measures of cohesion whilst avoiding their limitations to improve the accuracy of measurement of the construct and ensure its relevance to organizational settings. This must start with developing an enhanced theoretical foundation, relevant indicators and appropriate measurement scale. These are addressed in the next chapter.

4 Scale Construction & Content Validity



The purpose of Chapter 4 is to report the development of an enhanced theoretical model of organizational work team cohesion based on Carron et al.'s (1985) conceptualisation. This provides the basis for the generation of items for the new measure of cohesion that are then content validated. The design of the measurement scale employed is also presented. The results of the content validity study are used for initial theoretical item reduction. The extended theoretical model and items designed to measure dimensions were found to have good content validity by both members of organizational work teams and SMEs. Items that were judged by SMEs to be measuring related but distinct concepts were eliminated reducing the original item pool of 219 items to 129 for pilot testing.

4.1 Introduction

Chapter 2 identified the need for an enhanced theoretical model of cohesion that clearly delineates context-independent (primary) and context-dependent (secondary) dimensions of cohesion. Traditional psychometrics has tended to be atheoretical in nature with an empirically-driven approach (Kline, 2000). This approach to the development of cohesion measures has been no different with heavy use of factor analysis to identify dimensions of cohesion. Carron et al.'s (1985) conceptual model provides a good foundation for the context-independent dimensions of cohesion. Despite the notional view (provided by Cota et al. 1995) that part of the complexity and richness of cohesion stems from its specific manifestations in different contexts, little clarification has been provided on this. Contemporary best practice in psychometric development requires that measurement is based on sound theoretical models and appropriate scientific measurement scale (Kline, 2000). It is therefore the intention of this chapter to extend Carron et al.'s (1985) conceptual model to include secondary dimensions of cohesion relevant to organizational work teams. This can then be used as the basis for the development of items or indicators of each of the dimensions identified. The face and content validity of the items must then be established. Although not sufficient, this is a necessary step for establishing the construct validity of the measure (Hinkin, 2005).

4.2 Scale Construction

One of the first stages in the development of a new measure is item generation. However, item development relies on an adequate understanding of the underlying manifestations of a construct. The primary aim in identifying dimensions of cohesion and corresponding items is to ensure that they represent the domain of interest – i.e. cohesion. There are two approaches that can be taken to achieve this aim – a deductive approach and an inductive approach. Both of these methods are frequently used in the development of measures for organizational research (Hinkin, 2005). A deductive approach requires that at least some understanding of the construct exists and that sufficient literature exists to inform its definition. A thorough review of the literature is then required to inform the development of the theoretical model to be used for item generation. The inductive approach to scale construction is adopted where insufficient literature exists and the construct under study is ill-defined.

Despite some enduring inconsistencies, the cohesion literature is vast. Further, Carron et al.'s (1982, 1985) definition and conceptual model provide a sufficient working knowledge of cohesion. Adopting a deductive approach to scale development was therefore considered acceptable in this research. However, given the lack of research that has been conducted on the definition of cohesion in an organizational setting, a supplementary inductive approach was also used. This comprehensive approach was felt to be imperative for ensuring that the specific manifestations of cohesion could be adequately captured. The results obtained from the deductive and inductive approach were then compared. These are discussed below. The extension of Carron et al.'s (1985) conceptual model is presented based on the output from the deductive and inductive approach, addressing the need for an adequate conceptual foundation for an organizational work team measure.

4.2.1 Deductive Approach

Despite a lack of adequate or comprehensive definition of cohesion for organizational work teams, the body of research on team cohesion is large and relates to a variety of team types (from sports and exercise teams to military teams). Definitions that have been developed for other types of teams that share similar characteristics are likely to have some relevance. Starting with Carron et al.'s (1985) task, social, individual and team dimensions, the in-depth review of the existing cohesion literature presented in Chapter 2 and 3 was used to extract other dimensions and operationalisations of cohesion that have been suggested. The analysis presented in Chapter 2 and 3 represents a form of content analysis that answers many of the questions that must be addressed with this qualitative approach including what has been analysed, how it has been defined, and the context to

which it relates (Krippendorff, 2004). This section extracts the dimensions and operationalisations of cohesion that can then be mapped back to this analysis to determine their relevance to organizational work teams. Dimensions such as 'friendship' and 'attraction' were captured from unidimensional definitions of cohesion. From multidimensional definitions of cohesion, vertical cohesion and its operationalisations such as 'faith in the leader' (Griffith's, 1988), Yukelson et al.'s (1984) 'valued roles', and 'sense of belonging' (Bollen & Hoyle, 1990). From the literature on organizational work teams aspects such as 'unity of team norms and beliefs', 'collaboration' and 'monitoring and feedback' were captured. These were then clustered based on their similarity. The dimensions of cohesion identified from the existing research literature were found to cluster naturally into four overarching aspects of cohesion. These were task-based aspects, social-based aspects, horizontal aspects and vertical aspects of cohesion. This reflects the common threads identified in research literature. The dimensions and operationalisations identified were colour coded according to which aspect of cohesion they were judged by the researcher to relate to. The following colour code was used:

- *Pink* was assigned to aspects relating to task and horizontal aspects only (e.g. 'willingness to participate').
- *Blue* was used to represent aspects considered to relate to task cohesion and vertical aspects (e.g. 'competence of team leader').
- *Purple* was used to represent aspects measuring social and vertical cohesion (e.g. 'team leader takes personal interest in the welfare of team members').
- *White* was used to denote aspects that span across sections of the quadrant. For example; 'freedom of information sharing' relates to task-based cohesion and has both horizontal and vertical aspects and the team leaders 'commitment to the team' has both task and social-based aspects.

The results of this thematic analysis are shown in Figure 4.1 over the page.

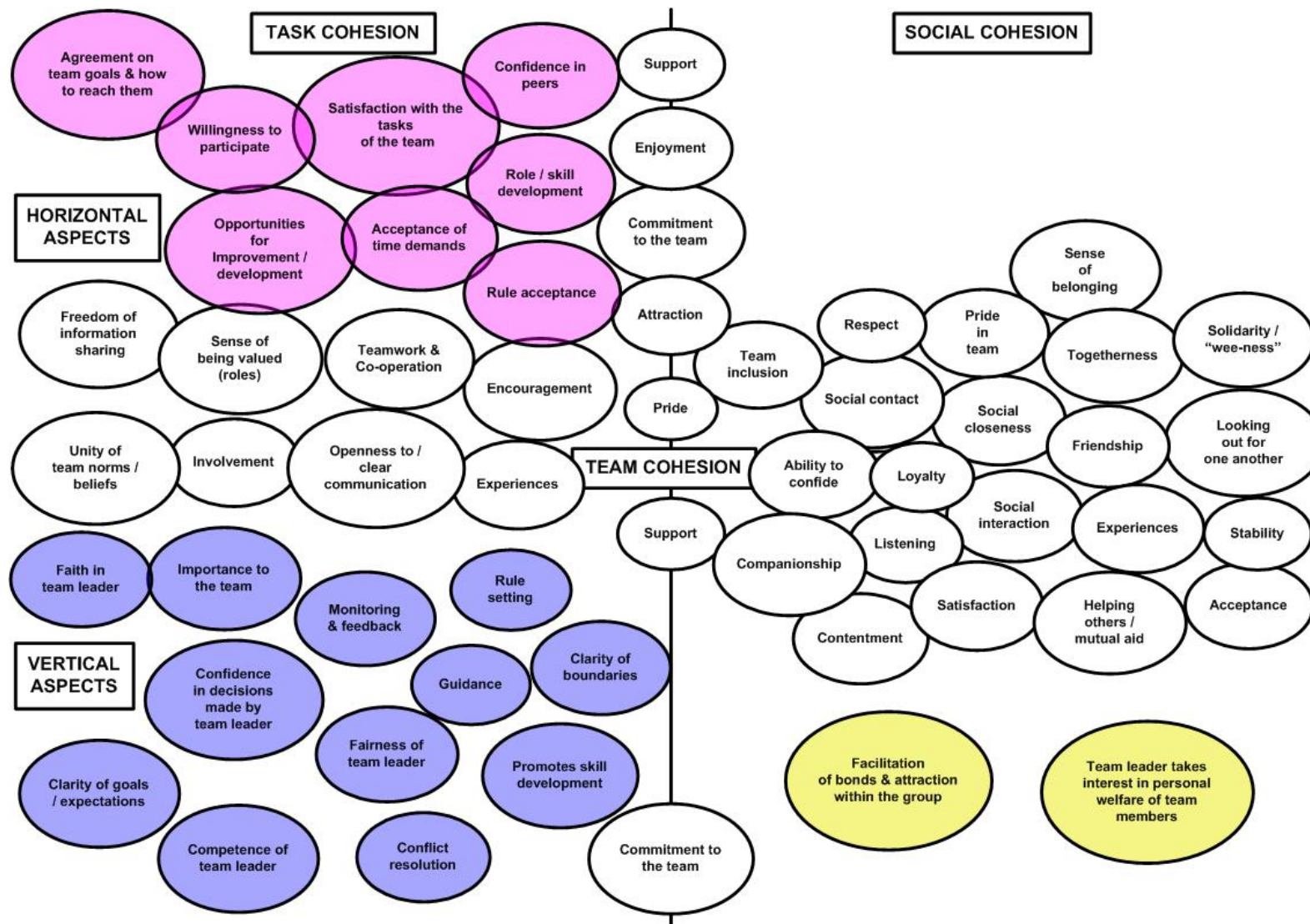


Figure 4.1: Content analysis of cohesion dimensions and operationalisations identified in the research literature presented in Chapter 2.

4.2.2 Inductive Approach

The inductive approach provided an important part of the construction of an adequate cohesion measure for organizational work teams. This approach typically involves asking a sample of respondents to describe their feelings about certain behaviours that the researcher believes is pertinent to the construct. Content analysis is then used to classify responses based on themes or key words (Hinkin, 2005). For this research a focus group was conducted with two psychologists from QinetiQ with experience in team working and occupational psychology. This was an opportunistic sample of subjects who had sufficient time available to participate in a focus group. However, those obtained for this research provided the advantage of not only being experts in the domain but 'active agents' in organizational work teams. As participants were experts in the domain, the focus group was kept informal and unstructured to allow for a full and comprehensive discussion. Discussions were opened by considering what is meant by cohesion in general and participants were asked to consider the key elements they felt were part of team cohesion in organizational settings. The session lasted for approximately 1½ hours. The focus group was run independently from the deductive approach but in parallel, to ensure that SMEs were not influenced by the dimensions that have already been identified in the cohesion literature. It was imperative to obtain as broad a view as possible on cohesion and its manifestations in organizational settings.

Emerging themes from the discussions were captured on a whiteboard. The first aspects of cohesion that were identified in the focus group were 'task cohesion' and 'social cohesion'. Both of these dimensions were considered to be important aspects of cohesion in organizational work teams. This led to sub-aspects of cohesion to be identified by the SMEs that could be clustered under either 'task cohesion' or 'social cohesion'. There was complete agreement between participants as to which cluster each theme belonged. In an organizational work context, task cohesion was considered to include a role-based dimension, aspects related to commonality of understanding within the team and supportive behaviours (e.g. support in the achievement of goals). In terms of supportive behaviours, SMEs felt that both support from peers and from the team leader were important in task cohesion. Similarly social cohesion was considered to include supportive behaviours relating to both peers and the team leader. In addition, social cohesion was considered to include liking for other team members, the team leader and the team as a whole, satisfaction with team life and a sense of belonging to the team. The themes identified in the focus group are presented in Figure 4.2 and Figure 4.3:

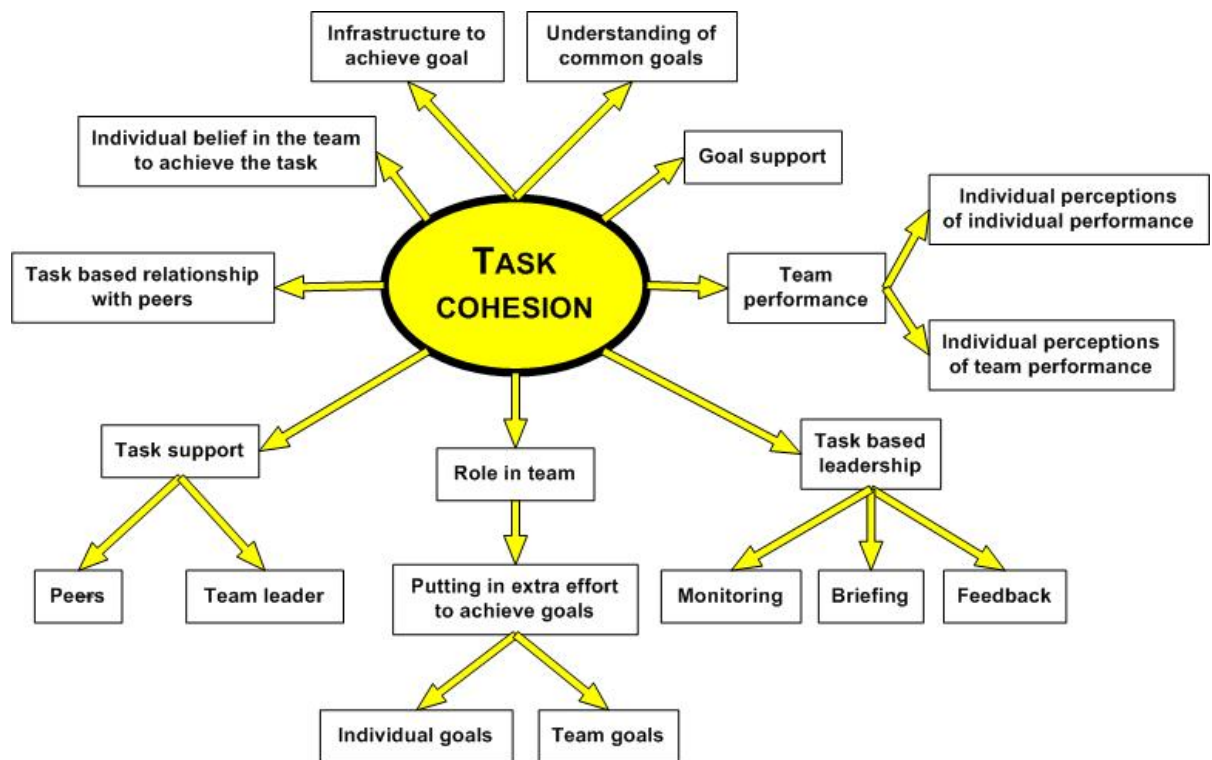


Figure 4.2: 'Task Cohesion' themes identified during the preliminary focus group.



Figure 4.3: 'Social Cohesion' themes identified during the preliminary focus group.

The themes identified in the focus group were compared to those identified from the cohesion literature to determine the dimensions that should be included in a measure of organizational work team cohesion. This provided a comprehensive approach. Conceptual consistency was found between the results of the deductive and inductive approach. SMEs identified all four of the aspects of Carron et al.'s (1985) conceptual

model. In addition, the peer and leadership aspects that were also identified by the SMEs matched Griffith's (1988) vertical and horizontal dimensions of cohesion. The role-based aspects and 'understanding of common goals' closely match Yukelson et al.'s (1984) 'valued roles' and 'unity of purpose' dimensions. No new aspects of cohesion were identified by SMEs in the focus group. Therefore it was felt that no further focus groups were necessary and that all important aspects had been adequately captured. Appendix A shows how the task and social aspects identified during the focus group fit with the key aspects of cohesion identified within the literature.

The results of the thematic analysis conducted under both the deductive approach and focus group were used to extend Carron et al.'s (1985) conceptual model of team cohesion. This would then provide a sound conceptual basis on which to develop the new measure of organizational work team cohesion. The extension of the conceptual model is discussed in the next section.

4.3 Extension of Carron et al.'s (1985) Conceptual Model for Organizational Work Teams

As described in Chapter 2, Carron et al.'s (1985) conceptual model of cohesion incorporates the primary dimensions of cohesion considered important across all team contexts. Its development was influenced by two major discussions in the research literature. Firstly, there has been much debate over the need to distinguish between the individual and the team within the group dynamics literature as a whole (e.g. Cattell, 1948; Zander, 1971) and more specifically in the research literature on cohesion (e.g. Evans & Jarvis, 1980). The second major discussion has centred on the need to distinguish between task and social cohesion (referred to as instrumental and affective aspects in Carron's (1982) definition of cohesion). This has been an important topic in not just the cohesion literature (e.g. Festinger, Gerard, Hyomovitch, Kelley, & Raven, 1952; Enoch & McLemore, 1967; Anderson, 1975; Mikalachiki, 1969) but also the leadership literature (e.g. Fiedler, 1967; Hersey & Blanchard, 1969; Fleishman & Peters, 1962). It is unsurprising that social and task cohesion was identified by SMEs in the focus groups as most pertinent to organizational work teams. Given the clear importance of Carron et al.'s (1985) conceptual model, this model was used as the foundation for an enhanced theoretical model for organizational work team cohesion.

For the purposes of the extended model and for added clarity and to clearly reflect 'teams' two of the dimensions in Carron et al.'s (1985) model were renamed. 'Individual Attraction to the Group' was renamed 'Individual Perceptions of Self' to reflect an individual's perceptions of their self in the team and their own relationships. 'Group Integration' was

renamed 'Individual Perceptions of Others in the Team' to reflect an individual's perception of the other team members and how they relate to one another.

The secondary dimensions relevant to organizational work teams could then be defined with this clear foundation. From the review of the nature of organizational work teams in Chapter 2 it is clear that organizational work teams have a defined purpose and common goals and their interactions will be based around activities conducted to support the achievement of these goals (e.g. Salas et al., 1992). Team members will assume structured roles that are complementary and which are collectively required to complete tasks and achieve the goal of the team. In an organizational work team context, cohesion will therefore include role-based manifestations and aspects that measure perceptions of unity in the team's purpose and how to conduct tasks and achieve the team's goal. Yukelson et al.'s (1984) dimensions of 'unity of purpose' and 'valued roles' reflect these aspects of cohesion that, although developed in a sports team context, have relevance to organizational work teams. Yukelson et al.'s (1984) operationalisation of 'valued roles' reflects individual's perceptions of whether their role is valued by both their peers and the team leader. This fits with the role-based aspects and 'understanding of common goals' identified by SMEs. Therefore these dimensions of cohesion were identified as important secondary dimensions that should be included in the extended theoretical model.

A further characteristic of organizational teams is their hierarchical nature where interactions exist both between peers (i.e. horizontal interactions) and between subordinates and team leaders (i.e. vertical interactions). The relationship between individual team members and the team leader has rarely been included in measures of team cohesion even those developed for teams in which clear member-leader relationships exists (such as member-coach relationships in sports teams). However, as part of the team, the team leader plays an important role in the functioning of the team. Likert's (1961) linking pins model describes the important role team leader's play in maintaining unity and instilling sense of belonging. The distinction between peers and the team leader was a key aspect identified in the focus group. In the cohesion literature, Griffith's (1988) and Yukelson et al.'s (1984) definition of cohesion are amongst the few that reflect the leader in the team. Griffith's (1988) operationalisation of vertical cohesion included perceptions of the team leader's fairness and competence and the sense that the leader takes an interest in the welfare of team members. Yukelson et al.'s (1984) notion of cohesion included perceptions of whether their role is valued by the team leaders. Together with Likert's notion of linking pins, this reflects that manifestations of vertical cohesion will have task, social, role-based and unity of purpose based aspects. This inter-relationship between dimensions was also reflected in the results obtained in the

focus group. SMEs viewed task and social dimensions as ‘overarching’ aspects of cohesion, under which other aspects of cohesion clustered. Role-based aspects were also identified as having individuals and team level aspects.

No other distinct aspects of cohesion were identified that should be included as secondary dimensions. In fact, many of the other aspects highlighted in the focus groups and cohesion literature were considered to be operationalisations of the primary and secondary aspects identified. For example, from the cohesion literature: ‘friendship’ can be considered an operationalisation of social cohesion; ‘acceptance of time demands’ and ‘rule acceptance’ can be considered operationalisations of horizontal aspects of task cohesion; and ‘fairness of team leader’ an operationalisation of vertical cohesion. Similarly, from the focus group, ‘liking for other team members’ can be considered an operationalisation of social cohesion and ‘goal support’ an operationalisation of task cohesion. These will be used to inform the generation of items to measure each dimension.

Carron et al.’s (1985) conceptual model was therefore extended to include the secondary dimensions vertical cohesion, horizontal cohesion, unity of purpose and valued roles. Vertical and horizontal aspects of cohesion can be considered as sub-aspects of both social and task cohesion. Valued roles and unity of purpose aspects of cohesion relate to task cohesion only. Both valued roles and unity of purpose also have both horizontal and vertical aspects, relating to both peer relationships and relationships with the team leader. The extended conceptual model, named the Multidimensional Team Cohesion Model (MTCM) is presented in Figure 4.4:

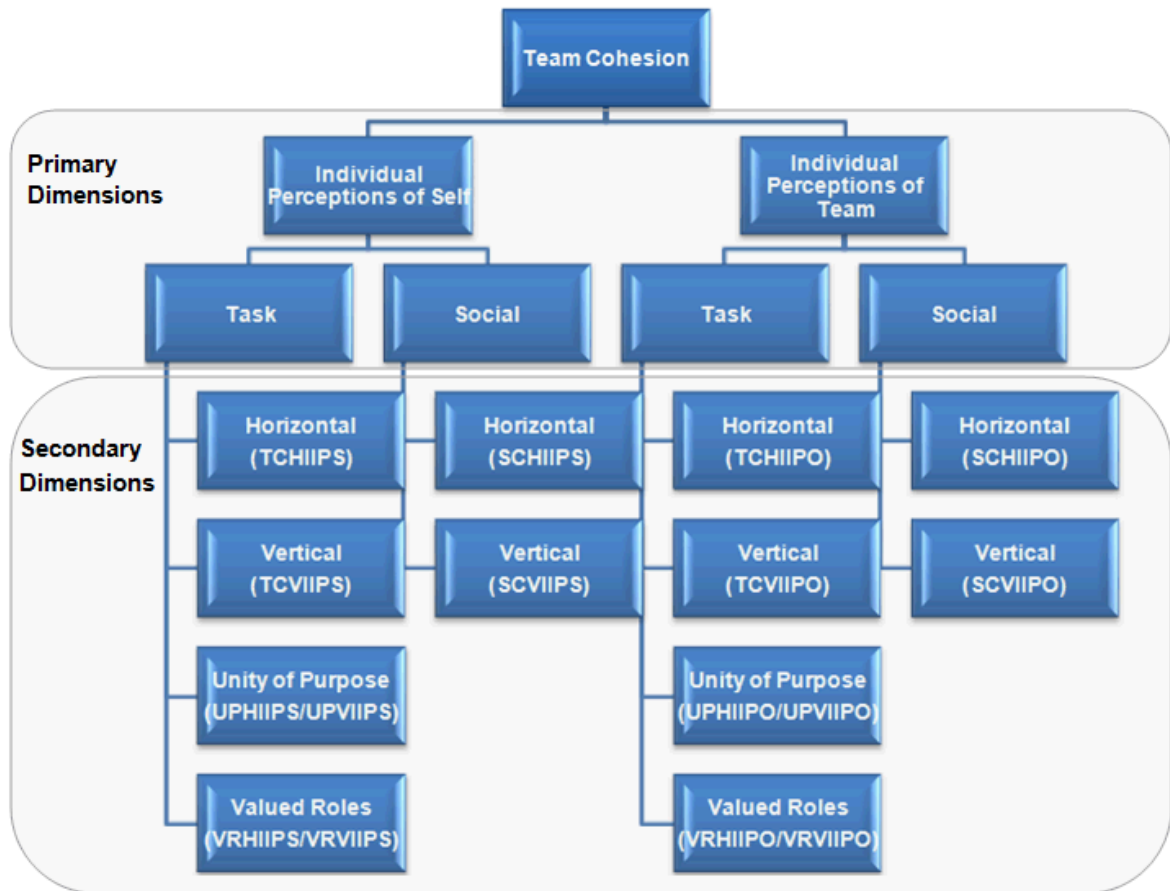


Figure 4.4: Extension of Carron et al.'s (1985) conceptual model for U.K. Organizational Work Teams.

The extended model of team cohesion for organizational work teams contains the following sixteen dimensions:

- Task Cohesion-Horizontal Interactions-Perceptions of Self (TCHIIPS)
- Task Cohesion-Horizontal Interactions-Perceptions of Others (TCHIPO)
- Task Cohesion-Vertical Interactions-Perceptions of Self (TCVIIPS)
- Task Cohesion-Vertical Interactions-Perceptions of Others (TCVIPO)
- Valued Roles-Horizontal Interactions-Perceptions of Self (VRHIIPS)
- Valued Roles-Horizontal Interactions-Perceptions of Others (VRHIPO)
- Valued Roles-Vertical Interactions-Perceptions of Self (VRVIIPS)
- Valued Roles-Vertical Interactions-Perceptions of Others (VRVIPO)
- Unity of Purpose-Horizontal Interactions-Perceptions of Self (UPHIIPS)
- Unity of Purpose-Horizontal Interactions-Perceptions of Others (UPHIPO)
- Unity of Purpose-Vertical Interactions-Perceptions of Self (UPVIIPS)
- Unity of Purpose-Vertical Interactions-Perceptions of Others (UPVIPO)
- Social Cohesion-Horizontal Interactions-Perceptions of Self (SCHIIPS)
- Social Cohesion-Horizontal Interactions-Perceptions of Others (SCHIPO)
- Social Cohesion-Vertical Interactions-Perceptions of Self (SCVIIPS)

- Social Cohesion-Vertical Interactions-Perceptions of Others (SCVHIPO)

The extended model carries the same assumptions as those defined by Carron et al. (1985). It makes no assumptions about the extent to which each of the aspects defined exist within any given team. That is, it does not assume that a team will be equally cohesive in all aspects; indeed a lack of perceived cohesiveness in any of the aspects does not necessarily mean that the team will not be cohesive. For example, a lack of vertical cohesion may not be detrimental to the overall cohesiveness of the team if it does not experience disruption in achieving its ultimate goals. Task cohesion may also be perceived as more strongly existing in the team than social cohesion, yet the team may still be tightly bound together. The differences in levels of each type of cohesion that is likely to exist in teams fits with Carron et al.'s (2002a) interpretation of the nature of cohesion. By incorporating Cota et al.'s (1995) primary and secondary distinction, the proposed model can be easily modified or replaced according to the team context of interest whilst still retaining the core aspects of team cohesion. This instils the consistency laid down by Carron et al. (1985) and adds further clarity to the measurement of team cohesion.

4.4 Item Generation

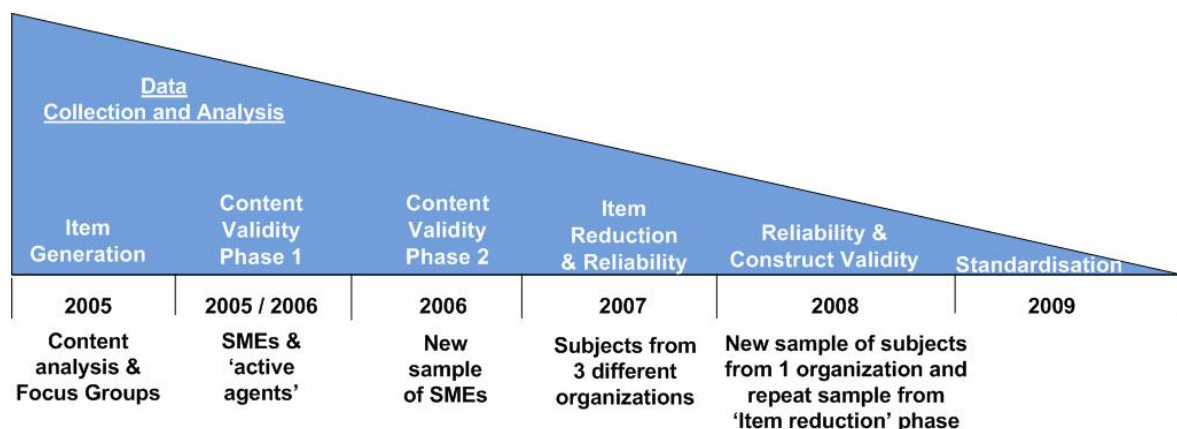


Figure 4.5: Timeline for data collection and analysis for item generation and validity

Figure 4.5 above shows the timeline of the data collection and analysis phases that were conducted in this research. This section describes the item generation phase, the first phase in the construction of the new measure of organizational work team cohesion. The content validity phases are also discussed in this Chapter. The empirical stages of the research - item reduction and construct validity, are presented in Chapters 5 and 6 respectively.

Once the aspects of cohesion had been fully captured and a conceptual model developed, the items for inclusion in the pilot version of the scale were then written. The items were written as attitude statements (e.g. 'I feel a part of what happens in the team') to reflect

the aspects of cohesion captured in the extended conceptual model. Respondents were asked to rate their level of agreement with the statement on a Likert scale, described in the next section. To obtain as wide a perspective on the construct as possible, items within existing measures of cohesion were examined to determine their applicability to organizational work team cohesion and to direct item writing. Due to the lack of definition in this context, this was a matter of judgement. Items considered relevant were modified and reworded for applicability. Following a comprehensive analysis of existing measures, items were selected from the measures reviewed in Chapter 3.

Items considered to have the potential to be re-used in a measure of organizational work team cohesion were selected from each existing measure based on the following criteria:

- Items that fit under the primary and secondary dimensions of cohesion outlined in the proposed conceptual model.
- Items considered relevant to the organizational work team context.
- Items most frequently used in the research literature were assessed for their relevance to the organizational work team context.

Items were re-phrased or adapted to ensure applicability to organizational work teams. For example, the item 'I like the program of physical activities done in this group' written for the Physical Activity Group Environment Questionnaire (PAGEQ developed by Estabrooks & Carron, 2000) was adapted to 'I am content with the tasks that I do within the team' for the MTCS reflecting individual team members perceptions of their own task interactions with their peers (TCHIIPS). Similarly, the item 'People in this company feel very close to each other' written for Griffith's (1988) Measure of Military Unit Cohesion was adapted to 'Members of the team feel very close to one another' for the MTCS reflecting individual perceptions of team members' social interactions with each other (SCHIIPS). The full list of items adapted from existing measures relating to each dimension can be found in Appendix B.

New items were developed to reflect the operationalisations identified in the preliminary focus group. For example, items were written to measure task-based leadership. This included items such as 'Team members are receptive to feedback from our immediate superior' and 'Team members do not value the feedback from our immediate superior'. This led to the development of items that reflected the horizontal task-based aspects of cohesion. New items were also developed to ensure both individual factors and team factors had been adequately captured. Cohesion cannot be treated simply at the individual level reflecting the individual's perceptions of their self in the team but must also reflect the level of the team to take account of the context in which the individual exists. Items written to measure individuals perceptions of their self within the team were written

using 'I', 'my' and 'me' and items written to tap individual's perceptions of their team members used the words 'team members', 'our' and 'we'. Items such as 'Members of the team regularly socialise together' were written to ensure that the MTCS reflected team referents for the dimension SCHIIPS that had not been included in past measures. Similarly, items such as 'My immediate superior instils a sense of shared purpose within the team' were written to ensure that vertical aspects of 'unity of purpose' had been adequately captured in the MTCS. The full list of new items written for each dimension is presented in Appendix C.

Items were written in line with best practice (e.g. Brewerton & Millwood, 2001; Shaughnessy & Zechmeister, 1997) to ensure that scale items were comprehensible to respondents that could then be validated through content validity in the pre-test phase. Care was taken in wording scale items avoiding words that the research population may be unfamiliar with, such as technical terms. For example, words such as 'taskwork' frequently used in the teamwork literature were replaced with 'the task of the team' to provide greater clarity. Ambiguous or vague wording was also avoided. Items were kept short and simple to reduce the possibility of misinterpretations. Items within the measure were also generally worded. For example, words like 'team' and 'immediate superior' were used to make the measure applicable to a wide range of teams within hierarchical organizations – not just work teams but also other types of teams such as military teams to support ease of adaptation. On first writing, items that were double-barrelled were split into two questions. For example, the item (written in the first iteration of the measure) 'My immediate superior is interested in what I think and how I feel about things' was split into two separate items; 'My immediate superior is interested in what I think about things' and 'My immediate superior is not interested in the way I feel about things'. This also reflected the use of a balance of positively and negatively worded items within the scale to discourage response acquiescence bias, where the same answer is provided to all questions regardless of content (Cronbach, 1946). In constructing positive and negative items, extreme attitude statements that may provoke a socially desirable response were avoided as were very bland items (Kline, 2000, Edwards, 1957). To ensure a sufficient pool of items from which the measure could be constructed, a large item pool of 219 items were written. The number of items written for each dimension is shown in Table 4.1 below:

Table 4.1:
Number of subscale items written for each dimensions
of the MTCS

MTCS Subscales	No. of Items
TC-HI-IPS	16
TC-HI-IPO	13
TC-VI-IPS	15
TC-VI-IPO	10
SC-HI-IPS	26
SC-HI-IPO	10
SC-VI-IPS	13
SC-VI-IPO	13
VR-HI-IPS	13
VR-HI-IPO	13
VR-VI-IPS	16
VR-VI-IPO	14
UP-HI-IPS	10
UP-HI-IPO	14
UP-VI-IPS	8
UP-VI-IPO	15

A good number of items were developed for each dimension to ensure that an adequate sample of its universe had been drawn and to maximise the validity of the measure. It also conforms to best-practice advice that at least twice as many items should be developed. This allows for items considered unsatisfactory through content validity or failing to load through factor analysis to be removed. This is important for enabling valid conclusions to be drawn about the nature of the construct (Kline, 2000). However, a careful trade-off is required between the length of the measure and reliability. It was necessary to ensure that the number of items developed was not so great that completion was affected by respondent boredom or fatigue. Too few items and the measure is likely to be too specific to be valid. Kline (2000) recommends a minimum of 10 homogenous items since even with a relatively small number of items estimates of reliability can still be precise. Although it is necessary to ensure that items are not simply measuring the same thing (i.e. are bloated specifics) as this can inflate estimates of reliability. The greater the number of items in the measure, the more reliable the measure is likely to be.

Once the items had been written, they were clustered based on similarity of content and according to the constructs identified in the conceptual model to ensure that each cluster

was distinct and no thematic duplication between clusters existed. Following item writing, the items were put into questionnaire format consisting of a 7-point Likert scale. The items were organised by the dimensions they were designed to measure to facilitate content validity. This scale design is described in the next section. The items were then content validated. Face and content validity of the items written was obtained through two phases. These are described in section 4.6.

4.5 Scale Design

Consistent with the majority of existing measures and as an appropriate approach to measure individual perceptions, the new measure was designed as a self-report questionnaire based on a Likert scale. The Likert scale offers a number of advantages in the measurement of attitudes and perceptions and is considered preferable over the use of other forms of attitude scale such as Guttman and Thurstone scales (Kline, 2000).

Developed by Louis Guttman (1950), the Guttman scale requires that items or statements written can be arranged so that individual's agreeing with any given item also agrees with all lower-order items. This type of scale can be used to measure how extreme individuals' attitudes are. However, they are more appropriate where items have a clear ordering as in ability or achievement tests where item difficulty can be ordered. The Thurstone scale was developed by Louis Thurstone in 1928 to measure attitudes towards religion. This type of attitude scale has a number of limitations for the measurement of attitudes. Although it requires that a large number of items be written which are considered to tap a particular attitude construct, it presumes that this construct is unidimensional. This is clearly inappropriate for the measurement of a multidimensional construct like cohesion. All of the items generated reflect the construct in a slightly different way. The large set of items must then be rated by a large number of judges, usually about 100 to ensure validity, on an 11-point scale ranging from 'strongly favourable' to 'strongly unfavourable'. Items are chosen that represent each 11 values and where there is a high degree of agreement between judges. Subjects are then asked to agree or disagree with the statements and an overall score on the construct obtained. Obtaining a sufficient number of judges, representative of the population that the test is intended for is often difficult.

In contrast, Likert scales are easier and more practical to construct. They also provide more information than Thurstone scales, enabling data to be collected on the extent of a subject's status on a construct by using a rating scale mode of response typically between 5 and 9 points. However, a number of issues with Likert scales need to be discussed. Likert scale data falls on the fuzzy line between an ordinal scale and an interval scale. Ordinal scales provide rank ordered information. In contrast, interval level measurement

provides scales that have equal measurement points, enabling the tester to determine how far apart subjects are from one another on the variable (Coolican, 1999). However, it is difficult to determine what scores on the variable actually mean since interval scales do not have a true zero. Since most psychological variables, such as team cohesion, personality and attitudes do not have true zeros, this poses a measurement difficulty. Standardisation of tests is particularly important to determine the meaning of scores (Kline, 2000). This is an issue that will be dealt with in Chapter 7. Likert scales could be considered a continuous measurement which has been rendered discrete by the researcher through specifying cut-off points along the continuous scale (Tabachnick and Fidell, 1996). In this sense it could be treated as a discrete interval level measure where it is tempting to assume that the underlying continuous scale has equal intervals between measurement points. However, in measuring human attitudes, it cannot be assumed that the difference between 'neutral' and 'agree' is the same as 'agree' and 'strongly agree' since moving from 'agree' to 'strongly agree' may involve a greater shift in attitude than moving from a 'neutral' to 'agree' position.

Although the intervals used in Likert scale cannot be assumed to be equal, Likert scales provide *rating* data and therefore contain more information than a rank ordered response. Rating scales allow greater differentiation between responses, but their nature can still provide a bunching of responses. For example, where respondents generally have positive feelings of cohesiveness towards the team they will rate towards the higher end of the scale. This results in skewed, non-normal data. Since much data in psychological research cannot be described as truly continuous, data that can be considered sufficiently close can still be analysed with techniques that require variables to be measured on a continuous scale (such as FA), with appropriate caution. Rating scale data becomes closer to interval data the larger the number of categories used. Although the statistical reliability of Likert scales peaks at 11-points (Lewis, 1993), generally seven is considered the optimum (Miles & Shevlin, 2008) to maximise response reliability (Nunnally, 1978). Although Tabachnick and Fidell (1996) suggest more than 20 should be used, this far exceeds the 7 ± 2 pieces of information individuals can retain in memory (Miller, 1956) and is more likely to favour those who are used to responding to rating scales whilst causing difficulties for those who are not (Miles & Shevlin, 2008). Despite assuming equal intervals, Nunnally (1978) argues that as results from such data have been replicated and shown to be meaningful, this is a reasonable assumption to make. The use of techniques such as FA on Likert scales that do not provide perfectly 'normal' data has also been standard practice in occupational psychology, for example in the investigation of the Big Five Personality traits (John & Srivastana, 2001). Likert scales are therefore considered appropriate for use in this research. However, testing the assumptions of techniques

applicable to interval scales, such as FA, is vital and will be conducted in this research to avoid drawing misleading conclusions. Non-normal data can lead to a Type II error where no significant effects are found even though they may be present in the data. Conversely, it can also lead to a Type I error – concluding significant effects where there are none (Miles & Shevlin, 2008). Where deviation from normality is small and/or the sample size sufficiently large, the use of a higher significance level (i.e. $p < .01$) is likely to be acceptable.

As Likert scales provide an odd number of points, there has been much discussion on the use of a mid-point category, such as neutral. The use of such a mid-point category can introduce a level of ambiguity resulting from ‘neutral’ or ‘undecided’ positions that could indicate either no-opinion or an on-the-fence opinion. It can also introduce the problem of subjects choosing the neutral response as a response set. However, its inclusion outweighs these disadvantages since a ‘neutral’ position represents a realistic and valid attitude for those who are tentative and uncertain. As such, it can represent genuine aspects of attitudes that should not be corrected for other than ensuring items are relevant to reduce the chance of the neutral category being used as a response set (Kline, 2000). A mid-point category was therefore used in the design of the measurements scale in this research.

The Likert scale can be presented in two ways:

1. As a graphical scale where the points on the scale are represented by numbers with the end points anchored with labels, for example,

Strongly agree 1234567 strongly disagree
2. As a numerical scale where points on the scale are defined by numbers only.

For the MTCS, a 7-point graphical Likert scale was constructed where each of the 7 points on the scale was anchored with appropriate labels ranging from ‘strongly disagree’ to ‘strongly agree’ with ‘neutral’ as the mid-point, as shown below:

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
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An additional eighth category was also used for the pilot version of the MTCS to allow subjects to make a ‘don’t know’ response. This was included as an item reduction technique to sift out items subjects consistently could not answer, as described in section 4.6.1. In particular, although SME feedback identified items that required subjects to rate how other team members and the team leader ‘feel’ as potential problem items they were kept in at this stage of scale construction to determine the extent to which subjects had

difficulties responding to these items. The limitation with this approach that needs to be taken into consideration is that a 'don't know' response may be given for a reason other than a lack of understanding of the item. For example, it may also reflect a moderate attitude to the item (Feick, 1989) or provide evidence of 'satisficing' where respondents answer the items as quickly as possible by selecting the same response (Krosnick & Fabrigar, 1997). However, as a 'don't know' category can provide important information for scale development by highlighting inadequacies in scale design, it was included in the test version of the scale (Fowler & Cannell, 1996). Labels were used on each of the points to facilitate ease of use and were considered less liable to error than a numerical scale. These were used instead of numbers to eliminate an unnecessary layer of information for the subject to attend to and to prevent any confusion.

4.6 Face Validity & Content Validity

Determining face and content validity is vital in the development of a psychological measure for ensuring that all important aspects of the construct of interest have been adequately sampled and that the items written are representative of these aspects. This is a step that has not been adequately conducted in the development of existing measures of cohesion. To test face and content validity, two validity phases were conducted. In the first phase, the initial test version of the MTCS was administered to an opportunistic sample of SMEs with expertise in both psychological research methods and the area of study. The sample of subjects included individuals who were also part of organizational work teams within QinetiQ but who differed to those obtained for the focus group. This enabled testing of whether MTCS items were considered to have general applicability across an organization and whether they incorporate the lexicon of organizational work teams. The items were critically analysed by the SMEs for their relevance to cohesion. This included examining the readability and comprehensibility of the measure. The second phase involved a more in-depth critical analysis of each individual item written for the MTCS using two further SMEs with extensive psychological experience in team working and occupational psychology.

4.6.1 Content Validity: Phase 1

Phase one of assessing content validity consisted of administering the MTCS to five SMEs with extensive experience in team working and organizational psychology. They were drawn from an academic setting as well as from a commercial research organization. SMEs were psychologists with between 6 and over 21 years experience. Three of the SMEs were senior psychologists within QinetiQ. The fourth SME was a Professor of Psychology at the University of Leicester and the final SME was the head of Military Behavioural Sciences and Philosophy at the Netherlands Defence Academy.

The MTCS was administered electronically for SME feedback. An instructions page was included outlining the purpose of the research and the contents of the document. The background to the research was presented to provide context. SMEs were asked to provide their current job role and number of years of relevant professional experience. The document (see Appendix D) was split into two sections; section one presenting the extended Multidimensional Team Cohesion Model (MTCM) and section two presenting the Multidimensional Team Cohesion Scale (MTCS) itself. SMEs were directed to review the conceptual model and provide comments following a description of the background to the development of the MTCM. They were also requested to carefully review the items within the scale and answer the questions presented in the feedback proforma. The background to the development of the MTCS was also presented. The scale was split into sections representing the dimensions of the MTCM. This was done so that items could be easily related to the conceptual model and dimension they were intended to represent. SMEs were asked to assess whether they considered the items to be representative of work team cohesion, whether they considered any items to be ambiguous and require clarification and whether they felt anything was missing or had not been covered. Any recommendations regarding experts in the field of team working, cohesion and/or psychometric development that could be approached for this phase of the study were also requested. This snowball sampling technique elicited some of the SME responses in this phase. SMEs were thanked for their assistance and assured that responses would remain anonymous and treated in confidence. A contact email address was provided for any questions or further information about the research if required.

Overall, SMEs agreed that the items in the MTCS appeared representative and valid indicators of team cohesion in an organizational work team context. They did not feel that there were any obvious aspects missing from the measure that should be included. Due to the limitations of definitions available in the cohesion literature that SMEs may have based their view on, the second content validity phase, described in section 4.6.2 provided a second check. SME feedback centred on clarity of items, construct repetition and item relevance.

Clarity of Items

It was raised by one SME that the items directed towards task cohesion did not seem to reflect the task-related things that a cohesive team 'does'. It was suggested whether more specific cohesive task behaviour should be more explicitly represented in a measure of 'team cohesion'. This raised an interesting point as to the stability of the 'task cohesion' concept and whether it can be measured universally. The question was posed as to whether it is a specifically task-contextual construct or is transportable across different

tasks. As the scale was designed as generic to be applicable across organizational team types, it was decided that items tapping task cohesion should be written so that they are relevant across the different team types and, as such, reflect generic organizational task-related behaviours. A similar point was also raised for the term 'goal' used within the scale, whether the team was used to mean 'goals for the task at hand' or 'goals for the team doing the tasks in the long term'. Items relating to goals in the scale were re-written as 'goals of the team' to reflect the latter meaning.

Construct Repetition

The MTCS was considered to contain some construct repetition. During item writing, any repetitious items were included in the initial version of the scale. This was to determine the best phrasing for items and to remove those that were less comprehensible or less representative of the lexicon of the intended research population. Although commented on, specific items considered repetitious were not identified or re-wording suggestions made, identifying the need to conduct a second more in-depth content validity phase.

Item Relevance

Rogue items were identified by SMEs and subsequently removed after further analysis. In particular, the item 'I have confidence in the equipment and technology that supports us' written as part of TCHIIPS was considered to be tapping a separate dimension and so would be included in a separate measure. The item 'I try to avoid missing a team meeting' was also considered to be tapping a separate construct. Items considered more relevant to other dimensions were also identified. The item 'I do not feel a sense of belonging to the team' originally written as part of the TCHIIPS was felt to be more related to social cohesion and so was moved under this dimension.

It was argued by SMEs whether items requiring respondents to rate how other team members 'feel' are valid, since it is difficult to know the feelings of others. However, sharing a cohesive bond should include having an awareness of how others feel about things within the team to enable both social and task support to be provided to keep the team together. After much consideration about this issue, acknowledging the difficulty with knowing how others feel, it was decided that at this stage of development these items would be kept in the MTCS for pilot testing. In part, this was based on the previous decision at scale design to include a 'don't know' response category as part of the measurement scale for identifying whether respondents consistently had difficulty providing a rating to such items.

A question was posed as to whether the construct as represented in the conceptual model applied to inter-team or intra-team relationships (i.e. the relationship between team members and the team leader who is part of the team; or to the team members, including the team leader and the superior(s) outside of the team who provide the tasking). The MTCS is designed to capture intra-team relationships. It is considered that a team will consist of a number of team members directed by a team leader that work together to achieve the tasks of the team. Although initial tasking may be provided by an individual outside of this team (e.g. higher manager or customer) it is this team formation that will be required to direct, scope and conduct the teams' tasks. The scale was therefore designed on this premise.

4.6.2 Content Validity: Phase 2

An in-depth SME workshop involving two experienced psychologists from QinetiQ and the University of Leicester was run over two days to content validate the items within the measure based on feedback from the first content validity phase. The aim of the workshop was to discuss the revised measure based on suggestions made in Phase 1. An exercise was also conducted to identify and cluster the dimensions in the measure and to discuss whether the items in the measure are representative of the dimensions identified and thus should be retained in the pilot version of the MTCS.

During the first part of the workshop, the modified version of the MTCS was presented to the SMEs and a discussion was facilitated of the themes and dimensions tapped by the measure. Each SME was simply requested to work through the measure and write down themes they felt were being tapped by the items on post-it notes, one theme on each post-it note. This activity was not directed to allow for freedom of interpretation and approach. Post-it notes were colour coded for each SME. The researcher also conducted this exercise to match against SME interpretations. This exercise was conducted for each dimension within the MTCM. After each section, each SME in turn discussed their thematic interpretation before being clustered based on similarity of theme. Themes were clustered on a large flip chart which allowed the post-it notes to be rearranged whilst they were being talked through. The clusters identified are shown in Appendix E. The purpose of this exercise was to scrutinize the themes to ensure their relevance to cohesion and as a final check that all important aspects had been included.

Two different approaches were taken by the SMEs that provided a complementary analysis. The first approach provided a detailed analysis of the underlying themes that each item in the scale was considered to reflect, for example enjoyment, friendship, role support and shared purpose. These themes were captured diagrammatically for each

dimension, shown in Appendix F. These themes were subsequently mapped onto each item, as shown in Appendices B and C. The second method was a categorisation approach where overarching themes were identified but categorised based on the form of the item, for example whether it reflected the individual's view of their self in the team, or the individual's view of others in the team. Each item in the MTCS was then matched to both item form and identified theme. The categorisations identified are presented in Appendix G for each MTCS dimension. This approach identified items that could not be categorised, and so required further inspection for their relevance to organizational work team cohesion. The method also helped to identify items that were felt to be included under the wrong dimension.

The second part of the workshop involved a detailed analysis of each item in the measure. The focus was on wording, relevance to cohesion as well as the dimension they were designed to tap, comprehensibility, and level of ambiguity. Discussion was also held on the issues raised during the first content validity phase, particularly regarding items requiring respondents to rate the feelings of others.

4.7 Initial Item Reduction

Following SME feedback, the items were revisited and re-analysed for their relevance to cohesion. The aim of this phase of the research was to identify any items that were not considered to be part of the construct of cohesion as understood by SMEs in phase 1 and 2, or items considered to be tapping a separate construct such as team effectiveness, team performance or decision-making behaviours that should not be included in a measure of team cohesion. Any duplicate items were also identified; those considered by SMEs to have a clearer meaning were retained. Any items removed based on this criteria were retained for further scrutiny before final removal. A small number of items were considered by SMEs to be 'rogue' items that did not fit with the nature of the scale as they referred to multiple superiors or should be part of a separate scale not considered to be tapping either an antecedent or consequence of cohesion as described above. It was considered that including reference to 'multiple superiors' added confusion in the measure since this is a highly improbable situation and in reality there are very rarely organizational work teams which have multiple leaders existing at the same level. Organizational work teams more commonly have a hierarchical management structure with upward reporting lines. This involved the removal of the items:

- 'My immediate superiors do not share a common direction.'
- 'I have confidence in the equipment and technology that support us.'

Feedback from the SMEs was mapped back to the findings from the literature review, particularly regarding items that were considered to be tapping separate but related

constructs. These items were removed if they were found not to have a strong theoretical link to cohesion. This method reduced the 219 original items to 117.

Some revision and rewording was suggested for some items. For example, the term 'immediate superior' was changed to 'team leader' and the term 'peers' was reworded to 'team members'. This also included items considered to be tapping a dimension other than the one they were originally written for and ambiguous items that were either re-phrased or discarded. An additional 12 items were written during content validity phase 2 forming a final total of 129 items for use in the pilot version of the MTCS. A breakdown of the number of items retained in each dimension for pilot testing is presented in Table 4.2 below:

Table 4.2:
Number of subscale items in the pilot version of the MTCS

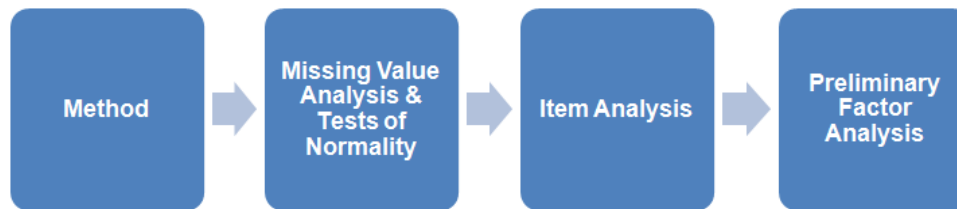
MTCS Subscales		No. of Items
Task Cohesion-Horizontal Interactions-Individual Perceptions of Self	TCHIIPS	6
Task Cohesion-Horizontal Interactions-Individual Perceptions of Others	TCHIIPO	6
Task Cohesion-Vertical Interactions-Individual Perceptions of Self	TCVIIPS	8
Task Cohesion-Vertical Interactions-Individual Perceptions of Others	TCVIIPO	8
Social Cohesion-Horizontal Interactions-Individual Perceptions of Self	SCHIIPS	12
Social Cohesion-Horizontal Interactions-Individual Perceptions of Others	SCHIIPO	6
Social Cohesion-Vertical Interactions-Individual Perceptions of Self	SCVIIPS	9
Social Cohesion-Vertical Interactions-Individual Perceptions of Others	SCVIIPO	9
Valued Roles-Horizontal Interactions-Individual Perceptions of Self	VRHIIPS	6
Valued Roles-Horizontal Interactions-Individual Perceptions of Others	VRHIPO	6
Valued Roles-Vertical Interactions-Individual Perceptions of Self	VRVIIPS	4
Valued Roles-Vertical Interactions-Individual Perceptions of Others	VRVIIPO	4
Unity of Purpose-Horizontal Interactions-Individual Perceptions of Self	UPHIIPS	10
Unity of Purpose-Horizontal Interactions-Individual Perceptions of Others	UPHIPO	12
Unity of Purpose-Vertical Interactions-Individual Perceptions of Self	UPVIIPS	13
Unity of Purpose-Vertical Interactions-Individual Perceptions of Others	UPVIIPO	10

Appendix H shows the items modified following the second content validity phase along with the reasons for modification. Appendix I provides a list of new items to be included in the MTCS suggested by SMEs involved in the second content validity phase. The final list of items retained for pilot testing are presented in the pilot version of the MTCS described in the next Chapter (see Appendix J).

4.8 Summary

A thematic analysis was conducted of the existing research literature to identify all dimensions of cohesion that could then be assessed for their relevance to an organizational work team context. Due to the lack of definitions of cohesion developed in this particular context, the deductive analysis was supplemented with an inductive focus group session to ensure all adequate manifestations of cohesion had been captured for organizational work teams. The manifestations identified in the focus group mapped well onto the existing cohesion literature. This confirmed that the definitions of cohesion held by SMEs, who were themselves members of work teams, were consistent with those held in the wider research literature. This analysis phase extended Carron et al.'s (1985) primary dimensions of cohesion to include secondary dimensions relevant to an organizational work team context – the MTCM. Due to the hierarchical nature of work teams and their role-based structure, these secondary dimensions were vertical and horizontal cohesion, valued roles and unity of purpose. The extended conceptual model gave rise to 16 dimensions of cohesion for which a set of indicators of each dimension were written. Following a comprehensive approach to content validity using both SMEs and organizational work team members, the majority of items were found to have relevance to organizational work teams. The content validity phase supported initial item reduction. Those that were considered to tap separate constructs were removed from the scale. Some additional items were added to ensure each dimension was adequately measured. The final scale included 129 items for pilot testing and empirical item reduction. This is addressed in Chapter 5.

5 Pilot Study: Empirical Item Reduction



The purpose of this Chapter is to empirically examine the content validated items written in the item development phase of this research. The primary aim of this phase is to develop a set of homogenous items for each dimension outlined in the extended conceptual model (MTCM). Items found not to contribute to the measurement of the dimension they were designed to tap were eliminated from the MTCS. Item analysis suggested a homogenous 8 dimensional structure of organizational work team cohesion. As specific forms of task cohesion, the dimensions ‘valued roles’ and ‘unity of purpose’ were not found to be distinct from general task cohesion and so were included as part of the higher-order dimension of task cohesion. A preliminary factor analysis (FA) was conducted as an initial investigation of a hypothesised 16 and 8 multidimensional structure of organizational work team cohesion. The factor solutions investigated were found to be unreliable and uninterpretable due to an insufficient sample size obtained for this analysis. However, partial analysis of the MTCM, increasing the subject to item ratio, provided some support for the validity of the model.

5.1 Introduction

In Chapter 4, a sufficient number of items were developed to measure each dimension of cohesion and were shown to have good content validity. The next step in scale development is empirical item analysis. Item analysis involves trialling the pool of items on a sample of subjects that represent the population the measure is intended for (i.e. organizational work teams). Item analytic techniques are then used to select items that empirically are found to measure the same dimension and are discriminating (i.e. discriminate perceptions of cohesion along the measurement scale). An important part of this aspect of test construction is producing a highly reliable measure (Kline, 2000). In developing an accurate measure of cohesion it is imperative that a heterogeneous sample is obtained. In particular, the critical variables (i.e. gender, team size, length of membership) against which cohesion is known to vary must be sampled to ensure selection of items that will accurately measure cohesion and be sensitive to group differences. Most frequently, factor analysis (FA) has been used to determine homogenous dimensions or factors. Items

that fail to load on any factor or load on more than one factor are considered problem items that should be eliminated from the measure. Retaining items that load on more than one factor makes the meaning of scores on dimensions unclear (Kline, 2000). Clear meaning of scores is imperative where a measure is to be used to inform decisions and the design of effective interventions to improve cohesion. However, obtaining stable factor structures relies on a sufficient sample size and can be difficult with FA techniques. It should therefore not be relied on for item reduction but used as a supplementary approach to analysis of inter-item, item-total and inter-scale correlations. This is the approach taken in this study.

5.2 Method

5.2.1 Sample

The pilot version of the MTCS was administered to an opportunistic sample of 204 members of organizational work teams. All respondents were selected as a result of being accessible for testing. Responses were obtained from those who volunteered to participate. Subjects were drawn from three different organizations, reflecting two different industries. This was important for ensuring that items selected for the final version of the MTCS would be relevant across different organizational settings. Eighty of the respondents were drawn from QinetiQ Ltd, a large defence, research and technology company. The majority of QinetiQ's 9,000 employees are technical staff comprising professional scientists and engineers, with a small number of administrative and support roles. Approximately 10% of employees are educated to PhD level and many are members of professional institutes with Chartered status. QinetiQ contains a large number of multidisciplinary co-located and distributed project teams covering a breadth of capabilities across defence (land, air and maritime), security (including national security & law enforcement, transport security and information security & systems assurance), and commercial arenas (including intelligent design, environment, human performance & protection, advanced sensors, energy, health, electronics, civil aviation and space). QinetiQ's employees span 36 locations across the UK ranging from North Scotland to Southern England, as well as representing QinetiQ's interests in North America through QinetiQ Inc⁵ who provide science and technology services to the US. The sample drawn for this research was from the UK only. One hundred and twelve respondents were drawn from the Property Services Department of Worcester County Council. The Property Services Department provides professional services for procurement and delivery of construction projects for local authority property stock. It contains a total of approximately 147 staff members comprising administrative staff

⁵ QinetiQ Inc. is a subsidiary of QinetiQ, see www.qinetiq-na.com/about_qinetiq.html (Last accessed 28-01-08).

and construction professionals with a mix of higher education and professional qualifications. Staff members work in multidisciplinary project teams, primarily co-located but with some mobile teams. Representing the same industry sector, 12 respondents were drawn from the Civil Engineering Department, South West Region of Network Rail. This department contains approximately 44 construction professionals and project managers providing delivery and procurement of civil engineering services for maintenance and delivery of national infrastructure. Staff members work in a mix of co-located and mobile multidisciplinary teams, providing teams that are likely to have varying levels of cohesion. Of this sample 50% ($n=102$) were female and 50% were male. The age of the respondents were evenly spread across the ranges from 21-60 with 5% respondents aged 61 and over. The sample obtained represented the job categories presented in Table 5.1 below:

Table 5.1
Subjects obtained for the pilot phase summarised by job category (N=204)

	Frequency	Percent
Accountancy	1	.5
Admin / Secretarial	17	8.3
Armed Forces	1	.5
Automotive	1	.5
Building Industry	92	45.1
Engineering	11	5.4
Finance & Banking	2	1.0
Government	1	.5
Human Resources	2	1.0
Managerial	9	4.4
Marketing & PR	4	2.0
Public Sector	5	2.5
Sales	4	2.0
Scientific & Technical	47	23.0
Other	7	3.4
Total	214	100

The sample represented a broad range of years experience as shown in Figure 5.1 below:

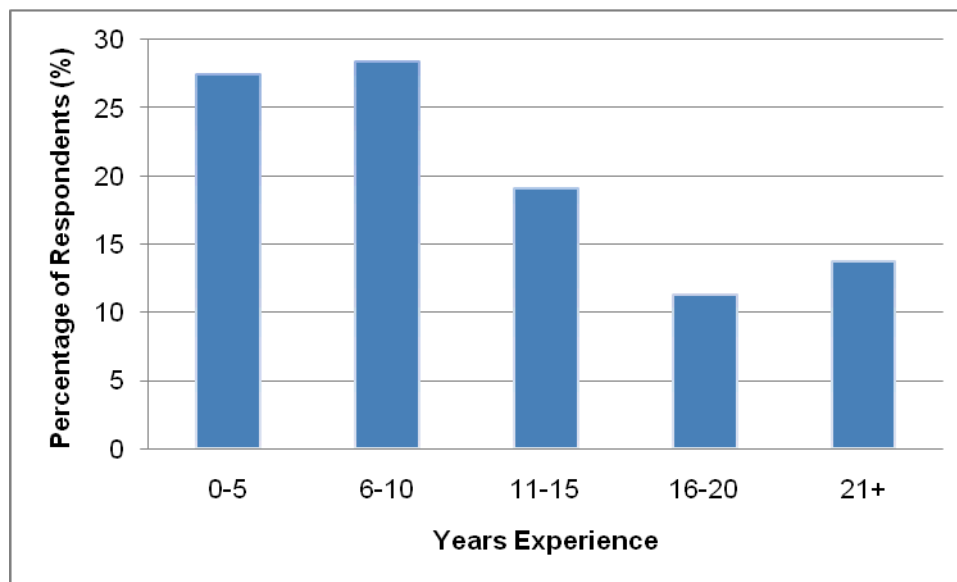


Figure 5.1: Pilot phase subjects summarised by number of years experience.

The sample consisted of 26.5% team leaders ($n=54$) and 73.5% team members ($n=150$). The length of time that respondents had been a member of their current team ranged from 2 months to 35 years ($M = 67.32$ months (5.61 yrs), $SD = 61.75$). The size of team subjects were members of from 2 to a very large team of 80 ($M = 8.79$, $SD = 7.84$).

The sample obtained for this phase of the research was not only representative across age, number of years experience, gender and team size but importantly represented a broad range of length of team membership. As described in Chapter 3, this is particularly important for ensuring that items selected for the final version of the MTCS are relevant in more or less 'mature' teams, supporting the accurate measurement of cohesion. In summary the sample was found to be heterogeneous and suitable for the accurate selection of items to measure the multidimensional aspects of organizational work team cohesion.

5.2.2 Materials

The content validated scale described in Chapter 4 was administered in the pilot phase of the study. The pilot version of the MTCS is presented in Appendix J. As the questionnaire contained 129 items, it was decided that it would be more manageable for respondents to complete if it was split up into a number of smaller sections. Items were ordered into whether they related to the individual (asking respondents to rate how well they feel they get on with other team members), the team (asking respondents to rate how well they feel their team members get on with each other), and the team leader. The last section pertaining to

the team leader was further split into Part A requiring respondents to rate how well they get on with the team leader, and Part B requiring respondents to rate how well they feel their team members get on with the team leader. These elements formed the main section headings of the MTCS.

Within each section, the items were randomly ordered but with a manual check to ensure that items relating to the same construct were not all presented together. This was to ensure that respondents processed and answered questions more accurately and did not simply answer similar items in a habitual way, purely because they were presented together. A mix of positive and negative items was also included in each section. Fifty-two of the items were negatively phrased, distributed throughout the scale. It was important that there was no particular pattern to this distribution to avoid response bias. Codes for each response were not included on the MTCS so as to not distract or lead the respondent. The pilot version was reviewed for readability and a final item check was conducted before it was administered.

5.2.3 Procedure

The MTCS was administered electronically to resemble the conditions under which the final test is most likely to be used. This is important in test construction and selecting items that are appropriate for use (Nunnally, 1978). Two electronic methods were employed simultaneously. In the first method, an email was distributed across all three organizations including the MTCS as an attachment. A copy of this email is presented in Appendix K. Within QinetiQ, the email was sent to all members of the Command and Integrated Systems (C&IS) division⁶ within QinetiQ with permission of the managing director of the division. Within Worcester County Council, the MTCS was distributed to respondents within the Property Services Department with permission of the Head of Service. A small set of females within the Civil Engineering Department, South West Region, at Network Rail were emailed the MTCS on an ad hoc basis. The second method was used within QinetiQ only. A message requesting participation was posted across the company's internal newsgroups (containing the same information presented in Appendix K) containing a link to the MTCS located on a central server within the organization. Although this method limited responses from only those that read the newsgroups, as a QinetiQ wide resource it enabled respondents from a more diverse set of work teams to be obtained from a wider range of capabilities.

⁶ The internal organization of QinetiQ was subsequently restructured with effect from April 2008 after all data for this phase had been collected from participants.

Prior to administration, ethical approval for the study was obtained from QinetiQ's internal ethics committee. The standardised email sent requested participation and provided instructions for opening and returning the MTCS. In line with the British Psychological Societies (BPS) Code of Ethics and Conduct⁷ participants were informed that by submitting the completed MTCS they were agreeing to their data being used in this research but that all data would be treated in the strictest confidence and anonymity guaranteed. It was assured that responses would be reported as a collective response only and used for the purpose of this research only. Participants were informed that responses would not be used to assess performance in any way either individual performance, team performance, or the performance of the team leader. Participants were also invited to contact the researcher if any further information about the study was required. They were also informed that they were free to withdraw from the study at any time. Confidentiality was also re-iterated in the standardised instructions provided in the MTCS. These are further described below.

Consistent with best practice in psychometric development, the first page of the pilot questionnaire contained standardised administration instructions (see Appendix J). The instructions outlined the purpose of the research and guided respondents through the contents of each section of the questionnaire. Respondents were first requested to answer a number of demographic questions to identify their background and to enable a check of the heterogeneity of the characteristics of the sample. These questions related to job type, number of years experience, length of time spent in their current team, size of current team and position held (i.e. team member or team leader). They were then asked to provide ratings for each item forming the actual team cohesion scale relating to the team members and team leader they currently work with and spend the majority of their time with. Respondents were instructed to respond to all items within the questionnaire as honestly as possible, providing their first thoughts and strength of feeling. They were assured that there were no right or wrong answers to items. Participants were required to complete the questionnaire before the specified deadline outlined in the covering email.

The methods of administration used in this research were chosen due to the costs and logistical challenges involved in administering a paper based version of the MTCS to a large number of participants across three organizations. Electronic administration also minimises disruption and is easier to administer. Human administration of the scale as a paper-based version using a 'test room' approach would have allowed a greater level of control through delivering it to participants under the same conditions. This approach allows the scale to be

⁷ http://www.bps.org.uk/the-society/code-of-conduct/code-of-conduct_home.cfm (last accessed 13-06-09)

administered to participants all together or in a phased approach where a large number of participants are required, at the same location and at the same time. Human administration allows for more experimental control, particularly regarding the amount of time participants are assigned for completing the test and controls for any test administration effects. This method would have also made it possible to ensure that all participants had fully understood the instructions. This highlights the importance of clear standardised instructions for electronic administration as used in this research. However, as previously mentioned it was the intention to administer the measure under the same conditions as its intended use; electronic administration therefore provided an appropriate method.

5.3 Missing Value Analysis and Tests of Normality

Prior to analysis, the data was prepared and manually entered into SPSS⁸. A simple data check was conducted to ensure that no errors had been made in data entry. This entailed inspection of the univariate descriptive statistics of the data. The minimum and maximum values of each demographic variable and each scale item were inspected to ensure that all responses were within the specified ranges. No oddities or out-of-range values were found in the data. Negatively phrased items were also reversed to ensure that the final scores represent overall team cohesion where a high score represents a high level of cohesion (as opposed to a high score representing a lack of team cohesion). Reversing negative items is also important for selecting items based on item-total correlations in item analysis (Nunnally, 1978). Missing data was also specified in the data source. Due to the nature of the missing values in this study, its careful consideration was required as described further in the next section.

5.3.1 Handling ‘Don’t Know’ Responses

As described in Chapter 4, a ‘don’t know’ response category was included in the pilot version of the MTCS to identify items that respondents consistently could not answer. An initial analysis was conducted to determine any items that should be removed from the scale due to receiving a high percentage of ‘don’t know’ responses. The criteria for removal was set by the researcher at >80% ‘don’t know’ responses. Inspection of the univariate statistics, presented in Appendix L1 did not reveal any individual items that contained a sufficiently large number of missing values to justify removal at this stage. Items 109, 120, and 129 were found to have the greatest number of cases with missing values (23%, 20% and 25% respectively). Therefore no items were removed from the scale on this basis.

⁸ SPSS version 15.0 for windows was used in this research.

5.3.2 Missing Value Analysis

Although a 'don't know' response was included in the measure for good reasons, it also poses a significant problem in item and factor analysis since these responses must be handled as missing data. These responses were found to be the only cause of missing values (i.e. no respondents provided a non-response to any items). Deciding how to handle this missing data is a non-trivial problem. Selecting an appropriate and acceptable method depends on both the amount and pattern of missing data since different methods can result in different conclusions being drawn. To determine the extent and nature of the missing data points, missing value analysis (MVA) was conducted using SPSS. The count of missing data provided in the univariate statistics was used to calculate the overall percentage of missing data points from the total number of possible data points (26316) in a sample of 204 providing responses to 129 scale items. 'Don't know' responses were found to account for 5.7% of the data. Although this is a relatively small fraction of the data it is spread across 82% of items (see Appendix L1) and 42% of cases.

Diagnosis of the nature of the missing data is difficult to establish. Detecting missing data that is missing completely at random (MCAR) is more straightforward, determining whether data is missing at random (MAR) or missing not at random (MNAR) often cannot be established with certainty. It is therefore necessary to make some assumptions about the nature of the 'missingness' based on analysis of patterns. As the data set is relatively large with a large number of variables, the most common missing data patterns were analysed together with frequency counts of the categorical variables to determine patterns requiring further exploration, shown in Table 5.2 below.

Table 5.2:
Unique common patterns of missing data

Number of Cases	Common Unique Pattern	Complete if...	Job Cat				Gender		Position		Organization	
			Armed Forces	Building Industry	Managerial	Scientific & Technical	Male	Female	Team Member	Team Leader	QinetiQ	Worcestershire County Council
119	—	119	0	57	3	22	55	64	107	12	38	70
3	A	122	0	3	0	0	3	0	3	0	0	3
4	B	154	1	3	0	0	3	1	0	4	0	4
3	C	147	0	3	0	0	1	2	0	3	0	3
3	D	166	0	1	1	1	2	1	0	3	2	1

The first column in Table 5.2 presents the number of cases that share a common pattern with 119 cases having no missing data. Four distinct patterns of missing data are identified with the number of complete cases reported if the scale items (pattern variables) in each pattern are deleted from further analysis, labelled *Complete if*. For ease of reference, only those categorical variables that have any meaningful relationship to each pattern are shown. Appendix L2 displays the scale items that cases are missing in each unique pattern.

Inspection of the unique common patterns shows that in pattern A for three cases, scale item number 3 'My values of what is important in life are similar to other team members' is the only missing value, but this only occurs against male team members within the building industry from Worcester County Council. Although pattern B and C vary slightly in the scale items that are missing together for four and three cases respectively, they share important similarities. The items missing for these cases all tap the individual's perception of other team members' feelings towards the team leader. Further, inspection of the categorical variables reveals that these missing scale items only occur for team leaders in Worcester County Council. This indicates that some team leaders in this organization do not know how their team members perceive them. Similarly, for three cases, all scale items relating to the team leader tapping all aspects of vertical cohesion including individual and team member perceptions are missing again only for team leaders. This is across both QinetiQ (2) and Worcester Country Council (1) as shown in pattern D. This serves to reinforce the difficulty some team leaders had with rating how their team members perceive them. This difficulty was confirmed through feedback obtained from team leaders who responded to the

questionnaire. This feedback was obtained by the researcher on an ad hoc basis by email during the administration of the pilot study, prompted by the respondent. The table of common missing value patterns also provides a view of whether for individual cases data is missing on more than one scale item. Inspection of the missing value patterns reveals three patterns of jointly missing data present in more than 1% of cases. Items 93-95, 98, 99, 101, 104, 105, 107-109, 111, 113-117, 119, 121-123, 127-129 are missing more often together than other scale items in four cases (as shown in Appendix L2). These items all tap team members' perceptions of the team leader across all dimensions of team cohesion identified in the MTCM.

The pattern of missing data was pursued further through cross-tabulation of the pattern variables (containing $\geq 5\%$ missing values) with the categorical variables 'job category', 'gender', 'position' and 'organization'. For each category, the frequency and percentage of complete values were calculated for the pattern variables and the amount of missing values presented as a percentage of the total sample size of each category. The cross-tabulation for gender (presented in Appendix L3) shows that whether the respondent was male or female does not seem to affect whether data is missing for any of the pattern variables. For example, for both items 39 and 65 males provided a response to the item 91.2% of the time and females reported a response 98% of the time. Any percentage difference between male and female responses is fairly minimal and may be due to little more than chance. Cross-tabulation of job category (presented in Appendix L4) revealed that those in the Building Industry, Managerial role or Marketing and PR are less likely to provide a response to scale items relating to the team leader. Overall, members of Worcester Country Council were also found to be less likely to provide a response to these scale items (see Appendix L5). However, the most notable difference is in 'position'. Team leaders were found to be much less likely to provide a response to the scale items relating to aspects of the team leader. This was particularly evident on items 93-129 relating to how team members view the team leader (shown in Appendix L6).

The final confirmation that missing values in the data are not missing at random is provided by the chi-square statistic Little's MCAR test (Little & Rubin, 2002). For this study, Little's MCAR test $\chi^2 = 9122.31$ (df = 84, $p = .00$), allowing the null hypothesis that the data is missing completely at random to be rejected ($p < .05$). This confirmed the non-random pattern of missing data observed in the descriptive statistics and tabulated patterns.

This missing value analysis indicates that missing values in the data are MNAR because the probability that subjects provide a response to scale items depends on both the content of

the item and their position within the organization. Many of the team leaders obtained in the sample were unable to respond to items about the 'team leader'. Instead of transposing these items to their immediate team leader, they believed it to be self referential and provided a 'don't know' response. Although team leaders were directed to respond to these items based on their relationship with their immediate team leader, this raises questions about where the boundary around the team should be defined to measure vertical aspects of cohesion. However, there are also likely to be some random elements to this pattern of missing data. For example, the reason for rating 'don't know' to any item may also be due to fatigue or difficulty understanding the item (Graham, 2009).

These types of missing values can be handled in two ways. Firstly, the items that contain missing values can be removed from further analysis. Inspection of the unique common patterns table shows that the number of cases with complete data can be increased from 119 to 166 if items in pattern D are omitted. However, this involves removing all items written to measure the vertical dimension of cohesion. Their removal would therefore distort the measurement of cohesion by eliminating vertical aspects of the construct. This may also distort the relationship between dimensions of cohesion. The second option to dealing with the missing values was therefore selected. This involves substituting the missing value with an estimated response. This approach provides the additional benefit of preserving the sample size, important for the use of factor analysis which is employed in this phase of the research for secondary item analysis and preliminary investigation of scale dimensionality. To determine the most appropriate imputation method, an initial inspection of the normality of the data was first conducted, described in the next section.

5.3.3 Initial Inspection of Normality

In order to inform selection of the most appropriate method for handling missing data the univariate normality (UVN) of the data was checked. To determine the fit between the data and the assumption of normality the distributions of the scale items in the research were first investigated. Inspection of skewness and kurtosis values for each scale item indicates non-normality (as shown in Appendix M). All scale items were found to have a negative skewness ranging from -.43 (item 84 'My team goes out of their way to make me feel happy within the team') to -2.54 (item 26 'I do not like being part of the team'). This indicates that data points are largely clustered towards the higher values of the team cohesion scale, reflecting that the majority of respondents rated a positive attitude towards each scale item with a smaller number of respondents rating a negative attitude. This skew is unsurprising given the nature of cohesion. As a generally positive team property, most respondents are expected to rate positively against the items with a smaller number of people reporting

negative feelings of cohesiveness. However, there could also be a selection effect in that many individuals who perceive a low level of cohesiveness leave the team. The majority of items were found to have a positive kurtosis with a small number (24) having a negative kurtosis. Kurtosis values range from .02 (item 78) to 8.08 (item 68). Kurtosis values therefore showed a greater departure from zero (i.e. normality) for some items than skewness values.

The visual appearance of the distribution of the *expected normal probability plots* and the *detrended expected normal probability plots* were also inspected. These provide the most useful graphical displays as they most clearly show deviation from expected values in a normal distribution. Due to the large number of scale items, those with skewness and kurtosis values departing the greatest from zero were examined. These were items 26 and 68 respectively. Item 26 also had a particularly large kurtosis (7.34) and item 68 a large skewness (-2.52) in comparison to the rest of the scale items. The expected normal and detrended expected normal probability plots for item 68 ($n=195$) 'I am receptive to feedback from my team leader' are presented in Figure 5.2 below:

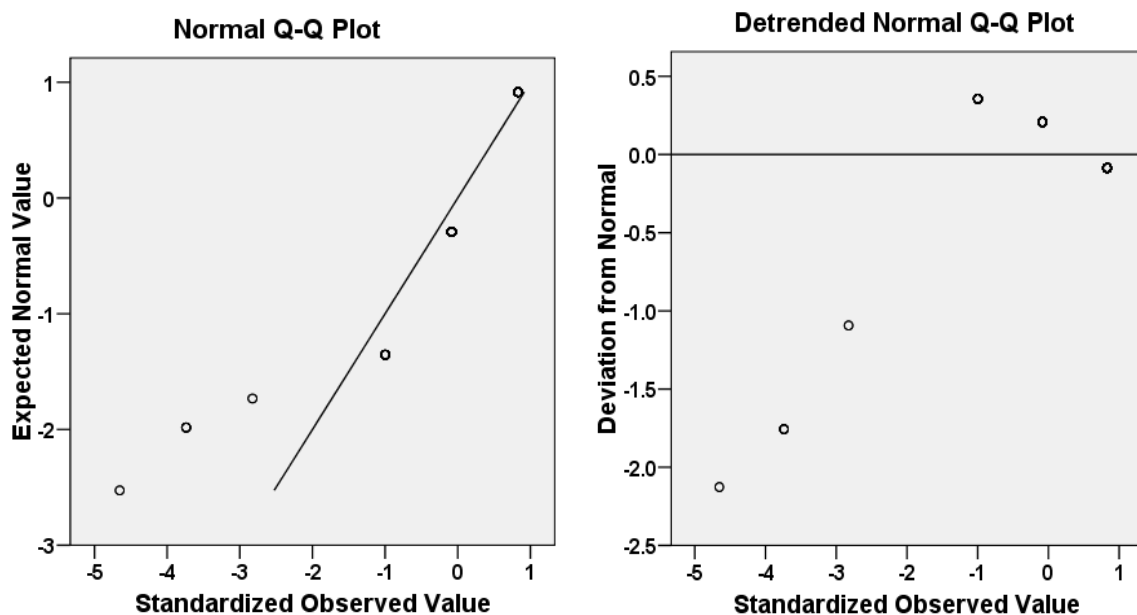


Figure 5.2: Expected and detrended expected normal probability plots for items with the greatest skewness and kurtosis

Both expected normal values and observed values were transformed into standardised z scores for ease of interpretation. The normal probability plot shows a non-symmetrical curve deviating from the straight line confirming a negative skew. This is evident from the negative tail in the lower left of the graph that deviates from the straight line. The detrended normal

probability plot also shows a non-normal distribution as data points are not evenly distributed above and below the horizontal line.

The expected normal and detrended expected normal probability plots for item 26 ($N=204$) 'I do not like being part of the team' are presented in Figure 5.3 below:

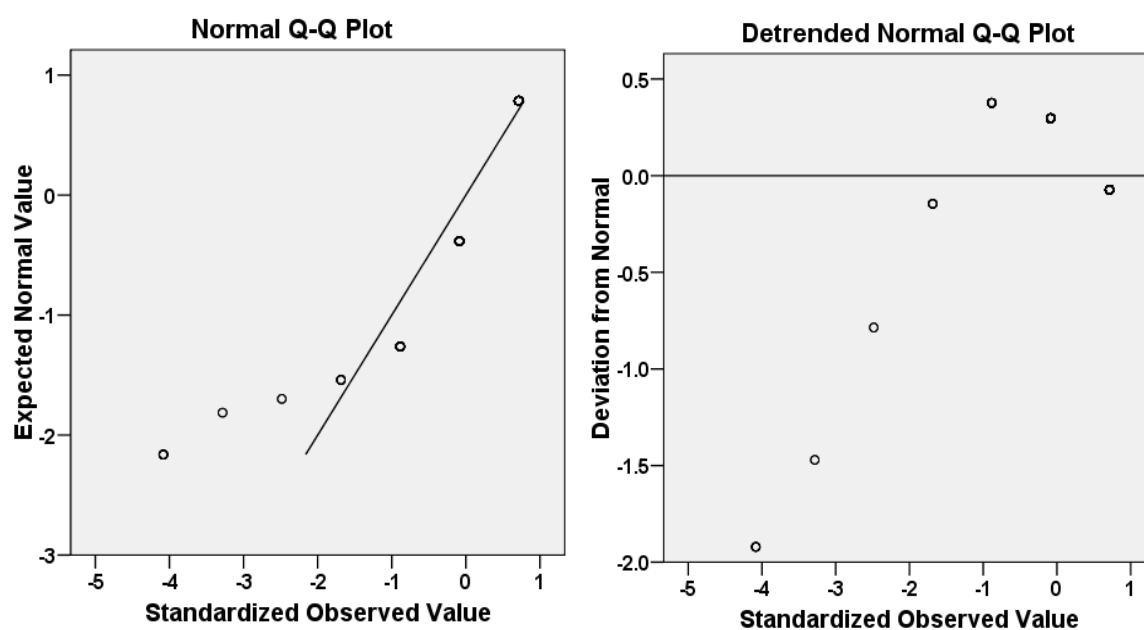


Figure 5.3: Expected and detrended expected normal probability plots for item 26.

The expected normal probability plot for item 26 also shows a non-normal distribution with a negative skew. This is confirmed by the detrended normal probability plot showing an uneven distribution of data points above and below the horizontal line. The non-normality of the data therefore must be taken into account in the selection of an appropriate imputation method as described in the next section.

5.3.4 Imputation of Missing Values

Both correlation methods employed for item analysis and factor analysis procedures in SPSS allow missing data to be handled using either a *listwise* or *pairwise* estimation. The major limitation with use of these statistical methods relates to sample size. Listwise deletion removes all cases with missing values from analysis. Since the data contains only 58% complete cases, listwise deletion would significantly reduce the number of cases that could be used in the statistical item reduction phase. As Kline (2000) suggests that at least 100 subjects are required for item analysis, this does not provide an acceptable method for drawing any meaningful conclusions. Pairwise deletion makes use of all cases but computes estimates separately for each pair of variables using those cases that have both

values. This has the effect of producing correlation coefficients based on different sample sizes and also different subjects weakening results. Further, both listwise and pairwise deletion methods depend on the assumption that the data is MCAR. Violation of this assumption can lead to biased estimates (Tabachnick & Fidell, 1996). Missing values were therefore estimated so that this data could be included in subsequent analysis. The investment of time to determine the most appropriate estimation method is vital for ensuring that the most appropriate method is employed that supports the accurate selection of items in scale development. It is therefore carefully considered in this research.

A number of estimation approaches exist including using prior knowledge to replace missing values with an educated guess. This approach relies on a high level of experience and a feel for the likely scores that would have been produced. It is not an acceptable approach where the number of missing values is large (Tabachnick & Fidell, 1996). An alternative approach is replacement of missing values with the mean of available data, or more usefully the mean for subsets of available data. However, for use in item and factor analysis this approach has severe implications. Use of the mean (particularly based on all available data rather than subsets) squashes the variance of a variable since the mean is likely to be closer to itself than the missing value it is intended to replace. The reduction in variance also reduces the correlation between variables. Due to the amount of missing data this is likely to have a big impact on correlations (Tabachnick & Fidell, 1996). Estimation using regression causes a similar problem as with use of the mean. In utilising complete cases to predict missing values, missing data is more likely to resemble existing data or the mean than the 'true' score, squashing the variance. Correlations are likely to be overly high, over fitting the data. This highlights the importance of using variables that provide a good predictor for variables with missing values. In factor analysis, the limitations with these approaches can result in 'factors' being produced that are artificial and do not reflect the 'true' data (Tabachnick & Fidell, 1996).

The final approach is the expectation-maximisation (EM) method. Like regression estimation, the EM method can be applied to data that is MAR and is an objective method. The EM method is more sophisticated as it makes an assumption about the underlying distribution of the partially missing data. A normal, mixed normal or skewed distribution can be specified for estimation. The EM method is an iterative technique in which the expected value of each missing data is estimated based on the assumed distribution and 'filled-in' following estimation of the data parameters (e.g. variances and mean). The expected values are then re-estimated based on the filled-in values and adjusted accordingly. To avoid underestimating error, the EM algorithm adds some error to the estimated variances used to

impute data. This process continues until estimated values converge resulting in maximum likelihood estimates of parameters that can be used to produce maximum likelihood estimates of the missing values (Little & Rubin, 2002).

Where missing data is MNAR, there is no single best approach to estimation. Based on the assumption of some inevitable 'random' elements to the missingness of the data (Graham, 2009) and the requirement to retain a large dataset for item and factor analysis, the EM method provides the best solution for this research. In light of the violation of normality, missing values were imputed based on the assumption of a non-normal distribution. Further, as the MVA clearly shows a non-random pattern to missing values, estimation using all items will bias estimation. Subset estimation makes theoretical sense since items are designed to tap different dimensions of cohesion as represented in the MTCM. Therefore subset estimation was computed to obtain results closer to the 'true score'.

Little's MCAR test was run on each subset of items designed to tap each dimension of cohesion. The estimated means and standard deviations calculated using listwise deletion (i.e. all cases with missing values are excluded from calculation), using all non-missing values (i.e. cases with missing values on the variable whose mean and standard deviation are being calculated are excluded) and using the EM algorithm were inspected. In light of the results obtained from the initial analysis of normality in section 5.3.3 EM estimates were computed based on a skewed distribution using Student's t^9 specifying the degrees of freedom as the maximum of 200. This was also compared with computing EM estimates based on the assumption that the data fits a normal distribution. Comparison of the two sets revealed that they produced the same results. This was not unsurprising due to the size of the sample used in the analysis. The effects of skewness and kurtosis become less important with samples of the size obtained in this research. When kurtosis is negative or flat, the underestimation of the variance of a variable disappears when the sample size reaches above 100 and 200 when the kurtosis is positive (or peaked). Similarly, skewness becomes less important with larger sample sizes (Tabachnick & Fidell, 1996). Similarly, with a large sample size the distribution of t tends to converge to a normal distribution density (Coolican, 1999). Little's MCAR results for each subset, based on the assumption of normality and non-normality, are presented in Table 5.3 below:

⁹ Student's t is used where the population is assumed to be normally distributed but the sample size is small enough to not be normally distributed (Coolican, 1999).

Table 5.3:**Little's MCAR results for each item subset under a normal and skewed distribution (N=204)**

Item Subset	Little's MCAR Test under a Normal Distribution			Little's MCAR Result under a Skewed Distribution		
	χ^2	DF	P	χ^2	DF	P
SC-HI-IPO	46.39	33	.06	46.45	33	.06
SC-HI-IPS	61.88	54	.22	63.18	54	.18
SC-VI-IPO	127.83	131	.56	128.21	131	.55
SC-VI-IPS	73.80	82	.73	73.91	82	.73
TC-HI-IPO	22.36	26	.67	22.38	26	.67
TC-HI-IPS	.30	5	.99	.30	5	.99
TC-VI-IPO	72.73	71	.42	73.66	71	.39
TC-VI-IPS	21.29	38	.99	21.29	38	.99
UP-HI-IPO	182.71	128	.00**	184.14	128	.00**
UP-HI-IPS	97.10	76	.05*	97.52	76	.05*
UP-VI-IPO	128.69	151	.91	128.98	151	.90
UP-VI-IPS	260.39	219	.03**	263.55	219	.02*
VR-HI-IPO	50.49	24	.00**	50.64	24	.00**
VR-HI-IPS	3.76	5	.59	3.76	5	.58
VR-VI-IPO	24.61	20	.22	24.66	20	.22
VR-VI-IPS	7.36	7	.39	7.36	7	.39

Note: * = significant at the .05 level; ** = significant at the .01 level.

For each subset where Little's MCAR was found to be significant ($p < .05$ or borderline), as highlighted in Table 5.3 above, the estimated means and standard deviations calculated using listwise deletion, all non-missing values and the EM algorithm were further examined to determine the extent to which these differed for each item in the subset. Listwise and all non missing values estimates were compared against the EM estimates since the latter have been found to provide good parameter estimates that approximate the 'true' value (Graham, 2009).

Subset items, whose estimated values (particularly estimated means) were found to vary the most and thus could potentially bias the estimation, were used to define smaller subsets on which to re-run Little's MCAR test. For example, as presented in Table 5.4 below, in the UPHIIPS dimension the estimated means for items 4, 6, and 16 showed the most difference between missing value methods.

Table 5.4:
Summary of estimated means for dimension UPHIIPS

	Item 3	Item 4	Item 5	Item 6	Item 9	Item 12	Item 16	Item 21	Item 27	Item 31
Listwise	5.72	5.99	5.35	6.08	5.84	6.05	5.98	5.54	5.99	4.95
All Values	5.71	5.91	5.34	6.00	5.83	6.01	5.94	5.52	5.94	4.94
EM	5.68	5.90	5.33	6.01	5.83	6.00	5.93	5.51	5.94	4.93

Items 4, 6 and 16 were therefore split out into a separate group and the two new subsets re-submitted to Little's MCAR test. Little's MCAR was found to be non-significant for both new subsets created for UPHIIPS as well as each new subset created for UPHIIPO and UPVIIPS, shown in Table 5.5 below (full results for each dimension are presented in Appendix N). This supported the imputation of as unbiased an estimate as possible.

Table 5.5
Little's MCAR result for UPHIIPS subsets

Dimension	New Subsets	Little MCAR Result		
		χ^2	DF	P
UPHIIPS	3, 5, 9, 12, 21, 27, 31	27.58 ^a , 27.63 ^b	33	.73
	4, 6, 16	7.45	5	.19
UPHIIPO	38, 39, 43, 47, 51, 52, 54	66.38 ^a , 66.68 ^b	50	.06
	55, 58, 60, 62, 64	13.37	15	.57
UPVIIPS	73, 78, 79, 87, 97, 110, 118, 124, 125, 126	122.57 ^a , 123.63 ^b	134	.75 ^a , .73 ^b
	74, 90, 92	10.45	7	.17

Note: ^a = χ^2 based on a normal distribution; ^b = χ^2 based on a non-normal distribution

For dimension VRHIPO Little's MCAR test was found to be significant ($p = .003$), with items 36, 48 and 59 being identified as the most problematic, as shown in Table 5.6:

Table 5.6:
Summary of Estimated Means for Dimension VRHIPO

	Item 36	Item 42	Item 46	Item 48	Item 50	Item 59
Listwise	5.70	5.91	5.98	5.43	5.95	5.64
All Values	5.69	5.89	5.96	5.35	5.93	5.59
EM	5.66	5.88	5.96	5.34	5.93	5.57

As a result item combinations were tested until Little's MCAR test was found to be non-significant. This resulted in the following split of items:

Table 5.7:
Item combinations for missing value estimation for VRHIPO

Item Numbers		Little's MCAR Result		
		χ^2	DF	P
Split 1	36, 42	6.25 ^a , 6.27 ^b	2	.04*
Split 2	46, 50, 59	2.61 ^a , 2.62 ^b	3	.46
Split 3	42, 46, 48, 50	10.12	8	.26

Note: ^a = χ^2 based on a normal distribution; ^b = χ^2 based on a non-normal distribution;

* = significant at the .05 level

Item 36 proved particularly problematic producing the best achievable result when paired with item 42, despite still obtaining a significant result ($p < .05$). Therefore only missing values in item 36 were estimated in this subset. Although missing value estimates for this item may be slightly biased, due to the importance of its content tapping team members pride in their role, it was not removed from the scale at this stage. Missing values in item 42 were estimated from item split 3 along with missing values in item 48. Due to Little's MCAR result obtained for split 2, any missing values in items 46, 50 and 59 were estimated using complete values in each other.

A complete data file was created from this analysis replacing missing values with EM estimates based on the assumption of a non-normal distribution. The extent to which the complete data file conformed to the assumptions of multivariate normality was then analysed to determine the extent of its affect on results obtained from item analysis and FA.

5.3.5 Multivariate Normality

Following imputation of missing values, multivariate normality (MVN) was examined before item reduction and initial exploratory factor analysis (EFA). MVN is particularly important for the use of FA. Where FA is to be used descriptively rather than inferentially, violation of the assumption of normality is not fatal to analysis, although normality enhances results. Both skewness and kurtosis have implications for FA as with small sample sizes <200, non-normality can cause an underestimation of the variance of variables. As part of normality, the data must also be homoscedastic. Pearson's product moment correlation or Pearson's r used in both item analysis and FA assumes that the data is homoscedastic. That is, it assumes "that the variability in scores for one continuous variable is roughly the same at all values of another continuous variable" (Tabachnick & Fidell, 1996, p80). In a bivariate relationship, when both variables are normal, the relationship will be homoscedastic. However, when one is non-normal, homoscedasticity will be violated resulting in heteroscedasticity. Pearson's r also assumes linearity between pairs of variables. Since the multivariate technique factor analysis has typically been used in the development of existing cohesion measures, analysis of these issues is particularly important for preventing erroneous results and misleading conclusions. This is a frequently overlooked issue in the development of cohesion measures and may contribute to the lack of agreement between measures as to the dimensions of cohesion identified from FA. In fact, tests of normality were only explicitly reported in the development and validation of the CSCS (Martin, 2002). To ensure that appropriate techniques are used in this research to develop a psychometrically-sound measure of organizational work team cohesion, a detailed statistical analysis of the properties of the data is presented.

Univariate Normality (UVN)

The first appropriate step in assessing MVN is to first examine univariate normality (UVN), that is, to test the normality of each scale item separately. Although an initial test of univariate normality was conducted it was necessary to re-conduct this analysis following imputation of missing values. As UVN is necessary but not sufficient for MVN, if any of the scale items show non-normality, MVN can be rejected. However, if all scale items conform to a univariate normal distribution, MVN should then be further analysed since each scale item may not be normally distributed with respect to each other (Looney, 1995).

The distribution of each scale item following imputation of missing values were found to again follow a negatively skewed distribution as identified in section 5.3.3. Little difference

was found between skewness scores obtained before and after imputation of missing values, with skewness values ranging from -.44 (item 84 'My team goes out of their way to make me feel happy within the team') to -2.58 (item 68 'I am receptive to feedback from my team leader'). Kurtosis results were also similar to those previously found. The majority of scale items were found to have a positive kurtosis, with a smaller number having a negative kurtosis (items 5, 11, 18, 31, 32, 40, 58, 62, 63, 69-72, 75, 80, 82, 84, 90, 92, 99, 109). Items 93 and 126, found to have a negative kurtosis before imputation, were found to have a positive kurtosis after imputation. Kurtosis values ranged from -.001 (item 75 'I feel close to my team leader') to 8.57 (Item 68 'I am receptive to feedback from my team leader'). Imputation of missing values had the effect of reducing the kurtosis value of 75 resulting in a normal kurtosis whilst increasing the kurtosis value of item 78 to .24, previously found to have a normal kurtosis value of .02. Any mismatch between skewness and kurtosis results before and after imputation of missing values may have been due to the amount of missing data in the scale items in which these differences were found.

Significance tests for skewness and kurtosis were not calculated. This is because the standard errors for skewness and kurtosis decrease as sample size increases. When the standard errors are compared with zero this can result in the null hypothesis of normality being rejected when in fact skewness and/or kurtosis do not depart sufficiently from normality to affect the results of analysis (Tabachnick & Fidell, 1996).

This assessment of UVN leads to the rejection of MVN due to the non-normality of each individual scale item. Therefore, further MVN analysis was not be conducted. Although this failure of normality may degrade results, particularly factor solutions obtained, due to the sample size being sufficient to reduce the effects of skewness and kurtosis, use of this data for item analysis and FA is still acceptable (Tabachnick & Fidell, 1996).

Linearity

Linearity was first investigated through inspection of bivariate scatterplots. Due to the large number of scale items used in the research, screening all possible pairs of items was not practical. Pairs of scale items to be screened for linearity were therefore identified through the skewness statistics. Items that were found to depart the most from non-normality (i.e. had the highest skewness and kurtosis values) were selected for analysis, presented in Table 5.8:

Table 5.8:

Scale items found to depart most from univariate normality (UVN)

Item Number	Skewness Value	Kurtosis Value
68	-2.58	8.57
26	-2.54	7.34
22	-2.20	6.76

A scatterplot matrix was produced showing each combination of items identified above, presented in Figure 5.4 below:

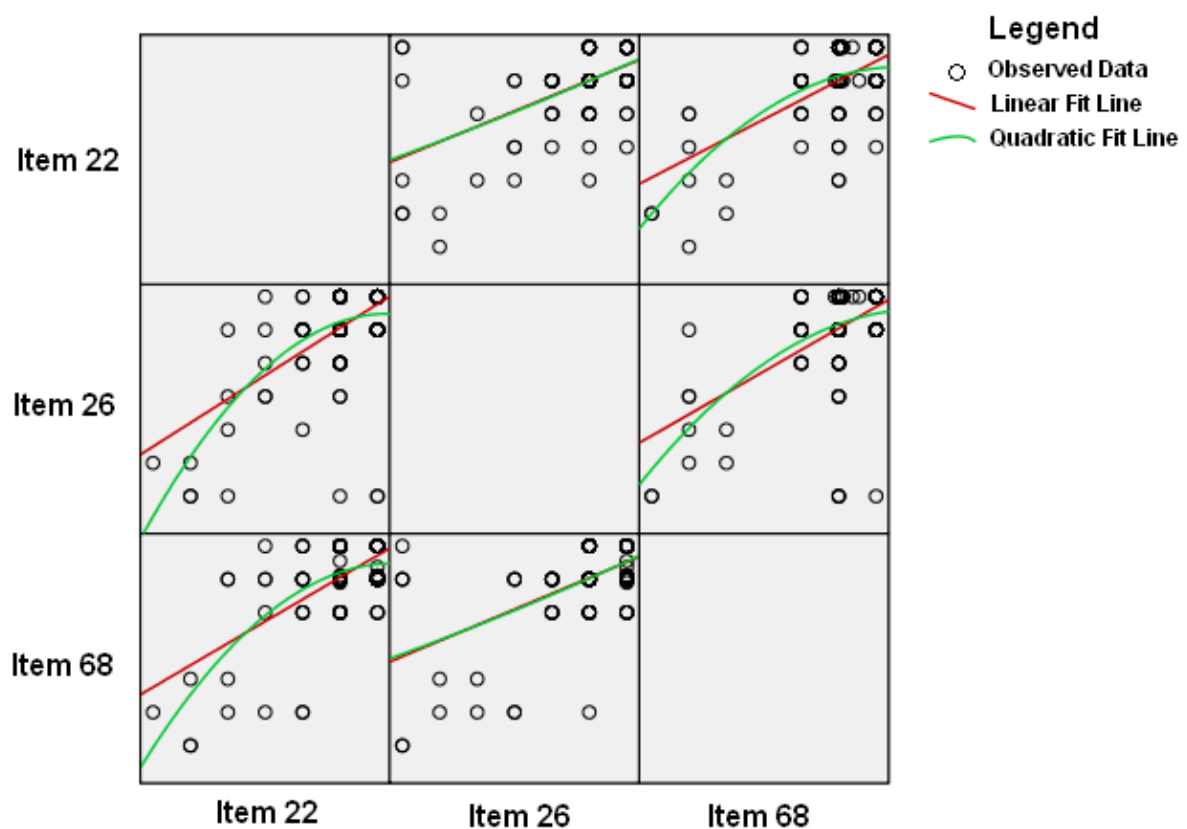


Figure 5.4: Scatterplot matrix showing the relationship between items 22, 26 and 68.

Both a linear and quadratic (curvilinear) fit line was overlaid onto each bivariate scatterplot shown in the scatterplot matrix. Examination of the r and r^2 linear and quadratic fit statistics reveals that for the majority of combinations they both fit the trend similarly well. As shown in Table 5.9:

Table 5.9:**Linear and quadratic model fit statistics for each item combination.**

Variable	Equation	R	R Squared	Adjusted R Squared
Item 22 * 26	Linear	.58	.33	.33
	Quadratic	.58	.33	.32
Item 22 * 68	Linear	.62	.39	.38
	Quadratic	.66	.43	.43
Item 26 * 22	Linear	.58	.33	.33
	Quadratic	.62	.39	.38
Item 26 * 68	Linear	.55	.31	.30
	Quadratic	.58	.33	.33
Item 68 * 22	Linear	.62	.39	.38
	Quadratic	.67	.45	.44
Item 68 * 26	Linear	.55	.31	.30
	Quadratic	.55	.31	.30

For example, in both models for item pair 22 * 26 $r^2 = .33$ indicating a moderately good description of the data. A significant model emerged for each equation tested against all item pair combinations ($p < .01$). Both the pattern of the scatterplots and the r correlation values show a positive moderate association between item pairs. The adjusted r^2 values reveal that in each model >30% of the variance within the data can be attributed to the relationship between the pairs of variables. As a further check, the linear correlation coefficient Pearson's r was compared with the eta coefficient of non-linearity. Pearson's r and eta will yield the same value where a linear relationship exists between variables (Garson, 2008). The results of this analysis are presented in Table 5.10 below:

Table 5.10:**Linear and non-linear correlation coefficients for each problem item pair.**

Variable	R	R Square	Eta	Eta Square
Item 22*26	.58	.33	.66	.43
Item 26*22	.58	.33	.64	.41
Item 22*68	.62	.39	.69	.48
Item 68*22	.62	.39	.69	.47
Item 26*68	.55	.31	.63	.39
Item 68*26	.55	.31	.64	.41

Although for all items pairs tested the eta coefficient of nonlinear association is greater than Pearson's r , the difference between them is relatively small indicating that the deviation from linearity is not extreme. R^2 values reveal that the linear relationship between items accounts

for 31%-39% of variance in the data. Eta^2 shows that the non-linear relationship between items accounts for 39%-48% of the variance in the data, only slightly more than the linear relationship.

Homoscedasticity

As some scale items are closer to normality than others, heteroscedasticity will be present in the data. This is most pronounced when plotting the relationship between scale items with the largest skewness values with those that have the lowest skewness values (i.e. are closest to normality). Violation of the assumption of homoscedasticity was therefore checked against the item with the highest skewness value and the item with the lowest skewness value - item 68 (-2.58) with item 84 (-0.44) and also against the item with the second highest skewness value and the item with the second lowest skewness value – item 26 (-2.54) with item 70 (-0.49). The scatterplots for these item combinations are presented in turn below:

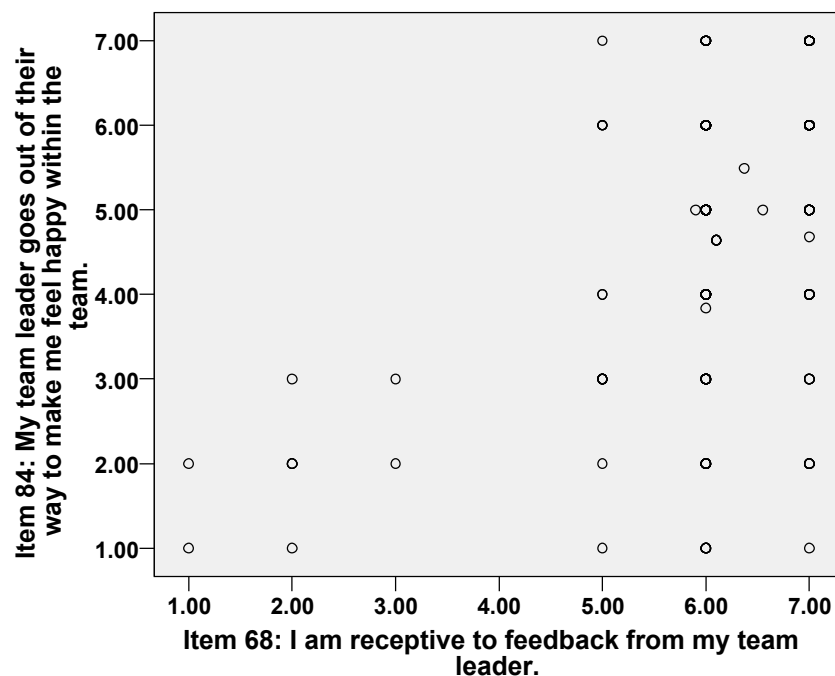


Figure 5.5: Scatterplot showing heteroscedasticity with skewness on item 68

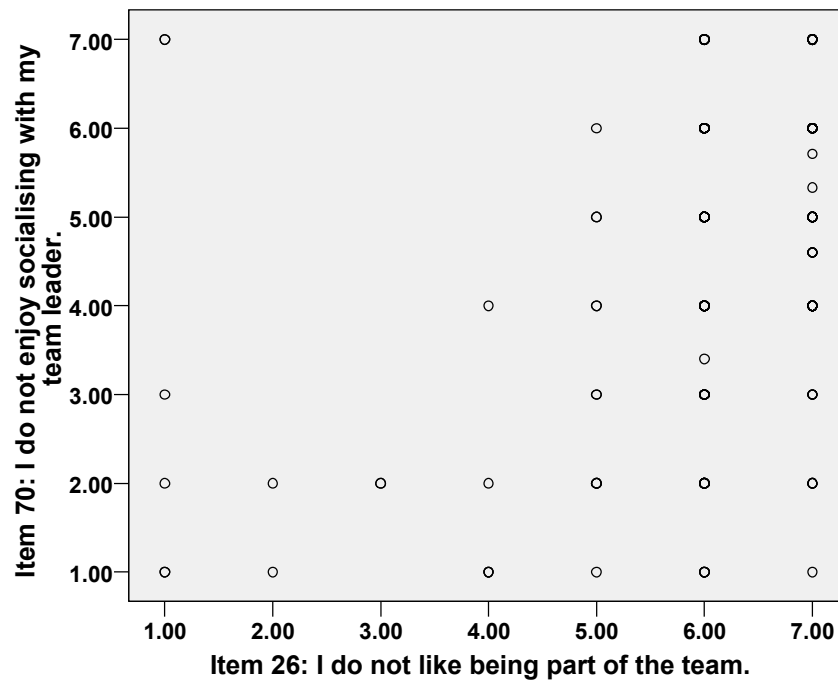


Figure 5.6: Scatterplot showing heteroscedasticity with skewness on item 26

Both scatterplots clearly show heteroscedasticity with skewness on item 68 and 26 respectively. Although, the relationship between items will display varying levels of heteroscedasticity with only a small number showing extreme heteroscedasticity, this analysis shows that it is clearly present in the data due to the range of skewness levels of the items. Although heteroscedasticity will weaken the results of analysis, it does not invalidate it making it still worthwhile.

The results of the tests of normality indicate that the use of Pearson's r is still appropriate and is likely to provide meaningful results. Any effects of the violation of assumptions are likely to be reduced as a result of the sample size obtained for this research. The linearity present in the data indicates that Pearson's r will not underestimate the strength of the relationship between scale items or fail to detect relationships where they exist (Tabachnick & Fidell, 1996). The main problem with the use of Pearson's or multivariate techniques in this case relates to the interpretation of inferential statistics. Caution can however be applied where assumptions are not fully met through the use of a higher level of 'significance' at interpretation. However, due to the nature of the variables in this research, and in defending Likert scale data as interval data, it is necessary to treat any linearity with caution. Some departure from linearity is not fatal to the PM correlation. Although a non-linear measure may be more appropriate, it often does not produce a large difference in result (Nunnally, 1978).

5.3.6 Item Analysis

The purpose of item analysis was to improve the MTCS by identifying and eliminating ineffective items not found to measure the dimension of cohesion they were written for. The aim was to identify a set of homogenous items for each dimension of cohesion. It also provides important preliminary information on the reliability and validity of scale items. In the development of existing cohesion measures, FA has been frequently used as the primary method of item reduction following item writing and content validity. In fact, FA is widely used to eliminate items. In the use of FA, researchers typically seek to eliminate items that do not load on any factor (i.e. do not load onto any of the dimensions of cohesion identified by the FA), have weak loadings on the intended factor or dimensions it was designed to measure, or have a strong loading on a factor or dimension it was not designed to measure (Kline, 2000). However, there are a number of important reasons why item analytic methods were used in this research for item reduction not FA. These are discussed below.

One of the most important of these reasons is that attitudes may not be factorially simple (Kline, 2000), but be composed of many factors that must all be measured to represent the construct, as in the case of cohesion. In the first instance, item analysis enables investigation of the correlation matrix before it is submitted to factor analysis to determine whether there is likely to be an underlying factor structure. A correlation matrix containing a wide range of correlations, ranging from high to low, indicates a large enough variance in correlations for subsequent factor analysis. Failure to conduct such analysis has provided one reason why the results of factor analysis have often been unsuccessful. This is particularly the case with dichotomous items where the variance in correlations is constrained. Multipoint items obtained from rating scales provide greater variance and correlations are usually higher (Nunnally, 1978). Items that have a low average correlation (inter-item and item-total correlation) with all other items and so do not provide a measure of a 'common core' (i.e. measure the desired attribute) can also be identified (Kline, 2000). Elimination of these items is important for improving the reliability of the measure, its construct validity, and the factorability of the data and the factor solution obtained.

Sample size provides a further reason for first employing item analysis. In order to obtain a good factor solution using factor analysis, large sample sizes are required. As described in Chapter 2, although Comrey and Lee (1992) describe 200 subjects as fair, Kline (2000) recommends a ratio of 3:1 subjects to items. Where sample size falls short of this recommended minimum or sample size is little more than the number of items in the scale, results of factor analysis may be nothing better than produced by chance. Factors then do

not hold up in subsequent studies (Nunnally, 1978). Although the sample size of 204 obtained in this research can be described as fair, due to the large number of items, the subject to item ratio is <2:1. Since this ratio falls slightly short of the recommended minimum the use of item analytic methods of item reduction is important for ensuring accurate, meaningful results. This does not however, render the use of FA inappropriate on this sample size, but it must be used for exploratory analysis to avoid misleading conclusions. For item analysis, a sample size of 100 is considered adequate (Nunnally, 1978; Kline, 2000). The reduced item set can then be submitted to factor analysis. This approach provides the advantage that no useful items will be discarded; only those that are not. Items will still be included that may then subsequently be discarded in factor analysis.

The complete data file containing EM estimates was submitted to item analysis for item reduction. A number of item statistics were computed to determine the effectiveness of each item in measuring team cohesion. The methods used for evaluating the effectiveness of items and associated elimination criteria are described below together with the results of each method employed. In each method the unit of analysis was the individual within the team.

5.3.6.1 Method 1: Examination of Item-Total Correlations

The primary method that will be used here for item selection is examination of item-total correlations. In the selection of items from multipoint scales, this provides the most appropriate approach to the selection of items to include in the final test since items which correlate well with one another, and hence have a high item-total correlation, can be considered to measure the same construct. Items that correlate most highly with the total score add more to the variability in the set of scores (the variance) and to the reliability of the measure than items that have a lower correlation with the item-total score (Nunnally, 1978). Analysis of item-total statistics therefore provides a method for identifying how useful an item is in terms of its ability to discriminate between different attitudes towards team cohesion (i.e. at all levels of cohesion) and whether the item measures the same construct as the scale. This provides the advantage of allowing the development of a general-purpose measure that can be used for a wide range of purposes and in a wide range of situations (Nunnally, 1978). Low item-total correlations may indicate that the item is ambiguous or that it measures something different to the rest of the items (Nunnally, 1978).

Due to the dimensionality of the scale, in order to measure the relationship between each item and the total score, each item was compared to the total score for the dimension it was designed to tap (Nunnally, 1978). To obtain the item-total scores, scores were summed over

items for each dimension of the scale and submitted to Pearson's r . Item-total scores were then ranked from highest to lowest. This enabled identification of items with particularly low item-total scores ($<.30$) that could be considered for removal depending on the content of the item and whether its removal would distort measurement of the dimension.

Corrected item-total correlations are reported that correct for the artefact produced by correlating an item with the total score. Item-total correlations are higher when the item is included in the total score than when correlated with the total score of all other items. Although this artefact is greatly reduced when more than 80 items are analysed (Nunnally, 1978), corrected item-total correlations were considered more acceptable for analysis.

All item-totals were found to fall between .30 and .89, as shown in Table 5.11 below.

Table 5.11:
Highest and lowest item-total correlations for each MTCS dimension.

	Highest r	Item No.	Lowest r	Item No.
TCHIIPS	.72	19	.66	22
TCHIIPO	.77	45	.60	35
TCVIIPS	.87	76	.51	88
TCVIIPO	.80	128	.63	105
SCHIIPS	.79	20	.60	10
SCHIIPO	.79	40	.30	61
SCVIIPS	.88	72	.57	80
SCVIIPO	.89	123	.79	96
UPHIIPS	.78	16	.49	31
UPHIIPO	.80	51	.57	62
UPVIIPS	.85	118	.64	90
UPVIIPO	.88	94	.69	107
VRHIIPS	.78	15	.67	29
VRHIIPO	.82	59	.74	42
VRVIIPS	.86	85	.76	67
VRVIIPO	.87	127	.83	106

The moderate to high average item-total correlations provide evidence for the homogenous nature of scale items where all items can be considered to contribute to the measurement of the dimension of team cohesion they were designed to tap (Nunnally, 1978). Items with higher item-total correlations will contribute more to the reliability of the test since this

indicates greater variance relating to the 'common factor' among scale items (Nunnally, 1978). Therefore, no items were removed at this stage on the basis of a low item-total correlation.

5.3.6.2 Method 2: Analysis of P-Values

For each item, the proportion of the sample providing each Likert scale category response was calculated, obtaining a p-value for each response option. The use of p-values provides a secondary method of item reduction to the use of item-total correlations. However, p-values have an element of importance in test construction since they influence the shape and dispersion of test scores (Nunnally, 1978, p270). Items with p-values above .8 (i.e. 80%) against any response options should be selected for removal as they do not sufficiently discriminate between subjects (Kline, 2000). High p-values also tend to skew the distribution of scores, particularly where the number of items in the scale is small (Nunnally, 1978). Despite the relatively large number of items in the MTCS, items that the majority of subjects provide the same response to will not adequately measure the individual differences in perceptions of team cohesion identified in Chapter 2 (e.g. gender). Response option p-values were not found to exceed 56% (item 22) for any item with sufficient variation in responses across items. Therefore no items were removed on this basis.

5.3.6.3 Method 3: Examination of Inter-Item correlations

Examination of the correlation of each item with every other item in the scale is important for investigating the internal consistency of the scale and identifying items that should be eliminated to improve it. In order for a scale to have internal consistency, items should be correlated highly with one another. However, items that do not correlate highly with one another do not measure the same construct and should be considered for removal (Kline, 2000). Therefore, items found to have a large number of low inter-item correlations (calculated using Pearson's r) were selected for deletion as this provides an indication that these items do not share a 'common core' (i.e. the attribute or construct being measured) with the other items in the scale. A criteria of >30% of low inter-item correlations with a correlation of <.20 (i.e. very weak correlations) was used for this analysis (a criteria determined by the researcher). Items with very high inter-item correlations $\geq .80$ were also examined to determine whether these were no more than simply bloated specifics (i.e. paraphrases of one another) or whether they are sufficiently theoretically distinct to be retained at this stage (Kline, 2000).

Item pairs with a high inter-item correlation ($\geq .80$) that were written to measure the same dimension were first inspected to determine if these items were nothing more than bloated specifics. These are presented in Table 5.12 below:

Table 5.12:

Item pairs with a high inter-item correlation tapping the same dimension.

Item Pairs	Item Content	Corr.	Dimension
65 70	I am friends with my team leader I do not enjoy socialising with my team leader*	.80	SCVIIPS
66 85	My team leader does not adequately recognise my contribution to the team* I do not feel that my team leader values my role*	.82	VRVIIPS
72 89	My team leader looks out for me I am proud to be working with my team leader	.82	SCVIIPS
73 97	My team leader sets me clear goals to work towards My team leader does not set clear rules for the team*	.82	UPVIIPS
98 122	Team members feel that the team leader helps the team work well together to achieve its goals under easy conditions Team members feel that the team leader work well together to achieve its goals under difficult conditions	.85	UPVIIPO
102 123	Our team leader takes an interest in the way team members feel about things Team members do not feel that our team leader looks out for them*	.82	SCVIIPO
102 112	Our team leader takes an interest in the way team members feel about things Our team leader tries to help team members feel happy within the team	.81	SCVIIPO
103 129	Our team leader shares similar opinions about people or ideas, whether positive or negative, as members of the team Team members' values of what is important in life are similar to those of the team leader	.84	UPVIIPO
112 123	Our team leader tries to help team members feel happy within the team Team members do not feel that our team leader looks out for them*	.80	SCVIIPO
112 120	Our team leader tries to help team members feel happy within the team Our team leader is not interested in the personal welfare of team members	.80	SCVIIPO

Note: * = scoring was reversed for these negatively phrased items.

Analysis of item content revealed that item 70, 'I do not enjoy socialising with my team leader', provides a vague alternative to item 65, 'I am friends with my team leader', and is open to greater interpretation in its meaning. Further, given a lack of opportunity for 'socialising' with the team leader, this item may be difficult to rate and yield a less accurate measurement of social cohesion than item 65, tapping 'friendship' with the team leader. Item 102, asking participants to rate whether they feel their 'team leader takes an interest in

the way team members feel about things', was also found to correlate highly with items that provide a more specific version of the aspect of cohesion it was designed to tap, in particular, item 112, 'Our team leader tries to help team members feel happy within the team' ($r = .81$). Although item 123, 'Team members do not feel that our team leader looks out for them', was also found to correlate highly with item 102 ($r = .82$), it also correlated highly with item 112 ($r = .80$) and was similarly identified as a vague version of item 112. Finally, item 129, 'Team members' values of what is important in life are similar to those of the team leader', was considered to be less comprehensible than item 103, 'Our team leader shares similar opinions about people or ideas, whether positive or negative, as members of the team', which it correlated highly with ($r = .84$). All other item pairs were considered sufficiently different to be retained at this stage of item reduction.

Although item pairs with high inter-item correlations tapping different dimensions should not be measuring the same thing, the content of these were inspected to ensure this was the case as presented in Table 5.13 below:

Table 5.13:
Item pairs with a high inter-item correlation tapping different dimensions.

Item Pairs	Item Content	Corr.	Dimension
72 81	My team leader looks out for me I value the support my team leader gives me in my role	.80	SCVIIPS & VRVIIPS
73 83	My team leader sets me clear goals to work towards My team leader supports me in my tasks through sharing information	.80	UPVIIPS & TCVIIPS
76 89	I am confident in my team leader's ability to do their job I am proud to be working with my team leader	.81	TCVIIPS & SCVIIPS
81 89	I value the support my team leader gives me in my role I am proud to be working with my team leader	.84	VRVIIPS & SCVIIPS
93 95	Team members feel that the team leader helps them to develop their skills within the team Team members do not get on socially with our team leader	.98	TCVIPO & SCVIPO
101 127	Team members are proud to be working with our team leader Team members value the support that our team leader gives them in their role	.83	SCVIPO & VRVIPO
102 127	Our team leader takes an interest in the way team members feel about things Team members value the support that our team leader gives them in their role	.82	SCVIPO & VRVIPO
112 127	Our team leader tries to help team members feel happy within the team Team members value the support that our team leader gives them in their role	.81	SCVIPO & VRVIPO
122 127	Team members feel that the team leader helps the team work well together to achieve its goals under difficult conditions Team members value the support that our team leader gives them in their role	.80	UPVIPO & VRVIPO
123 127	Team members do not feel that our team leader looks out for them Team members value the support that our team leader gives them in their role	.84	SCVIPO & VRVIPO

This analysis identified an item considered rogue to the measurement of cohesion, item 83, although originally designed to tap vertical aspects of task cohesion, does not fit with the nature of the scale. Item 83, 'My team leader supports me in my tasks through sharing information', was considered to be tapping the separate, although related construct, of information sharing and so should not form part of a measure of team cohesion. All other items were retained since their removal would distort the measurement of cohesion.

As a result of this analysis, the following items presented in Table 5.14 below were removed from the scale. This included their corresponding item(s) written to tap individual or team versions of the same item. A total of 15 items were therefore removed based on analysis of high inter-item correlations.

Table 5.14:
Items and their corresponding versions removed based on high inter-item correlations.

Items Removed	Corresponding Items to Remove	Content of Corresponding Items
70	13	I do not enjoy socialising with members of the team.
	95	Team members do not get on socially with our team leader.
102	69	My team leader is not interested in the way I feel about things.
123	56	Members of the team do not look out for each other.
129	72	My team leader looks out for me.
	3	My values of what is important in life are similar to other team members.
	39	Team members' values of what is important in life are similar to one another.
	78	My values of what is important in life are similar to those of my team leader.
	49	Members of the team help each other in their tasks through sharing information.
83	115	Team members feel that the team leader supports them through sharing information

Analysis of low inter-item correlations revealed that only two items were found to have >30% inter-item correlations <.20. Item 68, 'I am receptive to feedback from my team leader', was found to have 63% of very low inter-item correlations. Although this item has a relatively high subset item-total correlation ($r = .66$) indicating that it measures that same attribute as other items in the same subset, its large number of low inter-item correlations indicates that it does not share a 'common core' with the other items. Similarly item 80, 'I do not feel that my team leader is there for me when I need advice', shares little commonality with the rest of the scale items with 43% low inter-item correlations, despite its high subset item-total correlation ($r = .62$). Since these items may be tapping a separate construct, they were

removed from the scale. Their corresponding individual or team versions were also removed as shown in Table 5:15 below:

Table 5.15:
Items and their corresponding versions removed based on low inter-item correlations.

Items Removed	Corresponding Items to Remove	Content of Corresponding Items
68	57	Team members are not receptive to feedback from team members.
80	96	Our team leader does not provide team members with advice when they need it.

A final inspection of the content of the pilot version of the MTCS also revealed that item 108 'Team members are not receptive to feedback provided by the team leader' and item 105 'Team members are receptive to feedback from the team leader' were identical items. As the negative version of item 105, item 108 was therefore removed from the final version of the scale. Removal of the items identified above and through analysis of high inter-item correlations resulted in a reduced item set of 109 items to be submitted to reliability analysis, discussed in the next section. Table 5:16 below presents the number of items representing each subscale in the reduced version of the MTCS:

Table 5.16:
Number of subscale items in the reduced version of the MTCS.

MTCS Subscales	No. of Items
TCHIIIPS	6 (6)
TCHIIPO	4 (6)
TCVIIPS	6 (8)
TCVIIPO	6 (8)
SCHIIIPS	11 (12)
SCHIIPO	5 (6)
SCVIIPS	5 (9)
SCVIIPO	5 (9)
VRHIIPS	6 (6)
VRHIIPO	6 (6)
VRVIIPS	4 (4)
VRVIIPO	4 (4)
UPHIIPS	9 (10)
UPHIIPO	11 (12)
UPVIIPS	12 (13)
UPVIIPO	9 (10)

Note: Number of items in pilot version before item reduction of MTCS in parenthesis

5.3.6.4 Reliability

Cronbach's alpha was used to calculate the reliability of the 'reduced' item set. A high level of reliability is important for ensuring items differentiate between individuals attitudes at all levels of cohesion. Cronbach's alpha assumes that all items within the scale measure or are attempting to measure the same phenomenon or attribute. As a multidimensional scale, the reliability of each dimension was calculated to assess their internal consistency and the reliability of the overall scale was assessed to ensure that all items measure organizational work team cohesion. The following rules of thumb provided by George and Mallery (2003, p231) were followed in the interpretation of Cronbach's alpha:

- $>.9$ = Excellent
- $>.8$ = Good
- $>.7$ = Acceptable
- $>.6$ = Questionable
- $>.5$ = Poor
- $<.5$ = Unacceptable

Due to the size of the sample obtained for item analysis against the number of items in the scale, a reliability alpha $>.90$ was aimed for to control for the affects of sampling errors and chance that increase Cronbach's alpha. This high alpha level was also set due to application of the statistic with Likert data. In subsequent studies with a larger sample size where errors and chance results are reduced, a drop in the reliability alpha would then still yield an acceptable reliability (Nunnally, 1978). Although a high reliability was aimed for it was also acknowledged that due to the multidimensional nature of cohesion a slightly lower reliability may be obtained. This would not reflect a less reliable measure but instead would reflect the broad nature of the construct (Reis & Judd, 2000).

Cronbach's alpha for the overall reduced MTCS scale from the current sample, when all scale items are considered together, was .98. This high alpha obtained is not surprising given the relationship between reliability and the number of scale items (Kline, 2000). A large number of scale items as included in the MTCS, will yield a very high reliability. A scale that contains high inter-item and item-total correlations will also yield a high alpha since these indicate a fairly strong unifying construct. The concern with a high alpha is that items are bloated specifics (i.e. items are merely paraphrases of one another). However, any items considered to be bloated specifics identified through analysis of high inter-item correlations were removed from the measure. In scale development, where it is necessary to include a large pool of items for item reduction phases, this highlights the importance of conducting analysis of high inter-item correlations to ensure a very high reliability is not a

result of redundancy of items and narrowness in item content. Following item reduction the reliability of each subscale representing each dimension of cohesion is presented in the following table:

Table 5.17:
Subscale reliabilities

Subscale	Cronbach's Alpha α
TCHIIPS	.82
TCHIIPO	.75
TCVIIPS	.89
TCVIIPO	.88
SCHIIPS	.91
SCHIIPO	.78
SCVIIPS	.90
SCVIIPO	.92
VRHIIPS	.86
VRHIIPO	.90
VRVIIPS	.89
VRVIIPO	.91
UPHIIPS	.88
UPHIIPO	.91
UPVIIPS	.95
UPVIIPO	.94

For just under half of the subscales, reliability could be increased through the deletion of single items, as shown in Table 5.18 below:

Table 5.18:
Cronbach's Alpha if single subscale items are deleted

Subscale	Item for Deletion	Cronbach's Alpha α if Item Deleted
TCVIIPS	88	.90
TCVIIPO	105	.89
SCHIIPO	61	.87
SCVIIPS	75	.90
VRHIIPS	11	.86
VRVIIPS	67	.89
UPHIIPS	31	.89
UPHIIPO	62	.92
UPVIIPS	90	.95

However, as removal of any of the above items only increases alpha by a small amount and reliabilities with their inclusion are above acceptable, none of these items were removed at this stage. Further, when reliability reaches a certain level, any increase will not enhance construct validity (Reis & Judd, 2000). It was considered that their removal would have also distorted the measurement of team cohesion in organizational work teams.

A high reliability does not in itself indicate that scale items will be highly correlated with one another. For example, the subscale SCVIIIPS yields an equally high reliability when item 80 is included in the reliability analysis ($\alpha = .93$) as when it is deleted from analysis ($\alpha = .94$) despite 43% low inter-item correlations ($<.20$). With such items removed, correlation analysis of all other items conducted before this assessment of reliability revealed moderate to high correlations. This highlights the importance of inter-item correlation analysis in item reduction. Taken together, the correlation and reliability results indicate that the reduced MTCS to be validated has excellent internal consistency reliability. The stability of this result however, will be checked against a new sample of subjects obtained for scale validation.

5.3.6.5 Inter-Scale Correlations

In addition to examining inter-item correlations, it is also important to examine the inter-scale correlations to determine the extent to which the subscales in the MTCS are related. As the research theorises that all of the 16 subscales reflect the construct of team cohesion, they should all converge on the same construct and so have some inter-relationship (i.e. a moderate correlation). However, items with very high inter-scale correlations above .90 (Tabachnick & Fidell, 1996) may be multicollinear indicating that the subscales are measuring relatively the same dimension and are redundant. In order to determine the amount of discrimination between subscales, pairwise correlations were conducted among the 16 scales of the MTCS using Pearson's r . Subscales not considered to be sufficiently unique should be considered for removal since it can be concluded that they contain redundant information and are not needed in the analysis of team cohesion in organizational work teams. This analysis also provides a form of construct validity.

Following item reduction, inter-scale correlations were calculated. As the subscales are composed of different numbers of items, standardised z scores were used to enable direct comparison. MTCS subscales were found to correlate moderate to high with correlations ranging from .33 (SCHIIPO * VRVIIPS) to .90 (UPHIPO * VRHIPO) (see Appendix O). The wide range of correlations obtained indicated varying degrees of independence between subscales. Substantial independence between subscales is not expected since the items in the MTCS were all designed to measure one domain of interest (i.e. team cohesion in organizational work teams). A degree of uniqueness of the MTCS subscales is confirmed by the fact that the majority of any given subscales inter-scale correlations are lower than their respective scale reliabilities (i.e. their average inter-item correlations), showing that items written to measure a particular dimension are more related to that dimension than any other, as shown in Appendix O. However, for some subscales, their correlations with other MTCS

subscales were found to be higher than their respective reliabilities indicating a degree of overlap between their content. These subscales are presented in Table 5.19 below:

Table 5.19:

MTCS subscales with higher inter-scale correlations than reliability coefficients.

	TCHIIPS	VRHIIPS	VRHIIPO	TCHIIPO	TCVIIPS	SCHIPO	UPHIIPS
TCHIIPS	.82						
VRHIIPS	.87	.86					
VRHIIPO	.85		.90				
TCHIIPO				.75			
TCVIIPS					.89		
SCHIIPS		.87					
SCHIPO						.78	
UPHIIPS	.85			.79			.88
UPHIPO			.90	.85		.79	.88
UPVIIPS					.89		

The high inter-scale correlations found between the dimensions presented in Table 5.19 above are not an entirely unexpected result. As presented in the MTCM in Chapter 4, the dimensions, 'valued roles' and 'unity of purpose', are considered sub-aspects of task cohesion. However, since they have also been found to be distinct dimensions of cohesion by other researchers (e.g. Yukelson et al., 1984), they were included in the MTCS as distinct aspects. Their relationship to task cohesion as sub-aspects was also noted by SMEs in the inductive focus group. SMEs saw task cohesion as an overarching, high-order dimension. The results of the inter-scale correlations confirm the higher-order status of task cohesion. Therefore, it was considered that 'valued roles' and 'unity of purpose' should not be treated as distinct aspects of cohesion in empirical analysis but combined as part of the higher-order subscale of task cohesion. In terms of conceptual clarity, their continued explicit representation in the MTCM in Chapter 4 is important for determining how the MTCS should be adapted to other team contexts. The high inter-scale correlations between VRHIIPS * SCHIIPS and SCHIPO * UPHIPO is surprising given an expected distinction between social and task based aspects of cohesion. Their high inter-correlation may be a result of the dimensions within the pairs both measuring individual aspects (denoted by IPS) of cohesion or team aspects (denoted by IPO) in the case of the latter pair. The subscales with high inter-correlations therefore warrant further examination.

Two further methods of item analysis were conducted on the subscales presented in Table 5.19. Firstly, inter-item correlations were examined between items belonging to the different

subscales to determine whether any specific items were so highly correlated they could be considered to be tapping the same thing. As before, items were identified using the criteria of correlations $\geq .80$ for this analysis (Kline, 2000). Such items should be considered for elimination from the scale since they can be considered to be contributing little to the uniqueness of the subscale they were designed to tap. The second method employed was to determine whether items were more related to any other subscale than their own subscale. This analysis was conducted by correlating subscale items with their own total score and also with the total score of the subscale they were found to correlate highly with (Carron et al., 1985). Items found to correlate more highly with another subscale (indicating inter-scale equivalence) should be considered for elimination.

Inspection of inter-item correlations revealed that all correlations between items designed to measure different subscales were $< .80$, with the majority of correlations below $.70$. An inspection of item content confirmed that items were sufficiently conceptually different to be retained at this stage of scale development. Any similarity between items stemmed from the two forms of items that were developed to tap individual perceptions of self in the team and individuals perceptions of others in the team. For example, 'I do not feel that the team work well together to achieve the goals of the team under easy conditions' (UPHIIPS) versus 'Members of the team work well together to achieve the goals of the team under easy conditions' (UPHIPO).

Analysis of item-total correlations revealed that some items correlated slightly more highly with other subscales than the one they were designed to measure. This overlap mainly occurred between dimensions designed to measure different aspects of task cohesion where a large number of items were found to overlap, i.e. general aspects of task cohesion and specific aspects tapping valued roles and unity of purpose. This is not a surprising result given their hypothesised conceptual overlap. In comparison, social-based aspects of cohesion were found to be relatively distinct from task-based aspects. This analysis confirmed the decision to combine valued roles and unity of purpose with the more general aspects of task cohesion for any further empirical analysis. This involved merging VRHIIPS and UPHIIPS with TCHIIPS; VRHIPO and UPHIPO with TCHIPO; VRVIIPS and UPVIIPS with TCVIIPS; and VRVIPO and UPVIPO with TCVIPO. Internal consistency reliabilities and inter-scale correlations were then calculated for the eight dimensional model, presented in Table 5.20:

Table 5.20:

Inter-scale correlations and reliability coefficients (on the diagonal) for an 8 dimensional model.

	SCHIIIPS	SCHIIPO	SCVIIPS	SCVIIPO	TCHIIIPS	TCHIIPO	TCVIIPS	TCVIIPO
SCHIIIPS	.91							
SCHIIPO	.72	.78						
SCVIIPS	.63	.46	.90					
SCVIIPO	.56	.53	.84	.92				
TCHIIIPS	.89	.69	.61	.58	.95			
TCHIIPO	.79	.79	.53	.56	.90	.96		
TCVIIPS	.66	.44	.84	.81	.71	.62	.97	
TCVIIPO	.62	.54	.77	.88	.69	.67	.88	.97

Inspection of the inter-scale correlations for the eight dimensional model showed conceptual overlap between the subscales SCHIIPO and TCHIIPO only. The subscale SCHIIPO was found to have a higher correlation with TCHIIPO ($r = .79$) than its own internal consistency reliability ($r = .76$). Examination of item-total correlations revealed two items with inter-scale equivalence¹⁰, as shown in Table 5.21:

Table 5.21:

Item-total correlations for within and between subscales.

	SCHIIPO	TCHIIPO
SCHIIPO: Item 61	.16	.24
TCHIIPO: Item 52	.63	.62

Item 61: 'Team members are not proud to be part of the team' designed to tap SCHIIPO not only correlated more highly with the TCHIIPO subscale but following item reduction was found to have a poor correlation with its own subscale. It was therefore eliminated from the MTCS along with its corresponding item tapping individual perceptions (item 20). Item 52: 'Members of the team share similar opinions about people or ideas, whether positive or negative, as one another' was considered to be ambiguous and was also removed from the final version of the scale, along with its corresponding items 21, 92 and 103. The MTCS was therefore reduced to 103 items. Table 5.22 below presents the number of items representing each subscale in the final version of the MTCS:

¹⁰ These items were also found to be problem items when all 16 hypothesised dimensions were correlated separately.

Table 5.22:**Number of subscale items in the final version of the MTCS.**

MTCS Subscales	No. of Items
TCHIIIPS	6
TCHIIPO	4
TCVIIPS	6
TCVIIPO	6
SCHIIIPS	10
SCHIIPO	4
SCVIIPS	5
SCVIIPO	5
VRHIIPS	6
VRHIPO	6
VRVIIPS	4
VRVIIPO	4
UPHIIPS	8
UPHIPO	10
UPVIIPS	11
UPVIIPO	8

The results of this analysis indicate that the dimensions designed to tap specific aspects of task cohesion – unity of purpose and valued roles – should be treated as sub-aspects of the higher order dimension of task cohesion. This gives rise to an 8-dimensional structure rather than a 16-dimensional structure as explicitly outlined in the MTCM. This result warrants further investigation comparing the validity of both 8 and 16 dimensional models through factor analysis as described in section 5.4 below. The explicit representation of the 16 dimensions in MTCM is however important for supporting accurate adaptation of the secondary dimensions to other team contexts in which the measure is to be applied. The results of this analysis warrant further investigation through the use of FA, as described in the next section.

5.4 Preliminary Factor Analysis

The aim of the factor analysis conducted in this phase of the research was two-fold. Primarily, FA was run as a first exploration of the hypothesised dimensionality of the MTCS as captured in the MTCM presented in Chapter 4. Specifically, to provide an initial exploration of the validity of the eight dimensional model identified through inter-scale correlation analysis compared to the 16 distinct dimensions identified in the theoretical

model. At this stage of scale development, preliminary examination of whether the items in the MTCS represent the proposed conceptual model is important for informing the validity stage of the research. For example, if the structure obtained in FA does not represent that in the conceptual model, the MTCS and/or the theoretical model (MTCM) may need further development (Carron et al., 1985). If the factor structure is found to match the MTCM then this provides some early evidence of construct validity and can be used to inform the design of hypotheses to test the validity of the measure. Where a theoretically meaningful structure is obtained, FA can then be used to identify any problem items that do not load onto factors as intended (Kline, 2000). This provides a supplementary approach to item analysis to identify any further items that should be removed from the scale before validation.

5.4.1 Method

The data obtained from the pilot study ($N=204$) was submitted to exploratory factor analysis (EFA). EFA is the most common form of factor analysis and was considered the most appropriate form to be applied at this stage of the research as the aim of the analysis was to explore the structure of the MTCS, specifically to investigate the existence of an 8 versus 16 dimensional structure. Due to the limits of the sample size, the intended use of EFA was as a descriptive tool.

Principal axis factoring (PAF) was considered the most appropriate method to employ in this research for a number of reasons. Firstly, since the MTCS is based on the notion that the observed variables reflect a latent multidimensional construct as represented in the MTCM, it was important to select a statistical method that allows a balanced extraction of factors. As described in Chapter 3, this cannot be achieved with PCA. Secondly, although PAF is a linear procedure like PCA and all factor analytic techniques due to their use of Pearson's r , it does not assume multivariate normality (as with maximum likelihood factor analysis).

In order to reach a simple factor solution, direct oblimin rotation was selected (Kline, 2002). This oblique rotation method was used as factors were, as expected, found to be correlated as described in section 5.3.6.5. This also fits with the theoretical nature of cohesion. For example, although not always the case, social cohesion can increase task cohesion (Zaccaro & Lowe, 1988). Where factors are truly correlated, use of orthogonal rotation methods (e.g. varimax rotation), although easier to interpret, would result in a loss of information. However, where they are truly uncorrelated, results from oblique and orthogonal methods are nearly identical. The use of oblique rotation should therefore allow more accurate and reproducible results (Costello & Osborne, 2005). Following oblique rotation the pattern matrix is interpreted to determine factor structure. Although the pattern

matrix only represents the unique variance and not the shared contributions of each factor to a variable, it is easier to interpret than the structure matrix. Where factors are highly correlated, problems in interpreting the structure matrix can arise since correlations between items and factors are inflated making it difficult to determine which items are related to which factors (Tabachnick & Fidell, 1996).

To determine the number of factors to retain in the solution, both Horn's (1965) Parallel Analysis (PA) and the scree test was used. The rule of thumb, eigenvalues >1.0 was not used as it can overestimate the number of factors to retain (Costello & Osborne, 2005) and was a method proposed for PCA where eigenvalues are calculated from a correlation matrix that contains unities on the diagonal (Ledesma & Valero-Mora, 2007). Although one of the most accurate methods for determining the number of factors to retain, PA is not used here in isolation since it can still result in an underestimation where an oblique rotation method is used and the first eigenvalue is large (Beauducel, 2001). The scree test can also be inaccurate by 1 or 2 factors where sample size is small (Tabachnick & Fidell, 1995). Therefore both methods were used. In the latter method, the number of factors retained was decided by selecting the number of points above the natural bend of the curve. To check the accuracy of this selection, multiple factor analyses were run by setting the number of factors to retain based on the following three methods (Costello & Osborne, 2005; Tabachnick & Fidell, 1995):

1. The number of theoretically driven *a priori* dimensions. In this case both a 16-dimensional and 8-dimensional structure was tested.
2. Numbers below the number of factors identified by PA, the scree test and hypothesised in the *a priori* structure (if different).
3. Inspection of the residual correlation matrix. Several moderate residuals between pairs of variables (between .05 and .10) and some $>.10$ may indicate the existence of an additional factor. Therefore the number of factors to be extracted should be set one above that tested in the first two methods. In the absence of specific criteria for determining the number of residuals $>.05$ that could indicate the existence of an additional factor, a cut-off value of $>20\%$ was used.

The stability of the factor structure and fit to the data was examined through inspection of item loadings using the following criteria (Costello & Osborne, 2005; Tabachnick & Fidell, 2001):

- Item loadings $>.32$
- Few cross-loadings (items that load $>.32$ on more than one factor)

- No factors with fewer than three items
- Extracted item communalities $>.40$

The initial item communalities or square multiple correlations (SMCs) were also checked to determine the internal consistency of the factor solution. SMCs $<.30$ indicate that items do not relate well to other items and account for little variance in the factor scores (i.e. scores obtained by subjects on the factors). All SMCs should also be positive as negative SMCs indicate that too many factors have been retained (Tabachnick & Fidell, 1995).

5.4.2 Matrix Factorability

Before conducting factor analysis the factorability of the correlation matrix, (presented in Appendix P) based on 103 items, was examined to determine whether the factor solution obtained is likely to provide a good explanation of the observed data. Although examination of the item correlations provides an indication of the factorability of a matrix produced from scale items (i.e. the range of item-total and inter-item correlations), other statistical tests were used to confirm factorability. The Kaiser-Meyer-Olkin (KMO) test of sampling adequacy was used to determine the amount of variance within the data that could be explained by factors. A KMO value of $>.6$ is considered acceptable (Brace, Kemp, & Snelgar, 2006). Bartlett's test of sphericity was calculated to determine the strength of relationship between scale items. Although this test is very sensitive particularly with large sample sizes resulting in a significant result with large N even if correlations between items are low, this sensitivity is reduced with less than 5 subjects per item (Tabachnick & Fidell, 1996). As less than 5 subjects were obtained per item for the pilot phase, the test was conducted. In addition and as confirmation, anti-image diagonal values representing the KMO value of each individual scale item and off-diagonal partial correlations were examined. Partial correlations¹¹ smaller than respective correlation coefficients indicate that the scale items also have a relationship with the other items in the scale and therefore are likely to result in a factor structure. The residuals in the reproduced correlation matrix were also inspected to determine whether a good factor analysis solution is likely to be obtained (Brace et al. 2006).

The KMO test of sampling adequacy was .94 indicating that the correlation matrix of scale items has good factorability. Bartlett's test of sphericity was found to be significant ($p < .0001$) indicating a strong relationship between scale items. All on-diagonal values of the anti-image correlation matrix produced as part of PAF were found to be greater than .5, the minimum acceptable level with the lowest value against item 53 of .88. The off-diagonal

¹¹ Partial correlations are obtained between two scale items when the effects of other items are partialled out.

partial correlations were also found to be small (see Appendix Q) (Brace et al. 2006). Therefore, no further items need to be dropped from further analysis. The residuals (or error) computed between the observed and reproduced correlation values predicted in factor analysis assuming that the FA is correct, were found to be small in value with only 1% (102) non-redundant residuals with values $>.05$. Since the majority of residual values are low, the factor analysis conducted is likely to provide a good explanation of the data (Brace et al. 2006). Given the results obtained from the indicators of factorability, factor analysis was considered suitable with all 103 items.

5.4.3 Factor Analysis Results

To analyse the number of factors to retain using PA, the ViSta-PARAN program was used, developed by Ledesma and Valero-Mora (2007), a plug-in of ViSta¹² “The Visual Statistics System” (Young, 2003). The software program and plug-in are open-source and are freely available at <http://forrest.psych.unc.edu/research/index.html>. The advantage with this program is that it enables PA to be run for both PCA and PAF. It also enables simulation based on a parametric and non-parametric method. The technique compares the observed eigenvalues with those obtained from simulating data from random samples. The number of factors to retain is indicated by the point at which the observed eigenvalues stop exceeding those obtained from the random samples, corresponding to the 95th percentile of the distribution of eigenvalues (Ledesma & Valero-Mora, 2007). The results of this analysis were based on both a normal and non-normal distribution for comparison and 500 replications to ensure a reliable result. Both methods indicated that 5 factors should be retained, as shown in the output extract in Table 5.23:

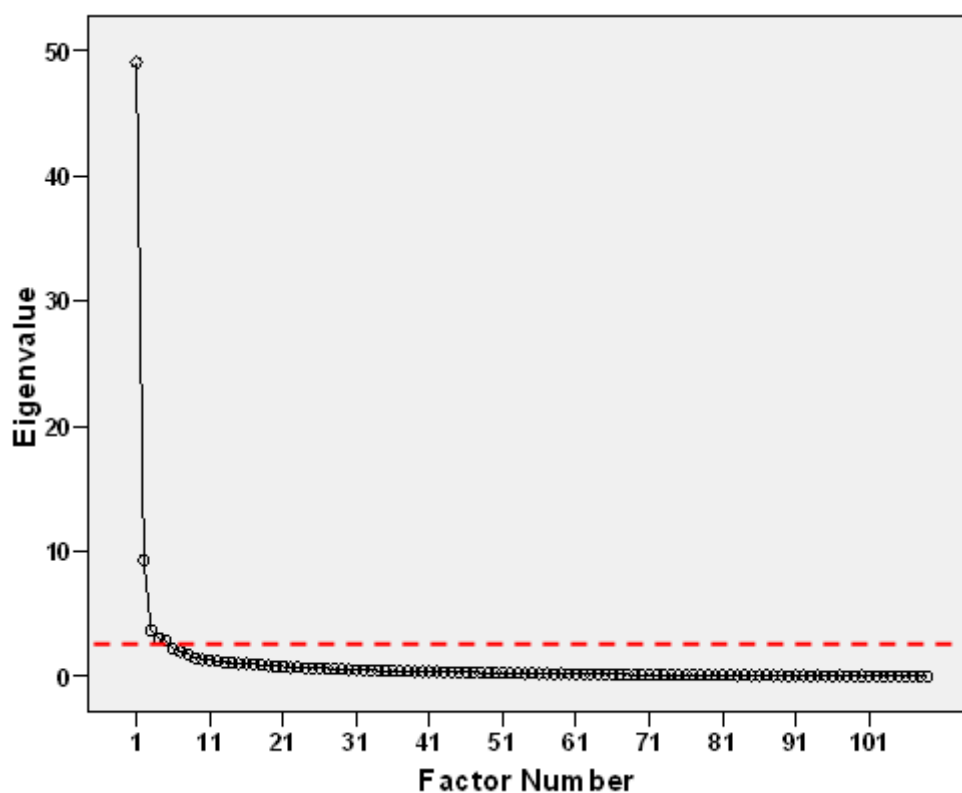
¹² Version 6.4 for Windows was used in this research.

Table 5.23:**Partial output from Parallel Analysis (PA) for the MTCS.**

	Observed	Mean	Eigenvalues at 95 th Percentile
Eigenvalue1	57.91	2.73 (2.75)	2.87 (2.88)
Eigenvalue2	11.15	2.60 (2.61)	2.70 (2.71)
Eigenvalue3	4.09	2.50 (2.51)	2.59 (2.60)
Eigenvalue4	3.43	2.42 (2.42)	2.49 (2.50)
Eigenvalue5	3.19	2.34 (2.35)	2.41 (2.42)
Eigenvalue6	2.29	2.28 (2.28)	2.34 (2.35)
Eigenvalue7	2.10	2.21 (2.22)	2.27 (2.28)
Eigenvalue8	1.86	2.15 (2.16)	2.21 (2.22)
Eigenvalue9	1.59	2.09 (2.10)	2.15 (2.16)
Eigenvalue10	1.41	2.04 (2.04)	2.09 (2.10)

Notes: Results from the nonparametric simulation reported in parenthesis.

Inspection of the scree test following PAF of all 103 items indicated a two to three factor solution, as shown in Figure 5.7 below:

**Figure 5.7: Scree plot to determine number of factors to extract for the MTCS at the pilot stage**

Based on the results obtained from the above methods, solutions for five, three and two factors were examined using oblimin rotations of the factor loading matrix together with the hypothesised 8 and 16 factor structures. Each solution was examined for their fit to the observed data. In addition, solutions for number of factors below these numbers (i.e. 15, 14, 7, 4 and a single factor solution) were examined.

Inspection of item loadings, number of cross-loadings and number of items loading each factor for the 14, 15 and 16 factor solutions revealed that these were relatively unstable solutions. In each solution, 21%-28% of items either failed to load on any factor or cross-loaded onto more than one factor $>.32$. Items that cross-load factors are expected where subscales of a measure correlate and oblique methods of rotation are used. Where items have a high cross-loading, it is important that these are removed from the measure of cohesion since they cloud the scoring and meaning of dimensions (Kline, 2000). If the MTCS is to have practical benefit, eliminating these items will be of particular importance for a clear understanding of the levels of cohesiveness against each dimension and the design of interventions to improve cohesion. However, unless the factor solutions are stable and provide a reliable estimate of the dimensionality of the underlying data, it is difficult to accurately identify cross-loading items that should be eliminated. Although, some degree of overlap was found, the sets of problem items were not found to be identical between factor solutions. In addition, two factors in the 16 factor solution and four factors in the 14 and 15 factor solutions contained an insufficient number of primary loadings. The factors produced by each solution were also difficult to interpret and did not reflect the hypothesised theoretically driven multidimensional structure outlined in the conceptual model.

The majority of factors identified in each solution contained items designed to tap distinct dimensions. For example, a single factor contained items designed to tap both social and task-based aspects of team cohesion. Similarly the eight and seven factor structures were also found to be unstable and uninterpretable. In each solution 30% and 33% of items respectively, either failed to load on any factor or cross-loaded on more than one factor. The eight factor solution also contained one factor with only one primary loading. Similarly the five and four factor solutions were unstable and uninterpretable with 21% and 17% of items, respectively that cross-loaded. The five factor solution also contained four items that failed to load on any factor. The two factor solution indicated by the scree test contained only one cross-loading item. However, the structure still remained uninterpretable as with all solutions examined. Similarly a homogenous one-factor solution resulted in no cross-loadings. Both the two and one-factor solutions contained the greatest number of low communalities with 18% and 31% respectively, of items with communalities $<.40$. The existence of a third factor

as suggested by the scree test was found to exist only as a result of items with cross-loadings. In all solutions tested the scree plot obtained did not change.

Inspection of the residuals correlation matrix for the 16, 8 and 5 factor solutions to determine whether any additional factors should be extracted, revealed that none of the factor solutions contained greater than 20% residuals $>.05$. In all solutions examined, no SMCs were found to be negative and no items were found to have SMCs $<.30$. Most items had SMCs $>.70$. This indicates that all items contribute to the internal consistency of the factor solution and contribute to substantial variance in the factor scores.

The lack of interpretable factors and stable solutions obtained may be due to a number of reasons. Firstly, it may result from problematic items that are low-loading, that cross-load or do not load onto any factors. Eliminating these items can improve the internal consistency and stability of the factor structure, although it is necessary to ensure that their removal does not distort the measurement of the construct (Costello & Osborne, 2005). Uninterpretability of the factor structure may also be due to poorly written items or a poorly conceived *a priori* theoretical model. However, it may also be a direct result of an insufficient sample size where analysis of numerous different factor structures will not resolve the issue. The many cross-loading items in the more complex factor solutions (e.g. 16, 8 factors) and many low communalities in the simpler factor solutions (e.g. 2 to 3 factors) indicates that the latter reason provides the most likely explanation for the poor factor structure (Kline, 2000). In this instance, a small sample size is unlikely to achieve an accurate analysis (Costello & Osborne, 2005). Testing this assertion was considered important for determining whether the lack of match between the factor structure and MTCM was simply due to sample size, not a poorly conceived conceptual model or items.

To test the impact of sample size on the stability of the factor structure, various subsets of items were selected tapping hypothesised dimensions of team cohesion that maximised the subject to item ratio. Although this methodology has practical benefits, it must be remembered that it cannot be used to inform the selection of items for the final measure. This is because items that load highly on a factor in the analysis of only a subset of items will fail to reveal whether they actually load higher or cross-load onto any other factors that exist when the full set of items in the MTCS are analysed (Kline, 2000). The hypothesised dimensions also included combining unity of purpose and valued role based aspects into a single task cohesion structure. The following combinations were selected at random for testing:

Table 5.24:**Randomly selected subsets to test the impact of sample size on factor structure**

No	Dimensions Tested	Subject to Item Ratio	Factor Structure Examined
1	TCVIIPO, VRVIIPO, UPVIIPO & SCHIIPO	9:1	2 versus 4 factor structure
2	SCVIIPO & SCHIIPO	22:1	2 factor structure
3	TCHIIPO, VRHIIPO, UPHIIPO & SCVIIPO	8:1	2 versus 4 factor structure
4	TCVIIPS, VRVIIPS, UPVIIPS, TCHIIIPS, VRHIIIPS & UPHIIPS	5:1	2 versus 6 factor structure

The two factor structures were found to be the most stable solutions obtained. The scree plots obtained for each combination suggested a two factor structure. None of the two factor solutions contained any cross-loading items $>.32$. All items had a strong primary loading onto only one factor. All solutions also exactly reflected the hypothesised structure tested. Interestingly, the number of communalities $<.40$ increased as the subject to item ratio decreased, ranging from no communalities $<.40$ (combination 1 with a subject to item ratio of 22:1) to six (combination 4 with a subject to item ratio of 5:1). This latter combination tested also contained one item (item 31) that failed to load $>.32$ on any factor. The factor solution for the most stable solution (SCVIIPO & SCHIIPO) is presented in Table 5.25. These two factors were found to account for the majority of the variance, accounting for a total of 76% of the variance.

Table 5.25:**Factor solution for SCVIPO & SCHIPO with 22:1 subject to item ratio**

	Factor		Communalities	
	1	2	Initial (SMCs)	Extracted
Item 99: Team members do not feel close to our team leader.	.73		.62	.63
Item 101: Team members are proud to be working with our team leader.	.81		.64	.67
Item 112: Our team leader tries to help team members feel happy within the team.	.94		.73	.79
Item 117: Team members are friends with our team leader.	.69		.69	.70
Item 120: Our team leader is not interested in the personal welfare of team members.	.92		.74	.79
Item 37: We are all good friends in this team.		.85	.64	.68
Item 40: Members of the team feel very close to one another.		.95	.70	.84
Item 44: Team members enjoy each others company.		.74	.61	.64
Item 63: Members of the team do not see the team as an important social unit.		.69	.53	.53

Note: rotation converged in 5 iterations

The four and six factor structures, (presented in Appendix R) tested to determine whether specific and general aspects of cohesion should be treated as separate dimensions in further analysis, were all found to be unstable solutions. Despite containing relatively few communalities <.40 (1-6) and no items with SMCs <.30, some items were found to cross-load >.32 on more than one factor. One item (item 18) in the six factor structure failed to load on any factor. All of the four and six factor solutions also contained one factor with only two primary loadings >.32, providing further indication of the instability of the factor structure. Inspection of the items that define each factor revealed that general and specific (i.e. unity of purpose and valued roles) aspects of task cohesion did not load onto separate factors. Factors did consistently distinguish between horizontal and vertical aspects of task cohesion and where tested, items designed to tap social aspects of cohesion consistently loaded

cleanly onto one factor, distinct from task cohesion. All scree plots for these solutions in fact pointed to a two factor structure that, as previously described, provided more stable solutions.

These results provide a preliminary indication that specific and general aspects of task cohesion should not be treated as separate factors and should be combined in further analysis. Further, they support previous research (e.g. Costello & Osborne, 2005) which suggests factor structures become more unstable as sample size decreases.

Although rating scales introduce more variance in correlations among items providing greater success in factor analysis, the results of this analysis highlights why factor analysis was not used for item selection in this research. PCA or FA has frequently been used in this way in scale construction, including in the construction of cohesion scales, such as the PAGEQ developed by Estabrooks and Carron (2000). Since the sample size obtained for this research provides only a 2:1 subject to item ratio where factor structures are likely to be accurate only 10% of the time (Costello & Osborne, 2005), this analysis shows that the reliability of the factor solution obtained on the entire set of items is severely questionable. Even with a subject to item ratio of 22:1, factor solutions may still be inaccurate 30% of the time (Costello & Osborne, 2005). Therefore, these results should be treated with caution and the stability of the factor solutions obtained be tested against a larger, new sample. Attempts to address this issue were made in the validity phase of the research.

5.5 Summary

The primary aim of the pilot study was to empirically reduce the set of items written for the MTCS, eliminating any items not found to adequately measure the dimensions of cohesion outlined in the MTCM. The representative sample containing individuals with heterogeneous characteristics obtained for this phase of the research was important for the accurate selection of items that measure organizational work team cohesion. This was also important for testing the stability of the MTCS and its factor structure. The sample not only represented organizational work teams from three different organizations but also sampled critical variables against which cohesion has been found to vary. In particular, a balanced sample of males and females were obtained along with team members that belong to various team sizes, ranging from small teams (e.g. 2 to 4 members) to larger teams (e.g. 20+). Team members were also samples across the team developmental stage continuum, measured by the length of time individuals had been members of their team. Sampling these critical variables is vital for ensuring that the measure will be sensitive to changes in cohesion and to ensure its stability across different teams.

The 'don't know' response category included at the scale development stage (described in Chapter 4) created a large number of missing values for empirical analysis. Missing value analysis revealed that this created missing values that were not missing at random (MNAR). 'Don't know' responses were largely found to have been rated by team leaders against items written to measure vertical aspects of cohesion. As the 'team leader', these respondents had difficulty providing responses to these items. This was despite instructions provided in the MTCS for team leaders to rate these items for their own immediate team leader. Instead of transposing these items to their immediate team leader, they believed it to be self referential and provided a 'don't know' response. Although these higher level team leaders are outside of the immediate team, they provide a role in constraining the action of the team leader or providing opportunities for their freedom of action that can have a direct effect on the cohesiveness of the team. However, this result does raise questions about where the boundary of analysis should be drawn around 'team' and whether a separate measure should be provided for team leaders. Handling missing values that are MNAR is a non-trivial problem, particularly where sample size must be preserved for use in multivariate techniques such as FA. Missing values must be imputed with care to ensure as unbiased an estimate as possible is obtained to prevent misleading conclusions being drawn from empirical analysis. As a sophisticated method that can be applied to non-normal data, missing data was imputed using the expectation-maximisation (EM) algorithm.

Items found to be little more than bloated specifics (identified through high inter-item correlations) and that did not measure the same underlying dimension or 'common core' (identified through inter-item correlations) were removed from the MTCS. This reduced the measure from 129 items to 109. The reduced measure was found to have excellent internal consistency reliability. The very high reliability of the MTCS is most likely due to the number of items in the measure. High reliability can also indicate bloated specifics. However, high inter-item correlations had been inspected and any bloated specifics removed from the scale.

Inter-scale equivalence analysis revealed conceptual overlap between specific context-dependent aspects of task cohesion (i.e. valued roles and unity of purpose) and context-independent aspects of task cohesion (i.e. general aspects). This indicates that task cohesion is a higher-order dimension of cohesion of which valued roles and unity of purpose are part. These sub-aspects should therefore not be treated as distinct dimensions of cohesion as represented in previous cohesion research (e.g. Yukelson et al., 1984). The 16 dimensions represented in the MTCM were reduced to 8 dimensions, combining individual, team, vertical and horizontal aspects of valued roles and unity of purpose with the

corresponding general aspects of task cohesion. This inter-relationship between task cohesion, valued roles and unity of purpose is captured in the MTCM; its explicit representation in the theoretical model is important for supporting the adaptation of the MTCS to other contexts. The inter-scale equivalence analysis of the eight dimensional model revealed items that correlated more highly with another dimension than the one they were written to measure. These were therefore removed, reducing the final measure to 103 items.

The results of the preliminary FA, conducted as an initial investigation of the structure of the MTCS (i.e. a 16 versus 8 dimensional structure) indicated that the sample size obtained in this phase was insufficient for adequate analysis of the dimensionality of the MTCS. Analysis of separate portions of the MTCM, increasing the subject to item ratio, provided some evidence for the validity of an eight dimensional structure. However, these results must be treated with caution since factoring the whole set of items together may produce a different factor structure due to the effect of different items on one another (Kline, 2000). Valued roles and unity of purpose were not found to be distinct from general task-based aspects. Furthermore, vertical, horizontal and social-based aspects of cohesion were found to consistently load onto separate factors. However, due to the sample size limitations in this research, these results must be further investigated. It is also important to conduct the factor analysis on the full set of items since the presence of the additional items may impact the factor structure obtained. Similarly, the reliability of the measure must be confirmed in a new sample that is not affected by the missing value pattern identified in this study. These analyses will be addressed as part of the validity phase of the research.

6 Validation of the MTCS



The purpose of this phase of the research is to replicate the stability of the internal consistency reliability of the MTCS in a new sample and determine its construct validity for practical use. The psychometric properties (i.e. the reliability and structure) of the criterion measures (TPQ, MOAQ-JSS and GEQ) used in this research were first examined to ensure that the subsequent analysis would be robust. The convergent (internal and external), divergent, differential and factorial validity of the MTCS was tested. In addition the sensitivity of the scale to expected differences in levels of cohesion was examined. In general, the reliabilities of the criterion measures could be replicated in the work team sample. The unidimensional structure of the MOAQ-JSS was replicated in the work team sample. However, the structure of the GEQ and TPQ reported by the test publishers could not be precisely replicated. The MTCS was found to have good internal convergent validity and partial support for external convergent validity with the GEQ was identified. Partial support was found for the divergent validity of the MTCS and the measure was found to have good differential validity and was sensitive to expected differences in levels of cohesion. The factorial validity of the MTCS could not be established due to an insufficient sample size or subject to item ratio for reliable results.

6.1 Introduction

Before the MTCS can be applied in any organizational setting (i.e. used by managers or practitioners to measure the cohesiveness of teams) it must be tested for its suitability as a measure of organizational work team cohesion. As described in Chapter 3, the lack of adequate benchmark test that is accepted as standard in the field and clear criteria for prediction provides a considerable challenge for establishing adequate validity. As a result, existing measures of cohesion are of varying psychometric quality. The validation of the MTCS requires a more comprehensive approach to validation than previously adopted in the development of existing measures of cohesion. Studies designed to determine the validity of existing measures of cohesion have typically sought to demonstrate the suitability of the measure through only a limited number of specific forms of validity (e.g. predictive validity or

factorial validity). However, validity studies must be designed around what is known about the nature of cohesion (based on previous research but also based on the results of Chapter 5) and test a set of hypotheses that together provide evidence of the construct validity of the measure. Such hypotheses must represent a variety of forms of validity. This approach is adopted in this research to improve the accuracy of the measurement of team cohesion. Since determining the construct validity of a measure relies on testing it against existing measures of cohesion and criterion variables, the psychometric properties of these selected measures must also be tested in the sample obtained for validation. If their reliability and structure cannot be replicated, then their use as 'benchmark' tests must be questioned. The high internal consistency reliability of the MTCS found in Chapter 5 must also be replicated in the new sample obtained for this phase of the research.

Establishing the validity of a measure of cohesion is not straightforward due to the abstract nature of the construct. As described in Chapter 2, the precise form that cohesion takes in different teams can vary with its dimensions more or less salient depending on context or team developmental stage. The validity of the MTCS must therefore be established across different conditions. Validity is a matter of degree and in cohesion research it is a necessarily extensive and long process; testing hypothesis that capture the nature of cohesion across different conditions. This research therefore provides the first stage in establishing supportive evidence for the validity of the MTCS, and as such should be viewed as part of a much larger research agenda for testing its validity.

6.2 Method

6.2.1 Sample

Following item reduction and refinement through item analysis, the final version of the MTCS was administered to two different samples to test its reliability and validity. The first sample was obtained to determine the sensitivity of the MTCS to expected changes in levels of cohesion. The sample was drawn from two organizations – QinetiQ and Worcester County Council. The nature of these organizations and the teams within them is described fully in Chapter 5. Following collection of data in the pilot phase, QinetiQ undertook a major reorganization providing an appropriate sample for this analysis. As an organization that had not undergone any changes between administration of the MTCS at the pilot and validity phase, Worcester County Council provided an appropriate control sample. Both of these samples are described in turn. Thirty-two of the original 80 respondents from QinetiQ who

responded in the pilot phase and gave consent to be re-tested were obtained¹³. This sample comprised 56% ($n=18$) males and 44% ($n=14$) females. The greatest percentage of subjects were aged between 31 and 40 (40%) with an equal split of subjects across the age ranges 21-30, 41-50 and 51-60. The size of team subjects were members of ranged from 4 to 22 members ($M = 10.47$, $SD = 4.89$). Subjects represented a broad range of team membership ranging from 2 months to 36 years ($M = 68.28$ months (5.69 yrs), $SD = 97.73$). Six subjects in the sample were team leaders and 26 were team members. Subjects also represented a broad range of years experience and a number of different job categories as shown in Figure 6.1 and Table 6.1:

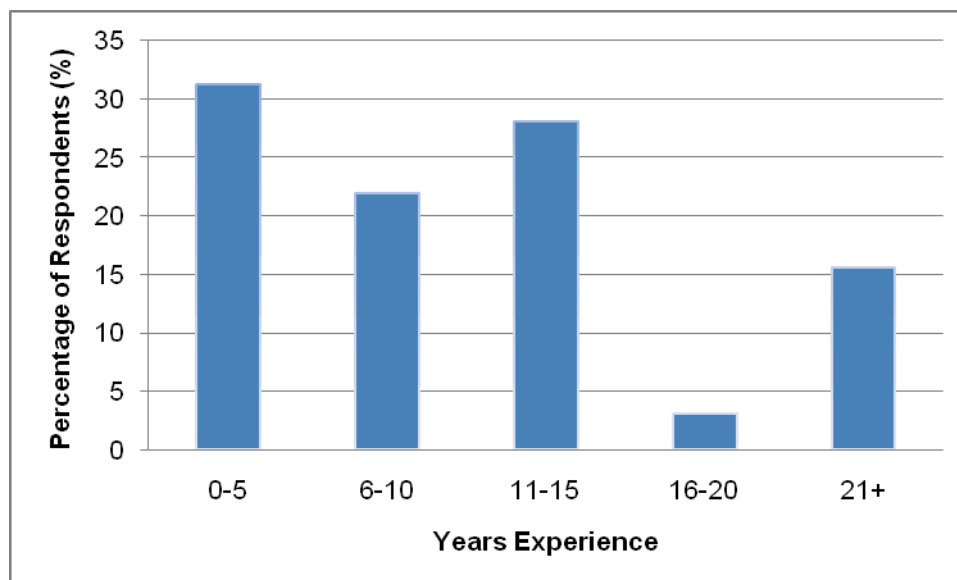


Figure 6.1: QinetiQ time 2 subjects summarised by number of years experience.

¹³ These subjects were identified from their email address obtained from their replies in the pilot phase.

Table 6.1:
QinetiQ time 2 subjects summarised by job category ($n=32$)

	Frequency	Percent
Admin / Secretarial	4	12.5
Engineering	3	9.4
Human Resources	1	3.1
Managerial	5	15.6
Scientific & Technical	17	53.1
Other	2	6.3
Total	32	100

From those who provided consent, 58 (48% male and 52% female) of the 112 Worcester County Council respondents from the original pilot sample were obtained for retesting at time 2. The greatest percentage of subjects were aged between 41 and 50 (40%) with 12% aged 21-30, 26% aged 31-40, 19% aged 51-60 and 3% aged 61+. The size of team subjects were members of ranged from 2 to 13 members ($M= 6.34$, $SD = 2.54$). Subjects in this sample also represented a broad range of team membership ranging from 1 year to 17½ years ($M = 77.07$ months (6.42 yrs), $SD = 50.80$). Nineteen subjects in the sample were team leaders and 39 were team members. Again Worcester County Council subjects represented a broad range of years experience and a number of different job categories as shown in Figure 6.2 and Table 6.2:

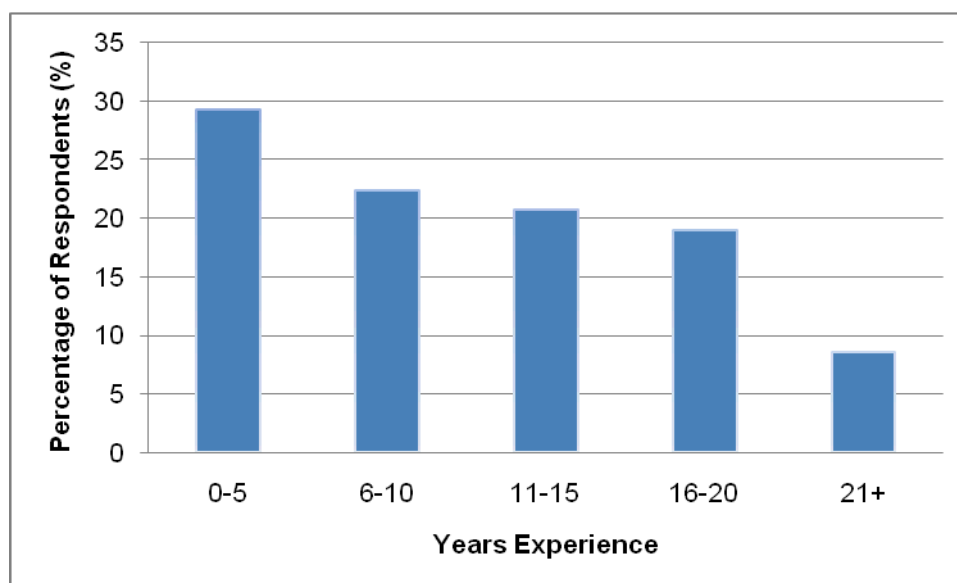


Figure 6.2: Worcester County Council time 2 subjects summarised by number of years experience.

Table 6.2**Worcester County Council time 2 subjects summarised by job category
(*n*=58)**

	Frequency	Percent
Admin / Secretarial	7	12.1
Building Industry	47	81.0
Finance & Banking	1	1.7
Government	1	1.7
Scientific & Technical	2	3.4
Total	58	100

A second new sample was obtained from QinetiQ to test both the stability of the internal consistency of the final version of the MTCS and to determine its validity. The sample obtained from QinetiQ for the validity analysis did not contain any subjects that had previously participated in the pilot phase. A new sample of subjects that represent other organizations, such as Worcester County Council, could not be obtained at this stage of the research due to access issues. A total of 214 new respondents were obtained. Of this sample 72% were male (*n*=155) and 28% were female (*n*=59). The majority of respondents were team members (174) with 40 subjects occupying a team leader role. The highest percentage of respondents was aged between 41 and 50 with a fairly equal spread of subjects aged 21-30, 31-40 and 51-60. Only 2% of subjects were aged 61 or above. The size of team subjects were members of ranged from 3 to 176 (*M* = 13.92, *SD* = 18.78) and length of membership ranged from between 1 month and 28½ years (*M* = 47.53 months (3.96 yrs), *SD* = 58.87). Subjects represented a range of years of experience and a range of job categories shown in Figure 6.3 and Table 6.3 below:

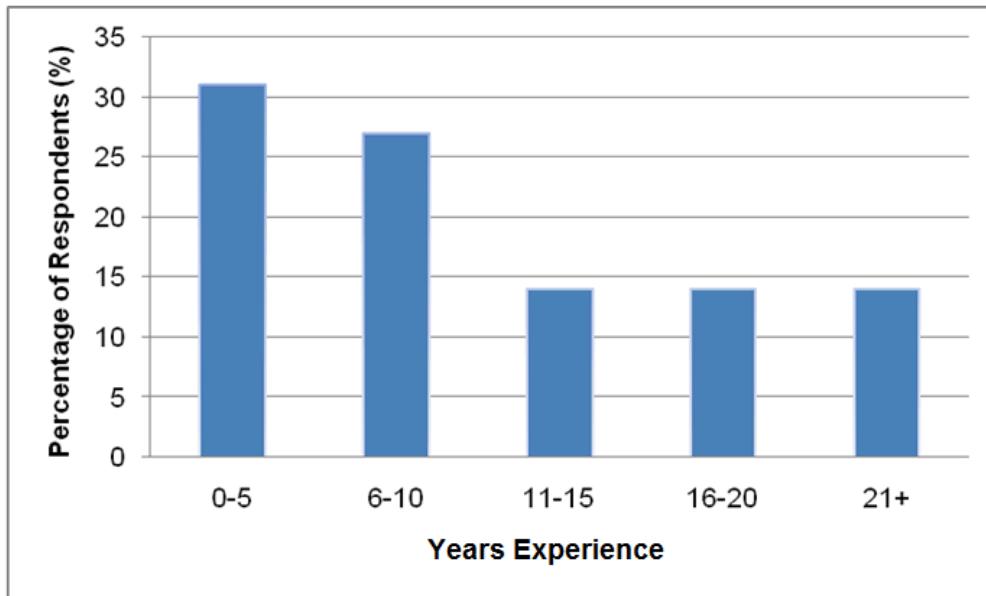


Figure 6.3: Subjects obtained for validity analysis summarised by number of years experience.

Table 6.3

**Subjects obtained for validity analysis summarised by job category
(N=214)**

	Frequency	Percent
Accountancy	3	1.4
Admin / Secretarial	9	4.2
Engineering	22	10.3
Government	1	.5
Legal	3	1.4
Managerial	27	12.6
Marketing & PR	4	1.9
Sales	11	5.1
Scientific & Technical	121	56.5
Other	13	6.1
Total	214	100

A similar representation of subjects was obtained in this phase as in the pilot phase across age, length of membership, years experience, team size, and position. A similar spread of subjects across job category was also obtained, although no subjects were obtained from

Worcester County Council representing the building industry. A higher number of male subjects were also obtained at this phase of the research.

6.2.2 Materials

6.2.2.1 The Multidimensional Team Cohesion Scale (MTCS)

The final version of the MTCS (see Appendix S), reduced to 103 items, was administered to all samples obtained from both QinetiQ and Worcester County Council. This version of the MTCS contained the same standardised administration instructions as presented in the pilot version of the measure and described in section 5.2.3. The design of the MTCS remained consistent from the pilot phase to prevent any response effects. For the first sample that was re-tested from the pilot phase, any learning effects were minimised by a 7 month gap between test and retest.

For the sample obtained for testing the sensitivity of the measure, the final version of the MTCS contained an additional question asking respondents if there have been any factors that have contributed to a change (if any) to the level of cohesion within their team since they last completed the MTCS. This was to determine whether any differences in levels of cohesion reported at time 1 and time 2 were due to external factors (i.e. organizational restructuring). For the new sample obtained from QinetiQ, the MTCS was administered and completed at the same time as three existing validated measures selected for comparison. These measures were included to test the convergent and divergent validity of the MTCS. Each measure is described in turn below.

6.2.2.2 The Group Environment Questionnaire (GEQ)

Based on the analysis of existing measures in Chapter 3, the Group Environment Questionnaire (GEQ) developed by Carron et al. (1985, 1998, 2002a) was selected as the most appropriate measure to assess convergent validity. As an existing measure of cohesion it is expected that the MTCS will have a modest correlation with the GEQ. However, very high correlations with the measure are not expected due to the under-representation of manifestations of cohesion in the GEQ that are considered important in an organizational team context. Very high correlations would also indicate redundancy in the measures. Although Carless and De Paola (2000) developed an adapted version of the GEQ for work teams (the TC Scale), following contact with the principal author it was not possible to obtain a copy of the adapted work team version as it is no longer held by the author. However, where their modifications to items could be identified in their published paper on the development of their measure, these were used. The GEQ is one of the most

widely used measures of cohesion and, unlike the majority of measures which have been validated in a single study only, the GEQ provides the advantage of having been validated in many different studies by many independent researchers. The measure is an 18-item instrument tapping individual and team aspects of social and task-based cohesion. The dimensions of the GEQ are presented in Table 6.4 below:

Table 6.4:
The dimensions of the GEQ

GEQ Scales	Item Numbers
Individual Attractions to the Group-Social (ATG-S)	1, 3, 5, 7, 9
Individual Attractions to the Group-Task (ATG-T)	2, 4, 6, 8
Group Integration-Task (GI-T)	10, 12, 14, 16, 18
Group Integration-Social (GI-S)	11, 13, 15, 17

The full list of GEQ items are presented in Appendix T. Over nearly 20 years of research, the dimensions of the GEQ were found to have acceptable internal consistency reliability as presented in Table 6.5 below (reported in the GEQ test manual, Carron et al., 2002a):

Table 6.5:
Internal consistency reliability of the GEQ dimensions

GEQ Scales	Cronbach's Alpha α
ATG-S	.64
ATG-T	.75
GI-T	.70
GI-S	.64

Previous studies conducted by Carron et al. (1985) achieved similar reliability results in different samples with heterogeneous characteristics. Carless and De Paola (2000) also obtained some evidence of good reliability with alpha ranging from .63 to .81 in a work team context. Carron et al. (1985; 1998; 2002a) did not examine the test-retest reliability of the GEQ due to the issues associated with obtaining stable results given the nature of the construct. They cite Schutz (1998) who argues that differences in reliabilities obtained at test and retest does not necessarily indicate that the measure is unstable but that the underlying construct is dynamic and changes from one time point to another. It is therefore difficult to determine true reliability using test-retest reliability.

The scale dimensions of the GEQ were found to be unique with low to moderate inter-scale correlations (Carron et al., 1985):

Table 6.6:
Inter-scale correlations of the GEQ dimensions

	ATG-S	ATG-T	GI-T	GI-S
ATG-S	—			
ATG-T	.43	—		
GI-T	.54	.32	—	
GI-S	.35	.32	.39	—

The GEQ has been extensively validated. Original testing of the measure provided evidence of content validity using five experts from social, industrial and sports psychology (Carron et al., 1985) and convergent and divergent validity (Brawley, Carron, & Widmeyer, 1987) with three measures: the Sport Cohesiveness Questionnaire (SCQ) (developed by Martens, Landers & Loy, 1971), the Sports-Modified Bass Inventory (SBOI) (developed by Bass, 1962; modified for a sports context by Ball & Carron, 1976) and the Team Climate Questionnaire (TCQ) (developed by Grand & Carron, 1982; Carron, 1986). Only the latter had known psychometric properties. Each criterion measure was chosen because it had more than one subscale that corresponded to the GEQ whilst also containing subscales considered to be tapping distinct constructs. Correlation of the task-based subscales of the GEQ with corresponding subscales in the SCQ and TCQ generally provided evidence of convergent validity in both a team and individual sports context (correlations ranged from $r = .41$ to $.62$). Only partial support for convergent validity was found for social-based aspects of cohesion as both ATG-T and ATG-S in a team sport context were found to correlate with social aspects of the SCQ ($r = .38$ and $.43$ respectively). Analysis of the correlation between dimensions of the GEQ and SBOI designed to measure personal motivations rather than perceptions of team cohesion revealed divergent validity of the GEQ (20 of the 24 correlations were low and non-significant for both individual and team sports, r ranged from $.03$ to $.28$, $p > .05$). The eight correlations between the social-based dimensions of the GEQ and the TCQ task-related and role-involvement subscales were also found to be low and non-significant ($r = .02$ to $.27$, $p > .05$). The factorial validity study conducted by Carron et al. (1985) provided support for the four factor structure of the GEQ. The four factor structure was also identified in research conducted by Li and Harmer (1996).

Discriminant function analysis and a post hoc univariate F test conducted by Brawley et al. (1987) showed that the GEQ has predictive validity through its ability to differentiate between different levels and types of perceived task cohesion present in individual sports where ATG-T was greater as predicted ($F(1, 187) = 7.22, p < .008, M \text{ individual} = 30.97 \text{ vs. } M \text{ team} = 28.85$) and team sports where GI-T was greater as predicted ($F(1, 187) = 14.37, p < .002, M \text{ team} = 32.64 \text{ vs. } M \text{ individual} = 28.88$). This provided validity evidence for the need to distinguish between individual and team-based aspects of cohesion. Higher levels of social cohesion (GI-S) in long-standing teams than newly formed teams was also found offering further support to the predictive validity of the GEQ ($F(1, 78) = 4.48, p < .03, M \text{ Long-standing} = 25.64 \text{ vs. } M \text{ New} = 22.74$). The task based aspects of the GEQ were also found to have construct validity as tested by assessing the relationship between cohesion and success/failure responsibility attributions (i.e. whether members of the teams considered themselves responsible for success or failure in team outcomes). The GEQ was found to successfully differentiate between high and low cohesion as the results obtained supported the prediction that in highly cohesive teams, members took more self-responsibility for failure than in low cohesive teams. In teams that experienced success, levels of task cohesion were not found to result in differences in responsibility attributions. Due to the design of the validity studies, greater evidence of validity for the task-based aspects of the GEQ was obtained than for the social-based aspects.

Since the GEQ was developed in a sports team context, many of the items needed to be reworded in order to be relevant to organizational work teams. This also involved removing items that could not be reworded. Modification and piloting of the GEQ in an organizational work team context is discussed fully in section 6.3.

6.2.2.3 The Team Performance Questionnaire (TPQ)

The Team Performance Questionnaire (TPQ) was developed by Donna Reichman (1998) and was selected to assess divergent and differential validity. There are few self-report measures of team performance that are general-purpose (Senior & Swailes, 2004). Most measures of team performance tend to be objective in nature where teams are assessed on the products they produce, such as profitability targets met. Managers' ratings of performance are also used to measure performance. However, obtaining ratings of individual and team performance was not logistically possible in this research. Therefore, a self-report measure of team performance was used. Finding a suitable team performance measure was difficult. Of the few instruments that were identified, the TPQ was found to be the most practical for use in this research. The TPQ is a 32-item instrument rated on a 5-point Likert scale. The TPQ items are presented in Appendix U. It measures six

characteristics that distinguish high-performing teams from average- and low-performing teams as captured in the Team Performance Model also developed by Reichman (1998):

Table 6.7:
The six subscales of the TPQ

TPQ Subscales	Item Numbers
Goals and Results	1-5
Collaboration and Involvement	6-10
Competencies	11-15
Communication Processes	16-20
Emotional Climate	21-25
Leadership	26-32

The content validity of the items within the TPQ was verified by a panel of five experts in team leadership and education. The TPQ was also found to have high internal consistency reliability ($N=183$) with subscale alphas ranging from .77 to .89. Each subscale alpha is not reported in the test manual. The subscales were also found to have acceptable test-retest reliability ($N=44$):

Table 6.8:
Internal consistency reliability of the TPQ subscales

TPQ Subscale	Cronbach's Alpha α
Goals and Results	.71
Collaboration & Involvement	.90
Competencies	.78
Communication Processes	.78
Emotional Climate	.78
Leadership	.80

However, only a 3-week gap was used between test and retest. Further, only factorial validity was conducted to determine construct validity. The results of the factor analysis, using varimax rotation, showed the existence of six factors matching the characteristics outlined in the Team Performance Model. The lack of other forms of validity tested in Reichman's (1998) research must be taken into account when using the TPQ to determine the divergent and differential validity of the MTCS. Convergent validity was not examined by

the test developer to determine whether the TPQ actually measures 'team performance' and not any other constructs.

6.2.2.4 The Michigan Organizational Assessment Questionnaire - Overall Job Satisfaction Scale (MOAQ-JSS)

As additional evidence of divergent and differential validity, Cammann et al.'s (1983) measure of Overall Job Satisfaction was selected, developed as part of the General Attitudes module of the Michigan Organizational Assessment Questionnaire (MOAQ-JSS). Although a number of measures of job satisfaction have been developed, Cammann et al.'s (1983) MOAQ-JSS is considered the most psychometrically sound (Bowling & Hammond, 2008). For this research, the length of the questionnaire provided a clear practical advantage, consisting of only the 3 items shown below:

1. All in all, I am satisfied with my job.
2. In general, I don't like my job.
3. In general, I like working here.

Items are rated on a 7-point Likert scale and scores are summed to provide an overall measure of job satisfaction. The measure was designed to assess an individual's affective response to their job. It captures this affective and emotional aspect by using the words 'like' and 'satisfied'. As such it has been described as having good face validity (Bowling & Hammond, 2008).

The scale was found to have high internal consistency reliability, with a Cronbach's alpha of .77. The factorial validity of each module in the MOAQ was assessed using principal axis factoring using varimax rotation. The sample obtained was split into two random-half samples to enable factoring to be conducted on two different samples. The items designed to tap overall job satisfaction were found to cluster on the same factor in both samples. Bowling and Hammond's (2008) meta-analysis of the MOAQ-JSS confirms the internal consistency ($\alpha = .84$) and test-retest reliability ($r = .50$) of the measure. Further, their meta-analysis confirmed the extensive construct validity of the measure finding expected patterns of relationship between the MOAQ-JSS and its antecedents (e.g. job complexity, autonomy and feedback), consequences (e.g. organizational citizenship behaviours, turnover and absenteeism) and correlates (e.g. organizational commitment, supervision and promotional opportunities).

6.2.3 Procedure

For this stage of the research, ethical approval was obtained from the University of Leicester's ethics committee. The final version of the MTCS was administered to QinetiQ participants via Survey Monkey¹⁴ together with the three other questionnaires selected as criterion measures (see Appendix V). Following data collection during the pilot phase the organizational structure of QinetiQ was re-organised into Lines of Business (LoB) and additional sectors (e.g. Consulting sector) that resulted from mergers between previous departments/divisions. As a member of a LoB during this phase of the research, a covering email and a link to the final version of the MTCS on Survey Monkey, was sent to each LoB Performance Manager to be administered to the members of each LoB. This was necessary to obtain the appropriate consent for administering the MTCS to large numbers of employees. Each LoB contains approximately 120 people. In order to reach the wider sectors of QinetiQ, the covering email and link to the MTCS was also posted on the company's intranet homepage, with prior permission.

As in the pilot phase of the research, a standardised email (see Appendix K) was sent to all respondents requesting their participation. Again, participants were informed that by submitting the completed MTCS they were agreeing to their data being used in this research but that all data would be treated in the strictest confidence and anonymity guaranteed. It was assured that responses would be reported as a collective response only. Participants were also invited to contact the researcher if any further information about the study was required. A link to the questionnaire on Survey Monkey was provided in the email. Two survey links were created. To determine the sensitivity of the measure, the retested QinetiQ sample obtained at time 2 were provided with a link to the final version of the MCTS only and were also informed that their repeat response formed a different phase of the research. The new sample obtained was provided with a link to the final version of the MTCS together with the three other questionnaires selected for comparison. Administration via Survey Monkey provided a much enhanced method of administration due to the size of the MTCS and the addition of the other three questionnaires added for validity analysis. This also enabled items to be randomly sorted for each respondent on accessing the measures. Before analysis, negative items were reversed where applicable on each questionnaire, with exception of the TPQ where all items were positively phrased as designed by the test developer.

¹⁴ Accessed via the website address: www.surveymonkey.com

Due to difficulties accessing the internet to complete the MTCS via survey monkey, a revised Excel version of the MTCS was administered to Worcester County Council participants. Following the pilot test, the Excel version was reformatted to reduce its file size to make it easier to open and complete. Despite the different methods of administration and potential response effects that this may have, this was considered acceptable as the Worcester County Council subjects formed part of the test/retest sample that were administered the MTCS in the same format at time 1. The layout and design of the MTCS was also kept consistent to minimise response issues.

6.3 Pilot Test of the Modified GEQ

As the GEQ was developed for a sports team context, not all items had relevance to work teams. Before administration, the GEQ therefore had to be modified and pilot tested. Although a full copy of the final items used in the TC Scale could not be obtained from Carless and De Paola (2000), directions were taken from their research paper on the modifications made to GEQ items. In accordance with the test manual developed for the GEQ, items were directly used if they were considered relevant to organizational work teams. Minor modifications were made to some items to enhance their applicability and items that were not considered relevant, even through rewording, were deleted. Table 6.9 below presents the original items in the GEQ and those retained in the adapted version.

Table 6.9:
Original GEQ items and modifications made in the adapted version

Original GEQ	Adapted GEQ
I do not enjoy being a part of the social activities of this team.	Retained unaltered.
I am not happy with the amount of playing time I get.	Deleted
I am not going to miss the members of this team when the season ends.	'season ends' replaced with 'team disbands'
I am unhappy with my team's level of desire to win.	'desire to win' replaced with 'commitment to the task' (Carless & De Paola, 2000)
Some of my best fiends are on this team.	'on' replaced with 'in' (Carless & De Paola, 2000)
This team does not give me enough opportunities to improve my personal performance	Retained unaltered
I enjoy other parties more than team parties	'other parties' and 'team parties' replaced with 'social events'

I do not like the style of play on this team.	Deleted
Our team is united in trying to reach its goals for performance	Retained unaltered
Members of our team would rather go out on their own than get together as a team.	Retained unaltered
We all take responsibility for any loss or poor performance by our team.	Retained unaltered
Our team members rarely party together.	'party' replaced with 'socialise'
Our team members have conflicting aspirations for the team's performance.	Retained unaltered
Our team would like to spend time together in the off season.	'in the off season' replaced with 'outside of work hours' (Carless & De Paola, 2000)
If members of our team have problems in practice, everyone wants to help them so we can get back together again.	'practice' replaced with 'work'
Members of our team do not stick together outside of practices and games.	'practices and games' replaced with 'work time' (Carless & De Paola, 2000)
Members of our team do not communicate freely about each athlete's responsibilities during competition or practice.	'athlete's' replaced with 'others' and 'competition or practice' replaced with 'work time'

Both of the items that were removed from the adapted version of the GEQ measured the dimension ATG-T leaving only two items tapping this dimension. The dimensions ATG-S, GI-T and GI-S were measured by five, five, and four items respectively.

The modified version of the GEQ (see Appendix W) was administered to 6 participants to be content validated. Three of the participants were psychologists, two were software engineers and one was a capability team leader (CTL). The background of the GEQ was described to participants and the purpose of the pilot outlined. Participants were asked to carefully review all items within the adapted version of the GEQ, considering the following:

- The relevance of item wording to an organizational context.
- The clarity of item wording.
- Any modifications that they feel should be made to enhance item relevance and comprehensibility.

In general, participants felt that the items have both social and task-based relevance to organizational work team contexts; although one participant felt that social aspects were over-represented. No specific suggestions were made for re-wording or modifying any of the

items presented. However, a number of points were made that are worthy of discussion. One point raised concerned the interpretation of items and the difficulty capturing the reason behind ratings provided. Specifically, low ratings provided to the item 'Members of our team do not communicate freely about each other's responsibilities during work time' could not capture whether people do not communicate freely because, for example, their work or team environment constrains communication or because individuals are unsure of each other's responsibilities. The difficulty and confusion introduced by the use of negative wording was also noted. This confirms the need to use negatively phrased items carefully.

Some additional aspects that they felt should be included in a measure of organizational work team cohesion were also suggested. For example, items that measure how overall team goals are achieved. It was also commented that although the GEQ includes an item that measures the achievement of team goals, it does not capture whether there is any conflict over the goals of the team. It was also suggested that items should be included that tap whether team members share the same 'backgrounds, ideology, interests'. Since the purpose was to use the GEQ as a criterion measure for validating the MTCS against, the aim was to make only minimally sufficient modifications to enable this. Therefore, additional items were not written for this measure.

6.4 Tests of Normality

Before testing both the properties of the comparison measures and the reliability and validity of the MTCS, the normality of the data obtained for the validity phase was first tested to determine suitability of analysis techniques (i.e. parametric correlation and FA).

6.4.1 MTCS

Initial data screening revealed no data imputation errors and no missing values were found. The majority of items were found to have a negative skew (values range from .001 to -1.64) and negative kurtosis with some items showing a positive kurtosis (values range from a normal kurtosis of .03 to severe kurtosis of 5.88). Skewness and kurtosis values for all items are presented in Appendix X. A bivariate scatterplot (shown in Figure 6.4 below) for the items with the highest skewness value (item 4) and highest kurtosis value (item 17) was inspected as the relationship between these items are most likely to depart from linearity.

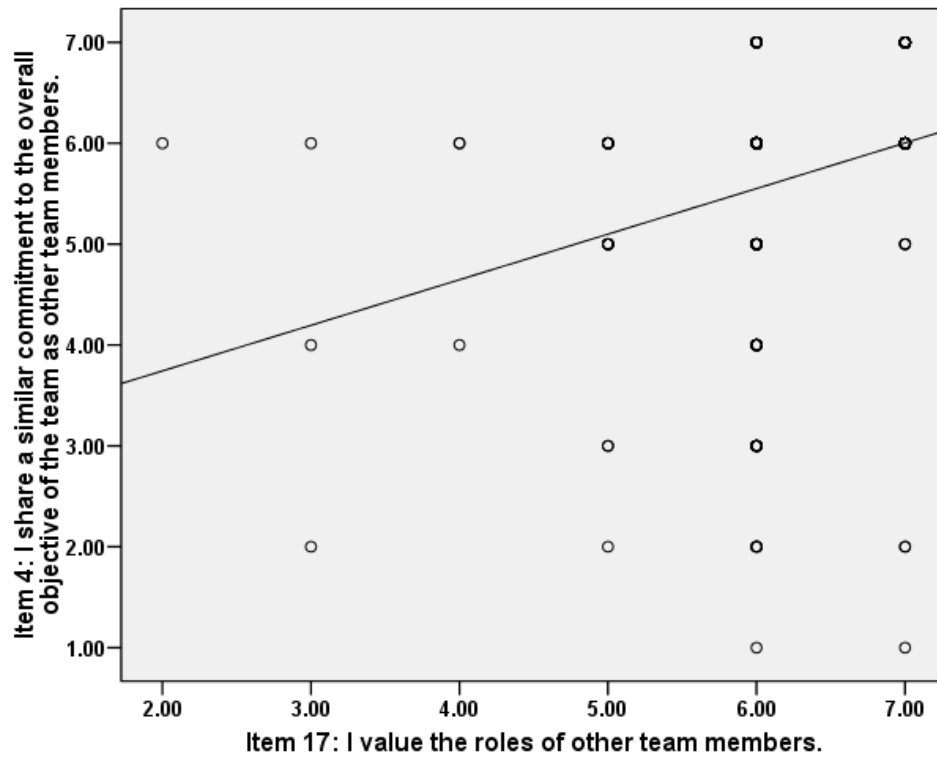


Figure 6.4: Scatterplot showing the relationship between MTCS items 4 and 17.

The scatterplot reveals some non-linearity in the relationship between items 4 and 17. However, comparison of the eta coefficient of non-linearity and Pearson's r indicates that this non-linearity is not extreme ($\eta = .33$, $r = .28$), the difference between eta and r is very small. Inspection of the bivariate scatterplot for the items with the highest and lowest skewness values, item 4 and 90 revealed mild heteroscedasticity in the data, evident from the skewness on item 4:

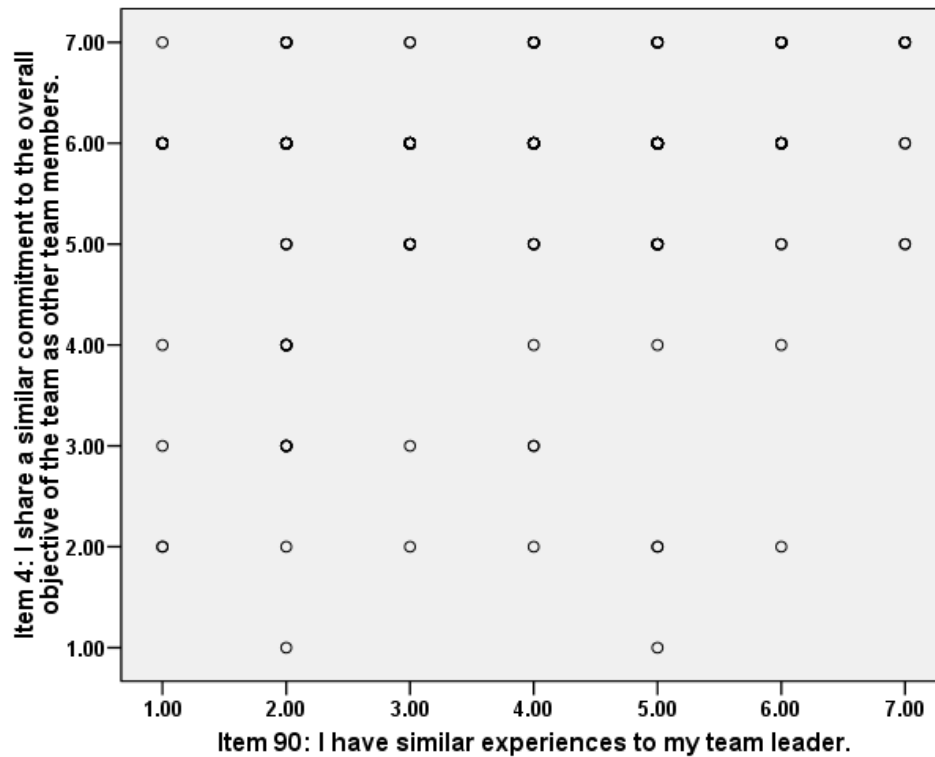


Figure 6.5: Scatterplot showing heteroscedasticity with skewness on MTCS item 4.

Given the large sample size obtained ($N = 214$), the non-normality of the data is likely to have minimal affect on the results obtained. Despite the heteroscedastic nature of the data slightly weakening results from any parametric statistical analysis, the minimal departure from linearity indicates that the use of Pearson's r in correlation and factor analysis is acceptable.

6.4.2 GEQ

No missing values were found against any GEQ items. Nine of the items were found to be mildly negatively skewed ranging from $-.44$ to -1.02 and eight of the items were found to have a mild positive skew, ranging from $.02$ to $.59$. The majority of items were also found to have a mild negative or flat kurtosis. Kurtosis values ranged from $.18$ to -1.27 . As the violation of normality is not extreme and the sample size is >200 , the effects of the skewness and kurtosis are likely to be minimal (Waternaux, 1976). The items with the highest skewness and kurtosis values were examined for linearity. These were items 3 and 11:

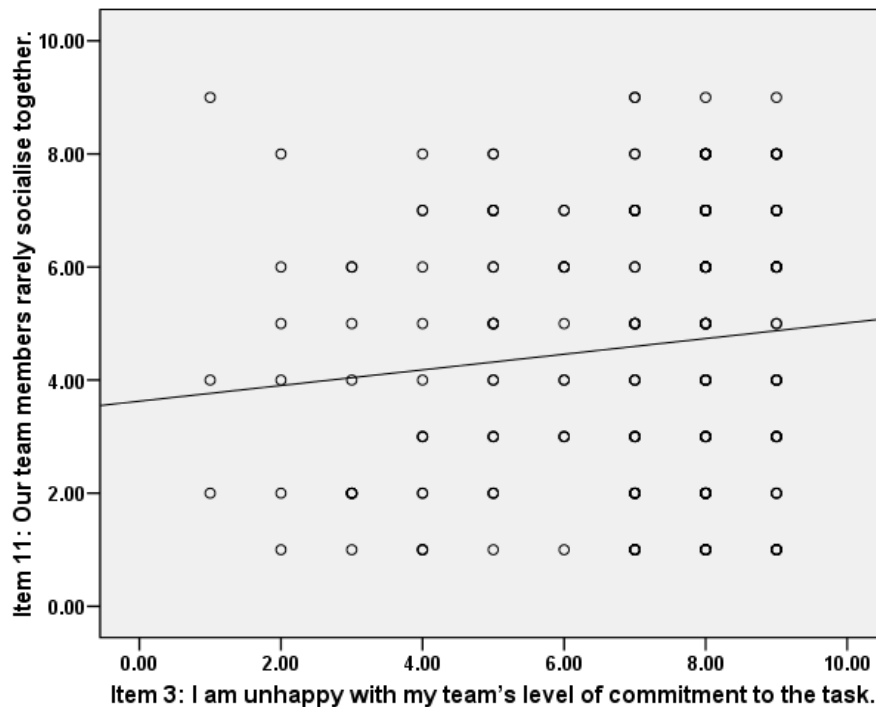


Figure 6.6: Scatterplot matrix showing the relationship between GEQ items 11 and 13.

The scatterplot reveals mild heteroscedasticity due to the skewness on item 3. Comparison of Pearson's r and the eta coefficient of non-linearity reveals that although the eta coefficient ($\eta = .20$) is larger than Pearson's r ($r = .12$), the difference is small indicating that the extent of non-linearity is small. The use of Pearson's r on this data is therefore acceptable in correlation and factor analysis, although the heteroscedasticity of the data will slightly weaken results obtained.

6.4.3 TPQ

All subjects provided a response to all TPQ items, no missing values were observed. All items were found to be negatively skewed, some with a positive kurtosis and some with a negative kurtosis. Skewness values ranged from -1.24 to -0.26 . Kurtosis values ranged from a near normal value of 0.08 to 2.26 . The items with the highest skewness and kurtosis values were examined for linearity. These were items 16 and 18:

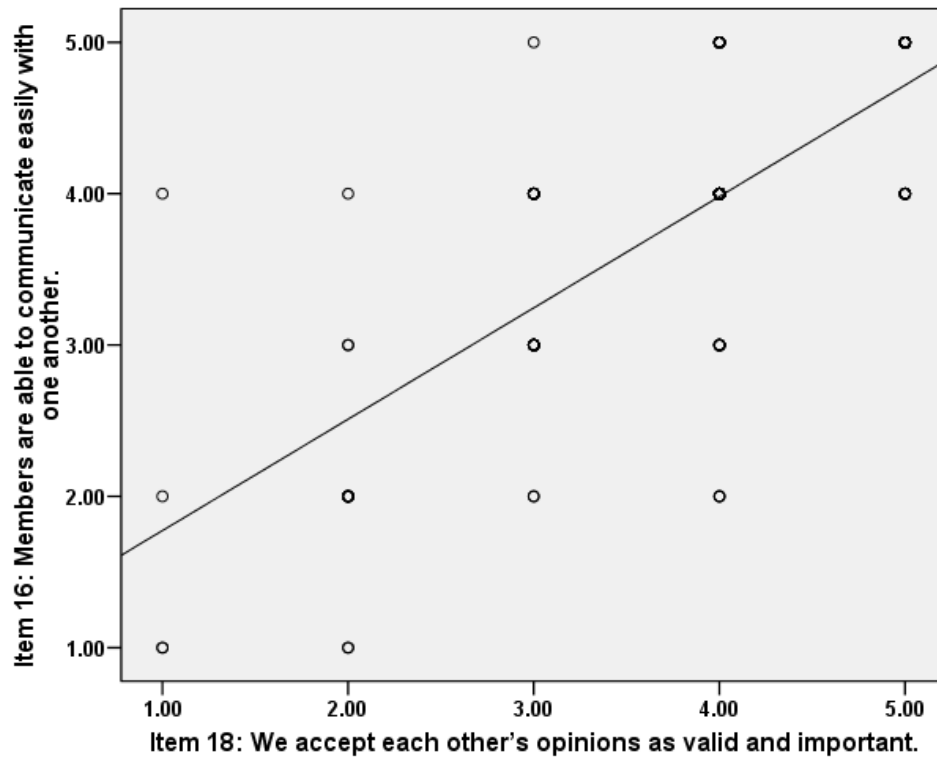


Figure 6.7: Scatterplot matrix showing the relationship between TPQ items 16 and 18.

The scatterplot indicates some non-linearity in the relationship between items 16 and 18. This is confirmed by comparison of Pearson's r and the eta coefficient of non-linearity. The eta coefficient ($\eta = .74$) is only slightly larger than Pearson's r ($r = .73$) indicating that the extent of non-linearity is small. The expected heteroscedasticity of the data was confirmed through inspection of the bivariate scatterplot for the item with the highest skewness value, item 16 (-1.24) and the item with the lowest skewness value, item 30 (-.24). Figure 6.8 below, shows that the heteroscedasticity results from skewness on item 16.

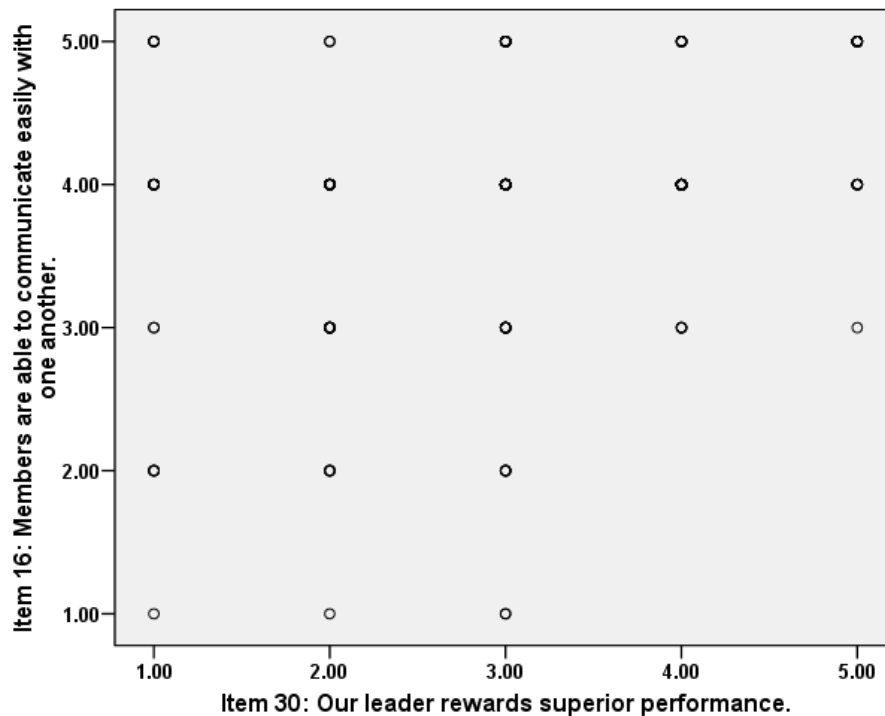


Figure 6.8: Scatterplot matrix showing heteroscedasticity with skewness on TPQ item 16.

As with the data obtained for the GEQ, the use of Pearson's r on the TPQ data is therefore acceptable in correlation and factor analysis. Again the results will be slightly weakened because of the heteroscedasticity of the data.

6.4.4 MOAQ-JSS

Descriptive statistics for the MOAQ-JSS revealed no missing values against any of the three items. All items were found to have a negative skew. Item 1 was found to have a negative kurtosis with item 2 and 3 a positive kurtosis as shown in Table 6.10 below:

Table 6.10:
Skewness and kurtosis values for the MOAQ-JSS ($N=214$).

	N	Skewness		Kurtosis	
		Statistic	Std. Error	Statistic	Std. Error
Item 1	214	-.71	.17	-.71	.33
Item 2	214	-1.08	.17	.21	.33
Item 3	214	-1.05	.17	.12	.33

Inspection of the bivariate scatterplots for the pairs of items indicated some non-linearity and heteroscedasticity, as shown in Figure 6.9:

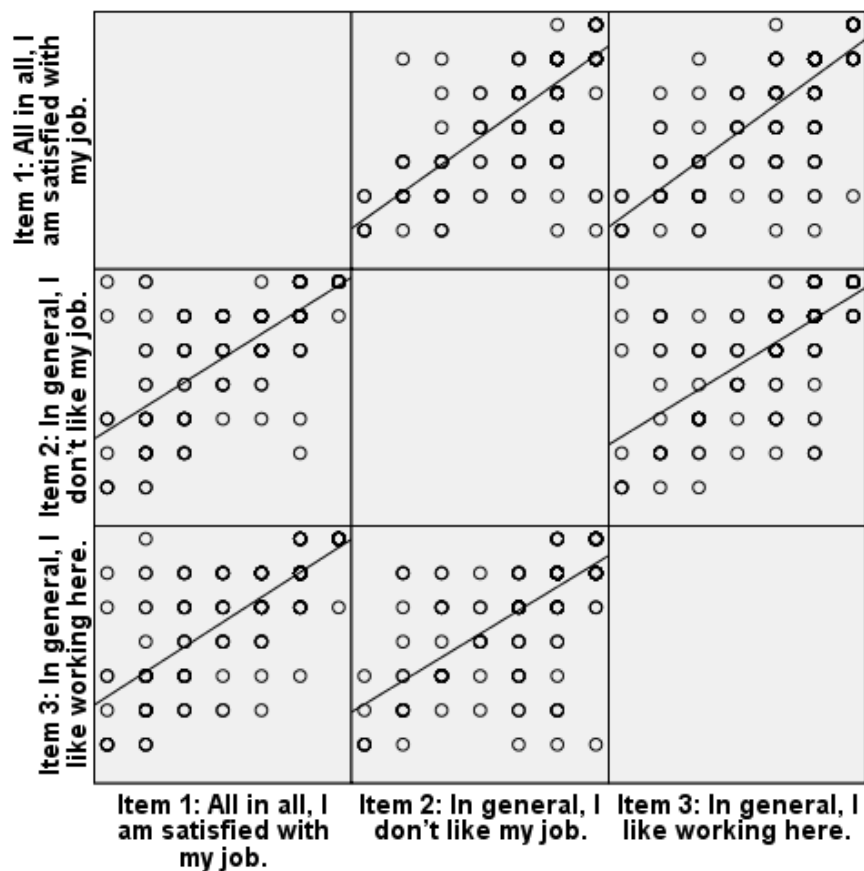


Figure 6.9: Scatterplot matrix showing the relationship between MOAQ-JSS items.

Comparison of Pearson's r and the eta coefficient for the items with the highest skewness and kurtosis values – items 1 and 2 revealed only a small departure from non-linearity. The eta coefficient ($\eta = .75$) was only very slightly larger than Pearson's r ($r = .76$). Therefore, the use of Pearson's r is acceptable for the MOAQ-JSS data is acceptable.

6.5 Properties of the Comparison Measures

Prior to testing the psychometric properties of the MTCS, the reliabilities of the criterion measures used for comparison were first calculated to determine their stability in an organizational work team sample. Their factor structures were also examined to determine whether they could be replicated in the work team sample. This is particularly important for determining the adequacy of the measures for validating the MTCS against. As the GEQ, TPQ and MOAQ-JSS were developed in the U.S., establishing their stability in a U.K. context is also vital for confirming their adequacy for use in the validation study. The TPQ and MOAQ-JSS were used as intended by their authors. The items within these measures did not use Americanised terminology so were considered acceptable for use without

modification. As discussed in section 6.3 the GEQ had to be modified to replace situation specific references to sports teams with those relevant to organizational settings.

6.5.1 Internal Consistency Reliability

Both the overall internal consistency reliability and subscale reliabilities (where applicable) were calculated for each criterion measure. The results are presented for each measure in turn below.

6.5.1.1 The GEQ

The overall reliability of the GEQ, when all items are considered as a single scale, was .88. The subscale reliabilities are reported in Table 6.11 below:

Table 6.11:
Subscale reliabilities for the GEQ (N=214).

GEQ Scale	Cronbach's Alpha
ATG-S	.73 (.64)
ATG-T	.44 (.75)
GI-T	.83 (.70)
GI-S	.81 (.64)

Note: Original reliabilities in parenthesis

The lower reliability of ATG-T may be due to only 2 of the 4 items originally written to tap this dimension being retained as relevant to an organizational work team context.

6.5.1.2 The TPQ

The overall internal consistency of the TPQ was .97. The subscale reliabilities are presented in Table 6.12 below:

Table 6.12:
Subscale reliabilities for the TPQ (N=214).

TPQ Scale	Cronbach's Alpha
Goals and Results	.88 (.71)
Collaboration & Involvement	.92 (.90)
Competencies	.87 (.78)
Communication Processes	.91 (.78)
Emotional Climate	.90 (.78)
Leadership	.90 (.80)

Note: Original reliabilities in parenthesis

The high reliabilities obtained by Reichman (1998) could be replicated in this work team sample. The reliabilities obtained in this research were found to be higher than the original reliabilities reported in parenthesis in Table 6.12 above. This is likely to be due to the larger sample size used in this research to test internal consistency reliability. Reichman (1998) tested the reliability of the TPQ against only 44 subjects.

6.5.1.3 MOAQ-JSS

The overall internal consistency of the Overall Job Satisfaction Questionnaire was .89.

As the reliabilities of the chosen comparison measures could be replicated and found to be excellent, they were considered adequate for determining the validity of the MTCS.

6.5.2 Factor Structures

Before testing the validity of the MTCS against the GEQ, TPQ and MOAQ-JSS, the factor structures of these measures were examined to identify whether the factor structures identified by the test developers could be replicated in the organizational work team sample. Principal axis factor analysis using direct oblimin rotation was run on the measures using the sample obtained for the validation phase ($N=214$). Matrix factorability and number of factors to retain were identified using the criteria set out in Chapter 5, section 5.4.1. The results obtained for each measure are presented in turn below.

6.5.2.1 GEQ

The correlation matrix of the scale items was found to have good factorability indicating a good factor solution. The KMO test of sampling adequacy was .89. Bartlett's test of sphericity is not reported for this analysis due to a subject to item ratio greater than 5:1 (13:1). Due to this large sample size compared to number of items, a significant result may be misleading (Tabachnick & Fidell, 1996). All on-diagonal values of the anti-image correlation matrix were found to be greater than .5, with the lowest value found against item 12 'Our team members have conflicting aspirations for the team's performance' of .82. The off-diagonal partial correlations were found to be small as were the residual values with only 14 (11%) non-redundant residuals with values $>.05$.

A four factor structure was first investigated as identified by Carron et al. (1985). This structure could not be replicated in the organizational work team sample obtained for this analysis as shown in Table 6.13 below:

Table 6.13

Factor loadings and communalities for the 16 items of the modified GEQ based on a four factor structure (N=214)

	Factor 1	Factor 2	Factor 3	Factor 4	Communalities
Item 1: I do not enjoy being a part of the social activities of this team	.49				.35 (.33)
Item 2: I am not going to miss the members of this team when the team disbands.	.46				.38 (.39)
Item 3: I am unhappy with my team's level of commitment to the task.		.43			.37 (.36)
Item 4: Some of my best friends are in this team.	.52		.47		.66 (.48)
Item 5: This team does not give me enough opportunities to improve my personal performance.			-.33	.32	.36 (.32)
Item 6: I enjoy other social events more than team social events.	.33				.20 (.24)
Item 7: For me, this team is one of the most important social groups to which I belong.	.55			.34	.58 (.52)
Item 8: Our team is united in trying to reach its goals for performance.		.35		.50	.62 (.56)
Item 9: Members of our team would rather go out on their own than get together as a team.	.66				.53 (.48)
Item 10: We all take responsibility for any loss or poor performance by our team.				.73	.63 (.54)
Item 11: Our team members rarely socialise together.	.70				.46 (.43)
Item 12: Our team members have conflicting aspirations for the team's performance.		.94			.86 (.46)
Item 13: Our team would like to spend time together outside of work hours.	.80				.65 (.57)
Item 14: If members of our team have problems in work, everyone wants to help them so we can get back together again.				.73	.54 (.45)
Item 15: Members of our team do not stick together outside work time.	.79				.61 (.53)
Item 16: Members of our team do not communicate freely about each other's responsibilities during work time.				.47	.56 (.51)

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

Although only one item (item 6) in the factor solution has a communality <.40 and an SMC <.30, four items cross-load onto more than one factor. Factor 3 also has only two items with primary loadings >.32. In addition, in this factor structure all items designed to measure the dimensions ATG-S and GI-S load onto a single factor (Factor 1). Factor 2 contains items

designed to measure ATG-T and GI-T. Factor 3 is defined by cross-loading items only designed to tap ATG-S and ATG-T. The final factor contains cross-loading items that measure the dimensions ATG-S and ATG-T with items designed to measure GI-T. The results from PA suggest a three factor structure. The observed eigenvalues stop exceeding those obtained from the random samples at three factors. The observed eigenvalue for three factors was 0.60 compared to 0.31 (based on both a normal and non-normal distribution) obtained from a random sample. The scree plot also points to a two or three factor structure:

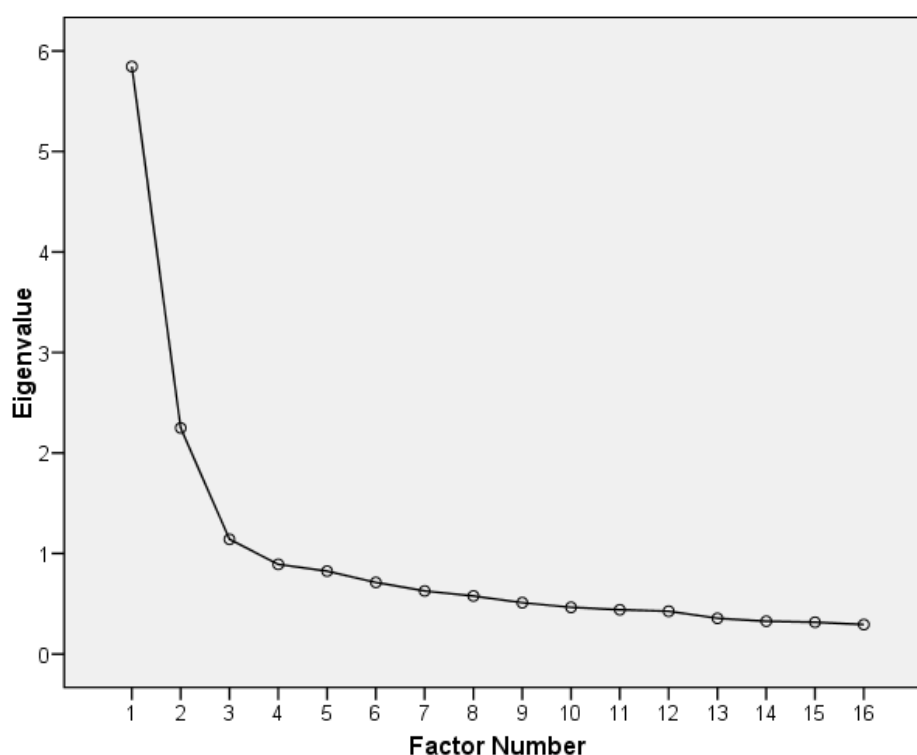


Figure 6.10: Scree plot to determine number of factors to extract for the GEQ at the validity phase

Inspection of a five, three, two and single factor solution revealed that the two factor solution provided the best fit to the observed data. In the two factor solution all items loaded cleanly on a single factor and the majority of factor loadings were strong. In this factor structure all items designed to tap ATG-S and GI-S loaded onto factor 1 and all items designed to tap ATG-T and GI-T loaded onto factor 2 as shown in Table 6.14 below:

Table 6.14:

Factor loadings and communalities for the 16 items of the modified GEQ based on a two factor structure (N=214)

	Factor 1	Factor 2	Communalities
Item 1: I do not enjoy being a part of the social activities of this team	.36		.30 (.33)
Item 2: I am not going to miss the members of this team when the team disbands.	.48		.38 (.39)
Item 3: I am unhappy with my team's level of commitment to the task.		.57	.32 (.36)
Item 4: Some of my best friends are in this team.	.76		.49 (.48)
Item 5: This team does not give me enough opportunities to improve my personal performance.		.56	.31 (.32)
Item 6: I enjoy other social events more than team social events.	.37		.19 (.24)
Item 7: For me, this team is one of the most important social groups to which I belong.	.71		.54 (.52)
Item 8: Our team is united in trying to reach its goals for performance.		.83	.65 (.56)
Item 9: Members of our team would rather go out on their own than get together as a team.	.58		.49 (.48)
Item 10: We all take responsibility for any loss or poor performance by our team.		.68	.52 (.54)
Item 11: Our team members rarely socialise together.	.66		.39 (.43)
Item 12: Our team members have conflicting aspirations for the team's performance.		.64	.38 (.46)
Item 13: Our team would like to spend time together outside of work hours.	.81		.65 (.57)
Item 14: If members of our team have problems in work, everyone wants to help them so we can get back together again.		.51	.37 (.45)
Item 15: Members of our team do not stick together outside work time.	.70		.50 (.53)
Item 16: Members of our team do not communicate freely about each other's responsibilities during work time.		.75	.57 (.51)

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

However, the solution is not entirely stable with seven items with communalities <.40 and one item with an SMC <.30. As the subject to item ratio obtained was only 13:1, the lack of replication could be due to an insufficient sample size to detect a more complex structure (Kline, 2000). However, other researchers have also had difficulty replicating the four factor structure of the GEQ. Carless & De Paola (2000) identified a three factor structure in an Australian work team context, failing to identify 'group integration' as a distinct aspect. They also failed to identify a hypothesised two factor structure distinguishing task and social cohesion or individual and team aspects of cohesion. Research by Schutz et al. (1994) also did not provide support for the four factor structure identified by Carron et al. (1985). It is therefore difficult to draw any conclusions about whether the four factor structure identified by Carron et al. (1985) is valid in an organizational context. Without this certainty and as the

GEQ has been extensively validated, the MTCS will be validated against the GEQ using the original four dimensional structure.

6.5.2.2 TPQ

A good factor solution was also indicated for the TPQ. The KMO measure of sampling adequacy was .95. Again Bartlett's test of sphericity is not reported for this analysis due to a subject to item ratio greater than 5:1 (6-7:1). The lowest on-diagonal value in the anti-image correlation matrix was .92 against item 32 'Our leader involves members in decision making', exceeding the minimum .5 value. All off-diagonal partial correlations were found to be small with only 11% non-redundant residuals with values $>.05$ was found.

In the sample tested, the six dimensional structure identified by Reichmann (1998) could not be replicated. Although the test developers of the GEQ provided a good account of the criteria they used in testing the factorial validity of the GEQ (Brawley et al., 1987), matching those used in this research, this was not the case for the TPQ. This makes it difficult to determine how extensive an approach was taken by Reichman (1998) or what criteria was used. This may be one reason for the differences in structure identified. However, some of the six dimensional structure was found as shown in Table 6.15 below. Items designed to tap the 'Leadership' dimension loaded cleanly on a single factor (Factor 2). Items designed to tap the 'Collaboration & Involvement' dimension also loaded onto a single factor (Factor 3) but with item 16, 18 and 19 designed to tap 'Communication Processes', the latter two items cross-loading onto more than one factor. All but one of the items (item 11) designed to tap the dimension 'Competencies' loaded onto a single factor cleanly. Items designed to tap 'Emotional Climate' loaded onto factors with items designed to measure 'Goals & Results'. Only one item failed to load onto any factor – item 15 'Team meetings are efficient and productive' designed to measure 'Competencies'. This sits slightly at odds with the other items designed to measure this dimension that are more orientated towards skill utilisation, conducting work effectively, development of new competencies and utilisation of the strengths of individuals. Inspection of the communalities and SMCs for each item revealed internal consistency of items and a stable factor structure.

Table 6.15

Factor loadings and communalities for the 32 items of the TPQ based on a six factor structure (N=214)

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Communalitie s
Goals & Result	Item 1	.45						.66 (.71)
	Item 2	.43			.36			.69 (.67)
	Item 3	.36						.60 (.67)
	Item 4				.51			.62 (.70)
	Item 5				.52			.60 (.65)
Collab & Involv	Item 6			-.77				.71 (.72)
	Item 7			-.50				.74 (.77)
	Item 8			-.59				.76 (.76)
	Item 9			-.45				.71 (.73)
	Item 10			-.79				.79 (.75)
Competencies	Item 11	.44					.37	.70 (.71)
	Item 12						.48	.61 (.61)
	Item 13						.59	.68 (.65)
	Item 14						.36	.54 (.59)
	Item 15							.52 (.61)
Comm Process	Item 16			-.62				.72 (.75)
	Item 17			-.39		-.74		.83 (.75)
	Item 18			-.45		-.37		.70 (.73)
	Item 19					-.35		.69 (.72)
	Item 20					-.52		.68 (.70)
Emotional Clim	Item 21				.82			.72 (.70)
	Item 22				.69			.71 (.74)
	Item 23				.97			.68 (.64)
	Item 24	.36						.73 (.76)
	Item 25				.77			.70 (.73)
Leadership	Item 26		.57					.49 (.54)
	Item 27		.71					.62 (.63)
	Item 28		.74					.70 (.72)
	Item 29		.74					.58 (.61)
	Item 30		.65					.52 (.59)
	Item 31		.87					.78 (.76)
	Item 32		.64					.62 (.64)

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

The results of the PA revealed a 4 factor structure. The observed eigenvalues stopped exceeding those obtained from a random sample at eigenvalue four. The observed eigenvalue was .77 compared with .69 (based on a normal and non-normal distribution) from the random sample.

The scree plot suggested the existence of two factors:

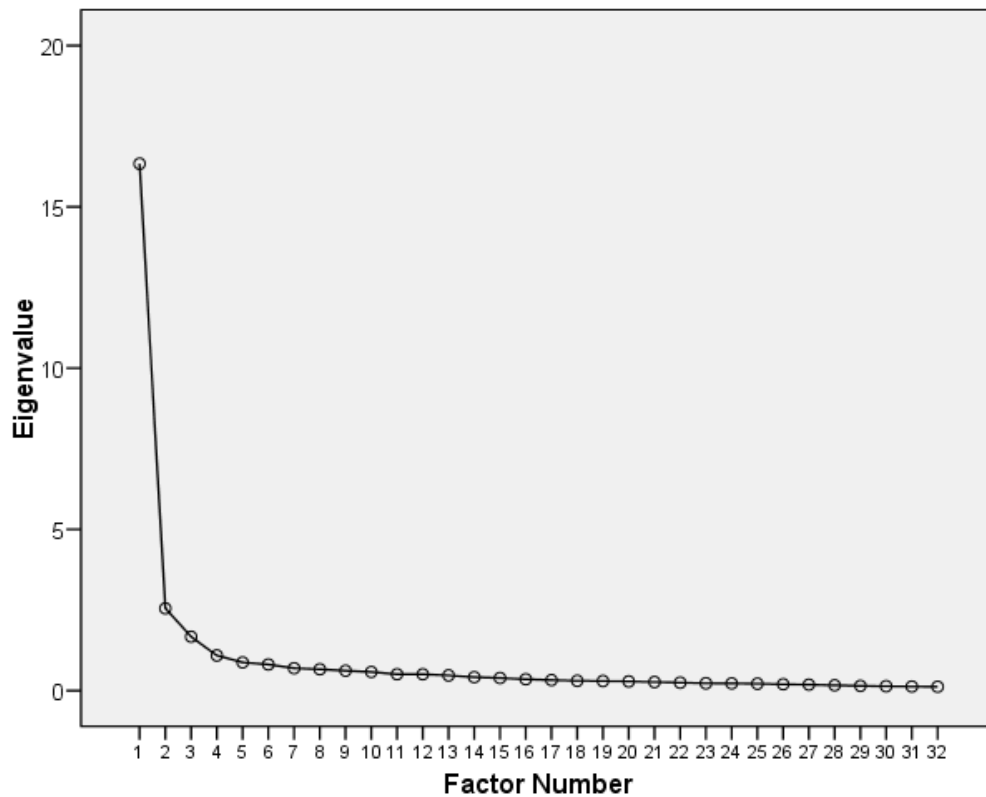


Figure 6.11: Scree plot to determine number of factors to extract for the TPQ at the validity phase

A five, four, three, and two factor structure were examined to determine if a stable factor structure could be identified with the organizational work team sample. No solution contained communalities $< .40$ or SMC's $< .30$. However, the factor structures with the fewest cross-loading factors were the three and four factor solutions. Both solutions indicate a slightly different structure and relationship between TPQ items and dimensions. The results of both of the solutions are presented in Table 6.16-6.17 below:

Table 6.16:

Factor loadings and communalities for the 32 items of the TPQ based on a four factor structure (N=214)

		Factor 1	Factor 2	Factor 3	Factor 4	Communalities
Goals & Results	Item 1				-.50	.65 (.71)
	Item 2			.41	-.47	.67 (.67)
	Item 3				-.41	.60 (.67)
	Item 4			.55		.60 (.70)
	Item 5			.54		.59 (.65)
Collab & Involv	Item 6	.82				.64 (.72)
	Item 7	.54				.72 (.77)
	Item 8	.82				.75 (.76)
	Item 9	.73				.70 (.73)
	Item 10	.71				.67 (.75)
Competencies	Item 11				-.57	.69 (.71)
	Item 12	.33				.53 (.61)
	Item 13	.46				.52 (.65)
	Item 14		.33			.49 (.59)
	Item 15				-.36	.52 (.61)
Comm Process	Item 16	.84				.71 (.75)
	Item 17	.61				.61 (.75)
	Item 18	.73				.69 (.73)
	Item 19	.75				.68 (.72)
	Item 20	.55				.57 (.70)
Emotional Climate	Item 21			.83		.69 (.70)
	Item 22			.71		.68 (.74)
	Item 23			.89		.68 (.64)
	Item 24				-.40	.72 (.76)
	Item 25			.80		.69 (.73)
Leadership	Item 26		.57			.49 (.54)
	Item 27		.72			.62 (.63)
	Item 28		.73			.70 (.72)
	Item 29		.77			.57 (.61)
	Item 30		.60			.49 (.59)
	Item 31		.80			.74 (.76)
	Item 32		.71			

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

Table 6.17:

Factor loadings and communalities for the 32 items of the TPQ based on a 3 factor structure (N=214)

		Factor 1	Factor 2	Factor 3	Communalities
Goals & Results	Item 1		.37		0.57 (.71)
	Item 2	.68			0.63 (.67)
	Item 3		.34		0.55 (.67)
	Item 4	.69			0.61 (.70)
	Item 5	.66			0.59 (.65)
Collab & Involv	Item 6			-.83	0.64 (.72)
	Item 7	.37		-.53	0.71 (.77)
	Item 8			-.84	0.75 (.76)
	Item 9			-.74	0.70 (.73)
	Item 10			-.71	0.57 (.75)
Competencies	Item 11	.35			0.51 (.71)
	Item 12	.32			0.52 (.61)
	Item 13			-.46	0.49 (.65)
	Item 14		.39		0.49 (.59)
	Item 15		.37		0.70 (.61)
Comm Process	Item 16			-.85	0.60 (.75)
	Item 17			-.61	0.68 (.75)
	Item 18			-.74	0.67 (.73)
	Item 19			-.76	0.57 (.72)
	Item 20			-.55	0.57 (.70)
Emotional Climate	Item 21	.78			0.63 (.70)
	Item 22	.74			0.67 (.74)
	Item 23	.74			0.54 (.64)
	Item 24	.50			0.70 (.76)
	Item 25	.80			0.65 (.73)
Leadership	Item 26		.55		0.47 (.54)
	Item 27		.71		0.60 (.63)
	Item 28		.83		0.69 (.72)
	Item 29		.78		0.55 (.61)
	Item 30		.64		0.48 (.59)
	Item 31		.81		0.72 (.76)
	Item 32		.66		0.54 (.64)

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

In the four factor structure, Factor 1 is defined by all items designed to tap 'Collaboration & Involvement' and all items designed to measure 'Communication Processes'. Two items written for the dimension 'Competencies' also load onto this factor that conceptually, are closely related to collaboration and involvement – item 12: 'Each team member is able to fully use his/her skills and abilities', and item 13: 'We capitalize on the strengths of team members'. Factor 2 is defined largely by all items designed to measure Reichman's (1998) 'Leadership' dimension. Item 14 'Each team member is encouraged to develop new competencies' of the 'Competencies' dimension also loads onto this factor. Since 'encouragement to develop new competencies' could equally be provided by the team leader as peers, it is not surprising that these load onto the same factor. Factor's 3 and 4 combine

items measuring 'Goals & Results' and 'Emotional Climate' suggesting that these are also related dimensions.

The three factor solution shows a different pattern of factor loadings. Factor 1 contains all items written to measure 'Emotional Climate' with some items that represent 'Goals & Results' and one cross-loading item that taps 'Collaboration & Involvement'. Factor 2 is defined by all items designed to measure 'Leadership' combined with some items designed to tap 'Goals & Results' and 'Competencies'. The third factor combines all items written for 'Collaboration & Involvement' and 'Communication Processes' with one item written to measure 'Competencies'.

As with the GEQ, although this lack of replication may be due to a different dimensional structure in organizational work teams, it is likely to be due to the insufficient sample size where only a 6-7:1 ratio was obtained for this study. Further, the difference in factor structures obtained may be due to differences in EFA methods used (Tabachnick & Fidell, 1996). Although PAF using oblique rotation was employed by Carron et al. (1985) to determine the structure of the GEQ, Reichman (1998) used 'confirmatory factor analysis' using a varimax rotation. The method used is not clearly reported in the test handbook developed for the TPQ. As some evidence for the theoretical structure defined by Reichman (1998) was obtained and in the absence of a large enough sample to ensure reliable results, the MTCS was validated against the TPQ using the test developer's theoretical dimensions.

6.5.3 MOAQ-JSS

The correlation matrix for the MOAQ-JSS scale items was found to have good factorability. The KMO measure of sampling adequacy was .74. All on-diagonal values of the anti-image correlation matrix were found to be greater than .5, with the lowest value against item 1 of .69. No residuals were found to have values greater than .05. As expected, the MOAQ-JSS was found to be unifactorial with all items loading onto a single factor as shown in Table 6.18 below:

Table 6.18

Factor loadings and communalities for the 3 items of the MOAQ-JSS (N=214)

	Factor 1	Communalities
Item 1: All in all, I am satisfied with my job	.92	.84 (.69)
Item 2: In general, I don't like my job	.82	.67 (.59)
Item 3: In general, I like working here	.84	.71 (.62)

Note. Initial communalities or SMC's shown in parenthesis.

The factor with the highest loading, item 1, reflects job satisfaction. The two other items also load very highly on this factor. This suggests that the items all measure the same underlying construct of job satisfaction as expected. All communalities are greater than .40 and all SMCs greater than .30 indicating the stability of the factor solution and confirming that all items relate well to one another.

6.6 MTCS: Tests of Reliability.

6.6.1 Test-Retest Reliability

Test-retest reliability is frequently used to measure the stability of a test over time, using the correlation coefficient to assess the degree of association between two sets of scores obtained on two different occasions. To be stable, the two sets of scores should correlate highly with one another. However, test-retest reliability is based on the assumption that little or no change has occurred in the construct being measured between the two occasions. Since the recommended interval for test-retest is at least 3 months to prevent distortion of measurement from subjects remembering previous responses (Kline, 2000), this assumption is unlikely to hold true for team cohesion. As described in Chapter 2, cohesion is a dynamic construct that is unlikely to stay stable over time. Therefore, little correspondence between scores taken at two measurement points is likely to be due to real changes in the measured construct, not poor reliability.

In addition to the nature of the construct, further factors also served to distort the measurement of test-retest reliability. One of the organizations tested at time 1, QinetiQ, undertook a major re-organization between test and retest, a significant organizational change likely to affect scores obtained at time 2. Further a large number of subjects were no longer available following the 7 month gap after initial administration of the MTCS. Therefore, in this instance, obtaining estimates for test-retest reliability were considered inappropriate and were not conducted. However, the methodology of test-retest reliability offered a useful way of testing the ability of the MTCS to discriminate between any differences in team cohesion following a major intervention. The test-retest design was therefore opportunistically employed when the re-organization occurred in QinetiQ to allow further testing of the validity of the MTCS, reported in section 6.7.2.

6.6.2 Internal Consistency Reliability

The internal consistency reliability of the MTCS was tested against the new sample obtained from QinetiQ ($N=214$). Cronbach's alpha was calculated for each of the eight subsets of the MTCS. The results are presented below:

Table 6.19:
MTCS subscale internal consistency reliabilities.

MTCS Subscale	Cronbach's Alpha α
Task Cohesion-Horizontal Interaction-Individual Perceptions of Self (TCHIIPS)	.92
Task Cohesion-Horizontal Interaction-Individual Perceptions of Others (TCHIPO)	.95
Task Cohesion-Vertical Interaction-Individual Perceptions of Self (TCVIIPS)	.96
Task Cohesion-Vertical Interaction-Individual Perceptions of Others (TCVIPO)	.96
Social Cohesion-Horizontal Interactions-Individual Perceptions of Self (SCHIIPS)	.85
Social Cohesion-Horizontal Interactions-Individual Perceptions of Others (SCHIPO)	.89
Social Cohesion-Vertical Interactions-Individual Perceptions of Self (SCVIIPS)	.89
Social Cohesion-Vertical Interactions-Individual Perceptions of Others (SCVIPO)	.88

All subscales were found to have a high internal consistency reliability ranging from .85 to .96. The internal consistency reliability for the full scale (incorporating all items within each subscale) was .99. No items were identified as having a large impact, either positively or negatively on the reliability of the subscales or overall scale if removed from the measure. These results confirmed the high reliability of the MTCS found in the pilot study and its stability in measuring organizational work team cohesion across different samples.

6.7 Construct Validity of the MTCS

In order to establish the construct validity of the MTCS, the following hypotheses were tested:

1. All MTCS subscales will correlate with one another, indicating that they measure the same underlying construct, i.e. cohesion (*concurrent / internal convergent validity*).
2. Scores on the MTCS will correlate moderate to high with scores on an existing measure of team cohesion – the GEQ, administered at the same time (*concurrent / external convergent validity*).
3. Scores on the MTCS will have a moderate to low correlation with scores on the MOAQ-JSS and TPQ, tests that, although related, do not purport to be measures of team cohesion (*concurrent / divergent validity*).
4. Scores on the task and social dimensions of the MTCS will differentially correlate with scores on team performance and job satisfaction (*criterion and differential validity*).

5. Team cohesion scores will change following a major re-organization compared with before its implementation (*scale sensitivity*).
6. Levels of cohesion will differ according to individual and team characteristics (e.g. gender and team size) (*scale sensitivity*).
7. A factor analytic study will show that MTCS items designed to represent particular dimensions within the theoretical model are related but will load onto distinct factors (*factorial validity*).

6.7.1 Hypothesis 1-3: Concurrent Validity

In order to establish concurrent validity, a number of studies were conducted to determine whether the MTCS is a good test of the theoretical construct of cohesion. Firstly, total scores on the MTCS and the criterion measures were correlated to determine the degree of conceptual overlap between measures. The internal validity of the MTCS was assessed through inspection of subscale correlations to determine whether they measure the same trait. Scores on the MTCS were also examined to determine the degree to which they relate to scores obtained on an existing measure of cohesion – the GEQ, and scores obtained on measures of distinct constructs – team performance and job satisfaction.

6.7.1.1 Conceptual Overlap between the MTCS and Criterion Measures

As a first step in investigating the concurrent validity of the MTCS and the conceptual overlap between criterion measures, the correlation between the total scores obtained for each measure was compared against their own internal consistency reliabilities. Correlations between measures at the subscale level are reported as part of the convergent and divergent validity studies. Due to the different length of the scales, scores were converted to z scores before conducting correlation analysis. The results of this analysis are shown in Table 6.20 below:

Table 6.20:

Correlations between the MTCS and selected criterion measures

	MTCS	GEQ	MOAQ-JSS	TPQ
MTCS	(.98)			
GEQ	.74	(.88)		
MOAQ-JSS	.60	.48	(.89)	
TPQ	.90	.73	.59	(.97)

Note: Subscale reliabilities are presented in bold.

The reliability coefficients for each measure were found to be consistently higher than their correlations with the other measures tested. This indicates that they all measure something unique from one another and therefore can be considered acceptable criterion measures. Although the highest correlation was expected between the MTCS and the GEQ since they are designed to measure the same construct, the highest correlation was actually found between the MTCS and TPQ, suggesting a higher degree of overlap. This was further investigated in establishing the convergent and divergent validity of the MTCS.

6.7.1.2 Internal Convergent Validity

In a multidimensional scale measuring a single construct, it is important to ensure that all subscales designed to measure each scale dimension are highly inter-correlated. Although the internal consistency reliability of each subscale should be higher than their correlation with other subscales, inter-correlations should be sufficiently high that they can be considered to measure the same underlying construct – i.e. team cohesion.

Table 6.21:
Correlations between MTCS subscales

	TCHIIPS	TCHIIPO	TCVIIPS	TCVIPO	SCHIIPS	SCHIIPO	SCVIIPS	SCVIPO
TCHIIPS	.92							
TCHIIPO	.88	.95						
TCVIIPS	.67	.60	.96					
TCVIPO	.65	.64	.93	.96				
SCHIIPS	.86	.81	.58	.57	.85			
SCHIIPO	.69	.81	.43	.49	.76	.89		
SCVIIPS	.56	.51	.86	.77	.59	.46	.89	
SCVIPO	.59	.61	.84	.87	.59	.57	.86	.88

Note: Subscale reliabilities are presented in bold.

All MTCS subscales were found to be highly inter-correlated (r ranged from .43 to .93) as shown in Table 6.21. Further, all subscale reliability coefficients were higher than any subscale correlation. This analysis provides evidence for the internal convergent validity of the MTCS.

6.7.1.3 External Convergent Validity

In order to assess whether scores on the MTCS and GEQ *converge*, the following specific predictions were made:

- H_1 : Scores on the MTCS will correlate moderate to high with scores on the modified GEQ administered at the same time.

- *H2*: Correlations will be highest between corresponding subscales of the GEQ and MTCS designed to tap the same dimensions as shown in Figure 6.12 below:

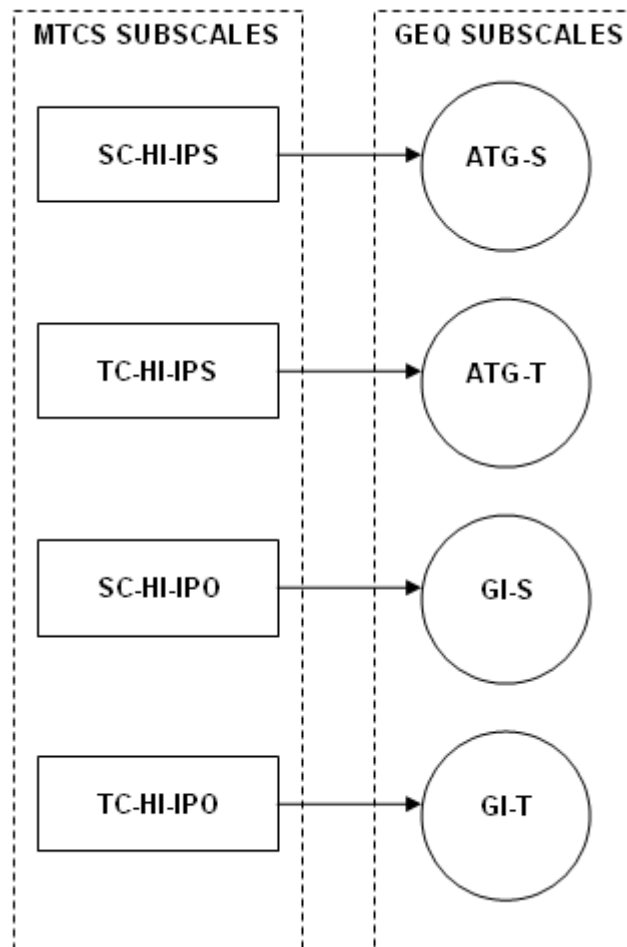


Figure 6.12: Predicted moderate to high correlations between MTCS and GEQ subscales

No specific predictions were made regarding correlation between the MTCS subscales tapping vertical aspects of cohesion and GEQ subscales since this was not a dimension tapped by the GEQ.

Due to different length rating scales and number of items used to tap corresponding subscales in each measure of team cohesion, both total scores and subscale scores were transformed to standardised z scores to enable direct comparison. In support of *H1*, total scores on the MTCS were found to correlate highly with total scores on the GEQ ($r = .74$, $p < .01$). This high correlation indicates that MTCS and GEQ items measure the same construct. It is important to note that as the correlation between measures does not exceed .90 they cannot be considered identical; the MTCS can be considered as providing something additional in the measurement of team cohesion over the GEQ. Inspection of

correlations between the subscales of the MTCS and GEQ revealed that all subscales were significantly correlated ($p < .01$) but to varying degrees, as shown in Table 6.22 below:

Table 6.22:
Correlations between MTCS and GEQ subscales.

	ATG-S	ATG-T	GI-S	GI-T
TCHIIPS	.46	.67	.35	.77
TCHIPO	.49	.65	.43	.83
TCVIIPS	.33	.59	.26	.62
TCVIPO	.33	.60	.28	.64
SCHIIPS	.61	.58	.48	.70
SCHIPO	.63	.48	.60	.70
SCVIIPS	.44	.48	.37	.52
SCVIPO	.44	.52	.43	.58

The correlations that were predicted to be highest are presented in bold in Table 6.22 above. Results of the subscale analysis revealed that all MTCS subscales correlated most highly with the GI-T subscale of the GEQ (r ranged between .52 and .83). This was only expected between TCHIPO and GI-T. However, as predicted in H_2 TCHIIPS correlated more highly with task based aspects than social based aspects of the GEQ. Ignoring MTCS subscale correlations with GI-T, the dimension SCHIIPS was found to correlate more highly with ATG-S ($r = .61$) than other GEQ subscales. SCHIPO however, was found to correlate more highly with ATG-S ($r = .63$) than GI-S ($r = .60$), although it still correlated more highly with these subscales than ATG-T ($r = .48$). This analysis shows some evidence of convergent validity, although the pattern of correlations between measures was not entirely as expected. This is likely to be due to the limited set of items in the GEQ that do not measure all behaviours expected to be present in organizational work team cohesion. Where similar dimensions have been captured, e.g. social and task cohesion, different situation specific references have been used to measure these dimensions. This may have also contributed to the unexpected patterns of correlation. The low correlations found between the task-based aspects of the MTCS and social-based aspects of the GEQ provide some preliminary evidence of divergent validity. However, as the GEQ cannot be considered an accepted 'benchmark' test of team cohesion, any evidence of validity obtained should not be taken on its own as evidence of construct validity of the MTCS (Kline, 2000). Other forms of validity were therefore explored.

6.7.1.4 Divergent Validity

Divergent validity was also assessed to determine whether scores on the MTCS correlated less highly with a measure designed to test a different construct. The MOAQ-JSS and TPQ were chosen as suitable for comparison as, although related to team cohesion, they do not purport to measure team cohesion. The MOAQ-JSS provides an individual level measure and the TPQ assesses an individual's perceptions of the team, allowing assessment of both the individual and team level perceptions measured by the MTCS. Total scores on the MTCS and scores on the MOAQ-JSS were found to be significantly correlated ($r = .60$, $p < .01$). This significant correlation is not surprising given the relationship between team cohesion and job satisfaction. However, it is a slightly lower overall correlation than that obtained between the MTCS and GEQ. Each subscale of the MTCS was also found to correlate moderately with scores on the MOAQ-JSS. These correlations are also lower than many of those between the MTCS and GEQ subscales as shown in Table 6.23:

Table 6.23:
Correlations between MTCS and MOAQ-JSS scores

	MOAQ-JSS
TCHIIPS	.58
TCHIIPO	.51
TCVIIPS	.53
TCVIIPO	.48
SCHIIPS	.58
SCHIIPO	.41
SCVIIPS	.55
SCVIIPO	.49

Although job satisfaction is clearly related to team cohesion, MTCS subscales can be considered conceptually different since items designed to measure each dimension correlate more highly with one another than overall job satisfaction. Since correlations below .7 generally indicate that the constructs are separate but related, this provides evidence of divergent validity. Further, the majority of correlations between MTCS subscales (as shown in Table 6.21 in section 6.7.1.2) are higher than the correlations between MTCS subscales and overall job satisfaction. The lower inter-subscale correlations than intra-subscale correlations (i.e. between MTCS subscales) provides some evidence of divergent validity.

Despite the high correlation between MTCS total scores and TPQ total scores ($r = .90$), all MTCS and TPQ subscale correlations were found to be lower than their respective subscale reliabilities as shown in Table 6.24:

Table 6.24:
Correlations between MTCS and TPQ subscales

	Goals & Results (.88)	Collaboration & Involvement (.92)	Competencies (.87)	Communication Processes (.91)	Emotional Climate (.90)	Leader- ship (.90)
TCHIIPS (.92)	.73	.79	.78	.70	.68	.59
TCHIIPO (.95)	.75	.80	.762	.74	.78	.54
TCVIIPS (.96)	.62	.59	.69	.59	.50	.86
TCVIIPO (.96)	.61	.60	.69	.60	.55	.85
SCHIIPS (.85)	.71	.79	.72	.67	.66	.53
SCHIIPO (.89)	.60	.72	.60	.61	.70	.38
SCVIIPS (.890=)	.52	.55	.59	.54	.43	.72
SCVIIPO (.88)	.55	.59	.63	.59	.51	.76

Note: MTCS subscale reliabilities are presented in parenthesis.

However, the correlations between MTCS and TPQ subscales were found to be as similarly high as those between MTCS subscales. The high correlations are not an entirely unexpected result given the relationship between team cohesion and performance. Further, there is some conceptual overlap between the items considered important for assessing team performance in the TPQ and items considered important for assessing team cohesion in the MTCS. In particular, the TPQ contains a dimension designed to measure 'Emotional Climate' that could be construed as similar to 'team cohesion'. This dimension contains items such as 'Each member demonstrates commitment to the team' and 'Each member is clear about and identifies with the team's values'. These correspond to MTCS items such as 'Members of the team do not share the same levels of commitment in conducting the team's tasks' and 'Members of the team share similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) as one another'. In theory

MTCS subscales should correlate more highly with this subscale than any other TPQ subscale given its label. However, other items within the TPQ designed to measure other subscales are also similar to those that would be expected in a team cohesion measure, such as 'Members feel a sense of belonging to the team' and 'Members of the team work well together' (both tapping Collaboration & Involvement). Despite the similarity of some items, MTCS items are written to specifically measure aspects of cohesion, such as 'commitment to the team's tasks' as opposed to the team in general, and 'Members of the team work well together to achieve the goals (i.e. the goals for the task at hand) of the team'. In general, the correlations between the MTCS and TPQ subscales were higher than those between the MTCS and GEQ subscales. This may be due to the limited scope of items in the GEQ and/or some construct overlap between the MTCS and the TPQ. As the TPQ has not been construct validated it is possible that it is construct contaminated.

6.7.2 Hypothesis 4-6: Differential Validity & Scale Sensitivity

In order to determine differential validity and scale sensitivity three hypotheses were tested:

- *H4*: Scores on the task and social dimensions of the MCTS will differentially correlate with scores on team performance and job satisfaction.
- *H5*: Team cohesion scores will change following a major re-organization compared with before its implementation.
- *H6*: Levels of cohesion will differ according to individual and team characteristics (e.g. gender and team size).

6.7.2.1 Hypothesis 4

To test hypothesis 4, task and social aspects of cohesion were correlated with both team performance and job satisfaction scores. Partial correlations were calculated between MTCS total scores and subscales controlling for the effects of task and social cohesion on correlations. The partial correlations between the total scores of task and social based aspects of the MTCS and total scores of the TPQ are presented below:

Table 6.25:

Correlations and partial correlations for MTCS task and social cohesion with team performance and overall job satisfaction

	Task Cohesion ^a	Social Cohesion ^b
TPQ	.59 (.90)	.22 (.84)
Overall Job Satisfaction	.12 (.59)	.23 (.61)

Note: ^a = controlled for social cohesion, ^b = controlled for task cohesion; correlations not controlling for any variables in parenthesis

The partial correlations for both task and social cohesion are lower than the ordinary correlations when task and social cohesion are not controlled for. This suggests that the observed correlation between task cohesion and team performance ($r = .90$) and social cohesion and team performance ($r = .84$) is only due to their common relationship with team performance. However, as the partial correlation for social cohesion ($r = .22$) is much smaller than the partial correlation for task cohesion ($r = .59$) compared to the observed correlations, it is likely that task cohesion plays a larger role in the relationship between team cohesion and team performance. The important role of both task and social cohesion was most evident in their relationship with overall job satisfaction. Inspection of both the ordinary and partial correlations showed that the high correlations that both of these aspects have with job satisfaction is much reduced when controlling for each variable (task cohesion $r = .12$ (.59); social cohesion $r = .23$ (.61)). The lower partial correlation for task cohesion suggests that for job satisfaction, social cohesion accounts for slightly more of the relationship between team cohesion and job satisfaction. These relationships were further inspected at the subscale level. The results of this analysis are presented in Table 6.26 below:

Table 6.26:

Correlations and partial correlations for MTCS subscales with TPQ subscales and the MOAQ-JSS

	a				b			
	TCHIPS	TCHIPO	TCVIIPS	TCVIPO	SCHIPS	SCHIPO	SCVIIPS	SCVIPO
Goals & Results	.29 (.73)	.40 (.75)	.38 (.62)	.32 (.61)	.17 (.71)	.03 (.60)	-.05 (.52)	-.08 (.55)
Collaboration & Involvement	.31 (.79)	.34 (.80)	.22 (.59)	.19 (.60)	.29 (.79)	.24 (.72)	.16 (.55)	.16 (.59)
Competence	.43 (.78)	.43 (.76)	.38 (.69)	.38 (.69)	.09 (.72)	-.01 (.60)	.02 (.59)	-.00 (.63)
Communication Processes	.26 (.70)	.38 (.74)	.22 (.59)	.19 (.60)	.13 (.67)	.05 (.61)	.10 (.54)	.11 (.59)
Emotional Climate	.24 (.68)	.42 (.78)	.25 (.50)	.30 (.55)	.13 (.66)	.19 (.70)	.03 (.43)	-.02 (.51)
Leadership	.28 (.59)	.25 (.54)	.61 (.86)	.56 (.85)	.08 (.53)	-.07 (.38)	-.06 (.72)	.03 (.76)
Overall Job Satisfaction	.15 (.58)	.11 (.51)	.09 (.53)	.05 (.48)	.21 (.58)	.06 (.41)	.22 (.55)	.13 (.49)

Note: a = controlled for social cohesion, b = controlled for task cohesion; correlations not controlling for any variables in parenthesis

The results of the subscale analysis confirm the results obtained from analysis of total scores; task cohesion contributes the most to the relationship between team cohesion and team performance and social cohesion slightly more to job satisfaction. This subscale analysis however, reveals that the specific forms of task and social based aspects differentially correlate with both team performance and overall job satisfaction. The analysis shows that task cohesion is particularly important in the relationship between cohesion and 'Competence' aspects of team performance; partial correlations for social cohesion when task cohesion is controlled for reveal a zero relationship ($r = -.00$ to $.09$) with team performance. Similarly, the relationship between social cohesion and 'leadership' aspects of team performance is a result of task cohesiveness, with vertical aspects of task cohesion – TCVIIPS and TCVIPO, correlating most highly ($r = .61$ and $.56$ respectively). In addition to contributing to evidence of differential validity, this result also provides evidence of convergent validity for the vertical aspects of cohesion represented in the MTCS. Although both task and social cohesion were found to be important in overall job satisfaction, SCHIIPS and SCVIIPS were found to be particularly important in job satisfaction ($r = .21$ and $.22$ respectively). All dimensions of social and task cohesion were found to contribute fairly equally to the 'Collaboration & Involvement' dimension of team performance. This analysis also highlights the importance and relevance of social cohesion in organizational work team cohesion. This is contrary to the results obtained by Carless and De Paola (2000) that led to its relevance in this context being questioned by the researchers.

6.7.2.2 Hypothesis 5

Following the initial administration of the MTCS, QinetiQ announced that it was to undertake a major re-organization. This event therefore provided an opportunity for the sensitivity of the MTCS to be tested. Following a 7 month gap between the pilot phase and implementation of the new organization structure, the MTCS was re-administered to as many QinetiQ and Worcester County Council subjects that were available for re-testing. Since Worcester County Council had not undergone any organizational changes, this pool of subjects provided a control sample for comparison. Before administration at posttest, an additional question was added to the MTCS for this analysis asking subjects whether there had been any factors that had contributed to a change (if any) to the level of cohesion within their team since last completing the MTCS. At both pretest and posttest, both sample groups completed the MTCS at the same time. However, many of the QinetiQ and Worcester County Council subjects that had completed the MTCS at pretest were no longer employees of the organizations at posttest. This reduced the sample sizes obtained from QinetiQ from 80 to 32 and reduced the 112 originally obtained from Worcester County Council to 58.

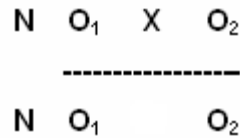
The open-ended responses obtained at posttest were sorted into groups and distinct thematic codes assigned. The coding scheme was developed based on the responses provided by the subjects, as shown in Table 6.27 below:

Table 6.27:
Factors affecting levels of cohesion between measurement points

Code	Theme	% of Responses from QinetiQ	% of Responses for Worcester County Council
0	No Reply	6%	33%
1	No Change	28%	64%
2	Restructuring / Redundancies	23%	0%
3	Management Issues	3%	0%
4	Team or Role Changes	34%	1.5%
5	Conflict	3%	0%
6	Change of Work Environment	3%	0%
7	Resigning from the Organization	0%	1.5%

Although a non-response could indicate no change, 64% of Worcester County Council respondents tested ($N=58$) compared to 28% of QinetiQ respondents ($N=32$) who explicitly reported no change in levels of cohesion between measurement at time 1 and time 2. Those respondents at Worcester County Council who did report a change in levels of cohesion since last completing the MTCS, cited team or role changes (1.5%) or their own resignation from the organization as the reason for this change. As expected, the primary reason for reported changes in levels of cohesion since time 1 within the QinetiQ sample was due to the major re-organization that occurred shortly after (23%) and the team and role changes that occurred as a result (34%). Management issues (3%), conflicts at work (3%) and a change of work environment (e.g. office move) (3%) were also cited by QinetiQ respondents as impacting levels of cohesion during the 7 month interval. QinetiQ respondents who explicitly reported no change and Worcester County Council respondents who did explicitly report a change contaminate the respective treatment and control samples. Therefore, these subjects were removed from further analysis.

Hypothesis 5 was tested using an opportunistic pretest-posttest non-equivalent control group (quasi-experimental) design (Gravetter & Forzano, 2008). Due to the nature of this opportunistic study, it was not possible to control the equivalence of the sample groups at pre-treatment to ensure they were directly comparable. The non-equivalent group design is illustrated below:



Where:

N = relates to pretest and posttest sample size

O₁ = pretest scores

O₂ = posttest scores

X = treatment (i.e. major re-organization)

--- = denotes lack of pre-treatment sampling equivalence.

This design provides a distinct advantage over simply testing a one-group pretest and posttest design for the QinetiQ sample only. If changes in attitude are observed in the one-group design it cannot simply be attributed to the intervention between pretest and posttest. It may also be due to other changes that have occurred over time, such as a learning effect or maturation (changes in subjects). The use of a control group for comparison reduces the time-related threats to validity since both should be subject to the same time-related factors. Therefore if both groups experience a similar level of change in cohesion scores between pretest and posttest it is likely due to other time-related factors, not the intervention. If only the QinetiQ sample experiences change in levels of cohesion, it could be concluded that the intervention has had affect. However, non-equivalence introduces other threats to the internal validity of the study such as pre-existing differences in histories or organizational environment that must be taken into account (Gravetter & Forzano, 2008).

Before conducting the analysis, items eliminated at item reduction during the pilot phase were removed from the pilot scores to match the 103 items administered at the validity phase. Inspection of sample group raw means, presented in Table 6.28 below, reveal little difference between within-group pretest and posttest means:

Table 6.28:
Pretest and posttest raw means by group.

Group	N	Pretest		Posttest	
		Mean	SD	Mean	SD
QinetiQ	80 ^a	547.11	77.69	539.61	87.51
(Treatment)	23 ^b				
WCC	112 ^a	598.34	87.74	603.29	88.33
(Control)	56 ^b				

Note: ^a = pretest sample size; ^b = posttest sample size.

However, to further analyse this difference, a paired-samples *t* test was conducted. As the directionality of the change was not predicted at the outset, a two-tailed test was used. Before conducting the *t* test the normality of the data was inspected. For total group and subscale scores, skewness values for the QinetiQ sample ranged from -.09 to -1.48 and kurtosis values ranged from .02 to 3.08. For the Worcester County Council sample, skewness values ranged from -.57 to -2.06, and kurtosis values from -.14 to 5.21. In both samples the more extreme skewness and kurtosis values were the exception. Further, the sample sizes, particularly for the Worcester County Council sample (*N*=56), reduce the impact of the skewness and kurtosis on the results of the *t* test. Therefore it was considered acceptable to run the *t* tests for this exploratory analysis. The mean difference between pretest and posttest conditions was 7.63 and the 95% confidence interval for the estimated population mean difference is between -43.56 and 58.81. The results of the *t* test showed that there was not a significant difference in pretest and posttest cohesion scores following the major reorganization $t(22) = .31, p = .76$. In line with Worcester County Council respondents reporting no change in levels of cohesion, a paired *t* test showed that there was not a significant difference between pretest ($M = 598.34, SD = 87.74$) and posttest ($M = 603.29, SD = 88.33$) cohesion scores $t(55) = -.20, p = .84$. The mean difference between conditions was -3.44 and the 95% confidence interval was between -37.27 and 30.40. These results were confirmed at the subscale level for each organization as shown in Table 6.29 and 6.30. The subscale results show that there was very little change in pretest and posttest scores, particularly for the Worcester County Council sample where results did not approach anywhere near significance.

Table 6.29:
Paired *t* test results for QinetiQ by subscale

	Pretest		Posttest		df	<i>t</i>	Sig.	95% CI
	Mean	SD	Mean	SD				
TCHIIIPS	107.33	17.47	107.70	18.88	22	.06	.95	-11.73 to 12.47
TCHIIPO	101.52	19.66	104.83	20.31	22	.52	.61	-9.86 to 16.48
TCVIIPS	113.59	18.03	111.43	17.85	22	-.40	.69	-13.36 to 9.06
TCVIIPO	97.89	12.95	93.35	16.33	22	-1.04	.31	-13.65 to 4.56
SCHIIIPS	55.24	6.49	54.61	9.43	22	-.23	.82	-6.21 to 4.95
SCHIIPO	18.94	5.30	17.96	5.83	22	-.55	.59	-4.69 to 2.72
SCVIIPS	26.50	3.60	24.39	5.14	22	-1.5	.14	-4.98 to .767
SCVIIPO	26.24	3.36	25.35	4.33	22	-.80	.44	-3.23 to 1.44

Table 6.30:**Paired *t* test results for Worcester County Council by subscale**

	Pretest		Posttest		df	<i>t</i>	Sig.	95% CI
	Mean	SD	Mean	SD				
TCHIIPS	121.88	15.66	123.11	14.25	55	.41	.68	-4.75 to 7.21
TCHIPO	119.25	18.16	121.16	16.00	55	.60	.56	-4.53 to 8.35
TCVIIPS	120.03	24.44	119.80	25.17	55	-.05	.96	-9.37 to 8.92
TCVIPO	102.77	18.69	103.54	17.37	55	.22	.83	-6.13 to 7.66
SCHIIPS	60.02	8.67	61.20	8.35	55	.73	.47	-2.07 to 4.43
SCHIPO	23.52	4.29	23.73	3.99	55	.29	.78	-1.29 to 1.71
SCVIIPS	25.51	7.56	24.79	8.74	55	-.49	.63	-3.70 to 2.26
SCVIPO	26.90	6.68	25.96	7.47	55	-.73	.47	-3.51 to 1.64

Due to the results of the paired *t* tests no further analyses were conducted. Had a significant difference between pretest and posttest mean scores been found in the QinetiQ sample, an analysis of covariance (ANCOVA) could have been conducted to determine the impact of a major reorganization on cohesion scores when pre-existing differences between groups and any other variables that influence levels of cohesion (such as team size) are partialled out.

There are a number of reasons why no change in levels of cohesion was detected for the QinetiQ sample following a major re-organization. Firstly, an important issue when looking at change in pretest-posttest designs is floor and ceiling effects. Ceiling effects occur when scores pile up at the high end of the scale (Clark-Carter, 1998). Conversely, floor effects occur when scores pile up at the low end of the scale. Both the negative skew of the data and the mean pretest scores indicates a ceiling effect for both samples. For the overall scale with 103 items and a 7-point Likert scale, a maximum mean score of 721 and a minimum of 103 is possible. For the subscales of the MTCS, this breaks down as follows:

Table 6.31:
Minimum and maximum mean scores for each MTCS subscale

	Minimum Mean Score	Maximum Mean Score
TCHIIPS	20	140
TCHIIPO	20	140
TCVIIPS	21	147
TCVIPO	18	126
SCHIIPS	10	70
SCHIIPO	4	28
SCVIIPS	5	35
SCVIPO	5	35

Inspection of the pretest means for each MTCS subscale across both organizations reveals that scores sit close to the maximum mean score possible on each MTCS subscale with only limited room for an increase in team cohesion but a large margin for decreases in perceptions of cohesion. Since the directionality of change was not predicted in this analysis, reported change by QinetiQ respondents may have related to either positive or negative changes. If both were reported by respondents, it is possible that their affect on cohesion scores cancelled each other out. If genuine positive changes had occurred as a result of the major reorganization, this may not have been detected by the measure due to ceiling effects. Further, respondents may be reluctant to rate items at the absolute extreme of a scale (i.e. providing a rating of 7) even if a change from a rating of 6 at pretest to a 7 at posttest had occurred. If respondents' report of change was perceived as negative, the lack of reporting this change on the MTCS may be due to a number of other reasons. Firstly, it may point to a difference between the perception of the organizational environment as a whole and perceptions of the team in which they work. In this instance any negative perceptions of the organization do not impact perceptions of the cohesiveness of their team when asked to rate their perceptions at this level. Thus, despite adverse external conditions (i.e. organizational level disruption) teams display the ability to remain cohesive. This fits with previous descriptions of the nature of cohesion (e.g. Yalom, 1970; Gross & Martin, 1952a, Brawley et al., 1988, Piper et al., 1983).

Due to the lack of change found between pretest and posttest scores for the QinetiQ sample as predicted from subjects open text responses, the sensitivity of the MTCS could not be confirmed. Therefore a further hypothesis was tested to determine the ability of the MTCS to

discriminate differences in levels of cohesion based on individual and team characteristics. This analysis is described in the next section.

6.7.2.3 Hypothesis 6

As described in Chapter 2, levels of cohesion have been found to differ according to a number of variables including individual (e.g. demographic variables such as gender) and team characteristics (such as team size). Since Carron et al. (2007) found that cohesion levels differ according to type of sport it may be that it will also differ depending on type of organization. Sanchez and Yurrebaso (2009) found that culture impacts levels of cohesion. Although their analysis was based on team culture it is logical that organizational culture may also impact levels of cohesion, an external force that inevitably affects teams. Differences in perceptions of cohesion between organizations will therefore be analysed in this section. Although Carron et al. (2007) also states that levels of cohesion will differ according to individual characteristics there is little detail on how such characteristics affect cohesion. Therefore individual characteristics such as age, gender and position (i.e. team leader or team members) in the team were also examined. Since differences in levels of cohesion across individual and team variables are likely to differ according to team type and nature of cohesion (Carron et al., 2007), no specific hypotheses were formed. For example, although gender differences are expected, no specific hypothesis was formed on whether male scale scores are higher or lower than female scale scores.

To test differences in scale scores, data collected on gender, age, position (i.e. team members or team leader), organization (i.e. QinetiQ versus Worcester County Council), and team size were analysed. To assess differences in gender, age, position and organization, independent-samples *t* tests were conducted on each of the MTCS subscales. Despite the non-normality of the Likert data, the use of the *t* test was considered acceptable due to the large sample size reducing the impact of any items with severe skewness or kurtosis on the results of the analysis. Pearson's *r* was used to assess the association between cohesion and team size. The results from each analysis are presented in turn below. In this sample, no significant difference between male and female scores were identified, as shown in Table 6.32 below:

Table 6.32:

Independent-sample *t* test results for differences in male (*n*=155) and female (*n*=59) cohesion scores by MTCS subscale.

	Male		Female		df	<i>t</i>	Sig. (2-tailed)	95% CI
	Mean	SD	Mean	SD				
TCHIIIPS	106.82	17.46	108.19	18.81	212	-.50	.62	-6.75 to 4.01
TCHIIPO	101.86	19.36	102.41	18.95	212	-.18	.85	-6.35 to 5.26
TCVIIPS ^a	106.21	23.73	105.95	28.50	90.28	.06	.95	-8.03 to 8.54
TCVIIPO	89.34	19.07	88.64	22.57	212	.23	.82	-5.36 to 6.75
SCHIIIPS	54.26	8.92	55.78	9.54	212	-1.09	.28	-4.26 to 1.23
SCHIIPO	18.36	4.78	19.05	5.43	212	-.91	.37	-2.19 to .81
SCVIIPS ^a	23.42	5.96	23.90	7.40	88.14	-.45	.66	-2.62 to 1.66
SCVIIPO ^a	24.26	5.57	23.97	6.96	87.72	.29	.77	-1.72 to 2.30

Note: ^a = the result for unequal variances is reported.

As a variable with more than two response categories, age was dichotomised for ease of analysis. The age categories 21-30 and 31-40 were coded as 1¹⁵ and the categories 41-50, 51-60 and 60+ were coded as 2. A significant difference between younger and older work team members was found but only for the subscales SCVIIPS $t(212) = 2.25$, $p = .03$, and SCVIIPO $t(212) = 2.01$, $p = .04$, as shown in Table 6.33 below. The mean scores for 21 to 40 year olds have a slightly higher level of social cohesion with their team leaders than do 41 to 60 year olds. However, the mean difference is very small.

Table 6.33:

Independent-sample *t* test results for differences in cohesion scores by age: 21-40yr olds (*n*=94) and 41-60+yr olds (*n*=120).

	21-40		41-60+		df	<i>t</i>	Sig. (2-tailed)	95% CI
	Mean	SD	Mean	SD				
TCHIIIPS	107.78	17.96	106.74	17.75	212	.42	.67	-3.81 to 5.88
TCHIIPO	102.95	18.94	101.28	19.45	212	.63	.53	-3.56 to 6.88
TCVIIPS	109.11	23.68	103.81	25.95	212	1.54	.13	-1.48 to 12.08
TCVIIPO	90.97	19.61	87.73	20.34	212	1.18	.24	-2.19 to 8.68
SCHIIIPS	55.45	9.18	54.08	9.03	212	1.09	.28	-1.11 to 3.83
SCHIIPO	19.21	4.95	18.03	4.94	212	1.73	.09	-.16 to 2.52
SCVIIPS	24.65	6.15	22.69	6.44	212	2.25	.03*	.24 to 3.67
SCVIIPO	25.10	5.81	23.46	6.02	212	2.01	.04*	.028 to 3.25

Note: * = significant at the .05 level.

¹⁵ Although an age category of 16-20 was included in the questionnaire, no subjects fell into this category.

Similarly, for position a significant difference between team members and team leader scores were found for the subscales TCHIIPS $t(72.17) = -2.76, p = .02$, SCHIIPS $t(212) = -2.17, p = .03$ and SCVIPO $t(212) = 2.05, p = .04$. Inspection of mean scores indicates that team leaders have a higher perception of horizontal aspects of task cohesion and horizontal aspects of social cohesion. However, individuals report that team members have a higher level of social cohesion with their team leaders, as shown in Table 6.34

Table 6.34:
Independent-sample t test results for differences in cohesion scores by position: team member ($n=174$) and team leader ($n=40$).

	Team Member		Team Leader		df	t	Sig. (2-tailed)	95% CI
	Mean	SD	Mean	SD				
TCHIIPS ^a	105.83	18.31	113.13	14.19	72.17	-2.76	.02*	-12.55 to -2.03
TCHIPO	100.95	19.48	106.65	17.42	212	-1.70	.09	-12.31 to .91
TCVIIPS	107.29	24.92	101.10	25.35	212	1.41	.16	-2.45 to 14.84
TCVIPO	89.99	19.63	85.48	21.60	212	1.23	.20	-2.40 to 11.44
SCHIIPS	54.04	9.16	57.48	8.35	212	-2.17	.03*	-6.55 to -.317
SCHIPO	18.48	5.08	18.88	4.47	212	-.46	.65	-2.12 to 1.32
SCVIIPS	23.90	6.48	22.05	5.71	212	1.66	.10	-.348 to 4.04
SCVIPO	24.57	5.91	22.45	6.01	212	2.05	.04*	.076 to 4.17

Note: ^a = the result for unequal variances is reported; * = significant at the .05 level.

To assess differences in organization, data from the pilot phase was used since only data from QinetiQ could be collected for the validity phase. Subjects obtained from Network Rail at the pilot phase were not included in this analysis due to only a small number of subjects being obtained from this organization. No significant differences were found between organizations against any of the MTCS subscales level as shown in Table 6.35 below:

Table 6.35:

Independent-sample *t* test results for differences in cohesion scores by organization: QinetiQ (QQ) (*n*=80) and Worcester County Council (WCC) (*n*=112).

	QQ		WCC		df	t	Sig. (2-tailed)	95% CI
	Mean	SD	Mean	SD				
TCHIIPS	106.23	18.96	107.55	17.30	190	-.50	.62	-6.53 to 3.87
TCHIIPO	100.80	19.34	102.46	19.13	190	-.59	.56	-7.21 to 3.88
TCVIIPS	102.44	25.37	107.54	24.95	190	-1.39	.17	-12.35 to 2.16
TCVIIPO	86.36	21.14	90.21	19.57	190	-1.30	.20	-9.69 to 2.00
SCHIIPS	54.50	8.99	54.86	8.88	190	-.27	.79	-2.93 to 2.22
SCHIIPO	18.55	4.64	18.61	5.17	190	-.08	.94	-1.49 to 1.37
SCVIIPS	22.94	6.22	23.84	6.46	190	-.98	.33	-2.75 to .93
SCVIIPO	23.55	6.35	24.38	5.77	190	-.94	.35	-2.56 to .91

Note: ** = significant at the .01 level.

There was also no significant correlation between team cohesion scores and team size:

Table 6.36:

Correlation between cohesion scores and team size (*N*=214).

	<i>r</i>	Sig. (2-tailed)
TCHIIPS	-.70	.31
TCHIIPO	-.10	.13
TCVIIPS	.00	.97
TCVIIPO	-.02	.78
SCHIIPS	.01	.87
SCHIIPO	-.03	.64
SCVIIPS	.03	.69
SCVIIPO	.01	.90

This analysis has revealed the ability of the MTCS to detect group differences in scale scores, discriminating differences at the subscale level. In interpreting cohesion scores, it is therefore important that norms are compiled at the subscale level where group differences are detected. This will be dealt with further in Chapter 7. As in hypothesis 5, finding a lack of difference between group scores does not mean that differences do not exist in other samples, types of teams or at other measurement points. It is therefore important to re-analyse group cohesion scores in other contexts in which the MTCS is to be used if cohesion is to be accurately understood, scored and interpreted.

The results of the independent-samples t test must be used with caution. Although this type of t test is typically used to compare the means of groups such as gender, they are not truly independent groups where individuals are randomly assigned to the groups. Therefore, other variables that have not been controlled for in random assignment may serve to enhance or mask any significant differences in means.

6.7.3 Hypothesis 7: Factorial Validity

In light of the results obtained for the preliminary factor analysis conducted in the pilot phase of the research, the factorial validity of the MTCS was tested by combining the subjects obtained in the pilot and validity phase ($N=418$) to maximise the amount of data available for statistical analysis. Ideally, an entirely new sample of subjects should be obtained to determine factorial validity. This should be conducted as part of a future research agenda to continue assessment of the validity of the MTCS. Unfortunately, a larger sample could not be obtained in the validity phase as planned.

As in the initial factor analysis, the approach taken was theoretically driven where the dimensions represented in the MTCM were used as an *a priori* hypothesis of the underlying factors in the data. The purpose of this FA study was therefore to verify the proposed structure represented in the conceptual model and investigate interpretation of an eight factor structure in terms of the conceptual model. Although where a hypothesised *a priori* structure exists confirmatory factor analysis (CFA) is often used, the sample size obtained was not sufficient enough to permit such an analysis (Kline, 2002). CFA allows hypotheses about the structure of scales to be tested determining the goodness of fit of the solutions to the observed data. Large samples are required to reduce discrepancies between goodness of fit tests. In fact, a sample of 500 is considered insufficient where more than two or three factors are hypothesised (Kline, 2002). Therefore, the hypothesised structure was tested with EFA. Even in EFA, without some *a priori* model of the factors that should emerge or adequate prior empirical research to assess the results against, determining the factor structure of a measure is difficult. A theory-driven approach is preferable over a data-driven approach (Tabachnick & Fidell, 1996). The advantage with adopting an EFA approach for this study is that it still enables unexpected structures to be identified not captured in the conceptual model but that are theoretically valid, suggesting potential modifications to the conceptual model.

Following examination of matrix factorability, the factor analysis run using principal axis factoring and direct oblimin rotation, was constrained to the eight factors proposed in the conceptual model to test its validity. The factor structure was interpreted based on the

pattern matrix. The criteria of minimum item loadings of .32 was used to interpret factors and the existence of few cross-loadings, no factors with fewer than three items, item communalities >.40 and SMC's >.30 were used to determine the stability of the solution (Costello & Osbourne, 2005; Tabachnick & Fidell, 2001).

The correlation matrix (presented in Appendix Y) of the combined sample ($N=418$) was found to have good factorability. The KMO test of sampling adequacy was .97. As the subject to item ratio was less than 5:1 Bartlett's test of sphericity was calculated and was found to be significant ($p < .0001$) indicating a strong relationship between scale items. All on-diagonal values of the anti-image correlation matrix was found to be greater than .5, with the lowest value found against item 34 'I feel I can offer personal support to team members when it is needed' of .92. The off-diagonal partial correlations were found to be small as were the residual values in the combined sample with only 95 (1%) non-redundant residuals with values >.05. The pattern matrix for the eight factor solution is shown in Appendix Z; the factor structure obtained is described below.

Although the eight factor structure identified does not entirely match the expected structure represented in the conceptual model, it provides some interesting findings. Only four of the items have communalities <.40 indicating that the factor solution is not a poor fit to the data. The composition of the factors therefore requires careful scrutiny. The composition of each factor is described in turn below.

Factor 1 captures only those items related to vertical aspects of cohesion. All but two of the items were written to measure vertical aspects of task cohesion and include items designed to tap general aspects of task cohesion as well as the specific aspects of unity of purpose and valued roles. However, items that measure individual perceptions and perceptions of the team both load onto this factor. This is likely to be due to similarity of item wording, designed to ensure balance of measurement. Two of the items however were written to tap vertical aspects of social cohesion – item 101 'Team members are proud to be working with our team leader' and 'I am proud to be working with my team leader'. Given the content of these items, it is not entirely surprising that they load onto this factor since they relate to pride in 'working' with the team leader. Therefore in future versions of the MTCS these items should be re-evaluated as part of task cohesion. Inspection of the highest loading items on factor 1 (these aid identification of the factor, Kline, 2002) indicate that this factor represents items that describe how the team leader helps the team work together, whether it be to achieve goals, recognising contributions, setting clear goals and rules or instilling a shared purpose.

Factor 2 contains items designed to measure horizontal task cohesion containing both general and specific aspects, with the exception of item 63 'Members of the team do not see the team as an important social unit' that does not seem to fit within the factor. In fact it loads fairly weakly on this factor with an item loading of .34. Although the highest loading item suggests that this factor represents development of skills in the team, not all of the items that load on this factor reflect this.

The majority of items in Factor 3 represent 'unity of purpose' but fails to distinguish between vertical and horizontal aspects of cohesion. The majority of items tap 'shared experiences' or 'shared thinking'. Two items that are designed to measure social cohesion that do not fit with this theme also load onto this item. However, these are secondary loadings as they load more strongly on factors 4 and 6, factors that contain more items that tap social cohesion.

Although the highest loading item in Factor 4 relates to 'social support', this does not adequately define the items that load onto this factor. Firstly, the factor contains items that also tap task support. Further, items also represent valued roles, acceptance and importance of social contact.

Factor 5 has a similar composition as Factor 1 but represents horizontal aspects of cohesion not vertical aspects. The highest loading item taps 'pride in team role' but the factor also reflects other aspects of cohesion such as shared understanding of goals and encouragement to express opinions. It also contains aspects of social cohesion such as enthusiasm, and sense of belonging.

Factor 6 contains only items related to vertical aspects of social cohesion but contains items written to measure both individual perceptions of self in the team and perceptions of others in the team. The highest and most cleanly loading items indicate that this dimension relates to friendship and feelings of closeness to the team leader.

Factor 7 contains items that relate to vertical aspects of valued roles and unity of purpose but does not have a clear definition as it contains items that relate to recognition of contribution, encouragement to express opinions, fair treatment and shared work experiences. The final factor, factor 8, relates to horizontal aspects of task cohesion including aspects of valued roles and unity of purpose and is mainly defined by items that tap commitment to the team's tasks. The last 10 items presented in the factor table

(Appendix Z) fail to load on any factor $>.32$. This may indicate heterogeneity of items on the MTCS. However, counterpart versions of these items do load onto factors.

The many cross-loading items in the factor solution show that a pure factor solution has not been obtained (Kline, 2002). This may be due to the complexity of the structure of the MTCS and, given the factor structure obtained where factors do not distinguish the distinct dimensions of cohesion represented in the conceptual model, these secondary loadings are not surprising.

It is worth noting that the results of the PA indicated a six factor structure. The observed value of eigenvalue six was 1.45 compared to 1.15 obtained from the random sample. Observed values beyond a six factor structure were found to be lower than those found in the randomly generated sample. The scree plot suggested a two factor structure as shown below in Figure 6.13 below. However, these factor solutions did not improve interpretation of factors and, in fact, resulted in a higher number of cross-loadings and items with communalities $<.40$ indicating that the items are not well defined by the factor solution. Therefore these solutions are not reported further.

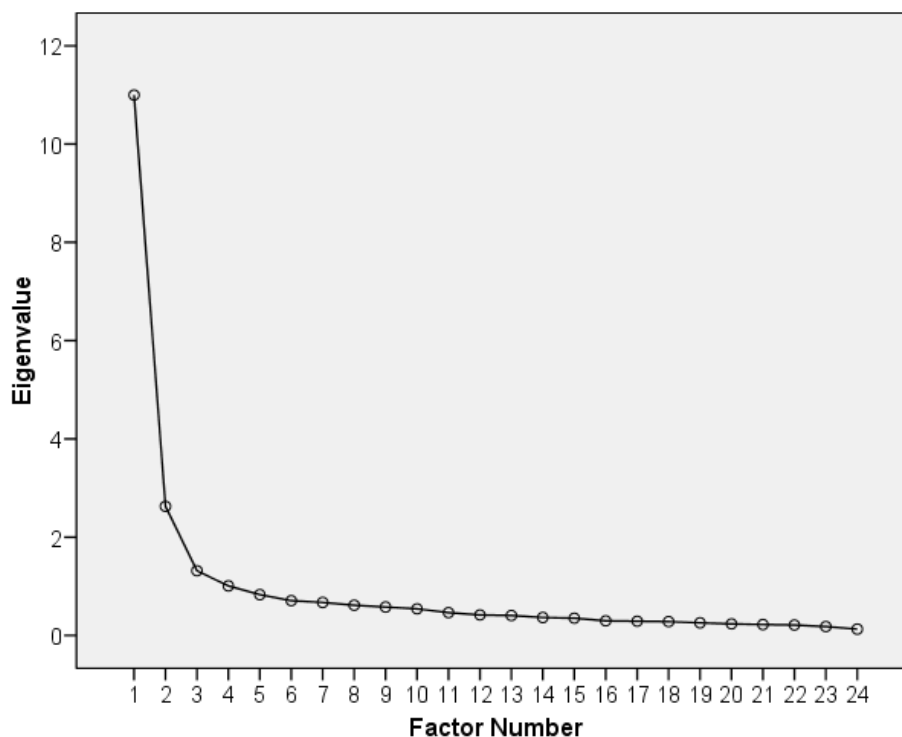


Figure 6.13: Scree plot to determine number of factors to extract for the MTCS at the validity phase

When the sample size is insufficient, investigating different numbers of factors is unlikely to improve interpretability. However, to determine the effect of sample size and factor complexity on the factor solution, two further analyses were conducted. Firstly, an eight factor structure was investigated using three items to represent each of the dimensions in the conceptual model to increase the subject to item ratio to 17:1. This was the minimum number of items that could be selected to adequately represent all aspects of task cohesion, i.e. general aspects of task cohesion, valued roles and unity of purpose. Care was taken to select items for each dimension that did not load onto a single factor in the eight factor structure obtained for all MTCS items to see if they loaded onto the same item given a larger subject to item ratio. The second analysis conducted was run to determine if a simpler factor structure could be detected as hypothesised. For this analysis four of the dimensions hypothesised in the conceptual model were tested: TCHIIPS (20 items), SCHIIPO (4 items), TCVIIPO (18 items) and SCVIIPS (5 items). The factor structures obtained for each of these analyses are presented in turn below.

Table 6.37

Factor loadings and communalities for 24 items of the MTCS based on an eight factor structure ($N=418$).

	Factors								Communalities
	1	2	3	4	5	6	7	8	
Item 120: SCVIIPO	.68			-.34					.74 (.64)
Item 116: TCVIIPO	.57								.65 (.61)
Item 100: VRVIIPO	.50								.69 (.66)
Item 118: UPVIIPS	.42							-.37	.76 (.72)
Item 40: SCHIIPO		.87							.86 (.75)
Item 37: SCHIIPO		.67							.77 (.72)
Item 63: SCHIIPO		.67							.57 (.55)
Item 24: SCHIIPS		.42			.32				.64 (.58)
Item 32: SCHIIPS		.35							.49 (.48)
Item 109: UPVIIPO			.86						.77 (.48)
Item 31: UPHIIPS			.50						.39 (.34)
Item 65: SCVIIPS				-.73					.87 (.74)
Item 117: SCVIIPO				-.47					.74 (.68)
Item 75: SCVIIPS				-.43					.59 (.58)
Item 17: VRHIIPS					.79				.67 (.47)
Item 26: SCHIIPS					.38				.50 (.46)
Item 19: TCHIIPS						-.86			.75 (.54)
Item 45: TCHIIPO					.32	-.48			.71 (.64)
Item 59: VRHIIPO						-.36			.63 (.59)
Item 66: VRVIIPS							.42		.70 (.61)
Item 77: TCVIIPS	.36							-.76	.69 (.59)
Item 89: SCVIIPS								-.58	.82 (.79)
Item 101: SCVIIPO								-.50	.80 (.75)
Item 62: UPHIIPO									.37 (.37)

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

Table 6.38

Factor loadings and communalities for 47 items of the MTCS based on a four factor structure (N=418).

	Factors				Communalities
	1	2	3	4	
Item 113: VRVIPO	0.87				.70 (.77)
Item 127: VRIIPO	0.86				.78 (.81)
Item 98: UPVIPO	0.84				.73 (.78)
Item 122: UPVIPO	0.82				.74 (.78)
Item 121: TCVIPO	0.81				.70 (.75)
Item 94: UPVIPO	0.80				.68 (.71)
Item 114: TCVIPO	0.77				.66 (.73)
Item 116: TCVIPO	0.77				.65 (.70)
Item 119: UPVIPO	0.75				.67 (.73)
Item 111: UPVIPO	0.71				.60 (.67)
Item 100: VRVIPO	0.70				.70 (.74)
Item 104: UPVIPO	0.69				.60 (.70)
Item 128: TCVIPO	0.68				.55 (.64)
Item 106: VRVIPO	0.68				.69 (.74)
Item 93: TCVIPO	0.65				.61 (.67)
Item 107: UPVIPO	0.65				.50 (.59)
Item 105: TCVIPO	0.59				.41 (.49)
Item 89: SCVIIPS	0.56			0.44	.75 (.79)
Item 109: UPVIPO	0.53		0.33		.40 (.51)
Item 75: SCVIIPS	0.39			0.39	.53 (.61)
Item 29: VRHIIPS		0.74			.56 (.63)
Item 30: TCHIIPS		0.70			.53 (.57)
Item 33: VRHIIPS		0.70			.53 (.60)
Item 15: VRHIIPS		0.70			.56 (.62)
Item 9: UPHIIPS		0.68			.48 (.52)
Item 1: TCHIIPS		0.65			.43 (.57)
Item 19: TCHIIPS		0.65			.52 (.61)
Item 11: VRHIIPS		0.62			.49 (.54)
Item 6: UPHIIPS		0.61			.50 (.58)
Item 27: UPHIIPS		0.61			.57 (.63)
Item 25: VRHIIPS		0.57			.56 (.65)
Item 17: VRHIIPS		0.55			.47 (.60)
Item 16: UPHIIPS		0.52			.55 (.62)
Item 18: TCHIIPS		0.51			.36 (.49)
Item 12: UPHIIPS		0.49			.53 (.61)
Item 22: TCHIIPS		0.40	0.34		.47 (.59)
Item 5: UPHIIPS		0.38			.40 (.48)
Item 4: UPHIIPS		0.38			.44 (.60)
Item 14: TCHIIPS		0.37	0.35		.44 (.58)
Item 40: SCHIIPO			0.75		.74 (.75)
Item 37: SCHIIPO			0.74		.75 (.75)
Item 63: SCHIIPO			0.63		.52 (.58)
Item 44: SCHIIPO			0.58		.64 (.69)
Item 31: UPHIIPS			0.42		.25 (.41)
Item 65: SCVIIPS				0.58	.67 (.72)
Item91: SCVIIPS				0.55	.60 (.58)
Item84: SCVIIPS	0.38			0.48	.61 (.64)

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

The results of the eight factor analysis indicate an unstable factor solution with factor 3 and 7 defined by only two and one item respectively. Despite the higher subject to item ratio, the interpretability of the eight factor structure did not improve and failed to support the eight dimensions represented in the conceptual model.

An interesting result was obtained from analysis of the simpler four factor structure. The factors extracted could be named according to the four dimensions of the conceptual model that were tested in this analysis. Factor 1 represents TCVIPO (including items that tap VRVIPO and UPVIPO), factor 2 represents TCHIIPS (including items that tap VRHIIPS and UPHIIPS), factor 3 represents SCHIPO and factor 4 represents SCVIIPS. However, some items were found to cross-load onto more than one factor. For example, two of the items designed to measure SCVIIPS, item 89 'I am proud to be working with my team leader' and item 75 'I feel close to my team leader' were found to cross-load onto factor 1. Given the content of these items, these could also relate to task cohesion. Item 109 'Team members have similar experiences with the team leader' designed to measure TCVIPO loaded onto both factor 1 as expected but also had a secondary loading on factor 3 that tapped SCHIPO. The horizontal version of this item, item 31 'I have similar experiences to others in the team' was found to load solely on factor 3, indicating that these items may relate to social cohesion not just task cohesion.

The results obtained from this analysis do not enable the eight dimensions represented in the conceptual model to be confirmed. An intuitive factor structure for all 103 items could not be obtained. However, this does not mean that it provides sufficient evidence for its rejection or re-definition since the factorial validity of the MTCS could not be adequately tested. The similarity of item content to ensure balance of measurement of aspects of cohesion across vertical and horizontal dimensions, individual perceptions of self in the team and perceptions of others, may be one reason for the difficulty in interpretation of the factor structure. Some items may need to be modified or re-written to ensure clean measurement of the intended dimensions. Another reason for this factor structure is sample size. As described by Osborne and Costello (2004), an insufficient sample size can result in overfitting causing misleading conclusions to be drawn. This is because overfitting can cause factors to be extracted that do not provide a true reflection of the underlying data and items that are incorrectly assigned to factors. Since only a 4:1 subject to item ratio was achieved, overfitting cannot be ruled out. Although increasing the subject to item ratio to 17:1, submitting a smaller number of items to factor analysis but that represent all eight dimensions of the conceptual model also failed to identify an interpretable structure. However, analysis of only part of the model revealed that factor analysis was able to identify

the hypothesised dimensional structure when a simpler structure (i.e. four rather than eight dimensions) was tested. Reflecting the nature of the construct of team cohesion, the MTCS does not have a simple structure. It is clear that, where many distinct factors are expected, a large sample size becomes even more vital. The relatively low loading and lack of marker variables with factor loadings $>.80$ in the analysis of all items also indicates that a large sample size is required for a reliable factor solution of a complex structure (Tabachnick & Fidell, 1996).

6.8 Summary

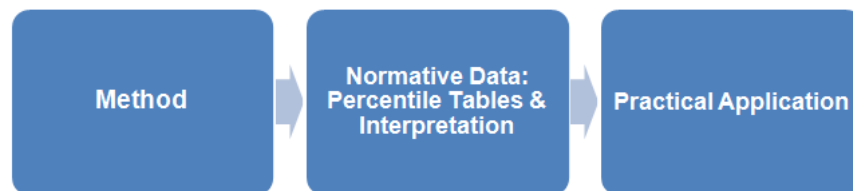
The criterion measures employed in this phase of the research (TPQ, MOAQ-JSS and GEQ) were found to have good internal consistency reliabilities. In general, these reliabilities tended to be higher than those obtained by their test developers. Only one dimension in the GEQ was found to have an unacceptable reliability below .5. This was likely to be due to only two of the original four items being relevant to work teams, resulting in an under-representation of this dimension. Unsurprisingly, due to their similarity, all three items of the MOAQ-JSS loaded onto a single factor representing overall job satisfaction. However, the four dimensional structure of the GEQ and the six dimensional structure of the TPQ could not be replicated. The FA conducted in this research indicated a two factor structure for the GEQ representing social and task based aspects of cohesion. The individual and team aspects could not be distinguished in the work team sample. For the TPQ, the most stable solutions indicated that two of the dimensions, 'Collaboration & Involvement' and 'Communication Processes', were highly related and loaded onto a single factor. All items designed to measure the 'Leadership' dimension loaded onto a single factor. The majority of items designed to tap 'Emotional Climate' also loaded onto the same factor. Items designed to measure 'Goals & Results' and 'Competencies' were found to be related to 'Leadership' and 'Emotional Climate'. Due to the sample size and subject to item ratio, the stability of the factor solutions obtained was questioned and should be treated with caution. This led the decision to develop the hypotheses for the construct validity study around the structures defined by the test developers.

Item-total correlations between the MTCS and the criterion measures revealed that they all measure something unique from one another. Importantly, this indicates that the MTCS measures something unique over the existing measure of cohesion (i.e. GEQ) and is not simply a measure of job satisfaction or performance. The MTCS was found to have good internal convergent validity. All subscales were found to be highly correlated, but no conceptual overlap was identified between subscales (i.e. all were found to contribute something unique to the measurement of cohesion). Partial support for the external

convergent validity of the MTCS was found. Task-based dimensions of the MTCS were found to correlate more highly with the task-based aspects of the GEQ. However, social-based aspects of the MTCS correlated slightly more highly with the task dimensions of the GEQ. Partial support was also obtained for the divergent validity of the MTCS. The MOAQ-JSS was found to have a moderate correlation with the dimensions of the MTCS. This indicates that, although job satisfaction is related to cohesion, cohesion as measured by the MTCS is a distinct construct. The task-based aspects of the MTCS were also found to have a low correlation with the social-based subscales of the GEQ. The MTCS was however, found to correlate highly with the TPQ, although still lower than the reliabilities of the MTCS subscales. Given the content of the TPQ, in particular the dimensions measuring goal, leadership and emotional climate aspects, the high correlation is not surprising. In fact, the TPQ includes items that are considered in this research to be part of cohesion, such as 'Members feel a sense of belonging to the team'. Given the task and vertical-based aspects of cohesion, it is not surprising that there is a high inter-relationship between these two constructs. The MTCS was also shown to have differential validity and be sensitive to differences in expected levels of cohesion. As predicted from previous research, task and social cohesion were found to differentially correlate with team performance, with task cohesion contributing more to the relationship between team cohesion and team performance. They were also found to differentially correlate with job satisfaction. Social cohesion was found to contribute more to the relationship between team cohesion and job satisfaction. This finding is contrary to previous research that has questioned the importance of social cohesion in work teams (Carless & De Paola, 2000). The sensitivity of the MTCS is a particularly important property of the measure given the dynamic nature of the construct. Differences in levels of cohesion were found between team members and team leaders and younger and older work team members.

Considering the nature of cohesion, the lack of a standard benchmark test or clear criterion variables to assess the validity of the MTCS against, full support for its construct validity cannot be expected through the tests conducted in this research alone. However, the findings of the construct validity study are encouraging and provide some indication of its practical benefit in measuring levels of cohesion in organizational work teams. The continued investment in testing its validity is therefore of great value to improve the measurement of cohesion in organizational work teams.

7 Scoring the Multidimensional Team Cohesion Scale (MTCS)



The purpose of this section is to convert scores on the MTCS into a ‘standard’ form to facilitate interpretation and enable practical use in an occupational setting. Normative data is provided for each subscale and classified by ‘age’ and ‘position; groups that were found to differ in their perceptions of levels of cohesiveness, as presented in Chapter 6. The normative data is provided in the form of percentile ranks. This approach has practical benefit as percentiles are easy for the non-expert to interpret and provide a simple method for comparing individuals and teams. It is imperative that the MTCS and norms compiled are used by trained, competent test users who have an adequate knowledge of the nature of cohesion as presented in this thesis, to avoid misuse and misunderstanding.

7.1 Introduction

In an occupational setting, psychological tests are frequently used in personnel selection and to assess training and development needs. To support accurate decision-making in these areas, it is imperative that scores are converted into a ‘standard’ form to support interpretation. The development of norms for this purpose is commonplace in the development of psychological tests in organizational and occupational psychology. For example, the Sixteen Personality Factor Questionnaire (16PF) and the Occupational Personality Questionnaire (OPQ) have good normative data to facilitate their interpretation. These measures are widely-used in both the U.S. and U.K. Normative data has been developed in both countries, demonstrating their practical use across contexts (Milward, 2005; Cook, 2004). Norms should be compiled based on a large representative sample of the intended population to determine what scores are ‘normal’ in the population. This provides a standard against which to compare individuals and teams relative to others. Importantly, this enables the user of the MTCS to determine whether individuals and their teams have a high or low level of cohesion. Without norms for comparison, it would be difficult to determine what scores on the MTCS mean in terms of levels of cohesion. An

understanding of what scores mean is particularly vital where the measure is to be used for diagnostic, evaluative or any intervention purposes. Understanding the scores of individuals or teams in reference to scores obtained by others across the dimensions of the MTCS is important for understanding how interventions should be designed to improve team functioning and ultimately organizational processes and outcomes. It therefore provides a fundamental part of the construction of the MTCS if it is to have any practical benefit.

7.2 Method

A norm-referenced approach to scoring was used since the intention was to define a scoring approach that allows comparison of individual and team cohesion scores with a 'norm' group. This approach is particularly appropriate given the nature of cohesion, i.e. what is high for one type of team (such as a virtual team) might be low for another type of team (such as self-managed teams). It also the most appropriate method for scoring team cohesion as it is difficult to define what behaviours are expected by individuals or teams with particular scores as in criterion-referenced scoring (Jackson, 1996).

In order to compile a scoring table, individual scores for each subscale were summed and converted into percentile scores. The use of percentiles offers a distinct advantage in this research since scores obtained on the MTCS were not normally distributed as is frequently the case with attitude data. Percentiles still allow exact interpretation in these instances. It also provides the simplest method allowing non-experts to easily interpret and compare scores. The main limitation with the use of percentiles is that they do not provide information on actual differences in scores between individuals and provide an underestimation of score differences at the extremes of the distribution. They also provide ordinal information limiting the statistical analysis that can be conducted using percentile scores (Kline, 2000). Based on the empirical results of hypothesis 6 discussed in Chapter 6.7.2.3, percentile score tables were compiled for the two different norm groups that could be differentiated based on their responses to the MTCS: age and position. Although differences were identified, in certain subscales, norms were compiled for all subscales for these groups. It is important to remember that due to the nature of cohesion, group differences may change over time and in different team contexts. The sample obtained for each norm group was not precisely balanced, but this is likely to reflect the population from which the sample was drawn (e.g. less subjects aged 61 and over and fewer team leaders than team members).

7.2.1 Sample

To define scoring tables for the MTCS, the subjects obtained from the Pilot Phase and Validity Phase were combined to increase sample size ($N=418$). This sample represents

three organizations: QinetiQ ($n=294$), Worcester County Council ($n=112$) and Network Rail ($n=12$). The sample consists of 257 males and 161 females. Descriptive statistics for age and position within the organization are presented in Table 7.1 below:

Table 7.1:
Descriptive statistics for age and position within the organization ($N=418$).

	Frequency	Percent	Cumulative Percent
Age			
21-30	78	18.7	18.7
31-40	113	27.0	45.7
41-50	120	28.7	74.4
51-60	91	21.8	96.2
61+	16	3.8	100.0
Position			
Team Member	324	77.5	77.5
Team Leader	94	22.5	100.0

In the sample tested, the size of team subjects were members of, ranged from very small containing only 2 members to very large teams containing 176 members ($M = 11$). Subjects also varied in the length of time they had been members of their team spanning from only 1 month to 35 years ($M = 4.75$ years).

7.3 Normative Data: Percentile Tables & Interpretation

The percentile tables for 'position' and 'age', are presented in Tables 7.2 to 7.4:

Table 7.2:
Normative values for position: team leader (TL) and team member (TM) by MTCS subscale ($N=418$).

%	TCHIIIPS		TCHIIPO		TCVIIPS		TCVIIPS		SCHIIIPS		SCHIIPO		SCVIIPS		SCVIIPS	
	TL	TM	TL	TM	TL	TM	TL	TM	TL	TM	TL	TM	TL	TM	TL	TM
95	136	134	132	132	145	140	118	118	68	68	27	27	34	33	34	33
90	131	130	129	128	138	137	116	115	67	66	26	26	33	32	33	31
85	129	129	127	127	135	135	114	113	65	65	25	25	32	31	31	31
80	127	127	124	125	133	132	112	111	64	64	25	25	32	30	31	30
75	125	125	121	122	130	130	110	108	63	63	24	24	31	29	29	30
70	122	123	120	120	128	127	109	106	63	62	23	23	30	28	29	29
65	122	121	118	118	126	124	106	105	62	60	23	23	29	28	28	29
60	119	120	116	117	125	122	104	103	61	59	22	22	28	27	27	28
55	118	118	114	114	123	120	102	101	60	58	21	22	27	27	27	27
50	117	115	113	112	122	117	99	98	59	57	20	21	25	26	26	26
45	115	113	111	110	117	114	98	95	57	57	20	20	24	25	26	26
40	114	111	109	107	112	112	95	94	56	56	19	19	24	24	25	25
35	110	109	106	105	101	106	89	91	54	55	18	19	22	23	24	24
30	105	107	97	100	96	101	82	87	51	54	18	18	22	21	23	22
25	100	103	93	97	91	96	80	83	50	52	17	17	20	20	23	21
20	90	98	87	92	84	88	75	78	47	50	15	16	19	20	21	20
15	87	93	75	86	76	81	71	71	45	48	13	15	16	18	20	18
10	77	86	68	78	73	69	62	62	42	44	11	13	14	15	17	15
5	70	75	62	69	60	56	58	55	34	35	8	10	10	11	14	11

Table 7.3:

Normative values for age by MTCS task cohesion subscale (*N*=418).

%	TCHIPS					TCHIPO					TCVIIPS					TCVIPO				
	21-30	31-40	41-50	51-60	61+	21-30	31-40	41-50	51-60	61+	21-30	31-40	41-50	51-60	61+	21-30	31-40	41-50	51-60	61+
95	133	135	134	135		129	134	132	133		139	142	140	141		115	122	118	116	
90	130	132	130	130	135	128	129	127	130	129	134	139	137	137	138	115	116	115	115	120
85	126	129	129	127	131	123	128	127	127	128	132	136	135	136	134	111	114	114	113	117
80	125	128	128	126	128	122	125	125	123	128	130	133	132	133	133	110	111	111	112	114
75	123	126	126	125	128	119	124	123	122	127	128	130	130	130	131	107	109	108	109	111
70	120	124	123	124	127	117	121	121	120	127	126	126	127	128	129	107	106	106	107	107
65	119	122	122	122	122	117	117	119	118	125	124	125	127	126	129	106	104	105	106	107
60	115	121	120	199	120	114	116	116	117	122	122	122	123	125	125	103	102	104	103	105
55	113	120	118	119	119	112	114	115	116	120	120	119	122	122	118	102	98	102	101	101
50	112	118	116	116	117	109	111	113	113	118	188	118	117	120	114	100	96	100	99	99
45	111	116	112	115	116	106	107	111	110	116	112	114	115	115	114	98	94	97	98	95
40	109	114	110	113	116	103	105	110	107	115	109	112	108	114	112	93	93	95	95	90
35	108	111	107	111	114	100	104	107	104	114	102	106	105	111	108	88	91	92	93	90
30	106	107	105	107	112	98	98	103	100	111	99	99	101	101	93	86	83	86	90	89
25	98	104	101	103	111	92	94	97	97	110	96	95	92	97	89	83	81	81	83	81
20	95	96	96	99	109	88	87	93	94	98	92	86	83	89	86	82	74	70	81	77
15	88	91	88	96	103	82	81	79	89	87	83	77	73	83	85	74	64	67	76	76
10	78	84	75	88	91	76	77	71	82	80	76	68	66	71	81	67	58	60	71	74
5	69	78	66	82	76	63	65	64	74	73	53	55	56	61	75	46	55	52	58	72

Table 7.4:

Normative values for age by MTCS social cohesion subscale (N=418).

%	SCHIIPS					SCHIIPO					SCVIIPS					SCVIIPO				
	21-30	31-40	41-50	51-60	61+	21-30	31-40	41-50	51-60	61+	21-30	31-40	41-50	51-60	61+	21-30	31-40	41-50	51-60	61+
95	68	67	69		27	27	28	27		32	33	34	34		32	32	34	33	32	
90	66	67	67	68	26	26	27	26	27	32	32	33	32	34	31	31	32	32	32	34
85	65	65	64	67	25	25	26	25	27	30	31	31	32	33	30	30	31	31	31	33
80	64	64	64	66	24	25	25	25	26	30	30	31	31	32	30	30	31	30	31	32
75	64	63	63	66	23	24	24	24	25	28	29	30	30	32	29	29	30	30	30	31
70	63	62	62	65	23	23	24	24	24	28	28	29	29	30	29	29	29	29	29	30
65	61	60	61	63	22	23	23	23	23	28	27	28	28	29	28	28	28	29	29	29
60	60	59	59	63	21	22	23	23	22	27	27	27	27	29	28	28	27	28	28	28
55	59	58	59	63	20	21	22	22	22	27	25	27	27	28	27	27	27	27	28	27
50	57	58	57	58	63	20	20	21	21	22	26	25	26	26	28	26	26	26	27	26
45	56	57	56	57	62	19	20	20	20	21	26	23	25	25	26	25	25	26	26	26
40	55	56	55	57	60	18	19	19	20	21	24	22	24	24	25	24	24	25	26	25
35	53	55	54	56	57	17	18	19	19	20	24	21	23	23	23	23	23	23	25	23
30	53	52	52	55	57	16	17	18	19	20	22	21	21	23	22	22	22	22	24	22
25	49	51	50	54	56	15	16	17	18	19	21	20	20	22	21	21	20	21	24	22
20	47	50	49	52	53	14	15	16	18	19	20	18	18	20	20	20	20	20	22	21
15	45	46	47	47	50	13	14	14	17	18	19	15	17	20	18	19	17	17	21	20
10	42	44	40	45	47	12	11	13	14	16	16	13	14	14	14	17	13	15	18	18
5	33	38	32	38	43	9	9	9	12	15	10	11	9	11	13	10	11	12	13	15

Since the subscales or dimensions of the MTCS were found to have a high inter-correlation, the MTCS could be scored at the global level. This is useful for determining the 'overall' cohesiveness of a team but should only be used descriptively and not as the basis of decisions. This is because each subscale contains a different number of items. Task cohesion represents a large number of items in the MTCS due to its general, specific, horizontal, vertical, individual and team-based manifestations. The 'overall' cohesion score will therefore be weighted more heavily towards task cohesion. Where decisions are to be made that affect individuals and teams (e.g. to determine training and development needs), it is advised that the MTCS be interpreted at the subscale level only.

As the MTCS reflects eight dimensions of cohesion, the normative information provided was compiled for each dimension separately to enable assessment of scores on each. Individuals and teams will not necessarily score comparatively on all dimensions. This is because a high level of cohesion on all dimensions is not necessarily required to maintain a strong enough bond to ensure the effective functioning of the team. For example if a team scores low on any aspects of vertical cohesion, this does not necessarily mean that the team is not cohesive. It may be very cohesive in terms of horizontal cohesion if it is a competent team that requires less interaction with the team leader. Less competent teams, or newer teams, may require more frequent interaction with the team leader and so may know the team leader better than more competent collectives. A low cohesion score on the vertical cohesion dimension may also be due to an ineffective leader or a result of a certain leadership style. It would not be unexpected for task cohesion to be more salient in organizational work teams, particularly at the early stages of team development where team members are relatively unfamiliar with one another. In light of the results of this research, where task cohesion was found to be more important for team performance, low social cohesion is not detrimental to team performance. For those assessing the cohesiveness of individuals and teams (e.g. higher managers), interpretation needs to be handled with some care.

The differences in magnitude of values in the percentile tables reflects the fact that each dimension is measured by a different number of items ranging from 4 (SCHIIPO) to 21 (TCVIIIPS). As a 7-point Likert scale (fully described in section 4.5) was used to assess team cohesion with anchors ranging from 'strongly disagree' (1) to 'strongly agree' (7), the higher the score on the MTCS, the higher the perception of team cohesiveness and the lower the score, the lower the perception of team cohesiveness. The percentile tables can be used to determine whether individual scores on the MTCS are high or low in comparison to the population for which the norms were calculated. For example, in Table 7.3 it can be

seen that for individuals aged between 21 and 30 a score of 125 on the subscale TCHIIPS falls at the 80th percentile rank indicating that 79% of individuals at this age range in organizational work teams score less than this. This therefore suggests a high perception of cohesion. In contrast, for individuals aged between 21 and 30 a score of 95 on the dimension TCHIIPS falls at the 20th percentile indicating that only 19% of scores for individuals at this age range on this dimension are below this. This suggests a fairly low perception of cohesion.

To aid interpretation of scores on each dimension of the MTCS, the following descriptions are provided based on a high cohesion score:

- TCHIIPS: in terms of taskwork, a high score on this dimension indicates that individuals feel content with, committed to and supported in their tasks and role. They feel they have a shared understanding of goals with other team members and similar experiences. Individuals feel valued in their role and contributions and feel that the team offers them the ability to improve and develop their skills.
- TCHIPO: a high score on this dimension indicates that individuals perceive that their fellow team members enjoy their tasks, are committed to them, support and encourage each other in their tasks and roles. Individuals perceive that team members agree on team goals, share the same way of thinking about them and work well together to achieve them. Team members are perceived as valuing each other and recognise each other's contributions. Team members are also perceived as having pride in their roles.
- TCVIIPS: a high score on this dimension suggests that individuals perceive that the team leader adequately recognises their contribution to the team and values their role within it, helping them to develop their skills. They also see the team leader as treating team members fairly. Individuals feel that they are given adequate guidance in their role and are supported and encouraged in conducting it. Individuals are confident that the team leader can perform their job and see the team leader as important in the team.
- TCVIPO: a high score on this dimension indicates that individuals perceive that the team leader encourages team members and helps them to develop their skills within the team. They also perceive that the team leader provides other team members with adequate guidance. Individuals feel that other team members feel valued in their role and supported. Individuals also perceive that other team members see the team leader as important to the success of the team and help the team to work well, sharing the same goals.

- SCHIIPS: individuals with a high score on this dimension feel a part of the team socially and value it for social contact and friendships. Individuals also feel that they can turn to other team members when they need personal support.
- SCHIPO: individuals with a high score on this dimension perceive that team members are good friends with one another and enjoy each other's company. Individuals feel that other team members see the team as an important social unit.
- SCVIIPS: a high score on this dimension suggests that individuals are friends with their team leader and feel that they take an interest in their personal welfare. They feel close to their team leader and feel that they go out of their way to make them feel happy within the team.
- SCVIPO: Individuals with a high score on this dimension perceive that team members are friends with the team leader and feel that they take an interest in their personal welfare. Individuals perceive that other team members feel that the team leader helps them to feel happy within the team.

7.4 Practical Application

The MTCS should be administered by individuals who have had sufficient training and are competent in the use of psychological tests and the interpretation of test scores. It is imperative that they have a full understanding of the nature of cohesion as presented in this thesis. This is imperative for the interpretation of MTCS test scores and building the profile of the cohesiveness of any given team. Given the dynamic nature of cohesion, the salience of particular dimensions at particular points over the lifecycle of team is likely to differ. Unless this is adequately understood, scores will be misunderstood and misused. It is important that the MTCS is administered to members of teams at the same time and that the standardised instructions provided in the MTCS are followed. This allows accurate comparison of individuals and their teams against other similar or different teams. In accordance with the BPS Code of Best Practice for Psychological Testing¹⁶, test users must provide a clear statement of their use of the test to the individuals they administer it to, how the scores obtained will be used, who will have access and how confidentiality will be assured.

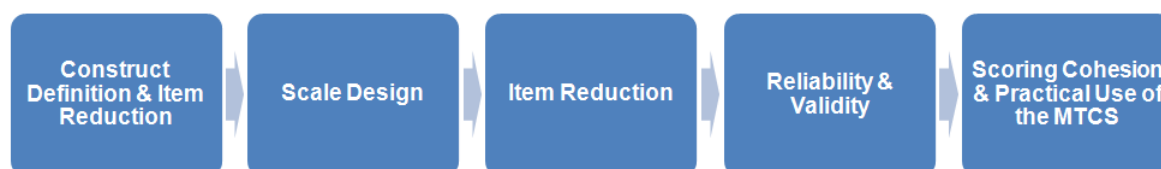
7.5 Summary

An important part of the construction of the MTCS is the conversion of scores to facilitate interpretation and provide a 'standard' against which individuals and teams can be compared. A normative approach was employed in this research where scores were

¹⁶ <http://www.psychtesting.org.uk/the-ptc/guidelinesandinformation.cfm> (last accessed 24th June 2009)

converted to percentile ranks. Given the nature of cohesion, this provides the most appropriate approach for comparing cohesion scores since high cohesion in one type of team (e.g. virtual teams) may be low cohesion for another type of team (e.g. self managed teams). For accurate interpretation of MTCS scores, it is important that test users have an adequate knowledge of cohesion and what levels of cohesion might be expected given the type of team or stage of team development measured. This approach also has a practical benefit as percentiles can be easily calculated and interpreted by non-experts. Based on the empirical findings of this research, norms were compiled for each of the eight dimensions of the MTCS. This was further categorised by age (21-30, 31-40, 41-50, 61+) and position (team member or team leader). Normative data was compiled for these 'groups' due to their differentiation of responses on the MTCS identified in Chapter 6. Although scores can be aggregated to provide an 'overall' or 'global' level of cohesion in a team, it is advised that this should be used descriptively. Where important decisions are to be made on individual and/or team improvement, MTCS scores must be interpreted at the subscale level. This is vital for understanding what aspects of cohesion should be improved in light of expected levels of cohesion in given types of teams or at different stages of a team's development. For example, as identified in this research, higher levels of task cohesion are more critical to team performance in work teams than social cohesion. It is critical that the MTCS is administered by individuals who have sufficient training, competence and knowledge of cohesion to accurately interpret and compare scores.

8 Discussion and Suggestions for Future Research



This Chapter discusses the results of this research, their implications and suggestions for future research under 5 headings: Construct Definition & Item Development, Scale Design, Item Reduction, Reliability & Validity and Scoring Cohesion & Practical Use of the MTCS. The limitations of this research are also highlighted. The original aims of this research are first revisited before discussing the broad range of findings obtained.

8.1 *Summary of Research Aims*

This research was conducted to address the need within group dynamics and occupational psychology for a psychometrically sound measure of organizational work team cohesion – the Multidimensional Team Cohesion Scale (MTCS). In order to develop such a measure a theoretically sound basis for its development must also be established. Specifically, the study attempted to:

1. Extend Carron et al.'s (1985) conceptualisation of cohesion for organizational work team contexts to distinguish context-independent and context-dependent manifestations of cohesion.
2. Generate a theoretically driven pool of items that provide individual and team perception-based indicators of the manifestations of cohesion identified in the conceptualisation.
3. Establish the face and content validity of the items.
4. Conduct a pilot study for statistical/empirical item reduction.
5. Investigate the construct validity of the MTCS using a separate set of empirical data.
6. Compile normative data for scoring cohesion using the MTCS.
7. Compare the findings of the study with previous research on the measurement of cohesion.

Despite the wealth of research that has been conducted on team cohesion over many decades, re-visiting the definition and measurement of the construct was vital for adding clarity on its nature in an organizational work team context, as well as providing an understanding of how conceptualisations and measures of cohesion can be adapted for other contexts. Almost all the research literature on team cohesion, early and recent,

mentions the inconsistency with which cohesion has been defined and measured. However, from the decades of research that has been conducted there is now at least some emerging agreement on how cohesion is defined and what the primary dimensions of cohesion are, captured in Carron et al.'s (1985) definition and conceptual model. Although their definition and conceptual model has been tested and used to develop measures in a sport and exercise team context, little research has been conducted to clarify the nature of cohesion in an organizational work team context. This is despite continuing research on cohesion in this context that links cohesion with important team outcomes such as performance and absenteeism. However, without paying adequate attention to the manifestations of cohesion in organizational work teams and ensuring measures are employed that capture these manifestations, the relationship between cohesion and other team variables cannot be adequately assessed. This research has addressed this gap by extending Carron et al.'s (1985) conceptual model from a four to an eight dimensional model to ensure all manifestations of cohesion important in organizational work teams were captured. This was used to develop a theoretically sound measure of cohesion for organizational work teams containing appropriate indicators of each manifestation for this context. The measure was then validated for practical use. This research provides an important step towards supporting a consistent approach to the measurement of cohesion in organizational work teams and thus clearer guidance to researchers. The aim of the research was to provide a tool that can be employed in research programmes investigating team cohesion or its relationship with other constructs such as team performance in organizations and used by practitioners (e.g. managers) to improve team working and team outcomes. The results of this research and their implications are discussed under a number of sub-headings: Construct Definition & Item Development, Scale Design, Item reduction, Reliability & Validity and Scoring Cohesion & Practical Use of the MTCS.

8.2 Construct Definition & Item Development

The first purpose of this research was to develop an enhanced theoretical underpinning to support accurate measurement of team cohesion in an organizational work team context. One of the major limitations of most existing measures of cohesion is that their development has not been driven by a clear theoretical foundation. This changed with the development of the GEQ where Carron et al. (1985) defined a conceptual model that has now become to be regarded as capturing the robust, most consistently identified aspects of cohesion. However, this still does not clarify the distinction between context-independent and context-dependent aspects of cohesion. Lack of attention paid to this distinction is likely to be one of the reasons why there is inconsistency in the number and nature of dimensions of cohesion that have been identified in the research literature.

Despite Cota et al. (1995) stating that some dimensions of cohesion could be considered primary dimensions that are relevant across all team contexts and others considered secondary dimensions that are relevant in particular team contexts, this clarification has still not been adequately dealt with. To address this gap and enhance understanding of cohesion, the first purpose of this research was to extend Carron et al.'s (1985) conceptual model to clearly delineate context-independent (primary) and context-dependent (secondary) dimensions relevant for an organizational work team context. The extended model communicates to other researchers how the MTCS can be adapted for other contexts that may or may not share similar characteristics to organizational work teams.

The approach taken in this research to identify secondary dimensions of cohesion was both deductive and inductive. The wealth of literature that exists on cohesion provides some boundaries around its definition and structure supporting a deductive approach. Carron et al.'s (1985) conceptual model provides a working knowledge of cohesion and research on the antecedents and consequences of cohesion aid delineation of what is part of the construct and what is considered a related but distinct psychological variable. But, with a lack of research on organizational work team cohesion, the use of SMEs provides an important part of identifying aspects of cohesion that are relevant in this context. The SMEs used for the inductive approach were not only psychologists but members of organizational work teams. The use of 'active agents' provided an important part of developing the MTCS. The perceptions of these individuals formed part of the basis for identifying dimensions that should be included in the measure and their expressions of these dimensions contributed to item writing. The development of any measure must be intrinsically related to theory, not just the researcher's theoretical viewpoints but must also include a wider theoretical basis. This has been a consistent weak point of existing measures of cohesion that this research has sought to address. Any evidence of validity has typically been achieved after construction of the measure. Construct validity must start with good initial theoretical construction; vital for accurate psychological measurement.

The results of the inductive and deductive approach were found to be conceptually consistent. A 16 dimensional model was identified extending Carron et al.'s (1985) task-social and individual-team primary dimensions with the secondary dimensions valued roles, unity of purpose and vertical-horizontal aspects. This was labelled the 'Multidimensional Team Cohesion Model' (MTCM). Since teams in organizations have a role based structure it was considered important to capture perceptions of whether individuals feel their roles and task contributions are valued and appreciated by team

members and the team leader. The achievement of team tasks and development of task cohesion is also linked to perceptions that there is a common commitment to the tasks and goals of the team where the team members and team leader share a common purpose. The hierarchical characteristic of organizations highlights the importance of capturing interactions between team members (horizontal cohesion) but also between team members and the team leader (vertical cohesion). The dimensions task cohesion, social cohesion, unity of purpose and valued roles have both individual-team and horizontal-vertical aspects giving rise to the 16 dimensions.

A pool of 219 items was written to express each dimension of cohesion captured in the MTCS. A large pool of items was essential to ensure adequate representation of each dimension of cohesion captured in the MTCM. A sufficiently large pool of items is also important for ensuring that an adequate number of items are retained to measure each dimension following item reduction. Items were designed to be general in nature. That is, items were worded to be broadly applicable to all types of organizational work teams. Items written using very specific referents, for example, referring to very detailed task aspects of a given organizational work team would likely require extensive rewording before use in other types of organizational work teams. The psychometric properties of the MTCS would then need to be established each time before use. Such a measure would be of limited practical use. Following Carron et al.'s (1985) conceptual model, the MTCS measures cohesion through the perceptions of individual team members. This is because individuals are socialised into a team and experience the team environment. Their perceptions about the team as a whole also provide a good measure of its unity. In improving the measurement of cohesion, an important part of the development of items for the MTCS was not just the inclusion of referents to the individual and team but also to the team leader to enable cohesion to be measured at these different levels.

A number of steps were conducted to ensure good face and content validity of the items developed for the MTCS. Items were based on a broad review of the existing research literature and both experts and representatives of organizational work teams were used to assess the validity of items in two phases. In the first phase, the MTCM and all items written for the MTCS were administered to experts in team working and organizational psychology. These experts were asked to assess whether the conceptual model and items were representative of organizational work team cohesion. The second phase involved an in-depth SME workshop with a new sample of SMEs to provide a detailed analysis of items and the dimensions they were designed to measure. Following this content validity phase, the original 219 items were reduced to 129. In the development of a measure of cohesion, where limited research is available on the manifestations of

cohesion in an organizational setting, this comprehensive approach is particularly important. Given that this limited research can also restrict individuals' views of cohesion, obtaining as wide a perspective as possible on the validity of content is imperative. The MTCS was considered to have good face and content validity by both SMEs and members of organizational work teams.

The MTCM was used as the underlying rationale for item development. Where there is a lack of agreed upon or standard definition of a construct, it is difficult to ensure that any measure developed to measure cohesion is free from construct contamination. Carron et al.'s (1985, 2000, 2002a) definition of cohesion has received some criticism despite being the most widely used definition and receiving some agreement that it provides a good foundation (Cota et al., 1995; Mudrack, 1989a, 1989b). However, Casey-Campbell and Martens (2009) argue that their definition of cohesion includes antecedents of cohesion such as individual perceptions and motivations to join a team that may have formed before the individual actually joined the team. Although in writing the items for the MTCS care was taken to ensure that items only reflected perceptions that would develop as a result of team interactions not those that occurred before joining the team, this does not guarantee that the measure is free from construct contamination. As a complex psychological variable, there are likely to be overlaps between cohesion and other constructs. For example, task cohesion involves commitment and coherence around goals, aspects that may overlap with team performance. Furthermore, valued role based aspects of cohesion may share some overlap with role clarity, role acceptance and role performance; constructs that have been identified as antecedents of cohesion (Dawe & Carron, 1999). Although care was taken to develop items that are specific to team cohesion, part of the continued construct validation of the MTCS must include hypotheses to test the divergent validity of the MTCS against such constructs. Any items that correlate more highly with other constructs (such as role clarity) should be re-written to more adequately capture their manifestation in team cohesion or removed from the scale. Establishing the construct validity of a measure is a necessarily long process (for example the GEQ was validated over more than 15 years) to ensure that items that correlate more highly with either antecedents or consequences of cohesion are removed from the final scale. This highlights the importance of developing a large pool of items to ensure adequate measurement of a construct following extensive item reduction and validation.

8.3 Scale Design

As the most appropriate measurement technique for capturing individual perceptions, the MTCS was based on a self-report measure using a 7-point Likert scale. The use of the self-report measure is essential when collecting cohesion data since it can only be

measured through the perceptions of individuals. An additional 'don't know' category was included in the pilot version of the MTCS to identify any items that respondents consistently couldn't answer. This was in response to some concern raised by subjects in the content validity phase of the research over the ability of team members to assess the feelings of others. This Likert form of measurement scale enables the individual's status on cohesion to be obtained and so provides a good technique for capturing levels of cohesion. There are a number of limitations with the use of self-report measures in the measurement of team cohesion, as with any team construct. Self-report measures may not always provide accurate data. Likert scales do not provide perfectly normal data and there has been much debate over its use with multivariate techniques such as FA. However, the use of Likert data with such techniques has been shown to provide replicable and meaningful results (Nunnally, 1978). The use of this measurement scale therefore provided an appropriate approach.

Self-report data must still be used appropriately. With this form of measurement, it may be difficult for team members to provide anything other than retrospective reports on interactions. This places some constraint on collecting data on team cohesion as it changes with team maturation. This may particularly be the case in the early stages of team development when team members are highly focused on learning their role within the team (Brannick 1997). Also individuals may also provide more favourable ratings about their team (social desirability), reporting higher levels of cohesiveness than perhaps exists in reality. This may happen if individuals feel that they are being judged so alter their responses accordingly. In an organizational work context, this may be done through concerns that the results will be used by management to assess the individual. However, as a phenomena that can only be measured through the eyes of the team members, these issues are an inherent challenge in cohesion research.

8.4 Item Reduction

Following item development and refinement through a comprehensive approach to content validation, a preliminary psychometric analysis was conducted as a basis for further item elimination. The aim of this phase of research was to develop a reliable, homogenous set of items that measure each dimension of cohesion. This was tested through a number of statistical procedures, including *intra-scale equivalence* (assessing whether items written to measure one of the MTCS dimensions correlated well with the total score of its own scale), *inter-scale equivalence* (assessing whether items correlate more highly with other subscales they were not designed to measure), and *internal consistency reliability* measured by Cronbach's alpha. This methodology provides a departure from the over-reliance on FA used in the construction of cohesion measures.

As a large sample technique, FA can result in misleading conclusions. The use of FA in cohesion research is likely to have played a large part in the inconsistency of dimensions of cohesion that have been identified, as described in Chapter 2. Factor structures can change with learning effects and factors produced can vary across samples that are known to differ on some criterion, such as cohesion (Tabachnick & Fidell, 1996). In contrast, item analytic techniques such as those used in this research require fewer subjects for accurate results. They are therefore less likely to result in the elimination of items that add to the reliability and validity of the measure.

Results of the item analysis revealed items that were little more than bloated specifics; items that did not share a 'common core' with the rest of the items written to measure the same dimension of cohesion and items that correlated more highly with another dimension than the one they were designed to tap. Elimination of these items reduced the MTCS to 103 items. The findings from the inter-scale analysis provided an important insight into the structure of the items in the MTCS. High inter-scale correlations between dimensions indicated an 8 dimensional structure rather than the 16 dimensional structure outlined in the MTCM. Although the theoretical model captures the expected inter-relationship between the primary and secondary dimensions of cohesion, the empirical analysis provided further evidence for their inter-relationship. The dimensions 'unity of purpose' and 'valued roles' was found not to be distinct from general task-based aspects of cohesion. This conceptual overlap is not surprising given their task-based nature. Given that they form specific aspects of task cohesion relevant to organizational work teams, it made conceptual sense to combine these with general aspects of task cohesion. Some conceptual overlap was identified between individual and team perceptions and task and social cohesion. Inter-scale equivalence of an eight dimensional structure however, revealed that combining specific and general aspects of task cohesion served to eliminate this conceptual overlap. In the development of their MSCl, Yukelson et al. (1984) identified 'valued roles' and 'unity of purpose' as distinct dimensions of cohesion. However, these researchers relied only on FA to identify dimensions of cohesion and employed an orthogonal rotation method that assumes no correlation between factors. Orthogonal methods are popular because they produce solutions that are easier to interpret. However, behaviours, feelings and attitudes do not function independently of one another (Costello & Osborne, 1995). The methodology employed by Yukelson et al. (1984) is therefore flawed and fails to account for the true inter-relationship between these dimensions of cohesion. The continued distinction between the context-independent and context-dependent aspects of task cohesion in the theoretical model however, is important for providing clarity on how the MTCS can be adapted to other contexts. The MTCS was

also found to have excellent reliability with no subscale reliability below .7, confirming that the subscales measure the same underlying construct of cohesion.

The heterogeneous sample obtained for item reduction provided a key strength of this research, supporting the selection of items that will provide accurate measurement of cohesion across organizational teams. If items are to be selected that have the sensitivity to reflect sample differences and all aspects of the multifaceted nature of cohesion then responses must be obtained from a heterogeneous sample (Carron et al., 1985). For the pilot phase, subjects were sampled across three different organizations, two of which conducted different types of work (scientific research vs. building industry). This was a major undertaking in itself. The teams represented in these three organizations were largely co-located or virtual multidisciplinary project teams. Given the project focus of many types of organizations, this is a valid and widely applicable sample. Findings from this research can only be generalised with caution to other organizations. The findings obtained must be replicated across other types of organizational teams.

The adequate consideration paid to the antecedents of cohesion in this research supported the identification of the critical variables (i.e. variables known to affect levels of cohesion) that must be sampled in order to develop a measure of cohesion relevant across teams. These included ensuring participants represented a broad range of team size, were balanced for gender and represented a broad range of length of membership. In this research, it was not logistically possible to sample by teams, i.e. identify and administer the MTCS to members of specific teams that represent various levels of team maturation. Therefore length of membership provided an alternative way of ensuring perceptions of team cohesion were obtained from individuals who ranged from new members to long standing members of a team. In the development of existing cohesion measures, a lack of attention has been paid to distinguishing the antecedents and consequences of cohesion from the construct itself. Sampling these critical variables has therefore been rarely considered.

One of the primary challenges of the item reduction phase of this research stemmed from the use of the 'don't know' category as an additional response option. Following feedback at the content validity stage that it may be difficult for team members to rate how others' feel in the team, this was included as a method for identifying any items that respondents consistently could not answer. Since the highest percentage of 'don't know' responses against any one item was only 25%, no items were removed from the scale on this basis. However, these responses were spread across the majority of items and nearly half of the subjects. Deciding how these responses should be handled proved a non-trivial problem.

The 'don't know' response category cannot simply be included as part of the Likert scale for a number of reasons. Firstly, this category does not fit with the nature of the interval nature of Likert scale; it is of a different characteristic. That is, it does not fit within the natural order from strongly disagree to strongly agree where the use of 'neutral' as a mid-point category is more appropriate. Secondly, 'don't know' responses are likely to mean something qualitatively different from 'neutral' responses and so cannot simply be collapsed into the mid-point category. The 'neutral' response may imply a genuine neither agree nor disagree response, ambivalence (i.e. being torn between the ends of the scale) or apathy (not caring) (Kline, 2000). A 'don't know' response can hold a number of possible meanings (Coombs & Coombs, 1977). However, as respondents were given the option to express an opinion or choose the 'neutral' mid-point category, in the context of this research, the use of the 'don't know' category indicates the following meanings:

- Difficulty in understanding the item.
- The respondent simply does not know the answer to the item (e.g. does not know how other people feel in the team).
- Lack of opinion or wish not to express an opinion.
- The respondent may not feel the item relates to them.
- Indecision.

Missing value analysis (MVA) revealed that team leaders had difficulty providing a response to items that related to vertical aspects of cohesion. In particular, a number of the team leaders obtained in the sample had difficulty providing a response to items that related to team members' perceptions of them. This highlights a social difference between team members and team leaders. As a 'team leader' they may not be privy to the same interactions that exist between peers, including expressions of behaviour, thoughts and feelings. This has important implications for the measurement of cohesion. As described in Chapter 2, one of the fundamental assumptions of cohesion (Carron et al., 1985) is that it can be measured through the perceptions of individual's and individual perceptions of the team as a whole providing a good estimate of its unity. If team leaders have a different social experience in the team, it is clear that estimates of the unity of the team as a whole can only be fully gained through the perceptions of the team members. This needs to be taken into consideration if the MTCS is to be used to assess team leader perceptions of cohesion at the team level in isolation. However, since team leaders are important to the functioning of a team (e.g. to maintain unity and reduce any tensions) (Likert, 1961), a level of awareness of how they are perceived by team members is important for ensuring they continue to adequately support the effective functioning of the team. Methods for improving this awareness should therefore be explored. In the first instance, follow-up data from a random sample of team leaders should be collected to

gather more information about why team leaders had difficulty responding to these items (Graham 2009). Time constraints and logistical challenges prevented obtaining a random sample of team leaders to probe this issue more deeply beyond the ad hoc feedback that had been obtained in this research. This should however, be considered further in future research.

A number of team leader respondents had difficulty rating not just team members' perceptions of the team leader but also their own perceptions of their team leader. Despite providing instructions in the MTCS to respondents who were the 'team leader' to rate these items for their own immediate team leader, respondents had difficulty transposing these responses to their team leader believing them to be self-referential. This was confirmed by ad hoc feedback provided by these respondents. This raises questions about where the boundary should be drawn around 'team' for the measurement of cohesion. Since the team leader's immediate superior plays a role in constraining and providing opportunities for action that can directly impact the team, they were included in the boundary of 'team' in this research. Further research is required to determine the level of impact of the team leader's immediate superior on the cohesiveness of a team. If this impact is minimal with more importance placed on team members' perceptions of the team leader then items written to tap an individual's perceptions of the team leader would not be applicable to the team leader. These items could be omitted by team leaders.

In empirical analysis, due to the nature of 'don't know' responses, they must be treated as missing values. Although items or cases with 'don't know' responses can be deleted from further analysis, this would have resulted in an under-representation of vertical aspects of cohesion in the MTCS or an insufficient sample size for analysis. These 'missing values' were therefore estimated. Imputing missing values into scale values (whatever estimation method employed) artificially creates an attitude or opinion for the respondent who rated a 'don't know' response where none may have existed (a false positive) (Gilljam & Granberg, 1993). This may impact the results of analysis, highlighting the importance of an initial theoretical underpinning *before* scale construction. This ensures that no items are discarded in item analysis that would distort the measurement of any of the dimensions of cohesion, supporting its construct validity.

A theoretical underpinning is also vital where FA is to be used to investigate the dimensionality of a measure. As described in Chapter 3, FA has been one of the most frequently used techniques in the development of existing cohesion measures. In almost all cases where it has been used, no underlying conceptual model has been used to support interpretation of FA results. Although most of the test developers of existing

measures have developed the items for their scales from existing theory, they have generally adopted a raw empiricist approach. The body of cohesion research has grown substantially over the years but the theory available at the time each measure was developed of course varies. In the development of the early measures, pre 1990s, it is easy to see how researchers found it tempting to use FA to support the development. Carron et al.'s (1985) conceptual model was only just being developed around this time and had not undergone the extensive validation that it has now received. However, without a pre-specified theory, there is no way to evaluate results or select appropriate FA methods (e.g. rotational methods) to analyse the data. It is clear from this research that existing theory must be drawn on to evaluate what type of relationships are likely to exist between the dimensions of cohesion, how many dimensions are expected to be identified in the FA, what items should the factors be composed of and whether the factors produced are consistent with theory (Armstrong, 1967). This need for theorising before empiricism is a long recognised issue, but one that has not been adequately adopted in the cohesion research. The research has moved the cohesion literature away from this raw empiricism to provide a theory driven approach that enables the above questions to be answered when interpreting empirical techniques such as FA. In fact, to support theory development, a triangulated approach was adopted utilising previous literature, the use of SMEs / 'active agents' and empirical techniques. The preliminary factor analysis conducted in this research shows that caution must be applied in defining dimensions of cohesion purely on this approach. As an inherently large sample technique, an insufficient sample size, or more importantly an insufficient subject to item ratio, can lead to inaccurate conclusions. Even with a subject to item ratio of 20:1, factor solutions can be inaccurate 30% of the time (Costello & Osborne, 2005). In fact only 2 studies reviewed achieved a subject to item ratio greater than this. Sample size is particularly important in FA for the detection of complex structures (Kline, 2000). As a complex structure, it is unsurprising that the solutions obtained in this research did not provide interpretable structures. However, it was interesting to note that, when only part of the model was examined increasing the subject to item ratio, the theoretically expected dimensions started to emerge. Both general and specific (i.e. valued roles and unity of purpose) aspects of task cohesion loaded onto a single factor and a distinction could be made between vertical, horizontal and social cohesion.

To further test the factorial validity of the MTCS, FA was conducted on the new sample obtained for the validity study. However, as a larger sample size could not be achieved for this stage of the research, the inherent difficulties with FA were again experienced. The factorial validity of the MTCS could therefore not be determined. The factorial validity of the MTCS will therefore not be discussed any further. Since the inter-scale equivalence

analysis conducted in the pilot phase provided some insight into the conceptual distinction between the eight dimensions of the MTCS, the dimensionality of the MTCS must continue to be investigated in future research where a much larger sample size can be obtained for use with FA.

8.5 Reliability & Validity

The excellent reliability of the MTCS and its subscales found in the pilot phase was also found in a new sample of subjects tested at the validity phase of the research. Further, the reliability of the MTCS was found to be greater than the reliabilities obtained for the dimensions of the GEQ. This provides an indication that the MTCS is a more appropriate measure in this context. It also indicates that the MTCS can be applied reliably across samples. As a necessary but not sufficient aspect of validity, the construct validity of the MTCS was determined to ensure its accurate measurement of cohesion. Assessing the validity of cohesion measures is not a straightforward process and requires a different approach than traditionally taken in the development of previous measures of the construct. Where no standard benchmark tests or clear criterion variables exist to assess the validity of a new measure of cohesion against, a more comprehensive approach is required. Instead of designing single studies to assess certain forms of validity, for example concurrent validity and predictive validity, it is necessary to build evidence for the construct validity of the measure through a set of hypotheses generated based on the nature of the construct. This set of hypotheses must capture all aspects of validity and only together can they provide evidence for the validity of the measure. Approaches to determining the validity of previous measures has rarely taken this form. In fact, although Carron et al.'s (1985) GEQ is the most extensively validated measure of cohesion, only specific forms of validity have been the focus of attention. Out of the 44 studies reported in their test manual (Carron et al., 2002a), 36 were designed to test predictive validity only, 1 tested content validity, 3 tested concurrent (convergent) validity and 4 tested factorial validity. Although this extensive number of studies can provide some evidence for the validity of the GEQ, it is still insufficient. For example, in the absence of an adequate benchmark test of cohesion, assessment of divergent validity is important for ensuring the measure is free from construct contamination or doesn't just measure something else. A comprehensive and systematic approach to validity is vital in the development of cohesion measures to demonstrate construct validity.

In the assessment of convergent validity, some evidence was provided for the task, social, individual and team dimensions of the MTCS, identified through the high correlation of these subscales with corresponding subscales of the GEQ. In general, task based aspects of the MTCS were found to correlate more highly with task-based aspects of the

GEQ. However, in general social-based aspects of the MTCS were not found to correlate more highly with the social-based aspects of the GEQ. As acknowledged by Brawley et al. (1987), the social dimensions of the GEQ are less well validated than their task dimensions. The horizontal team based aspects of task cohesion (i.e. the TCHIPO dimension) correlated most highly with the corresponding GI-T dimension of the GEQ. Similarly, the horizontal individual based aspects of social cohesion (i.e. the SCHIPS dimension) were found to correlate more highly with the corresponding ATG-S subscale of the GEQ. This lends some support that a distinction can be made between individual and team aspects of cohesion in an organizational work team context not just in sports teams.

Evidence was also obtained for the divergent validity of the MTCS. Although organizational work team cohesion and job satisfaction were found to be related, the correlation between MTCS scores on each dimension and scores on the MOAQ-JSS were lower than .6. This indicates that although the constructs are related they can be considered distinct from one another. The task-based aspects of the MTCS were also found to have a low correlation with the social-based aspects of the GEQ. The correlation between MTCS and TPQ subscales were however found to be higher and in some cases higher than between MTCS subscales. Further, MTCS subscales correlated more highly with the TPQ than GEQ. In particular, the highest correlations were found between task-based aspects of cohesion and 'Goals & Results', 'Collaboration & Involvement' and 'Competencies'. The MTCS contains items that are designed to measure the aspects of the TPQ dimensions but only as they manifest in cohesion. For example, items that measure commonality towards achieving the goals of the team, supportive behaviour related to roles and skill development and inclusion in the team. This highlights the complexity of cohesion as it manifests in organizational work teams. The TPQ however, appears to measure some aspects that have been considered to be part of cohesion. Given that the 'Collaboration & Involvement' dimension is measured through items that are considered to measure aspects of cohesion, such as 'Members of the team feel a sense of belonging to the team', a high correlation is unsurprising. With the nature of the items measuring aspects of organizational work teams and the higher number of items in the TPQ, it is also unsurprising that the MTCS correlates more highly with the TPQ than GEQ. This does not necessarily mean that the MTCS measures team performance (most correlations are in fact around .7 or below) but as a complex phenomenon with different manifestations, there is inherently a degree of overlap between these measures.

The TPQ has not been extensively validated. In fact, only the factorial validity of the TPQ has been tested. However, there is a lack of self-report measures of team performance that are general-purpose (Senior & Swailes, 2004). Measures tend to be objective where

teams are assessed on the products they produce, such as profitability targets met. Managers' ratings of performance could also be used to measure performance. However, these measurement methods were not logistically possible in this research. Therefore, a self-report measure of team performance was used. Although the TPQ has high reliability that could be replicated in this sample, its limited validity must be taken into account when interpreting findings from this research. Future research could employ the use of the Multitrait-Multimethod (MTMM) matrix approach to validation developed by Campbell and Fiske (1959). This provides a framework for assessing the convergent and discriminant (or divergent) validity of a measure using multiple methods, thereby reducing attenuated correlations (i.e. common method variance) between measures that use the same measurement scale. Both managers' ratings and the self-report measure could be used in this approach. In the measurement of cohesion, however, there are no other methods that can be used to adequately assess individual's perceptions of cohesion. Any attenuated correlations between constructs that are best measured by self-report methods will therefore remain a challenge for any researcher validating the MTCS.

The results of the differential validity assessment conducted in this research indicated that both social and task cohesion play an important role in organizational work teams. Although, overall, task cohesion was found to contribute more to the relationship between team cohesion and team performance, analysis at the subscale level revealed that both task and social cohesion were equally important for 'Collaboration & Involvement' aspects of team performance. Further, social cohesion was found to contribute more to the relationship between cohesion and job satisfaction, particularly SCHIPS and SCVIIPS dimensions. Unsurprisingly, task cohesion was found to be particularly important to 'Competence' based aspects of team performance.

Previous research has raised questions about the importance of social cohesion in work teams. Task cohesion has been found to have a stronger relationship with other team variables, such as communication and co-operation, team effectiveness, team performance, and job satisfaction (Carless & De Paola, 2000, Mullen & Cooper, 1994). Since Carless and De Paola (2000) found social cohesion to be weakly related to team performance and job satisfaction, they concluded that there was perhaps little use in assessing social cohesion in work teams. However, they also acknowledge that the lack of relationship between social cohesion and work team characteristics may be due to a narrow operationalisation of social cohesion. The items within the GEQ (Carron et al., 1985) and derivative TC Scale (Carless & De Paola) focus on whether team members are friends with one another and socialise together. The MTCS employs a wider operationalisation of social cohesion. Items that measure this aspect of the construct

include whether individuals have pride in their team, whether they are enthusiastic about it, feel accepted and feel they can go to other members of the team when they need personal support. A vertical dimension is also included. The team, individual, horizontal and vertical aspects of social cohesion provide a much richer representation of this aspect of cohesion. This may have resulted in stronger relationships between social cohesion and work team characteristics, such as team performance and job satisfaction, being detected than found in previous research. This research indicates that social cohesion is not just a pre-requisite for the development of task cohesion (Carless & De Paola, 2000) but plays an important part in work team outcomes. The results of differential validity analysis highlight the need to apply caution in drawing conclusions about the nature of cohesion in any context without adequate definition and operationalisation of dimensions. Further, they emphasise the importance of a systematic and extensive validation process in cohesion research due to the complex relationship between cohesion and other team variables. The salience of dimensions in the relationship between team cohesion and other team variables is likely to vary over time and in different team contexts. Only once validation of the construct is conducted against a wide range of criterion variables, over the stages of team development and in a range of work team contexts, will an understanding of the true nature of cohesion emerge. This research provides a solid foundation for this continued validation.

Obtaining similar evidence of validity for vertical and horizontal dimensions of cohesion was more difficult since this was not a manifestation of cohesion included in the GEQ. The horizontal-vertical distinction was, however, identified through the correlation between MTCS subscales and the subscales of the measure of team performance (TPQ). Results revealed that the vertical aspects of both task and social cohesion represented in the MTCS correlated most highly with the leadership dimensions of the TPQ. Tests of differential validity revealed that both individual and team-based vertical aspects of task cohesion played a greater role in the relationship between team cohesion and team performance. Some evidence has been obtained in this research to demonstrate that a distinction should be made between task/social, individual/team, and horizontal/vertical manifestations of cohesion in an organizational work team context. The results therefore not only provide some evidence for the validity of the MTCS but also the validity of the extended conceptual model (i.e. the MTCM). However, further research is required to validate their relative importance in this context.

A key strength of the MTCS is its ability to detect expected differences in levels of cohesion. This is a crucial attribute of any measure designed to assess cohesion. Unlike a trait, cohesion is not a property of individuals and teams that stays constant and stable

over time. As described in Chapter 2, cohesion changes over the lifecycle of a team, as the team develops and matures. As a 'state', perceptions of cohesion will vary as a function of time and context. Further, as identified in this research, cohesion will also vary according to individual level characteristics such as age and the position they hold within the team (i.e. team member or team leader). Although cohesion has been reported to change due to demographic variables and individual characteristics (Carron et al., 2007), relatively little has been said about how cohesion changes as a function of these. Further research should include investigation of how cohesion differs across variables such as age and position. For example, it might be hypothesised that team leaders will have a higher level of cohesiveness than team members due to their position as a 'role model' and authority figure in the team. Can optimum levels of cohesion required for team functioning be identified in different types of work team? For example, virtual teams may require higher levels of cohesion to function effectively than co-located self-managed teams. Certain levels of cohesion may be required in certain dimensions depending on team type. Investigation of these issues will not only enhance theory development but the practical use of the measure and interpretation of scores in organizations. It will enable managers to make more accurate decisions about where to direct their resources to improve team cohesion and team functioning. The sensitivity of the measure to such changes is therefore fundamental to accurate measurement of the construct and effective decisions. Since the majority of measures have focused on very limited forms of validity, determining their sensitivity to changes in levels of cohesion has largely been overlooked. This has been conducted for the GEQ but based on items that, as described in this research, are insufficient for measuring organizational work team cohesion.

The changing nature of cohesion has implications for the interpretation of test scores and establishing the predictive validity of the measure. Test scores should be interpreted in line with expected change points in the team's developmental lifecycle. This helps to determine the 'shelf-life' of test scores and how long they can be used as the basis of decisions in organizations. Their usefulness for decision-making will ultimately decrease over time (Jackson, 1996). Predictive validity was not conducted in this research due to the lack of clear criterion variables for prediction. For example, as described in Chapter 2, there is much inconsistency over the nature of the relationship between team cohesion and performance. Other variables, such as leadership style, moderate the relationship between these two constructs confounding results. There is also insufficient research on how the relationship changes over time. Determining whether the MTCS has predictive validity is therefore difficult. A comprehensive research programme is required to determine the predictive validity of the MTCS against a number of different variables at both the individual level (e.g. absenteeism) and team level (e.g. team performance and

productivity) to establish evidence. The findings of Chapter 6 revealed task cohesion to contribute more to team performance and social cohesion to job satisfaction. This suggests that task cohesion is likely to be a better predictor of team performance and social cohesion a better predictor of overall job satisfaction. This hypothesis should be tested in future research programmes that continue the validation of the MCTS.

The results of this research provide support to the contemporary view that team cohesion is a multidimensional construct and, importantly, that the different dimensions have a different effect on other team variables. Further, despite the debate over whether team cohesion is an individual or team level construct (Zaccaro, 1991), the findings provide some suggestion that individuals do distinguish between individual and team level perceptions in organizational work teams. This supports Carron et al.'s (1985) conceptual model and findings in a sports and exercise team context. However, in adapting the GEQ for a work team context, Carless and De Paola (2000) failed to replicate its four-factor structure, finding only three factors - task cohesion, social cohesion and individual attractions to the group. They therefore concluded that individuals in this context don't distinguish between individual and team-level cohesion. However, their conclusion is based on the results from FA, a technique that, as already described, can result in misleading conclusions where insufficient sample sizes are employed. Indeed, Carless and De Paola conducted factor analysis with less than 200 subjects. A sample size of less than 300 can introduce measurement error and lead to inaccurate results. This research also failed to replicate the four-factor model of the GEQ and also to establish the eight factor model of the MTCS through factor analysis due to sample size. However, results of the correlation analyses conducted in this research show that each of the aspects in the extended conceptual model are important in team cohesion and can be considered distinct. This further highlights the importance of not basing conclusions on the results of FA alone. Future research must include studies to further investigate the results found in this research. This should also include studies designed to replicate results. There have been very few attempts to replicate research findings in the cohesion literature. Of the multidimensional definitions, only some replication attempts of Carron et al.'s (1985) research and Yukelson et al.'s (1984) work have been conducted. Replications should include determining the generalisability of results across different organizational work teams (cross-validation) as well as teams that share similar characteristics. Determining the extent of relevance of the secondary dimensions to other types of teams that share similar characteristics to organizational work teams will contribute further to theory development. Replication of the results found will enable their merits to be fully assessed and their generalisability to other organizational work teams or other teams that share similar characteristics.

The psychometric properties of the MTCS were assessed using a single sample of subjects from one organization. Despite this sample being opportunistic, the sample was representative across team size, age, gender, length of membership, years experience and position (i.e. team member or team leader). It also consisted of naturally occurring work teams operating in a natural setting that represent a common form of team in organizations – the project team. Further research is required to replicate the findings obtained in this research and continue investigation of the psychometric properties of the MTCS. As a dynamic construct, it is important that the validity of the MTCS is assessed over an extended period of time to ensure its psychometric properties remain stable as levels of cohesion change over time and across all stages of team development.

8.6 Scoring Cohesion & Practical Use of the MTCS

In addition to ensuring the MTCS is reliable and valid, it was critical to clearly define how the measure is scored and how these scores are interpreted. A measure must have practical benefits. Understanding how the collected data can be scored and should be scored is important for the practical use of the measure whether it is used in evaluation and further research or for decision-making and the design of team interventions. Despite being one of the most important parts of test construction, reporting how test scores should be interpreted has largely been ignored in the development of existing measures of cohesion. Only the GEQ is provided with a test manual that outlines norms for understanding the meaning of scores obtained on its subscales. From a technical viewpoint, compiling norms that can be used as a ‘standard’ against which scores can be compared is important where a measurements scale is used that does not have a true zero, such as the Likert scale (Kline, 2000). From a theoretical viewpoint, comparing scores of individuals or teams on the MCTS with scores obtained on the measure from a large representative sample is important for understanding whether cohesion levels are high or low.

One of the strengths of the MTCS is in how cohesion can be scored. Team cohesion has most frequently been assessed through ratings provided by individual team members. Scores obtained are then often aggregated to obtain a team level score of cohesion that represents the team’s level of cohesion. Cohesion is treated as a team-level variable. This aggregation of data to obtain a team level score enables researchers to assess the relationship between team cohesion and other global team properties such as team performance (Brannick, 1997). However, there are both theoretical and empirical implications to assessing cohesion in this way. There must be a good theoretical rationale that the variable of interest can be considered a team level construct. In considering team cohesion as a team property and accepting the assumptions of Carron et al.’s (1985)

conceptual model, team cohesion can be assessed through the perceptions of the members of the team as it is these members that experience the team environment – e.g. their social and task situation. Since team members are part of the team, they are likely to be able to provide good reports of interactions between team members (Brannick, 1997). If data is to be collected at the individual level but aggregated to a team level, it is important that items also contain team referents. To address limitations with previous team measures that have typically only measured individual perceptions of their self in the team, as described in Chapter 3, referents to the team as a whole, to other team members and to the team leader were used to enable scores to be obtained at the individual, team member, team leader and whole team level. Before aggregation, it is important for researchers to determine empirically that self-reports of team cohesion tend to differ between teams (such as through the use of analysis of variance, James (1982)), but also that individual members of each team have a high level of agreement in their ratings of the team-level items. This can be determined through inter-rater reliability analysis. This within-group analysis is important for identifying whether individual level scores can be used to reflect team level constructs since individuals working together in teams are likely to have homogenous perceptions of team attributes (Brannick, 1997). Such analysis should be conducted in any future research where the MTCS is to be employed.

In terms of the interpretation of cohesion, a number of norm tables have been provided where differentiation of responses to the MTCS have been empirically identified. These are based on a representative sample of subjects that range in the length of time they have been a member of their team, that are from a number of organizations and team sizes. It is possible that the position of an individual or team in terms of level of cohesion will vary according to the norm table used for the basis of comparison. For example, in an individual aged between 21 and 30 scoring 119 on the TCHIIPS dimension of the MTCS sits at the 65th percentile of the norm table for 'age'. However, if they are also a team leader, comparing them against this norm table reveals that they have a slightly lower perception of cohesion, sitting at the 60th percentile. In interpreting cohesion, it is therefore important that the norm table used is appropriate for the decision that is to be made based on the scores. This holds true where more than one individual or team is to be compared using the norm tables, although their relative position to one another within a norm table will not change (Jackson, 1996). In interpreting cohesion scores against the norm tables it is also necessary to take adequate consideration of the impact of the wider context in which teams exist that may affect an individual's responses on the MTCS, such as the organizational environment and culture. It is interesting to note that in this research, no changes to levels of cohesion were detected in the QinetiQ sample following a major re-organization despite respondents reporting that it had affected levels of

cohesion. One possible reason for this is that teams display the ability to remain cohesive despite adverse external conditions. However, appropriate additional information should be collected on the test taker which can be used in the evaluation and interpretation of test scores (Jackson, 1996).

The norm tables compiled in this study enable comparison of individuals only against different norm groups (position and age). However, it is important that norm information is also obtained at the team level to enable comparison between teams. Unfortunately it was not possible in this research to guarantee responses from individuals who are part of the same team, or indeed target enough of these types of responses to enable a scoring table to be compiled at this level. In the continuing development of the MTCS, this data would need to be collected to compile a percentile table for this level of interpretation. Norms can only be considered in the context and for the population they have been compiled for (Jackson, 1996). It is imperative that norms are kept current. They should be re-calculated regularly to ensure they are accurate. It is equally important that where future studies are conducted, either validation or to examine the relationship between cohesion and other variables, that new norms are compiled for groups in which differences are identified. This must be done before the measure is used to assess teams.

The key conclusions of this research are presented in the next Chapter together with its academic and practitioner contribution.

9 Conclusions



The purpose of this Chapter is to outline the conclusions of the research and the contribution which has been made to both the academic community and occupational practitioners. Based on the need for a clear definition and measure of organizational work team cohesion, this research has extended an existing conceptual model of team cohesion delineating between context-independent and context-dependent dimensions of cohesion. It has also improved the indicators of cohesion for an organizational setting including broadening the definition of social cohesion to improve its measurement. A theoretically-grounded and psychometrically valid measure of cohesion has been developed based on a comprehensive theoretical and empirical scale construction methodology. The MTCS can be used by academics to more accurately measure the relationship between cohesion and work team outcomes. Practitioners can use the measure to inform the design and implementation of interventions to improve cohesion and team functioning.

The interest in this research was based in the field of team working and focused on how one of the most important team variables for team functioning – team cohesion - should be defined and measured in an organizational work team context. This thesis represents one of the few studies to have both a theoretically-grounded and psychometrically valid approach to measuring cohesion, using real-world repeated data sets from industrial and public service organizations, gathered over a three year period. In organizational work teams, importance continues to be placed on team cohesion as a mechanism for improving team functioning, performance and productivity. This is evident by the recent research that has been conducted in occupational psychology (e.g. Nelson & Quick, 2007). The research in this context has primarily focused on the relationship between cohesion and important work outcomes such as organizational commitment (e.g. Wech et al., 1998) and team conflict (e.g. Tekleab et al., 2009). However, this research has ignored the lack of adequate understanding of how cohesion should be defined, particularly in specific contexts, as described in Chapter 2. Further, it has not addressed the lack of adequate measure that can be applied in organizational work teams. Without adequate measurement, the relationship between cohesion and other team variables

cannot be accurately determined. This has major implications where measures of cohesion are to be used to inform decisions about individuals and teams in organizations.

This research was conducted to improve understanding of cohesion and its measurement in organizational work teams and instil some consistency in the analysis of cohesion, providing a solid foundation for the comparison of results from cohesion studies. The research presented in Chapter 3 highlighted the different approaches taken by researchers to develop cohesion measures and establish their scientific validity. The implications this has had on the information that the measure provides and the predictive utility of the test outcomes has also been discussed throughout this thesis. In developing the MTCS, part of the purpose of this research was to define a comprehensive approach to measure development that can be adopted in the adaptation of the measure to other contexts or to inform the development of psychological tests of other constructs.

The MTCS is similar to some existing measures of cohesion (e.g. the GEQ and TC Scale) as it provides a self-report measure that captures an individual's perceptions of their self and others in the team. However, it differs from existing measures in very important ways. Firstly, the MTCS is based on a clear conceptual understanding of the manifestations of cohesion important for organizational work teams. Further, the context-independent (primary) and context-dependent (secondary) manifestations of cohesion are clearly delineated to support a consistent approach to measurement of cohesion and the adaptation of the MTCS to other contexts. Secondly, the approach taken to establish the validity of the MTCS takes account of the nature of cohesion and the lack of consistency in the research literature over its definition, measurement and reported relationships with other constructs. A set of hypotheses were developed to examine a number of forms of validity that only together can be taken as evidence of the construct validity of the MTCS.

The research presented in Chapters 4, 5 and 6 provides good emerging evidence for the reliability, content validity and construct validity of the measure. Evidence has also been obtained for its practical use due to its sensitivity to expected changes in levels of cohesion. Previous approaches have tended to take a more conventional approach to validation where only one or two forms of validity are tested. This is insufficient for establishing the validity of a measure of cohesion where no accepted benchmark test or clear criterion variables exist against which the measure can be assessed. Important in this process of validation is ensuring indicators written for each manifestation of cohesion were independently validated by both SMEs and representatives of organizational work teams to ensure the breadth and richness of the manifestations had been adequately captured. This research has also attempted to separate cohesion from its antecedents

and consequences to reduce construct contamination and increase accuracy of measurement. In addition, although items are carefully written to be relevant to organizational work teams, they are also worded to be broadly applicable to other types of teams, allowing the MTCS to be easily adapted to other contexts that share similar characteristics with minimal impact on its psychometric properties. Where it is adapted to other contexts, its psychometric properties in this context must be established to ensure its continued reliability and validity in measuring cohesion.

9.1 Academic Contribution

The research outlined in this thesis provides a theoretical, methodological and practical contribution to the academic community. Based on a thorough review of the cohesion literature and focus groups, this research has extended Carron et al.'s (1985) context-independent conceptual model of cohesion to include context-dependent dimensions of cohesion relevant to an organizational work team context – the Multidimensional Team Cohesion Model (MTCM). It has also tested Carron et al.'s (1985) conceptual model in an organizational setting; a context in which it has not been previously applied or validated. This research has shown the four dimensions in their conceptual model to be relevant to organizational work teams. Although Carron et al.'s (1985, 2002a) measure of cohesion, the GEQ, developed on the conceptual model was used to inform the development of the MTCS, the indicators for each dimension of cohesion have been re-written. This was to ensure that all manifestations of cohesion had been adequately captured and to prove a broader definition of the dimensions of cohesion, particularly social cohesion which has been only narrowly defined in previous measures. Items in the MTCS also include referents to the team leader as well as the team and individual to enable analysis at the member-member, member-team and member-leader levels adding to the body of knowledge.

In developing and testing the psychometric properties of the MTCS, this research presents a clear methodology that should be adopted where there is no benchmark criterion measure or clear criterion variables against which to validate a new measure. This methodology takes a theoretically driven approach to scale construction that is sufficiently comprehensive to ensure cohesion is accurately measured. This moves the cohesion literature away from the over-reliance on FA to explain the dimensionality of the underlying data. Instead, empirical techniques such as correlation analysis and FA are employed to test theoretically driven hypotheses. The MTCM captures not only the dimensions considered to be part of organizational work team cohesion but also the relationship between them. This provides a solid theoretical foundation for evaluating the results of empirical analysis. Furthermore, this research has adopted a more

comprehensive approach to the validation of cohesion measures than traditionally used. To adequately establish the construct validity of the MTCS, a set of hypotheses representing the various forms of validity were generated based on what is known about the nature of cohesion. Only together can they provide evidence for the validity of the measure.

As a measure that has been shown to be reliable over two independent samples and have some evidence of construct validity, following a continued programme of validation the MTCS will provide practical benefits to the academic community. The MTCS will support systematic comparison of studies on organizational work team cohesion across organizational settings and team maturation in which the construct is either the cause or effect under study. The MTCS will also enable the relationship between team cohesion and other work team variables to be further explored allowing more accurate measurement of the relationship between cohesion and work characteristics.

9.2 *Practitioner Contribution*

Organizations have continued to recognise the importance of cohesion to team functioning but have little understanding of what cohesion is and how to measure it. The MTCS will therefore enable practitioners (e.g. managers) to measure cohesion at any given time and provide an accurate interpretation of levels of cohesion across the dimensions of the MTCS for individuals, the team and team leaders. Managers should support the use of the MTCS within organizations to support greater awareness of how to support both team members and team leaders. The MTCS should be used to identify the aspects of cohesion that require improvement to enhance team functioning. The measure should however, only be used by practitioners with sufficient knowledge of the nature of cohesion (as presented in this thesis) and competence in the administration of psychological tests. This is important for ensuring the MTCS is used appropriately and scores interpreted correctly.

It is advised that the use of scores on the MTCS should not be used as the sole basis for decisions. It should be recognised that cohesion can also be affected by other factors such as wider organizational environment or cultural issues that exist outside of the team (Carron et al., 2002a). Based on conceptual evidence and the empirical results obtained in this research, it is suggested that practitioners can use the MTCS to obtain an 'overall' cohesion score due to the inter-relationship between dimensions. However, where important decisions are to be made about individuals and teams, scores for each dimension of the measure must be obtained. This will enable comparison of task cohesion and social cohesion or vertical and horizontal cohesion depending on the aim of

analysis. The measure therefore allows a more detailed level of analysis than any previous measure of cohesion. This will enable the more effective development of interventions (e.g. training programmes) to enhance cohesion. It also provides key information on where these interventions should be placed for optimum effect. However, it is also advised that post intervention, cohesion is re-measured to determine whether the intervention has had any unintended effects on other dimensions of cohesion. Any positive effects can be harnessed in the design of future interventions and any negative effects mitigated early before the overall cohesiveness of the team is affected. For consultants and training providers, this research enables programmes to be developed using a consistent language and measuring framework.

In the six years that this research has been conducted over, this thesis provides a fundamental move forward in the cohesion literature than has occurred over the last 30+ years. This research has established a firm foundation for follow-on research into cohesion and its scientifically-grounded measurement. It provides a practically usable measurement tool for both academics and practitioners.

10 Abbreviations

ANCOVA	Analysis of Covariance
ATG-S	Attractions to Group-Social
ATG-T	Attractions to Group-Task
BPS	British Psychological Society
C&IS	Command and Integrated Systems
CFA	Confirmatory Factor Analysis
CSCS	Coaching Staff Cohesion Scale
CTL	Capability Team Leader
EFA	Exploratory Factor Analysis
EM	Expected-Maximisation
FA	Factor Analysis
GAS	Group Attitude Scale
GCS	Gross Cohesiveness Scale
GCS-R	Group Cohesiveness Scale-Revised
GEQ	Group Environment Questionnaire
GI-S	Group Integration-Social
GI-T	Group Integration-Task
HCHP-GCS	Harvard Community Health Plan Group Cohesiveness Scale
IPO	Input-Process-Output
KMO	Kaiser-Meyer-Olkin
KR20	Kuder-Richardson 20
MAR	Missing at Random
MCAR	Missing Completely at Random
MFI	Military Base Cohesion
MNAR	Missing not at Random
MOAQ-JSS	Michigan Organizational Assessment Questionnaire – Overall Job Satisfaction Scale

MSCI	Multidimensional Sport Cohesion Instrument
MTCM	Multidimensional Team Cohesion Model
MTCS	Multidimensional Team Cohesion Scale
MTMM	Multitrait-Multimethod
MVA	Missing Value Analysis
MVN	Multivariate Normality
OPQ	Occupational Personality Questionnaire
PA	Parallel Analysis
PAF	Principal Axis-Factoring
PAGEQ	Physical Activity Group Environment Questionnaire
PCA	Principal Components Analysis
PCS	Perceived Cohesion Scale
SA	Staff Attraction
SCQ	Sport Cohesiveness Questionnaire
16PF	Sixteen Personality Factor Questionnaire
SMCs	Square Multiple Correlations
SME	Subject Matter Expert
SCHIIPS	Social Cohesion-Horizontal Interactions-Perceptions of Self
SCHIIPO	Social Cohesion-Horizontal Interactions-Perceptions of Others
SCVIIPS	Social Cohesion-Vertical Interactions-Perceptions of Self
SCVIIPO	Social Cohesion-Vertical Interactions-Perceptions of Others
SU	Staff Unity
SV	Shared Value
TC	Team Cohesion
TCHIIPS	Task Cohesion-Horizontal Interactions-Perceptions of Self
TCHIIPO	Task Cohesion-Horizontal Interactions-Perceptions of Others
TCVIIPS	Task Cohesion-Vertical Interactions-Perceptions of Self
TCVIIPO	Task Cohesion-Vertical Interactions-Perceptions of Others
TCQ	Team Climate Questionnaire
TEAM	Team Evolution and Maturation
TPQ	Team Performance Questionnaire
UPHIIPS	Unity of Purpose-Horizontal Interactions-Perceptions of Self

UPHIPO	Unity of Purpose-Horizontal Interactions-Perceptions of Others
UPVIIPS	Unity of Purpose-Vertical Interactions-Perceptions of Self
UPVIPO	Unity of Purpose-Vertical Interactions-Perceptions of Others
UVN	Univariate Normality
VRHIIPS	Valued Roles-Horizontal Interactions-Perceptions of Self
VRHIPO	Valued Roles-Horizontal Interactions-Perceptions of Others
VRVIIPS	Valued Roles-Vertical Interactions-Perceptions of Self
VRVIPO	Valued Roles-Vertical Interactions-Perceptions of Others
WRAIR	Walter Reed Army Institute of Research

APPENDIX A

Figure A1: Overlay of deductive and inductive analysis for task cohesion

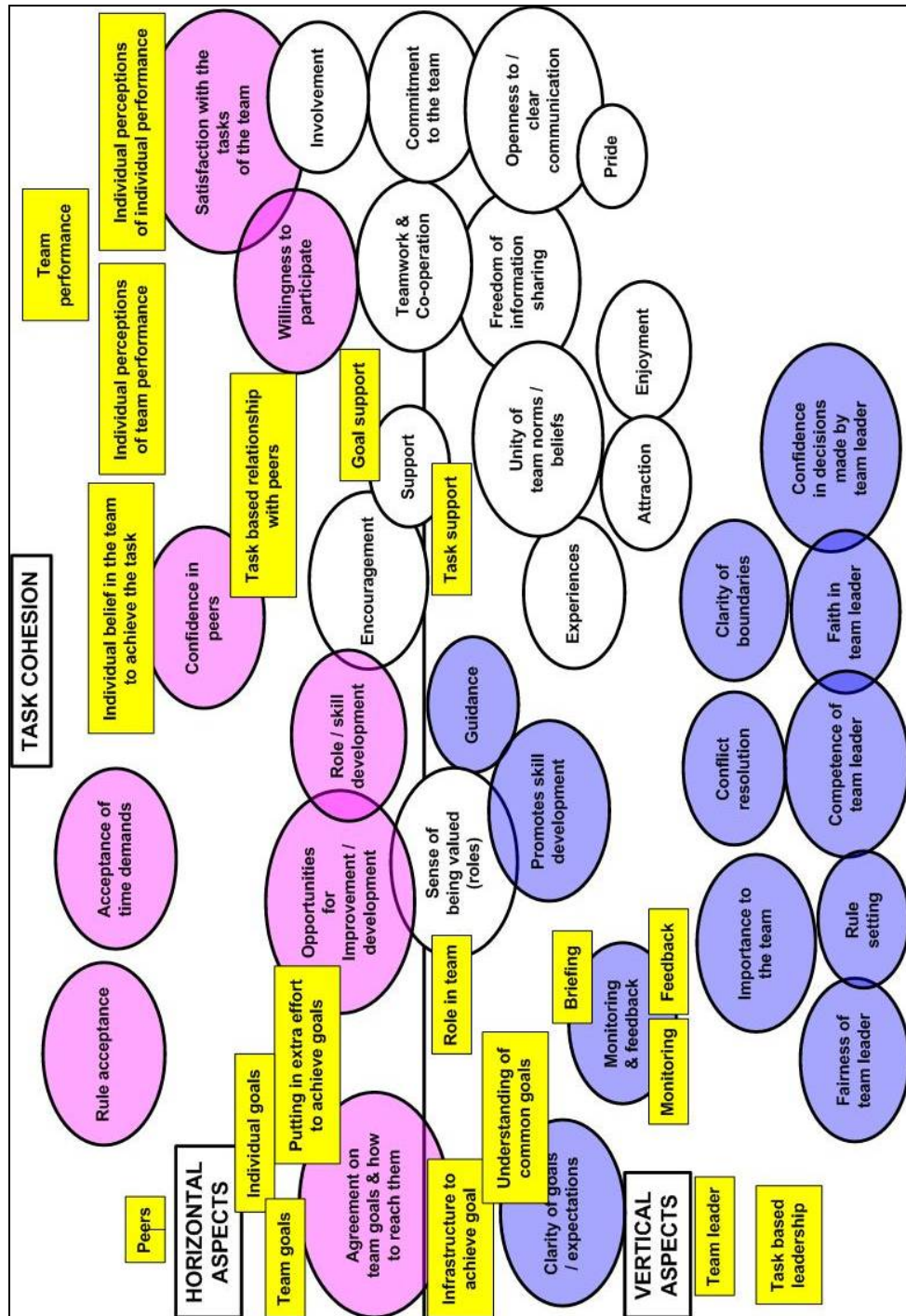
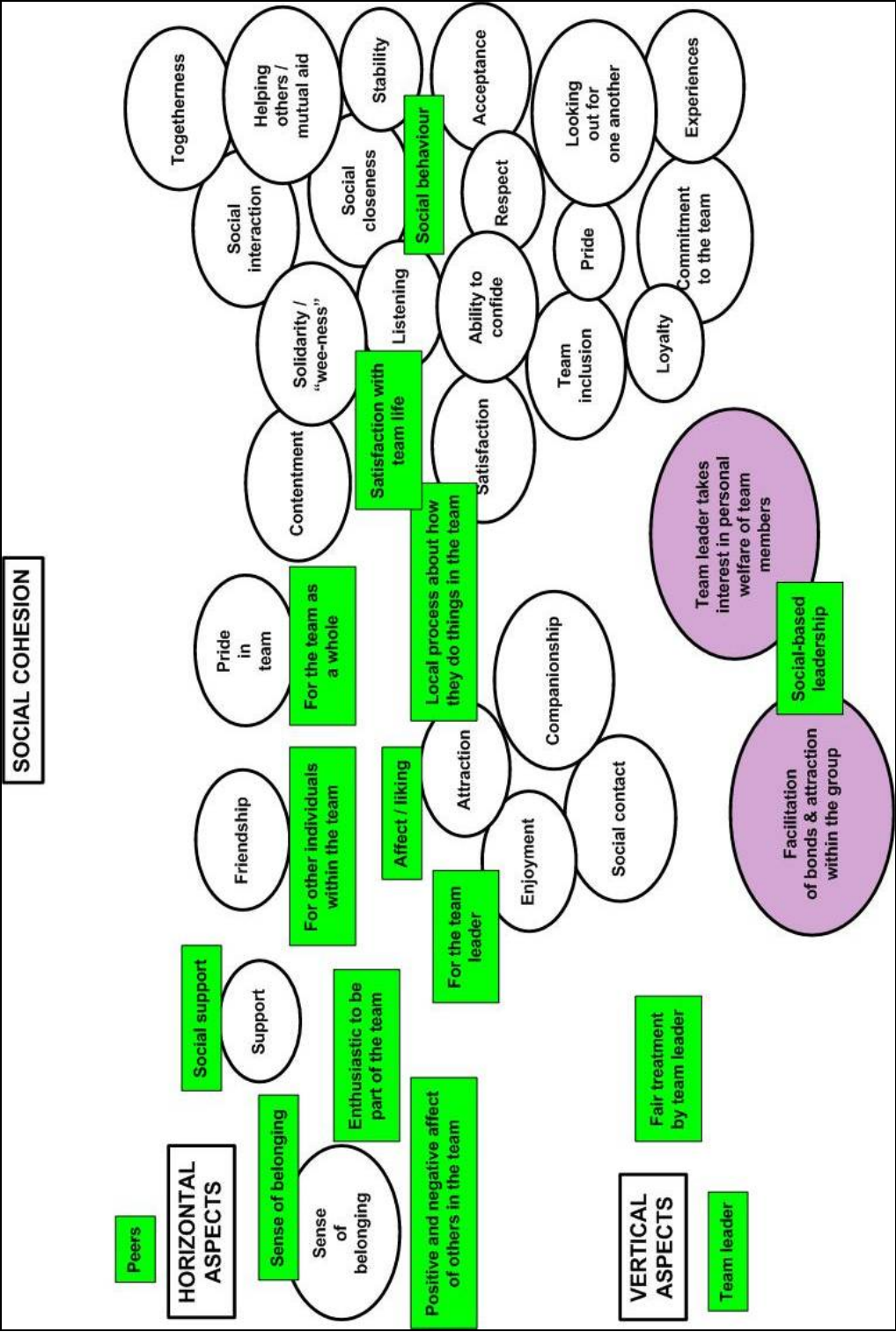


Figure A2: Overlay of deductive and inductive analysis for social cohesion



ANNEX B:
Full list of items adapted from existing measures of cohesion

DIMENSION	ITEM	ITEM ADAPTED FROM	SOURCE
Task Cohesion – Horizontal Interactions	I am content with the tasks that I do within the team.	I like the program of physical activities done in this group.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'individual Attractions to the Group - Task.
	The team provides me with good opportunities to improve my skills.	This physical activity group provides me with a good opportunity to improve in areas of fitness I consider important. This physical activity group provides me with good opportunities to improve my personal fitness.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'individual Attractions to the Group - Task.
	I do not feel that my peers in the team adequately support me in achieving my tasks.	Rate the degree of support and mutual respect players have for one another.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	I am strongly committed to the mission of the team.	I am strongly committed to the mission here.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Identification with mission and ultimate purpose'.
		Are you committed to the operating procedures your coach sets down for your team?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	I share the same levels of commitment in conducting the team's tasks as my fellow team members.	I'm unhappy with my teams' level of commitment to the task.	The Team Cohesion (TC) Scale (Carless & De Paola, 2000).
	Members of the team do not share the same levels of commitment in conducting the task of the team.	I'm unhappy with my teams' level of commitment to the task.	The Team Cohesion (TC) Scale (Carless & De Paola, 2000).
		I am unhappy with my team's level of desire to win.	The Group Environment Questionnaire (GEQ) (Carron et al., 1985).
	Members of the team do not enjoy the tasks conducted.	Members of our group enjoy the type(s) of physical activities offered.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration

We help each other develop new skills within the team.	We help each other develop new skills in our physical activity group.	- Task'. The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration – Task'.
Members of the team help each other in their tasks through sharing information. Team members (usually) feel free to share information. Team members provide each other with encouragement in completing their tasks.	Members of our physical activity group enjoy sharing information. We encourage each other in order to get the most out of the program.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration – Task'. The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration – Task'.
There is a lot of teamwork and co-operation among team members.	How good was the teamwork on your team? There is a lot of teamwork and cooperation among soldiers in my company. How good do you think the teamwork is on your team? In general, I think the teamwork on our team is poor.	The Cohesiveness Questionnaire (Gruber & Gray, 1981, 1982) - tapping 'Affiliation Cohesion'. Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Unit Teamwork' dimension (one factor). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
Communication between team members is clear. When I joined the team, other members of the team went out of their way to help me learn how to do my job effectively. I am satisfied with the team's accomplishments	Communication between coaches is clear. When I came here, people went out of their way to help me learn the ropes. In terms of your definition of success in athletics, how satisfied are you about what was accomplished by the team this season?	The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Informal Socialization into base community'. The Cohesiveness Questionnaire (Gruber & Gray, 1981, 1982) - tapping 'Team Performance Satisfaction'.
The team provides me with the opportunity to improve my personal performance.	This team does not give me enough opportunities to improve my personal performance. This team does not give me enough opportunities	The Team Cohesion (TC) Scale (Carless & De Paola, 2000). The Group Environment Questionnaire

Task Cohesion – Vertical Interactions	I have confidence in the equipment and technology that support us.	to improve my personal performance. I have a lot of confidence in our weapons.	(GEQ) (Carron et al., 1985). Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Company Combat Confidence' dimension, Factor 3: Confidence in Weaponry. The Team Cohesion (TC) Scale (Carless & De Paola, 2000). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Team members generally agree on team goals (i.e. the goals for the task at hand).	Our team members have conflicting aspirations for the team's performance. How important is it to you that your teammates are on the same wavelength with one another (i.e., teammates are thinking alike in order to achieve successful team performance).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). The Group Attitude Scale (Evans et al., 1986) - tapping 'Attraction'. The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Task'.
	I have confidence in the skills and abilities of my peers within the team. I try to avoid missing a team meeting.	In general, how much confidence do you have in your teammates' capabilities? I would not feel badly if I had to miss a meeting of this group.	The Coaching Staff Cohesion Scale (Martin, 2002).
	Members of the team are comfortable with the time demands placed on them to achieve their targets.	Members of our group are satisfied with the intensity of physical activity in this program.	The Coaching Staff Cohesion Scale (Martin, 2002).
	The team does not work well together to overcome obstacles the team is facing.	We work well together to overcome obstacles the team is facing.	The Coaching Staff Cohesion Scale (Martin, 2002).
	Communication from my immediate superior is clear.	Communication between the coaches is clear.	The Coaching Staff Cohesion Scale (Martin, 2002).
	There are clear boundaries between my superior and team members.	We agree on where the boundaries between student-athletes and the coaching staff should be set.	The Coaching Staff Cohesion Scale (Martin, 2002).
	I do not feel my immediate superior helps me to develop my skills within the team.	How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	I do not feel that my superior provides me with adequate guidance in my tasks.	How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	My superior freely shares information	Members of our physical activity group enjoy	The Physical Activity Group Environment

with me to support my tasks.	sharing information.	Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Task'.
My superior does not provide me with encouragement in my tasks.	How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood). NCOs most always get willing and wholehearted cooperation from soldiers.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
Our immediate superior usually gives willing and wholehearted co-operation to team members. Team members feel that our superior provides clear communication to the team. I value the feedback that my immediate superior gives me.	Communication between the coaches is clear. I enjoy the feedback from the instructor in this physical activity group.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Unit Teamwork' dimension (one factor). The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Individual Attractions to the Group - Social.
I do not feel my immediate superior knows their job.	My squad leader knows his stuff.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Small-Unit Command Confidence' dimension, Factor 1: Squad Confidence.
I have confidence in my immediate superior.	In the event of combat, how would you describe your confidence in your platoon leader?	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Small-Unit Command Confidence' dimension, Factor 1: Platoon Leadership.
My immediate superiors do not share a common direction. My immediate superior is not committed to the long term success of the team. My superior is critical to the success of the team. Team members do not feel that our superior is critical to the success of the team. I have confidence in the decisions made by my immediate superior.	The coaches share similar coaching philosophies. The coaching staff is committed to the long term success of the team. Each coach is critical to the success of the team. Each coach is critical to the success of the team. How would you describe your confidence in the tactical decisions of your Battalion Commander,	The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Senior Command

Social Cohesion – Horizontal Interactions		Brigade Commander, Division Commander, Corps Commander, and the Army General Staff? I feel a sense of belonging to.....	Confidence' dimension (one factor).
	I do not feel a sense of belonging to the team.		Perceived Cohesion Scale (PCS) (Bollen & Hoyle, 1990) - tapping 'Sense of Belonging' dimension.
		How strong a "sense of belonging" did you have toward your team?	The Cohesiveness Questionnaire (Gruber & Gray, 1981) - tapping 'Affiliation Cohesion'.
		I feel like I belong here.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Sense of "we-ness" or identification with the base community'.
		I feel a strong sense of belonging to this staff.	The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002).
		How strong a sense of belonging do you feel you have to your team? In general, I do not feel a strong sense of belongingness to this team. My feelings of belongingness with this group would be:	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	The social contact that I have in the team is important to me.	How strong a sense of belonging do you feel you have to the people you work with? The social interactions I have in this physical activity group are important to me.	Gross Cohesiveness Questionnaire (Johnson & Fortman, 1988) (Modified version of the Gross Cohesiveness Scale - GCS Gross, 1957) - taps affective aspects of cohesion. Indik (1965).
	If the team was to disband, I would not miss my contact with the other team members.	For me, this team is one of the most important social groups to which I belong. If this program was to end, I would miss my contact with the other participants. If I were told my group would not meet today, I would feel badly. I am not going to miss the members of this team	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Individual Attractions to the Group - Social'. The Group Environment Questionnaire (GEQ) (Carron et al., 1985). The Group Attitude Scale (Evans et al., 1986) - tapping 'Attraction'.
			The Group Environment Questionnaire

	when the session ends.	(GEQ) (Carron et al., 1985)
I want to remain a member of the team.	I want to remain a member of this group. Do you want to remain in the group? I want to continue being part of this coaching staff. Do you desire to continue to be a member of this team? The index asks group members whether or not they 'preferred to remain in the group rather than leave'.	The Group Attitude Scale (Evans et al., 1986) - tapping 'Attraction'. Schacter (1951). The Coaching Staff Cohesion Scale (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). Index of Group Cohesiveness (Seashore, 1954).
I do not like being part of the team.	I like my group. How well do you like the group?	The Group Attitude Scale (Evans et al., 1986) - tapping 'Attraction'. Gross Cohesiveness Questionnaire (Johnson & Fortman, 1988) (Modified version of the Gross Cohesiveness Scale - GCS Gross, 1957) - taps affective aspects of cohesion.
I feel a part of what happens in the team.	I feel involved in what is happening in my group. I see myself as part of thecommunity.	The Group Attitude Scale (GAS) (Evans et al., 1986) - tapping 'Attraction'. Perceived Cohesion Scale (Bollen & Hoyle, 1990) - tapping 'Sense of Belonging' dimension.
My peers make me feel an accepted member of the team.	I feel like an accepted member of the coaching staff. Do you feel you are an accepted member of this team?	The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
Compared to other teams I know of, I feel my team is better than most.	Compared to other groups I know of, I feel my group is better than most.is one of the best schools [cities] in the nation. Compared to other groups that you belong to, how much do you value your membership on this basketball team?.	The Group Attitude Scale (GAS) (Evans et al., 1986) - tapping 'Attraction'. Perceived Cohesion Scale (PCS) (Bollen & Hoyle, 1990) - tapping 'Feelings of Morale' dimension. The Cohesiveness Questionnaire (Gruber & Gray, 1981) - tapping 'Value of Membership'.

	The index asks group members whether or not they 'perceived their group to be the better group'.	Index of Group Cohesiveness (Seashore, 1954).
I feel it would make a difference to the team if I were not here.	I feel it would make a difference to the group if I were not here.	The Group Attitude Scale (GAS) (Evans et al., 1986) - tapping 'Attraction'.
I am enthusiastic about the team.	I feel my absence would not matter to the group. I am enthusiastic about.....	Perceived Cohesion Scale (PCS) (Bollen & Hoyle, 1990) - tapping 'Feelings of Morale' dimension.
I often go out of my way to help others in the team.	People are helpful around here.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Reciprocity and readiness to help other members'
	I often go out of my way to help others on this installation.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Cooperation or suppression of self-interest for the sake of the common life'.
I am proud to be part of the team.	I am happy to be at [live in].....	Perceived Cohesion Scale (PCS) (Bollen & Hoyle, 1990) - tapping 'Feelings of Morale' dimension.
	I'm proud to be part of this installation.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Pride in membership and participation in the base ceremonial life'.
	Rate the degree of pride you feel in being members of this team?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	In general, I do not feel much proud in being a member of this team.	
I am not proud of my team.	I am proud of my company.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Sense of Pride' dimension (one factor).
I feel what I do in my team is worthwhile.	What I do in the Army is worthwhile.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Sense of Pride' dimension (one factor).

I feel I can go to most of the members of my team when I have a personal problem.	Do your teammates make you feel significant and worthwhile? I can go to most people in my squad for help when I have a personal problem, like being in debt.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Unit Social Climate' dimension, Factor 2: Instrumental and Affective Support.
I am good friends with my peers in the team.	This is a friendly base/post. Some of my good friends are in this physical activity group. Some of my best friends are in this team. Some of my best friends are on this team.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Friendliness'. The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Individual Attractions to the Group - Social'. The Team Cohesion (TC) Scale (Carless & De Paola, 2000). The Group Environment Questionnaire (GEQ) (Carron et al., 1985).
We are all good friends in this team.	How satisfied are you with the friendships that you have developed within your team? This is a friendly base/post. We are good friends in this physical activity group.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Friendliness'. The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Social'.
Team members enjoy each others company.	How satisfied are you with the friendships that you have developed within your team? We enjoy each others' company in our physical activity group.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Social'.
Members of the team feel very close to one another.	Members of the team would rather go out on their own than get together as a team. People in this company feel very close to each other.	The Group Environment Questionnaire (GEQ) (Carron et al., 1985). Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Unit Social Climate'

Members of the team do not look out for each other.	In this company, people really look out for each other.	dimension, Factor 1: Trust and Caring. Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Unit Social Climate' dimension, Factor 1: Trust and Caring. The Group Environment Questionnaire (GEQ) (Carron et al., 1985).
In spite of individual differences, feelings of togetherness exist in the team. Team members would not miss the social contact in the team if it were to disband.	If members of our team have problems in practice, everyone wants to help them so we can get back together again. In spite of individual differences, a feeling of unity exists in my group.	The Group Attitude Scale (GAS) (Evans et al., 1986) - tapping 'Attraction'.
I enjoy my social interactions within this team.	Members of our physical activity group would likely spend time together if the program were to end. I enjoy my social interactions within this physical activity group.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Social'. The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Individual Attractions to the Group - Social'.
This team is an important social unit for me.	I do not enjoy being a part of the social activities of this team. This physical activity group is an important social unit for me.	The Group Environment Questionnaire (GEQ) (Carron et al., 1985) The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Individual Attractions to the Group - Social'.
A valuable aspect of the team is our social interactions.	For me this team is one of the most important social groups to which I belong. A valuable aspect of our physical activity group is our social interactions.	The Team Cohesion (TC) Scale (Carless & De Paola, 2000). The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Social'.
I feel included in the team.	I feel included in the group. To what degree do you feel that you are included by the group in the group's activities.	The Group Attitude Scale (Evans et al., 1986) - tapping 'Attraction'. Gross Cohesiveness Questionnaire (Johnson & Fortman, 1988) (Modified version of the Gross Cohesiveness Scale - GCS Gross, 1957) - taps cognitive aspects

I do not feel that I am a member of the team.	I do not feel a part of the group's activities.	of cohesion. The Group Attitude Scale (GAS) (Evans et al., 1986) - tapping 'Attraction'.
	I feel distant from the group. I feel that I am a member of thecommunity.	Perceived Cohesion Scale (PCS) (Bollen & Hoyle, 1990) - tapping 'Sense of Belonging' dimension.
My closest friendships are with the team members that I work with.	My closest friendships are with the people I work with.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Unit Social Climate' dimension, Factor 2: Instrumental and Affective Support.
We spend time socialising with each other before and after conducting our task.	How satisfied are you with the friendships that you have developed within your team? I spend my after-duty hours with people in this company.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Unit Social Climate' dimension, Factor 3: Friendships.
	Members of our physical activity group often socialize during exercise time.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Social'.
	Members of our group sometimes socialize together outside of activity time.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Social'.
	We spend time socializing with each other before and after our activity sessions.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Social'.
The team is closely knit.	Our team would like to spend time together outside work hours. How closely knit do you think your team was?	The Team Cohesion (TC) Scale (Carless & De Paola, 2000). The Cohesiveness Questionnaire (Gruber & Gray, 1981) - tapping 'Affiliation Cohesion'.
	Do you perceive your team to be closely knit?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
Members of the team usually work out	People here can usually work out their	Measure of Base Cohesion / MFI Base

	their disagreements.	disagreements.	Cohesion Scale (McClure & Broughton, 2000) - taps 'Cooperation or suppression of self-interest for the sake of the common life'.
Social Cohesion - Vertical Interactions	My immediate superior is a good role model to me.	The officers are good role models.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Informal socialization into base community life'.
	My immediate superior does not take an interest in my personal welfare.	My NCOs are interested in my personal welfare.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Concerned Leadership' dimension, Factor 1: Leader Concern for Soldiers.
	My immediate superior is interested in what I think about things.	My NCOs are interested in what I think and how I feel about things.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Concerned Leadership' dimension, Factor 1: Leader Concern for Soldiers.
	My immediate superior is not interested in the way I feel about things.	My NCOs are interested in what I think and how I feel about things.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Concerned Leadership' dimension, Factor 1: Leader Concern for Soldiers.
	My immediate superior talks to me personally outside normal duties.	My platoon leader talks to me personally outside normal duties.	Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Concerned Leadership' dimension, Factor 2: Personal Contact with Leaders.
	I am friends with my immediate superior. Our immediate superior is not interested in the personal welfare of team members.	How satisfied are you with the friendships that you have developed within your team? My NCOs are interested in my personal welfare.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Concerned Leadership' dimension, Factor 1: Leader Concern for Soldiers.
	Team members are friends with our immediate superior. Our immediate superior takes an interest in the way team members feel about things.	How satisfied are you with the friendships that you have developed within your team? My NCOs are interested in what I think and how I feel about things.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). Measure of Military Unit Cohesion (Griffith, 1988) - tapping 'Concerned Leadership' dimension, Factor 1: Leader Concern for Soldiers.

Valued Roles - Horizontal Interactions Valued Roles - Vertical Interactions	<p>My peers within the team support me in my role.</p> <p>I do not feel I am adequately rewarded for my contributions to the team.</p> <p>I feel that the other members of the team value my role within the team.</p> <p>Members of the team are happy with their roles.</p>	<p>Rate the degree of support and mutual respect players have for one another.</p> <p>How much do you feel your role or contribution to the team is valued by your teammates?</p> <p>How much do you feel your role or contribution to the team is valued by your teammates?</p> <p>Rate the degree to which your team has well defined roles in that each person knows what is expected of them.</p> <p>Rate the degree of support and mutual respect players have for one another.</p>	<p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p> <p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p> <p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p> <p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p>
	<p>Members of the team generally seem as though they receive sufficient support in their role.</p> <p>Members of the team are clear about their role within the team.</p>	<p>Rate the degree to which your team has well defined roles in that each person knows what is expected of them.</p> <p>Members of our team do not communicate freely about each athlete's responsibilities during competition or practice.</p>	<p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p> <p>The Group Environment Questionnaire (GEQ) (Carron et al., 1985).</p>
	<p>Team members do not understand how their role fits within the team.</p>	<p>Rate the degree to which your team has well defined roles in that each person knows what is expected of them.</p> <p>Members of our team do not communicate freely about each athlete's responsibilities during competition or practice.</p>	<p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p> <p>The Group Environment Questionnaire (GEQ) (Carron et al., 1985).</p>
	<p>Team members do not feel adequately rewarded for their contribution to the team.</p> <p>Team members do not value each other's roles within the team.</p> <p>I understand how my role fits within the team.</p>	<p>How much do you feel your role or contribution to the team is valued by your teammates?</p> <p>How much do you feel your role or contribution to the team is valued by your teammates?</p> <p>Rate the degree to which your team has well defined roles in that each person knows what is expected of them.</p>	<p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p> <p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p> <p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p>
	<p>I do not feel that my contributions to the team are valued by my fellow team members.</p>	<p>How much do you feel your role or contribution to the team is valued by your teammates?</p> <p>In general, I feel my role or contribution to the team is not valued by my teammates.</p>	<p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p>

Members of the team do not value the contributions made by other team members.	How much do you feel your role or contribution to the team is valued by your teammates?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
I do not feel that my immediate superior adequately supports me in my role. I am unclear about what my immediate superior expects of me within the team.	Rate the degree of support and mutual respect players have for one another. The members of the coaching staff know what is expected of them. Rate the degree to which your team has well defined roles in that each person knows what is expected of them.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). The Coaching Staff Cohesion Scale (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
My immediate superior does not help me understand my role within the team.	Rate the degree to which your team has well defined roles in that each person knows what is expected of them.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
My immediate superior adequately rewards me for my contribution to the team.	How much do you feel your role or contribution to the team is valued by the coaching staff?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
I do not feel that my immediate superior values my role within the team. Our immediate superior does not help team members understand what their role is within the team. Our immediate superior does not ensure that team members understand each others roles.	How much do you feel your role or contribution to the team is valued by the coaching staff? Rate the degree to which your team has well defined roles in that each person knows what is expected of them. How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
Our immediate superior adequately rewards team members for their contribution to the team.	How much do you feel your role or contribution to the team is valued by the coaching staff?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
My immediate superior values team members' roles within the team. I am unclear about what my superior expects of me. My superior clearly describes what my role entails within the team.	How much do you feel your role or contribution to the team is valued by the coaching staff? The members of the coaching staff know what is expected of them. Rate the degree to which your team has well defined roles in that each person knows what is expected of them.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). The Coaching Staff Cohesion Scale (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
My immediate superior helps me to	Rate the degree to which your team has well	Multidimensional Sport Cohesion

Unity of Purpose - Horizontal Interactions	understand how my role fits within the team.	defined roles in that each person knows what is expected of them.	Instrument (MSCI) (Yukelson et al., 1984).
	My immediate superior does not describe to me what my role is within the team.	Rate the degree to which your team has well defined roles in that each person knows what is expected of them.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Most team members are clear about what our superior expects of them.	The members of the coaching staff know what is expected of them.	The Coaching Staff Cohesion Scale (Martin, 2002).
	Our superior goes out of their way to help team members understand their role within the team.	Rate the degree to which your team has well defined roles in that each person knows what is expected of them.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Our immediate superior does not explain to team members how their role fits in the team.	Rate the degree to which your team has well defined roles in that each person knows what is expected of them.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	I feel that my immediate superior values the contributions I make to the team.	How much do you feel your role or contribution to the team is valued by the coaching staff?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Our immediate superior makes sure that team members are clear about what is expected of them within the team.	Rate the degree to which your team has well defined roles in that each person knows what is expected of them.	The Coaching Staff Cohesion Scale (Martin, 2002).
		How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Our immediate superior ensures that all team members know how their role contributes to the goals of the team.	How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).	Multidimensional Sport Cohesion Instrument (MSCI) ((Yukelson et al., 1984).
	Team members do not feel that our immediate superior values the contributions they make to the team.	How much do you feel your role or contribution to the team is valued by the coaching staff?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Our immediate superior does not help team members develop competencies to fulfil their roles.	How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	The rules in the team do not make good sense to me.	Most of the rules around here make good sense to me.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Acceptance of the base

I enjoy the opportunity to share experiences with the others in the team.	I enjoy the opportunity, within this physical activity group, to share experiences with others who are similar to me.	community normative order'. The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Individual Attractions to the Group - Social'.
	Similar to 'I look forward to coming to the group'.	The Group Attitude Scale (GAS) (Evans et al., 1986) - tapping 'Attraction'.
	Similar to 'How much did you like playing with this particular group of fellows?'	The Cohesiveness Questionnaire (Gruber & Gray, 1981) - tapping 'Affiliation Cohesion'.
	How much do you enjoy playing with this particular team?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
I feel that the team sticks together in pursuit of its goals despite any tensions that arise within the team.	The coaching staff sticks together.	The Coaching Staff Cohesion Scale (Martin, 2002).
	In general, our team seems to fall apart easily and lose its intensity in crucial situations (i.e., when the going gets tough).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Conflict never seems to be resolved on our team (i.e. teammates argue a lot and have trouble getting along with one another).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Do you feel your team sticks together well when things are going bad?	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
I do not feel that I am encouraged to express my opinions within the team.	The coaches are encouraged to express their opinions.	The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002).
I do not share the same way of thinking as my fellow team members about how to achieve the goals of the team.	How important is it to you that your teammates are on the same wavelength with one another (i.e., teammates are thinking alike in order to achieve successful team performance).	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Our group is united in its beliefs about the benefits of the physical activities offered in this program.	
I share similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) as my team members.		The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Task'.
Members of the team share similar beliefs (for example, sharing the same opinions about people of ideas whether positive or negative) as one another.	Our group is united in its beliefs about the benefits of the physical activities offered in this program.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) - tapping 'Group Integration - Task'.

Unity of Purpose - Vertical Interactions	Team members do not have a shared understanding of the goals of the team.	Our team members have conflicting aspirations for the team's performance. We agree on team goals.	The Group Environment Questionnaire (GEQ) (Carron et al., 1985). The Coaching Staff Cohesion Scale (Martin, 2002).
	Members of the team work well together to achieve the goals of the team. Team members feel that the team sticks together in pursuit of its goals despite any tensions that arise within the team.	Do your teammates have a clear understanding of the goals the team is striving to achieve? Our team is united in trying to reach its goals for performance.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). The Group Environment Questionnaire (GEQ) (Carron et al., 1985).
		The coaching staff sticks together. We agree on what to do to reach our team goals. In general, our team seems to fall apart easily and lose its intensity in crucial situations (i.e., when the going gets tough). Conflict never seems to be resolved on our team (i.e. teammates argue a lot and have trouble getting along with one another). Do you feel your team sticks together well when things are going bad? How important is it to you that your teammates are on the same wavelength with one another (i.e., teammates are thinking alike in order to achieve successful team performance).	The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	Team members do not encourage one another to express their opinions within the team. Team members generally agree on what to do to reach our team goals.	The coaches are encouraged to express their opinions.	The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002).
		The coaching staff generally agrees on the best way to work together. We agree on what to do to reach our team goals. How important is it to you that your teammates are on the same wavelength with one another (i.e., teammates are thinking alike in order to achieve successful team performance).	The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).
	I feel that my immediate superior treats people fairly.	The command treats people fairly here.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) - taps 'Acceptance of the base

My immediate superior helps to resolve any tensions that arise in the team to ensure it sticks together in pursuit of its goals.	<p>The coaching staff sticks together.</p> <p>In general, our team seems to fall apart easily and lose its intensity in crucial situations (i.e., when the going gets tough). Conflict never seems to be resolved on our team (i.e. teammates argue a lot and have trouble getting along with one another). Do you feel your team sticks together well when things are going bad?</p>	<p>community normative order'. The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p>
My immediate superior encourages me to express my opinions within the team.	<p>The coaches are encouraged to express their opinions. Rate the degree to which your coach creates an atmosphere where players have the right and freedom to express their ideas and feelings in a democratic way.</p>	<p>The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p>
My immediate superior does not set clear rules within the team.	<p>How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).</p>	<p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p>
Our immediate superior does not set clear goals for the team to work towards.	<p>How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).</p>	<p>Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p>
Team members feel that our immediate superior helps to resolve any tensions that arise in the team to ensure it sticks together in pursuit of its goals.	<p>The coaching staff sticks together.</p> <p>In general, our team seems to fall apart easily and lose its intensity in crucial situations (i.e., when the going gets tough). Conflict never seems to be resolved on our team (i.e. teammates argue a lot and have trouble getting along with one another). Do you feel your team sticks together well when things are going bad?</p>	<p>The Coaching Staff Cohesion Scale (CSCS) (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).</p>
Team members do not feel that our	<p>The coaches are encouraged to express their</p>	<p>The Coaching Staff Cohesion Scale</p>

immediate superior encourages them to express their opinions within the team.

Team members feel that our immediate superior sets clear rules within the team.

opinions.

Rate the degree to which your coach creates an atmosphere where players have the right and freedom to express their ideas and feelings in a democratic way.

How well does your coach prepare your team, both mentally and physically to demonstrate its skills during competition (i.e., strategy, roles, and operating procedures are well understood).

(CSCS) (Martin, 2002).

Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).

Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).

ANNEX C:
The full list of new items written for each Multidimensional Team Cohesion Scale (MTCS) dimension

DIMENSION	NEW ITEM
Task Cohesion – Horizontal Interactions	<p>I value the other members in the team.</p> <p>My peers do not help me develop new skills within the team.</p> <p>Team members are not receptive to feedback and criticism from peers.</p> <p>I am comfortable with the time demands placed on me within the team to achieve my objectives.</p> <p>I am willing to take on new tasks within the team.</p> <p>I am satisfied with the way the team progresses with tasks.</p> <p>Members of the team are willing to take on new tasks within the team.</p> <p>Members of the team are unsatisfied with the way the team progresses with tasks.</p>
Task Cohesion – Vertical Interactions	<p>I am receptive to feedback and criticism from my immediate superior.</p> <p>I am confident in my immediate superior's ability to do their job</p> <p>Team members are receptive to feedback from our immediate superior.</p> <p>Team members do not value the feedback provided by our immediate superior.</p> <p>Team members are unhappy with the guidance provided by our superior.</p> <p>Team members are content with the level of encouragement provided by our superior in completing our tasks.</p> <p>Team members value our immediate superior.</p> <p>Team members have confidence in our immediate superior.</p> <p>Team members believe that our superior is committed to the long-term success of the team.</p> <p>Team members do not have confidence in the decisions made by our immediate superior.</p>
Social Cohesion – Horizontal Interactions	<p>I do not enjoy socialising with members of the team</p> <p>Members of the team do not see the team as an important social unit.</p> <p>Members of the team regularly socialise together.</p> <p>Team members are not proud to be part of the team.</p>
Social Cohesion - Vertical Interactions	<p>I do not socialise with my team members.</p> <p>I feel close to my immediate superior.</p> <p>When I joined the team, I feel that my immediate superior went out of his way to help me fit in.</p> <p>My immediate superior looks out for me.</p> <p>I do not feel that my superior is there for me when I need advice.</p> <p>I do not enjoy socialising with my immediate superior.</p> <p>I am proud to be working with my immediate superior.</p> <p>Our immediate superior is not a good role model to team members.</p>

Valued Roles - Horizontal Interactions

Team members do not get on socially with our immediate superior.
Our immediate superior socialises with us outside of normal duty hours.
Team members do not feel close to our superior.
Our immediate superior goes out of his way to help team members to feel happy within the team.
Team members do not feel that our immediate superior looks out for them.
Our immediate superior does not provide team members with advice when they need it.
Our immediate superior does not care about the people in the team.
Team members are proud to be working with our immediate superior.
Our immediate superior never asks team members how they are feeling.
I do not get on socially with my immediate superior.
I am unhappy with my role in the team.
I am proud to be conducting my role within the team.
I am unclear about my role within the team.
I do not understand how my role contributes to the goals of the team.
I do not know what the roles of other team members are.
I feel I have sufficient opportunity to develop my role within the team.
Team members are proud of their roles within the team.
Team members understand each others roles.
I feel that my fellow team members help me to develop competencies to fulfil my role.
I feel that my team provides adequate feedback on my performance.
Members of the team understand how their role contributed to the goals of the team.
Team members help each other to develop competencies to fulfil their roles.
Members of the team feel that they have sufficient opportunity to develop their role within the team.
Members of the team provide adequate feedback to one another regarding their individual performance.

Valued Roles - Vertical Interactions

I do not feel I receive sufficient feedback from my superior to support my role.
My immediate superior helps me understand how my role contributes to the goals of the team.
My immediate superior ensures I understand the roles of other team members.
My immediate superior does not provide me with sufficient opportunity to develop my role within the team.
Team members receive sufficient feedback from our immediate superior to support them in their role.
My immediate superior helps me to enhance my competencies to fulfil my role.
My immediate superior regularly provides me with feedback on my performance.
Team members feel that our immediate superior provides them with sufficient opportunity to develop their roles within the team.

Unity of Purpose - Horizontal Interactions

Team members do not feel that our immediate superior provides enough feedback on their individual performance.
I do not share similar same values (i.e. similar fundamental principles) as my team members.
I clearly understand the goals of the team.

**Unity of Purpose - Vertical
Interactions**

I have shared similar experiences with others in the team.
I do not feel that the team works together to achieve the goals of the team.
Members of the team share similar values (i.e. similar fundamental principles) as one another.
There is not a sense of shared purpose within the team.
Team members share the same way of thinking about how to achieve the goals of the team.
Members of the team regularly share their experiences with one another.
Members of the team have shared similar experiences.
The rules in the team do not make sense to team members.
Team members have a shared sense of purpose within the team.
Members of the team do not work towards the same goal.
My immediate superior sets me clear goals to work towards.
My immediate superior instils a sense of shared purpose within the team.
I do not share my experiences with my immediate superior.
I have shared similar experiences with my immediate superior.
My immediate superior does not share the same goals as the team.
Our immediate superior shares similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) as members of the team.
Our immediate superior shares similar values (i.e. similar fundamental principles) as members of the team.
Team members regularly share their experiences with our superior.
Team members have shared similar experiences with our immediate superior.
Team members feel that our immediate superior shares the same goals as the team.
I feel that my immediate superior succeeds in helping the team work towards achieving its goals.
Team members do not feel that our immediate superior does not succeed in helping the team work towards achieving its goals.

Appendix D:
Content validity version of the Multidimensional Team Cohesion Measure
(MTCM) and MTCS

Instructions

Purpose of the Research:

My name is Hannah State-Davey and I am currently undertaking a PhD at the University of Leicester, supervised by Professor Stammers. The purpose of the research is to develop a measure of team cohesion to be applied to organizational work teams. The aim of this phase of the research is to gain feedback from subject matter experts (SME's) on the Multidimensional Team Cohesion Scale (MTCS) to test both face and content validity. The background to this research study is provided on the following page.

Contents:

This document contains TWO sections.

Multidimensional Team Cohesion Model (MTCM):

The conceptual model on which the scale was based is presented first along with a brief explanation of its contents. Please review the conceptual model and answer the question in the feedback proforma provided as fully as possible.

MTCS:

The MTCS is presented in section two. Please carefully review all of the items within the scale and provide answers to the questions in the feedback proforma provided as fully as possible.

Information to Respondents:

Please send replies back via the following email address: hmsdavey@qinetiq.com by no later than **26th May 2006**.

I would welcome any recommendations that you have regarding any experts in the field of teamworking, cohesion and/or psychometric development that I could approach for this study?

For further information about this research I will be glad to answer any questions that you have about this study at any time. I can be contacted at the email address above.

Thank you for participating in this research study.

Context

Background to the Research:

Cohesion is considered a fundamental even essential team variable that is important in understanding teams and predicting team outcomes (e.g. team effectiveness and performance). In organizational work teams, cohesion has important outcomes at both the individual level (e.g. absenteeism, turnover) and group-level (e.g. performance). Today's organizational teams are becoming increasingly distributed, placing challenges on developing and maintaining cohesion. However, team cohesion will remain important for achieving team effectiveness and performance. As a dynamic construct, cohesion will develop and evolve over the life cycle of the team.

Despite the wealth of academic research on the topic there is considerable disagreement between researchers in the field over the definition and structure of cohesion. Definitions of the construct reflect either a unidimensional structure (e.g. defined as the attractiveness of the team) or multidimensional structure (e.g. it has both social and task based aspects) resulting in different dimensions of cohesion being identified by different researchers. Even where there is agreement, different terms are often used to describe the underlying dimensions of cohesion. Furthermore, little research has been conducted to distinguish between those dimensions that can be generalised across team types (primary dimensions) and those that are considered specific to a team context (secondary dimensions). As a result multiple measures of cohesion exist that have an inadequate conceptual basis, with no one measure accepted as standard in the field making it difficult for researchers to compare studies of team cohesion. Many have also not been adequately psychometrically analysed to establish their reliability and validity.

Much of the research on team cohesion has been conducted in co-located teams, mainly in sports and exercise contexts. The purpose of this research is to provide a distinction between the primary dimensions of cohesion and secondary dimensions relevant to distributed organizational work teams in order to develop a valid and reliable measure of team cohesion applied in this context, which is sensitive to changes in the level of cohesion over the life cycle of the team.

Multidimensional Team Cohesion Model (MTCM)

Background to the Development of the MTCM:

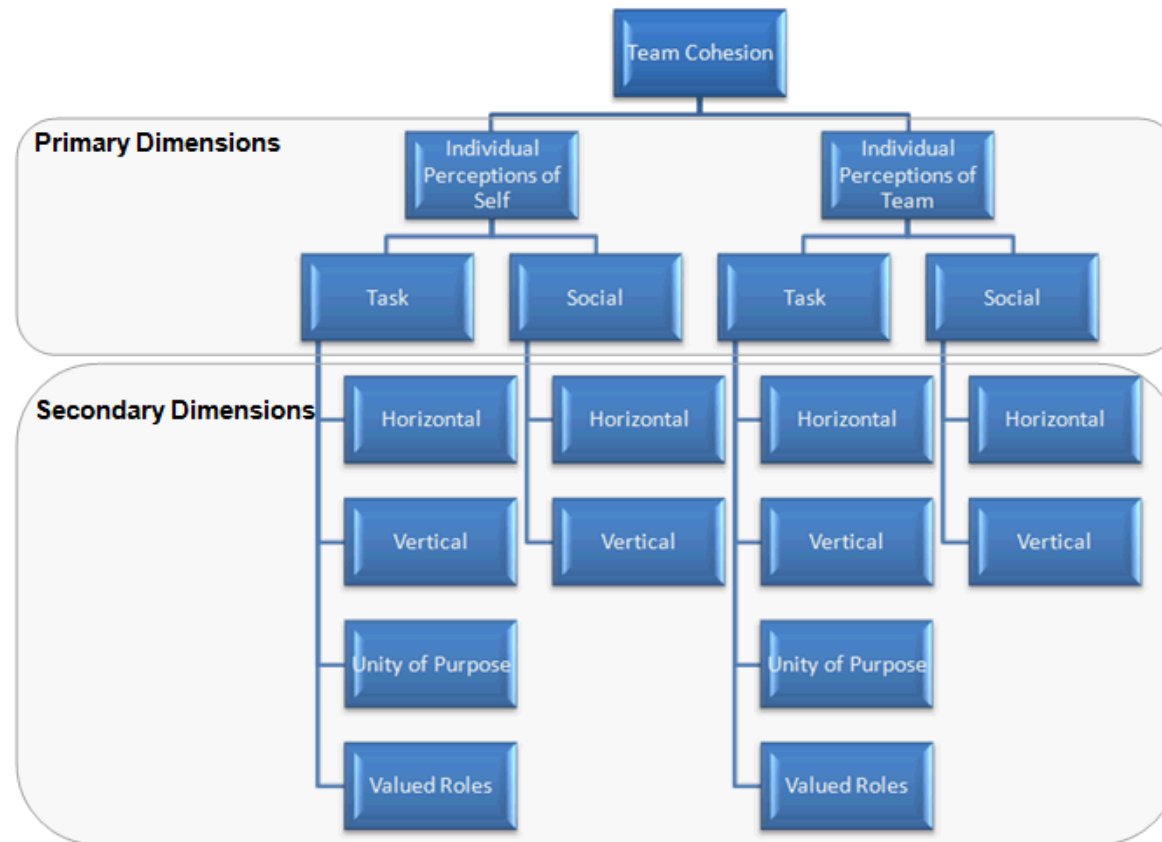
The Multidimensional Team Cohesion Model (MTCM) presented in the following page is a modified and extended version of Carron et al's (1985)¹⁷ conceptual model of sports team cohesion. It has applicability to a wide range of contexts, not just organizational work teams. The MTCM encompasses the four primary dimensions of cohesion represented in Carron et al's model.— '**Social Cohesion**', '**Task Cohesion**', '**Individual aspects**' and '**Team aspects**'. It also reflects cohesion as a quality of both the individual and the team, held important in Carron et al's model. An individual's perception about their own interactions within the team and those of the team as a whole permeate all dimensions within the model.

The model has been extended to reflect cohesion as a construct that has both primary and secondary dimensions, suggested by Cota et al (1995)¹⁸. Social, task, individual and team aspects are primary dimensions of cohesion as they can be considered relevant to all types of teams, not just organizational work teams. The secondary dimensions, those relevant to only certain team types, identified as important to organizational work team cohesion are '**Horizontal**' (relationships between peers) and '**Vertical**' (relationships between subordinates and superiors) cohesion. These relationships will be both social and task based. '**Unity of Purpose**' can also be considered a secondary dimension of cohesion reflecting the norms, beliefs and values within the team. Since organizational work teams also have defined roles, '**Valued Roles**' is also included as a secondary dimension of cohesion. Both 'Unity of Purpose' and 'Valued roles' are relevant to task-based cohesion only.

¹⁷ Carron, A.V., Widmeyer, W.N., and Brawley, L.R. (1985). The development of an instrument to assess cohesion in sport teams: The Group Environment Questionnaire. *Journal of Sport Psychology*, **7**, 244-266

¹⁸ Cota, A.A., Evans, C.R., Dion, K.L., Kilik, L., and Longman, R.S. (1995). The structure of group cohesion. *Personality and Social Psychology Bulletin*, **21**(6), 572-580.

Multidimensional Team Cohesion Model (MTCM)



MTCM Feedback Proforma

Current Job Role:

Relevant Professional Experience:

0-5 yrs ☐ 6-10 yrs ☐ 11-15 yrs ☐

15-20 yrs ☐ 21 + yrs ☐

From your background and experience, please would you consider the following question about the **Multidimensional Team Cohesion Model (MTCM)**. Many thanks for your assistance.

Do you have any comments on the 'Conceptual Model for Organizational Work Team Cohesion'?

Multidimensional Team Cohesion Scale (MTCS)

Background to the Development of the MTCS:

The Multidimensional Team Cohesion Scale (MTCS) presented in the following pages was based on a comprehensive analysis of dimensions and items in existing measures of team and group cohesion in the academic research literature. The measure is designed to capture both individual and team aspects of organizational work team cohesion across each dimension identified in the conceptual model. It is also generally worded to make it applicable to a wide range of team contexts. Level of cohesion is rated on a Likert scale shown below, ranging from 7 (Strongly Agree) to 1 (Strongly Disagree).

Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
7	6	5	4	3	2	1

Multidimensional Team Cohesion Scale (MTCS)

Task Cohesion - Horizontal Aspects

	Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
I am content with the tasks that I do within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The team provides me with good opportunities to improve my skills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel that my peers in the team adequately support me in achieving my tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am comfortable with the time demands placed on me within the team to achieve my objectives.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am willing to take on new tasks within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am satisfied with the way the team progresses with tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I value the other members in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am satisfied with the team's accomplishments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel a sense of belonging to the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am strongly committed to the mission of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have confidence in the equipment and technology that support us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have confidence in the skills and abilities of my peers within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My peers help me develop new skills within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I try to avoid missing a team meeting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Members of the team share the same levels of commitment in conducting the task of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team enjoy the tasks conducted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team are comfortable with the time demands placed on them to achieve their targets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team are willing to take on new tasks within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team are unsatisfied with the way the team progresses with tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We help each other develop new skills within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team help each other in their tasks through sharing information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members (usually) feel free to share information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members provide each other with encouragement in completing their tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members are receptive to feedback and criticism from peers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a lot of teamwork and co-operation among team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members generally agree on team goals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members generally agree on what to do to reach our team goals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication between team members is clear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The team does not work well together to overcome obstacles the team is facing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The team provides me with the opportunity to improve my personal performance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Task Cohesion - Vertical Aspects

	Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
I value the feedback that my immediate superior gives me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am receptive to feedback and criticism from my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am confident in my superior's ability to do their job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel my immediate superior knows their job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have confidence in my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have confidence in the decisions made by my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior is committed to the long term success of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication from my immediate superior is clear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are clear boundaries between my superior and team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My superior is critical to the success of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel my immediate superior helps me to develop my skills within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superiors do not share a common direction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that my superior provides me with adequate guidance in my tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My superior freely shares information with me to support my tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My superior does not provide me with encouragement in my tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am unclear about what my superior expects of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members are receptive to feedback from our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior usually gives willing and wholehearted co-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

operation to team members.							
Team members have confidence in our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not have confidence in the decisions made by our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members are unhappy with the guidance provided by our superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members believe that our superior is committed to the long-term success of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not feel that our superior is critical to the success of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members feel that our superior provides clear communication to the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members are content with the level of encouragement provided by our superior in completing our tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members value our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not value the feedback provided by our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Most team members are clear about what our superior expects of them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Social Cohesion - Horizontal Aspects

	Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
I am good friends with my peers in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This team is an important social unit for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy my social interactions within this team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy working with the individuals within this team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If the team was to disband, I would not miss my contact with the other team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy the opportunity to share experiences with the others in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The social interactions that I have in the team are important to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I want to remain a member of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like being part of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel a part of what happens in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel included in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compared to other teams I know of, I feel my team is better than most.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel it would make a difference to the team if I were not here.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel that I am a member of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am enthusiastic about the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I joined the team, other members of the team went out of their way to help me learn how to do my job effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often go out of my way to help others in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am proud to be part of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I am proud of my team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel what I do in my team is worthwhile.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My peers make me feel an accepted member of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel I can go to most of the members of my team when I have a personal problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not socialise with my team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We are all good friends in this team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team do not see the team as an important social unit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A valuable aspect of the team is our social interactions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members enjoy each others company.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team regularly socialise together.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We spend time socialising with each other before and after conducting our task.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team regularly share their experiences with one another.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team usually work out their disagreements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team feel very close to one another.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team look out for each other.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My closest friendships are with the team members that I work with.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In spite of individual differences, feelings of togetherness exist in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members would not miss the social contact in the team if it were to disband.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The team is closely knit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members are not proud to be part of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Social Cohesion - Vertical Aspects

	Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
My immediate superior is a good role model to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior does not take an interest in my personal welfare.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior is interested in what I think about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior is not interested in the way I feel about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior talks to me personally outside normal duties.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I socialise with my immediate superior on a regular basis.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not share my experiences with my superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel close to my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I joined the team, I feel that my immediate superior went out of his way to help me fit in.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior looks out for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel that my superior is there for me when I need advice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am friends with my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don not get on socially with my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am proud to be working with my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior is not a good role model to team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior is interested in the personal welfare of team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not get on socially with our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Our immediate superior socialises with us outside of normal duty hours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members regularly share their experiences with our superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not feel close to our superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior goes out of his way to help team members to feel happy within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not feel that our immediate superior looks out for them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior does not provide team members with advice when they need it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members are friends with our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior does not care about the people in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior takes an interest in the way team members feel about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members are proud to be working with our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior never asks team members how they are feeling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Valued Roles - Horizontal Aspects

	Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
I am happy with my role in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My peers within the team support me in my role.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am unclear about my role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am proud to be conducting my role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My superior clearly describes what my role entails within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I understand how my role fits within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not understand how my role contributes to the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not know what the roles of other team members are.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel I am adequately rewarded for my contributions to the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that the other members of the team value my role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that my fellow team members help me to develop competencies to fulfil my role.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel that my contributions to the team are valued by my fellow team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel I have sufficient opportunity to develop my role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that my team provides adequate feedback on my performance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team are happy with their roles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team generally seem as though they receive sufficient support in their role.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team understand how their role contributed to the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team are clear about their role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members are proud of their roles within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not understand how their role fits within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members understand each others roles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not feel adequately rewarded for their contribution to the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members value each others roles within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members help each other to develop competencies to fulfil their roles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Members of the team do not value the contributions made by other team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team feel that they have sufficient opportunity to develop their role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team provide adequate feedback to one another regarding their individual performance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Valued Roles - Vertical Aspects

	Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
I do not feel that my superior adequately supports me in my role.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel I receive sufficient feedback from my superior to support my role.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My superior does not help me understand my role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am unclear about what my immediate superior expects of me within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior helps me to understand how my role fits within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior helps me understand how my role contributes to the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior does not describe to me what my role is within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior ensures I understand the roles of other team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior adequately rewards me for my contribution to the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel that my immediate superior values my role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior helps me to enhance my competencies to fulfil my role.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that my immediate superior values the contributions I make to the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

My immediate superior does not provide me with sufficient opportunity to develop my role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior regularly provides me with feedback on my performance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior makes sure that team members are clear about what is expected of them within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members receive sufficient feedback from our immediate superior to support them in their role.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our superior goes out of their way to help team members understand their role within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior does not explain to team members how their role fits in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior ensures that all team members know how their role contributes to the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior does not describe to team members what their role is within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior does not ensure that team members understand each others roles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior adequately rewards team members for their contribution to the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior values team members' roles within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior does not help team members develop competencies to fulfil their roles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not feel that our immediate superior values the contributions they make to the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members feel that our immediate superior provides them with sufficient opportunity to develop their roles within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not feel that our immediate superior provides enough feedback on their individual performance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Unity of Purpose - Horizontal Aspects

	Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
I share similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) as my team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not share similar same values (i.e. similar fundamental principles) as my team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The rules in the team make good sense to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that my immediate superior treats people fairly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I clearly understand the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have shared similar experiences with others in the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel that the team works together to achieve the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that the team sticks together in pursuit of its goals despite any tensions that arise within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that I am encouraged to express my opinions within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I share the same way of thinking with my fellow team members about how to achieve the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team share similar beliefs (for example, sharing the same opinions about people of ideas whether positive or negative) as one another.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team share similar values (i.e. similar fundamental principles) as one another.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team do not work towards the same goal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not have a shared understanding of the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a sense of shared purpose within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members share the same way of thinking about how to achieve the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Members of the team have shared similar experiences.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of the team work well together to achieve the goals of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members feel that the team sticks together in pursuit of its goals despite any tensions that arise within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members encourage one another to express their opinions within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The rules in the team do not make sense to team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Unity of Purpose - Vertical Aspects

	Strongly Agree	Agree	Slightly Agree	Don't Know	Slightly Disagree	Disagree	Strongly Disagree
My immediate superior sets me clear goals to work towards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior instils a sense of shared purpose within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have shared similar experiences with my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I share similar values (i.e. similar fundamental principles) with my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not share similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) with my immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that my immediate superior succeeds in helping the team work towards achieving its goals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior helps to resolve any tensions that arise in the team to ensure it sticks together in pursuit of its goals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior encourages me to express my opinions within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior does not share the same goals as the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My immediate superior sets clear rules within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Our immediate superior shares similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) as members of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior shares similar values (i.e. similar fundamental principles) as members of the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our immediate superior does not set clear goals for the team to work towards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members have shared similar experiences with our immediate superior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members have a shared sense of purpose within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members feel that our immediate superior does not succeed in helping the team work towards achieving its goals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members feel that our immediate superior helps to resolve any tensions that arise in the team to ensure it sticks together in pursuit of its goals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members do not feel that our immediate superior encourages them to express their opinions within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members feel that our immediate superior shares the same goals as the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members feel that our immediate superior sets clear rules within the team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

MTCS Feedback Proforma

From your background and experience, please would you consider the following questions about the Multidimensional Team Cohesion Scale (MTCS), giving thought to the comparability of items with one another. Please continue on a separate sheet of paper, if necessary. All replies will be rendered anonymous and treated in confidence. Many thanks for your assistance.

1. Do the items in the MTCS appear representative of team cohesion in an organizational work team context as you understand it? If no, please explain.
2. Are there any parts of the MTCS that you feel are ambiguous and require further clarification (for example, any parts that need rewording to make them more relevant to all levels of personnel in an organization)? If yes, please explain.

3. Is there anything that you feel is missing from the MTCS or that is incorrect?
If yes, please explain.

4. Is there anything else that you would like to comment on that you feel hasn't
been covered?

Cohesion themes clustered during the second content validity phase



Appendix F:

Figure F1: Themes clustered by task cohesion – horizontal interactions

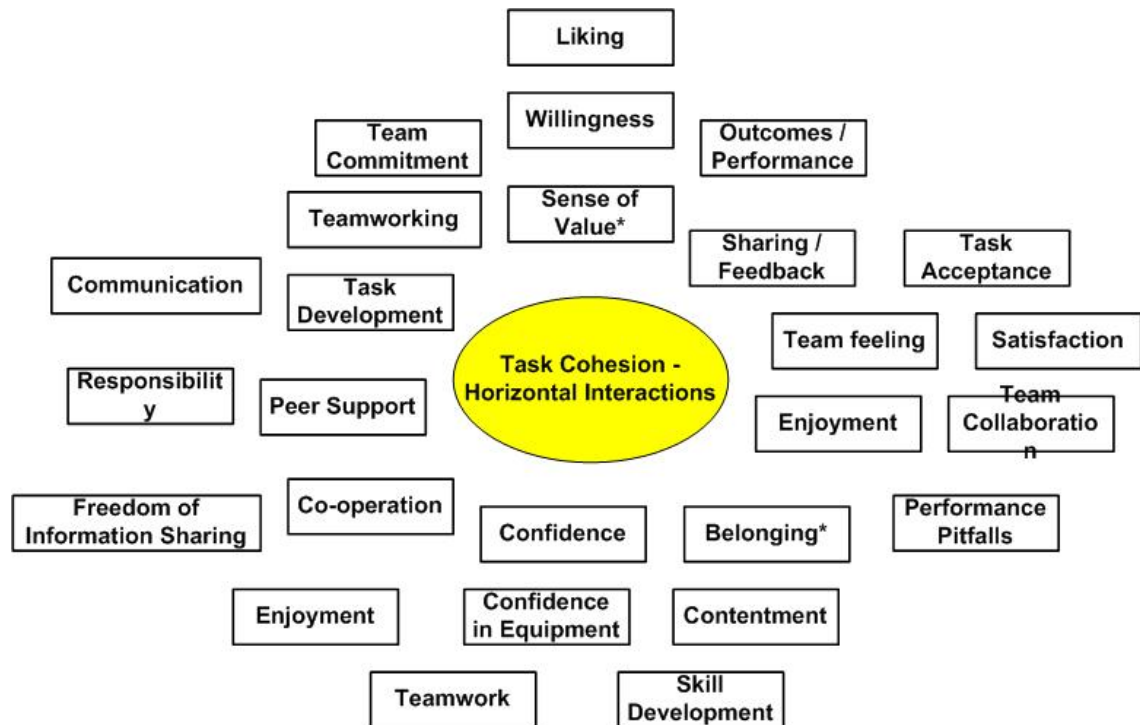


Figure F2: Themes clustered by task cohesion – vertical interactions

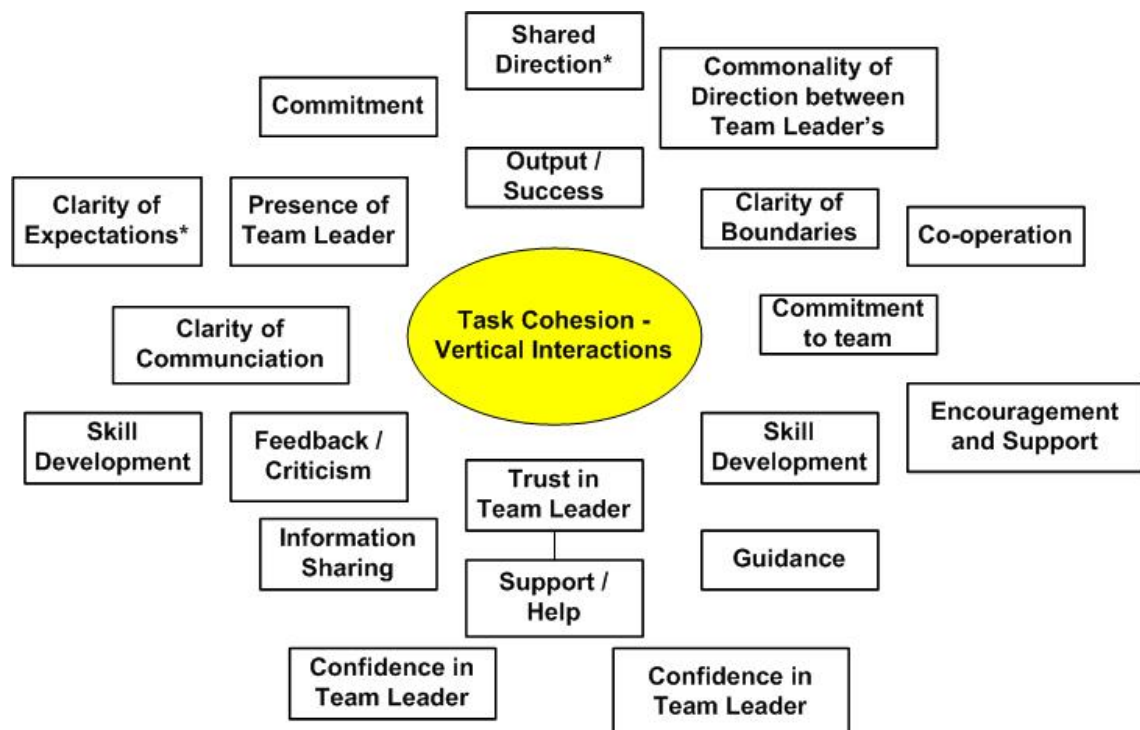


Figure F3: Themes clustered by social cohesion – horizontal interactions

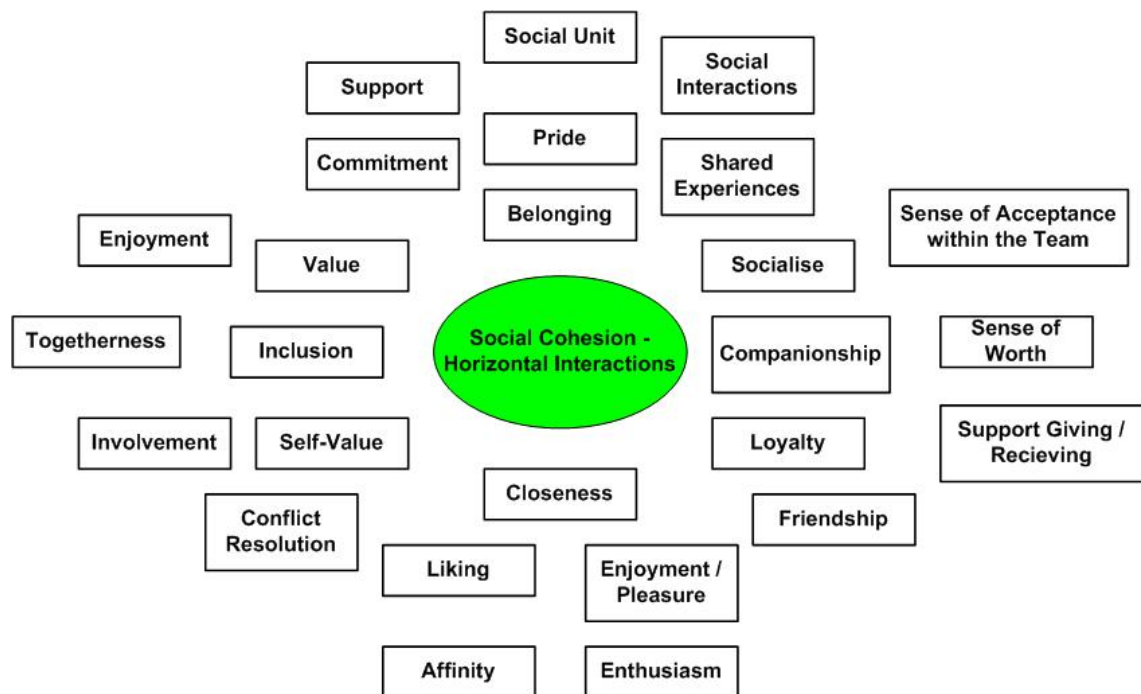


Figure F4: Themes clustered by social cohesion – vertical interactions

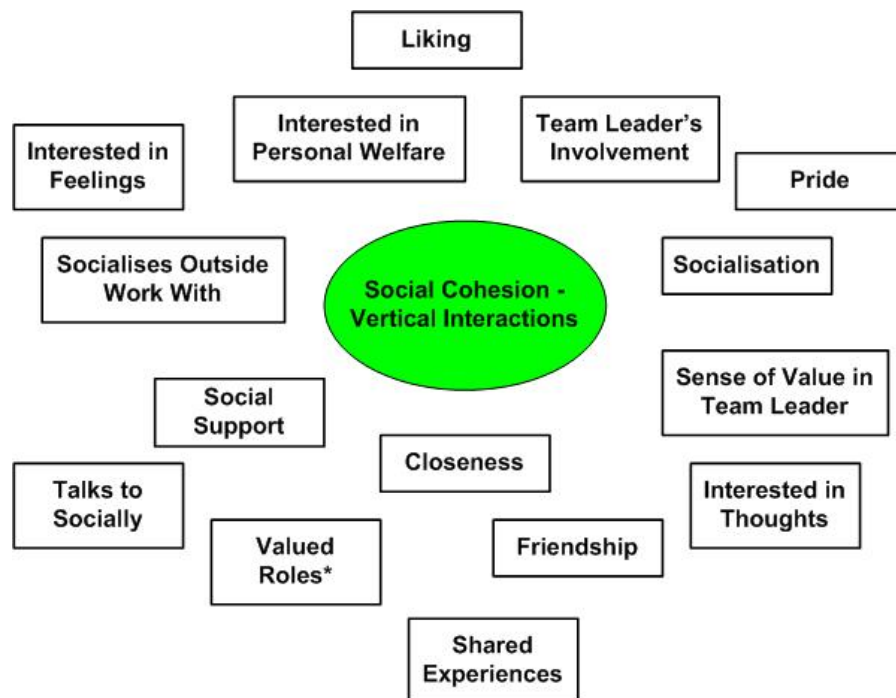


Figure F5: Themes clustered by unity of purpose – horizontal interactions

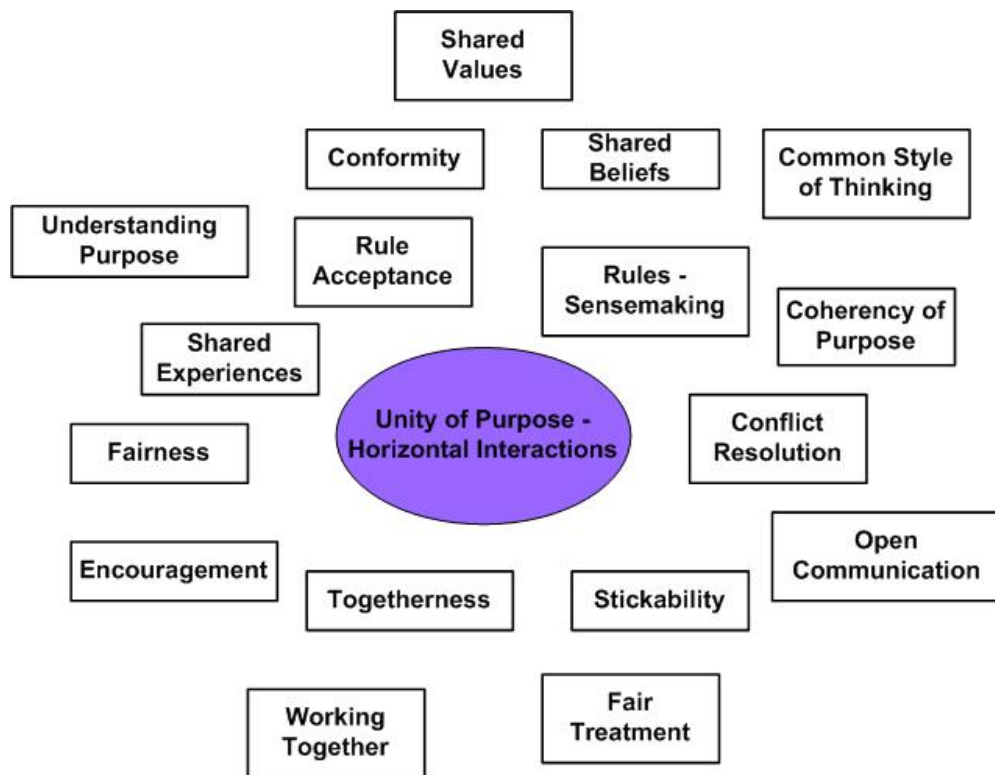


Figure F6: Themes clustered by unity of purpose – vertical interactions

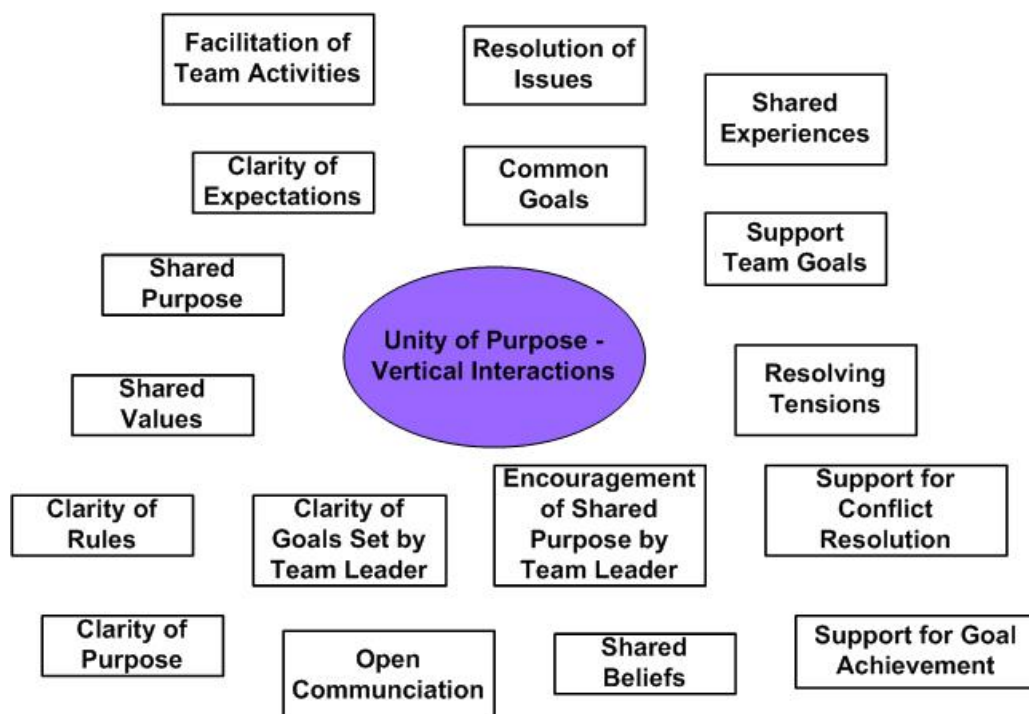


Figure F7: Themes clustered by valued roles – horizontal interactions

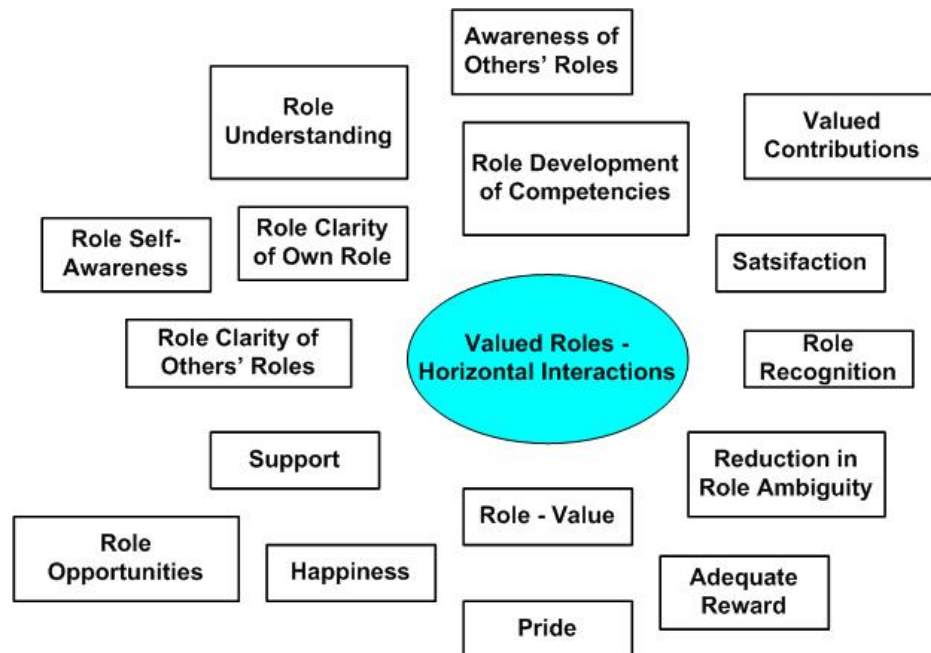
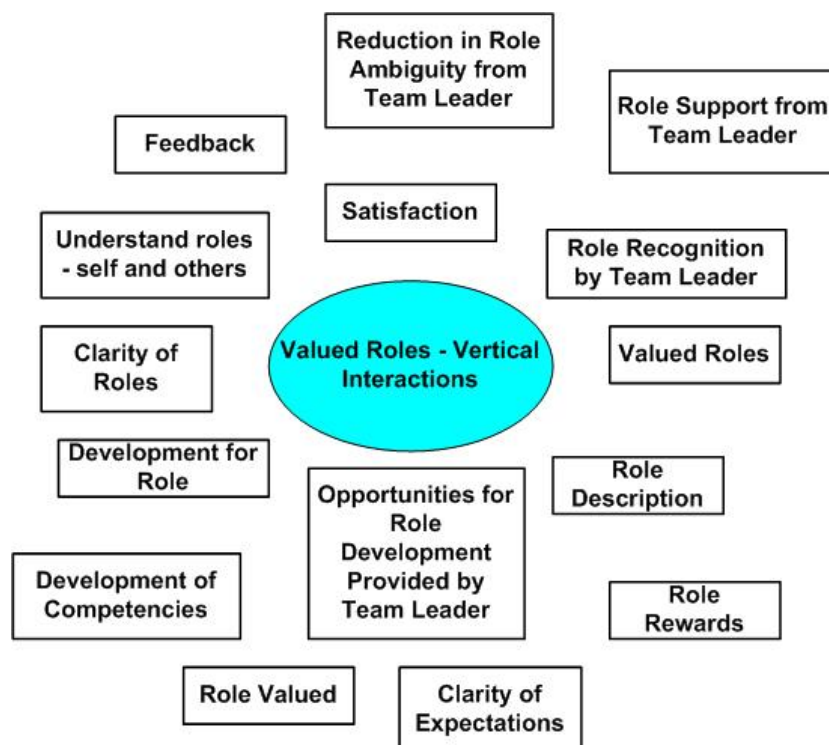


Figure F8: Themes clustered by valued roles – vertical interactions



Appendix G

Categorisation of underlying themes based on item form. Item numbers correspond to item numbers in the content validity phase version of the MTCS presented in Annex D. Items appearing as bold in the tables are those that could be categorised under more than one category.

Figure G1: Categorisation of items written for task cohesion – horizontal interactions.

	Individual Tasks	Commitment to Tasks	Team Tasks
Individuals' View	1-5, 30	7, 9, 10, 14,	6, 8, 12, 13,
Individuals' View of the Team's View	17, 18, 20, 21, 28, 29	15, 16, 23, 24,	19, 22, 25-27, 28, 29

Items that could not be categorised, requiring further inspection:

Item 11: I have confidence in the equipment and technology that supports us.

Figure G2: Categorisation of items written for task cohesion – vertical interactions.

	Team Leader's Task Role	Team Leader's Supportive Role
Individuals' View	31-34, 38, 40, 44,	35-37, 41, 43, 45, 46,
Individuals' View of the Team's View	48 , 53-55, 57, 58	47-52, 56, 58 ,

Items that could not be categorised, requiring further inspection:

Item 39: There are clear boundaries between my superior and team members.

Item 42: My immediate superiors do not share a common direction.

Figure G3: Categorisation of items written for social cohesion – horizontal interactions.

	Friendship	Social Unit	Enjoyment	Pride	Involvement	Self-Valued	Support	Togetherness
Individuals' View	59, 92	60, 63, 65, 81	61, 62, 64, 67, 73, 84	70, 76, 77	66, 68, 69,	71, 72, 78,	74, 75, 80,	79
Individuals' View of the Team's View	82	83, 86, 87, 94	85,	96			91,	88-90, 93, 95

Figure G4: Categorisation of items written for social cohesion – vertical interactions.

	Superior's Support	Superior's Involvement	Superior's Social Involvement	Pride in and Closeness with Superior	Superior as Role Model
Individuals' View	105-107	98-100, 103	101, 102, 108, 109	104, 110	97
Individuals' View of the Team's View	112, 119, 121	115, 117, 118, 122, 124	113, 114, 120	116, 123	111

Figure G5: Categorisation of items written for valued roles – horizontal interactions.

	Role Satisfaction	Role Support	Clarity of Role Expectations	Pride in Role	Role Development
Individuals' View	125, 133, 134, 136	126	127, 138	128	129-132, 135, 137
Individuals' View of the Team's View	139, 146, 147	140, 149	141, 142, 144, 145	143	148, 150, 151

Figure G6: Categorisation of items written for valued roles – vertical interactions.

	Role Support	Clarity of Role	Reward and Satisfaction from Role	Valued Role	Role Development
Individuals' View	152	153-159	160	161, 163	162, 164, 165
Individuals' View of the Team's View	166, 167	168-172	173	174, 176	175, 177, 178

Figure G7: Categorisation of items written for unity of purpose – horizontal interactions.

	Shared Beliefs	Understanding Purpose	Fairness	Coherency
Individuals' View	179, 180, 184	181, 183, 185, 187, 188	182	186
Individuals' View of the Team's View	189, 190	191-193	198	194-197, 199

Figure G8: Categorisation of items written for unity of purpose – vertical interactions.

	Clarity of Purpose	Shared Purpose	Shared Experience	Shared Values	Facilitation	Resolution
Individuals' View	200	201		203, 204	205, 207	206
Individuals' View of the Team's View	208	201 , 209, 214, 218	213	210, 211	212, 215, 219	202, 216, 217

Appendix H:
Items modified following the second content validity phase

DIMENSION	ORIGINAL ITEM	MODIFIED ITEM	ORIGINAL SOURCE	REASON FOR MODIFICATION
Team Cohesion – Horizontal Interactions	The team provides me with good opportunities to improve my skills.	The team provides me with good opportunities to improve my existing skills.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) – tapping ‘individual Attractions to the Group – Task.	To clarify the meaning of the item to ‘existing skills’ as opposes to just ‘skills’.
	I do not feel that my peers in the team adequately support me in achieving my tasks.	I do not feel that my team members adequately support me in achieving my tasks.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	‘Peers’ changed to ‘team members’ to reflect the lexicon of the intended population.
	I value the other members in the team.	I value the roles of other team members.	New item written at item writing stage.	Reworded to be more specific and moved to ‘Valued Roles – Horizontal Interactions.
	I am strongly committed to the mission of the team.	I share a similar commitment to the overall objective of the team as other team members.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) – taps ‘Identification with mission and ultimate purpose’.	Re-written to remove the ambiguous term of ‘mission’ and moved to ‘Unity of Purpose – Horizontal Interactions’.
	My peers do not help me develop	My team members do not	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984). New item written at item	‘Peers’ changed to ‘team

Team Cohesion – Vertical Interactions	new skills within the team.	help me develop new skills.	writing stage.	members' to reflect the lexicon of the intended population. Re-written for clarity.
	Members of the team do not share the same levels of commitment in conducting the task of the team.	Members of the team do not share the same levels of commitment in conducting the team's tasks.	The Team Cohesion (TC) Scale (Carless & De Paola, 2000).	
	Team members are not receptive to feedback and criticism from peers.	Team members are not receptive to feedback from team members.	New item written at item writing stage.	Re-written for clarity and due to the item being double-barrelled.
	I am receptive to feedback and criticism from my immediate superior.	I am receptive to feedback from my team leader.	New item written at item writing stage.	Re-written for clarity and due to the item being double-barrelled. 'Immediate superior' was also replaced with 'team leader' to ensure the right lexicon was used.
	I am confident in my immediate superior's ability to do their job	I am confident in my team leader's ability to do their job.	New item written at item writing stage	'Immediate superior' was replaced with 'team leader' to ensure the right lexicon was used for the intended population.
	I do not feel my immediate superior helps me to develop my skills within the team.	I do not feel my team leader helps me to develop my skills within the team.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	'Immediate superior' was replaced with 'team leader' to ensure the right lexicon was used for the intended population.
	I do not feel that my superior provides me with adequate guidance in my tasks.	I do not feel that my team leader provides me with adequate guidance in my tasks.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	'Immediate superior' was replaced with 'team leader' to ensure the right lexicon was used for the intended population.
	My superior freely shares information with me to support my tasks.	My team leader supports me in my tasks through sharing information.	The Physical Activity Group Environment Questionnaire (PAGEQ)	Re-worded to be similar to the task cohesion – horizontal interactions

My superior does not provide me with encouragement in my tasks.	My team leader does not provide me with encouragement in my tasks.	(Estabrooks & Carron, 2000) – tapping ‘Group Integration – Task’.	version.
Team members are receptive to feedback from our immediate superior.	Team members are receptive to feedback from the team leader.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	‘Immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon was used for the intended population.
Team members do not value the feedback provided by our immediate superior.	Team members are not receptive to feedback provided by the team leader.	New item written at item writing stage	‘Immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon was used for the intended population.
Team members are unhappy with the guidance provided by our superior.	Team members are not receptive to feedback provided by the team leader.	New item written at item writing stage	Re-written for clarity and ‘immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon was used for the intended population.
Team members are content with the level of encouragement provided by our superior in completing our tasks.	Team members are unhappy with the guidance provided by the team leader.	New item written at item writing stage	‘Immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon was used for the intended population.
My immediate superior is not committed to the long term success of the team.	Team members are content with the level of encouragement provided by the team leader in completing tasks.	New item written at item writing stage	Re-written for clarity and ‘immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon was used for the intended population.
My immediate superior is critical to	My team leader is not committed to the long term success of the team.	The Coaching Staff Cohesion Scale (Martin, 2002).	‘Immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon was used for the intended population.
	My team leader is	The Coaching Staff	‘Immediate superior’ was

Social Cohesion – Horizontal Interactions	the success of the team.	important to the success of the team.	Cohesion Scale (Martin, 2002).	replaced with 'team leader' to ensure the right lexicon was used for the intended population.
	Team members believe that our superior is committed to the long-term success of the team.	Team members believe that the team leader is committed to the long-term success of the team.	New item written at item writing stage	'Immediate superior' was replaced with 'team leader' to ensure the right lexicon was used for the intended population.
	Team members do not feel that our superior is critical to the success of the team.	Team members do not feel that the team leader is important to the success of the team.	The Coaching Staff Cohesion Scale (Martin, 2002).	'Immediate superior' was replaced with 'team leader' to ensure the right lexicon was used for the intended population. The term 'critical' was also replaced with 'important'.
	My peers make me feel an accepted member of the team.	My team members make me feel an accepted member of the team.	The Coaching Staff Cohesion Scale (Martin, 2002).	The term 'peers' was replaced with 'team members' to ensure the right lexicon is used for the intended population.
			Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	
	I feel I can go to most of the members of my team when I have a personal problem.	I feel I can go to most members of my team when I need personal support.	Measure of Military Unit Cohesion (Griffith, 1988) – tapping 'Unit Social Climate' dimension, Factor 2: Instrumental and Affective Support.	Re-written for clarity.
	I am good friends with my peers in the team.	I am good friends with my fellow team members.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) – taps 'Friendliness'. The Physical Activity	The term 'peers' was replaced with 'team members' to ensure the right lexicon is used for the intended population.

Social Cohesion – Vertical Interactions	I enjoy my social interactions within this team.	I do not enjoy socialising with members of the team.	Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) – tapping ‘Individual Attractions to the Group – Social’.	
			The Team Cohesion (TC) Scale (Carless & De Paola, 2000).	
			Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	
			The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) – tapping ‘Individual Attractions to the Group – Social’.	Re-written for clarity.
	My immediate superior does not take an interest in my personal welfare.	My team leader does not take an interest in my personal welfare.	Measure of Military Unit Cohesion (Griffith, 1988) – tapping ‘Concerned Leadership’ dimension, Factor 1: Leader Concern for Soldiers.	The term ‘immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon is used for the intended population.
	My immediate superior is not interested in the way I feel about things.	My team leader is not interested in the way I feel about things.	Measure of Military Unit Cohesion (Griffith, 1988) – tapping ‘Concerned Leadership’ dimension, Factor 1: Leader Concern for Soldiers.	The term ‘immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon is used for the intended population.
	I feel close to my immediate superior.	I feel close to my team leader.	New item written at item writing stage	The term ‘immediate superior’ was replaced with ‘team leader’ to ensure the right lexicon is used for the

My immediate superior looks out for me.	My team leader looks out for me.	New item written at item writing stage	intended population. The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
I do not feel that my superior is there for me when I need advice.	I do not feel that my team leader is there for me when I need advice	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
I am friends with my immediate superior.	I am friends with my team leader.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
I do not enjoy socialising with my immediate superior.	I do not enjoy socialising with my team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
I am proud to be working with my immediate superior.	I am proud to be working with my team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Our immediate superior is not interested in the personal welfare of team members.	Our team leader is not interested in the personal welfare of team members.	Measure of Military Unit Cohesion (Griffith, 1988) – tapping 'Concerned Leadership' dimension, Factor 1: Leader Concern for Soldiers.	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Team members do not get on socially with our immediate superior.	Team members do not get on socially with our team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the

Team members do not feel close to our superior.	Team members do not feel close to our team leader.	New item written at item writing stage	intended population. The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Our immediate superior goes out of his way to help team members to feel happy within the team.	Our team leader tries to help team members feel happy within the team	New item written at item writing stage	Re-written for clarity and the term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Team members do not feel that our immediate superior looks out for them.	Team members do not feel that our team leader looks out for them.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Our immediate superior does not provide team members with advice when they need it.	Our team leader does not provide team members with advice when they need it.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Team members are friends with our immediate superior.	Team members are friends with our team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Our immediate superior takes an interest in the way team members feel about things.	Our team leader takes an interest in the way team members feel about things.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Team members are proud to be working with our immediate superior.	Team members are proud to be working with our team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the

Valued Roles – Horizontal Interactions	My peers within the team support me in my role.	I value the support my team members give me in my role.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	intended population. Re-worded for clarity and the term 'peers' was replaced with 'team member' to ensure the right lexicon is used for the intended population. Re-worded for clarity.
	I am proud to be conducting my role within the team. I do not feel I am adequately rewarded for my contributions to the team.	I am proud of my role within the team. I do not feel that my contributions to the team are adequately recognised.	New item written at item writing stage Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	Re-worded for clarity – 'rewarded was replaced with 'recognised'.
	Members of the team generally seem as though they receive sufficient support in their role.	Team members value the support they receive in their role from other team members.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	Reworded to be more specific and related to 'roles support'.
	Team members do not feel adequately rewarded for their contribution to the team.	Team members do not feel adequately recognised for their contribution to the team.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	Re-worded for clarity – 'rewarded was replaced with 'recognised'.
Valued Roles – Vertical Interactions	I do not feel that my immediate superior adequately supports me in my role.	I do not feel that my team leader values my role.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
	My immediate superior adequately rewards me for my contribution to the team.	My team leader does not adequately recognise my contribution to the team.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	Re-worded for clarity – 'rewarded was replaced with 'recognised'. The term 'immediate superior' was also replaced with 'team leader' to ensure the right lexicon is used for the intended population.
	Our immediate superior adequately rewards team members for their	Our team leader adequately recognises	Multidimensional Sport Cohesion Instrument	Re-worded for clarity – 'rewarded was replaced

Unity of Purpose – Horizontal Interactions	contribution to the team.	team members' contributions to the team.	(MSCI) (Yukelson et al., 1984).	with 'recognised'. The term 'immediate superior' was also replaced with 'team leader' to ensure the right lexicon is used for the intended population.
	My immediate superior values team members' roles within the team.	Our team leader values team members' roles within the team.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
	I share similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) as my team members.	I share similar opinions about people or ideas, whether positive or negative, as other team members.	New item written at item writing stage	Re-written for clarity.
	I do not share similar same values (i.e. similar fundamental principles) as my team members. The rules in the team do not make good sense to me.	My values of what is important in life are similar to other team members. The rules of the team do not make sense to me.	New item written at item writing stage	Re-written for clarity.
			Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) – taps 'Acceptance of the base community normative order'.	Slightly re-phrased for better wording.
	I clearly understand the goals of the team.	I have a shared understanding of the goals of the team as other team members.	New item written at item writing stage	Re-phrased based on advice from SME's.
	I enjoy the opportunity to share experiences with the others in the team.	I enjoy the opportunity to work with other team members.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) – tapping 'Individual Attractions to the Group –	Re-worded for clarity.

		Social'. The Group Attitude Scale (Evans et al., 1986) – tapping 'Attraction'. The Cohesiveness Questionnaire (Gruber & Gray, 1981) – tapping 'Affiliation Cohesion'. Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	
I have shared similar experiences with others in the team. I do not feel that the team works together to achieve the goals of the team.	I have similar experiences to others in the team. I do not feel that the team work well together to achieve the goals of the team under easy conditions.	New item written at item writing stage New item written at item writing stage	Re-worded for clarity. Re-worded for clarity and to be more specific.
I feel that the team sticks together in pursuit of its goals despite any tensions that arise within the team.	I feel that the team work well together to achieve the goals of the team under difficult conditions.	The Coaching Staff Cohesion Scale (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	Re-phrased based on SME comments.
Members of the team share similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) as one another.	Members of the team share similar opinions about people or ideas, whether positive or negative, as one another.	The Physical Activity Group Environment Questionnaire (PAGEQ) (Estabrooks & Carron, 2000) – tapping 'Group Integration – Task'.	Re-worded for clarity.
Members of the team share similar values (i.e. similar fundamental principles) as one another. Members of the team have shared	Team members' values of what is important in life are similar to one another. Members of the team have	New item written at item writing stage New item written at item	Re-worded for clarity. Re-worded for clarity.

Unity of Purpose – Vertical Interactions	similar experiences.	similar experiences to one another.	writing stage	
	Members of the team work well together to achieve the goals of the team.	Members of the team work well together to achieve the goals of the team under easy conditions.	Team Cohesion (Scale) (Carless, & De Paola, 2000).	Re-worded for clarity and to be more specific.
	The rules in the team do not make sense to team members.	The rules of the team do not make sense to team members.	New item written at item writing stage	Re-worded slightly.
	Team members generally agree on what to do to reach our team goals.	Team members generally agree on what to do to reach team goals.	The Coaching Staff Cohesion Scale (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	Re-worded slightly
	I feel that my immediate superior treats people fairly.	I feel that my team leader treats people fairly.	Measure of Base Cohesion / MFI Base Cohesion Scale (McClure & Broughton, 2000) – taps 'Acceptance of the base community normative order'.	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
	My immediate superior sets me clear goals to work towards.	My team leader sets me clear goals to work towards.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
	My immediate superior does not instil a sense of shared purpose within the team.	My team leader does not instil a sense of shared purpose within the team.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
	I do not share my experiences with my immediate superior.	I do not share my work experiences with my team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the

I have shared similar experiences with my immediate superior.	I have similar experiences to my team leader.	New item written at item writing stage	right lexicon is used for the intended population. The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population. Also reworded for clarity.
I share similar values (i.e. similar fundamental principles) with my immediate superior.	My values of what is important in life are similar to those of my team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population. Also reworded for clarity.
I do not share similar beliefs (for example, sharing the same opinions about people or ideas whether positive or negative) with my immediate superior.	I do not share similar opinions about people or ideas, whether positive or negative, with my team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population. Also reworded for clarity.
My immediate superior helps to resolve any tensions that arise in the team to ensure it sticks together in pursuit of its goals.	My team leader helps the team to work well together to achieve the goals of the team under difficult conditions.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population. Also reworded for clarity.
My immediate superior encourages me to express my opinions within the team.	My team leader encourages me to express my opinions within the team.	The Coaching Staff Cohesion Scale (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
My immediate superior does not share the same goals as the team.	My team leader does not share the same goals as the team members.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the

My immediate superior does not set clear rules within the team.	My team leader does not set clear rules for the team.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	right lexicon is used for the intended population. The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Our immediate superior shares similar beliefs (for example, sharing the same opinions about people of ideas whether positive or negative) as members of the team.	Our team leader shares similar opinions about people or ideas, whether positive or negative, as members of the team.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population. Also reworded for clarity.
Our immediate superior shares similar values (i.e. similar fundamental principles) as members of the team.	Team members' values of what is important in life are similar to those of the team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population. Also reworded for clarity.
Our immediate superior does not set clear goals for the team to work towards.	Our team leader does not set clear goals for the team to work towards.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Team members regularly share their experiences with our superior.	Team members regularly share their work experiences with the team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Team members have shared similar experiences with our immediate superior.	Team members have similar experiences with the team leader.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population. Also reworded for clarity.
Team members feel that our	Team members feel that	The Coaching Staff	Also reworded for clarity.

immediate superior helps to resolve any tensions that arise in the team to ensure it sticks together in pursuit of its goals.	the team leader helps the team work well together to achieve its goals under difficult conditions.	Cohesion Scale (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	
Team members do not feel that our immediate superior encourages them to express their opinions within the team.	Team members do not feel that the team leader encourages them to express their opinions within the team.	The Coaching Staff Cohesion Scale (Martin, 2002). Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Team members feel that our immediate superior shares the same goals as the team.	Team members feel that the team leader shares the same goals as the team.	New item written at item writing stage	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.
Team members feel that our immediate superior sets clear rules within the team.	Team members feel that the team leader sets clear rules for the team.	Multidimensional Sport Cohesion Instrument (MSCI) (Yukelson et al., 1984).	The term 'immediate superior' was replaced with 'team leader' to ensure the right lexicon is used for the intended population.

Appendix I:

List of new items suggested by Subject Matter Experts (SMEs) during the second content validity phase to be included in the MTCS

DIMENSION	NEW ITEM
Task Cohesion – Vertical Interactions	Team members feel that the team leader supports them through sharing information.
Social Cohesion – Horizontal Interactions	Team members feel that the team leader helps them to develop their skills within the team. I feel I can offer personal support to team members when it is needed.
Social Cohesion - Vertical Interactions	My team leader goes out of their way to make me feel happy within the team.
Valued Roles - Horizontal Interactions	Members of the team do not support each other in their role.
Valued Roles - Vertical Interactions	I value the support my team leader gives me in my role. Team members value the support that our team leader gives them in their role. I value the role of my team leader. Team members do not value the role of our team leader.
Unity of Purpose - Horizontal Interactions	No new items written for this dimension
Unity of Purpose - Vertical Interactions	My team leader helps the team to work well together to achieve the goals of the team under easy conditions. Team members feel that the team leader helps the team work well together to achieve its goals under easy conditions. Team members do not feel that the team leader treats people fairly.

Appendix J:
Pilot version of the MTCS

Instructions

Please read the instructions below carefully before completing the questionnaire.

Purpose:









This questionnaire seeks to develop an understanding of how well your team works together.

Contents:

The questionnaire contains FOUR sections.

- Section one:** Background and About Your Team.
Section two: The Individual – relating to how well you and your fellow team members get on with each other
Section three: The Team – relating to how well you feel your team members get on with each other
Section four: The Team Leader – relating to how well you and your fellow team members get on with the team leader
If you are the team leader, please answer the questions about your own immediate team leader

Please respond to all items within the questionnaire as honestly as possible, rating your level of agreement or disagreement along the scale below, for example:

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
							

If you do not know the answer to any of the items then please check the 'Don't Know' box at the end of the scale.

Please read each item carefully and provide your first thoughts and strength of feeling. There are no right or wrong answers.

Please complete the questionnaire for the team you CURRENTLY work in for the majority of your time, i.e. for the team members and team leader you work with on a regular basis.

The questionnaire should take no longer than 30 minutes to complete.

Confidentiality:

All answers to the questionnaire will be made anonymous and treated in the strictest confidence. Answers to the questionnaire will not be used to assess your performance or the performance of your team members or team leader.

Section 1: Background & About Your Team

Background:

1. What is your current job category?

- | | | | |
|---------------------|-----------------------|------------------------|-----------------------|
| Accountancy | <input type="radio"/> | Human Resources | <input type="radio"/> |
| Admin / Secretarial | <input type="radio"/> | Legal | <input type="radio"/> |
| Armed Forces | <input type="radio"/> | Managerial | <input type="radio"/> |
| Automotive | <input type="radio"/> | Manufacturing | <input type="radio"/> |
| Building Industry | <input type="radio"/> | Marketing & PR | <input type="radio"/> |
| Education | <input type="radio"/> | Public Sector | <input type="radio"/> |
| Engineering | <input type="radio"/> | Retail | <input type="radio"/> |
| Finance & Banking | <input type="radio"/> | Sales | <input type="radio"/> |
| Government | <input type="radio"/> | Scientific & Technical | <input type="radio"/> |
| Health | <input type="radio"/> | Other | <input type="radio"/> |

2. How many years experience do you have in your current job role?

0-5 yrs ☐ 6-10 yrs ☐ 11-15 yrs ☐ 16-20 yrs ☐ 21 + yrs ☐

3. Are you male or female?

Male ☐ Female ☐

4. What is your current age?

16-20 yrs ☐ 21-30 yrs ☐ 31-40 yrs ☐
41-50 yrs ☐ 51-60 yrs ☐ 61 yrs or over ☐

About Your Team (i.e. the team with which you spend the majority of your time):

1. How long have you been a member of your current team?

Years Months

2. How many members are in your current team?

3. What position do you hold within your current team?









































Team Member ☐ Team Leader ☐

Section 2: The Individual

Please read the following items carefully and rate your level of agreement or disagreement based on how well you feel you get on in within the team. Please answer the items for the SAME team.

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
1	I am content with the tasks that I do within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	I feel a part of what happens in the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	My values of what is important in life are similar to other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	I share a similar commitment to the overall objective of the team as other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	I do not share the same way of thinking as my fellow team members about how to achieve the goals of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	The rules of the team do not make sense to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	I do not feel a sense of belonging to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	I am enthusiastic about the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	I do not feel that I am encouraged to express my opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	I am not proud of my team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	I do not feel that my contributions to the team are adequately recognised.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	I feel that the team work well together to achieve the goals of the team under difficult conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
13	I do not enjoy socialising with members of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14	I share the same levels of commitment in conducting the team's tasks as my fellow team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15	I feel that the other members of the team value my role within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16	I have a shared understanding of the goals of the team as other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17	I value the roles of other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18	My team members do not help me develop new skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19	The team provides me with good opportunities to improve my existing skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20	I am proud to be part of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21	I share similar opinions about people or ideas, whether positive or negative, as other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22	I enjoy the opportunity to work with other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23	The social contact that I have in the team is important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24	I am good friends with my fellow team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25	I value the support my team members give me in my role.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26	I do not like being part of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27	I do not feel that the team work well together to achieve the goals of the team under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28	My team members make me feel an accepted member of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29	I am proud of my role within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
30	I do not feel that my team members adequately support me in achieving my tasks.								
31	I have similar experiences to others in the team.								
32	I feel I can go to most members of my team when I need personal support.								
33	I am unhappy with my role in the team.								
34	I feel I can offer personal support to team members when it is needed.								

Section 3: The Team

Please read the following items carefully and rate your level of agreement or disagreement based on how well your team members get on with one another. Please answer the items for the SAME team.

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
35	Members of the team do not enjoy the tasks conducted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36	Team members are proud of their roles within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37	We are all good friends in this team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38	Members of the team work well together to achieve the goals of the team under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39	Team members' values of what is important in life are similar to one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40	Members of the team feel very close to one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
41	Members of the team do not share the same levels of commitment in conducting the team's tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42	Team members value the support they receive in their role from other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43	Team members generally agree on what to do to reach team goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44	Team members enjoy each others company.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45	We help each other develop new skills within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
46	Team members do not value each other's role within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
47	The rules of the team do not make sense to team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
48	Team members do not feel adequately recognised for their contribution to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
49	Members of the team help each other in their tasks through sharing information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
50	Members of the team do not support each other in their role.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
51	Team members share the same way of thinking about how to achieve the goals of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
52	Members of the team share similar opinions about people or ideas, whether positive or negative, as one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
53	Team members provide each other with encouragement in completing their tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
54	Members of the team regularly share their experiences with one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
55	Team members do not encourage one another to express their opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
56	Members of the team do not look out for each other.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
57	Team members are not receptive to feedback from team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
58	Members of the team have similar experiences to one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
59	Members of the team are happy with their roles.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
60	Members of the team work well together to achieve the goals of the team under difficult conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
61	Team members are not proud to be part of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
62	There is not a sense of shared purpose within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
63	Members of the team do not see the team as an important social unit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

































































































































		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
64	Team members do not have a shared understanding of the goals of the team.								

Section 4: The Team Leader

Please read the following items carefully and rate your level of agreement or disagreement based on how well you feel you and your fellow team members get on with the team leader. Please answer the items for the SAME team.

PART A

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
65	I am friends with my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
66	My team leader does not adequately recognise my contribution to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
67	I value the role of my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
68	I am receptive to feedback from my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
69	My team leader is not interested in the way I feel about things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
70	I do not enjoy socialising with my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
71	I do not feel that my team leader provides me with adequate guidance in my tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
72	My team leader looks out for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
73	My team leader sets me clear goals to work towards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
74	My team leader encourages me to express my opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
75	I feel close to my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
76	I am confident in my team leader's ability to do their job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know

77	My team leader is important to the success of the team.								
78	My values of what is important in life are similar to those of my team leader.								
79	I feel that my team leader treats people fairly.								
80	I do not feel that my team leader is there for me when I need advice.								
81	I value the support my team leader gives me in my role.								
82	I do not feel my team leader helps me to develop my skills within the team.								
83	My team leader supports me in my tasks through sharing information.								
84	My team leader goes out of their way to make me feel happy within the team.								
85	I do not feel that my team leader values my role.								
86	My team leader does not provide me with encouragement in my tasks.								
87	I do not share my work experiences with my team leader.								
88	My team leader is not committed to the long term success of the team.								
89	I am proud to be working with my team leader.								
90	I have similar experiences to my team leader.								
91	My team leader does not take an interest in my personal welfare.								
92	I do not share similar opinions about people or ideas, whether positive or negative, with my team leader.								

PART B

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
93	Team members feel that the team leader helps them to develop their skills within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
94	Team members feel that the team leader sets clear rules for the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
95	Team members do not get on socially with our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
96	Our team leader does not provide team members with advice when they need it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
97	My team leader does not set clear rules for the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
98	Team members feel that the team leader helps the team work well together to achieve its goals under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
99	Team members do not feel close to our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
100	Our team leader values team members' roles within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
101	Team members are proud to be working with our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
102	Our team leader takes an interest in the way team members feel about things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
103	Our team leader shares similar opinions about people or ideas, whether positive or negative, as members of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
104	Team members do not feel that the team leader treats people fairly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
105	Team members are receptive to feedback from the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
106	Our team leader adequately recognises team members' contributions to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
107	Team members regularly share their work experiences with the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
108	Team members are not receptive to feedback provided by the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
109	Team members have similar experiences with the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
110	My team leader does not share the same goals as the team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
111	Team members feel that the team leader shares the same goals as the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
112	Our team leader tries to help team members feel happy within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
113	Team members do not value the role of our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
114	Team members do not feel that the team leader is important to the success of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
115	Team members feel that the team leader supports them through sharing information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
116	Team members are unhappy with the guidance provided by the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
117	Team members are friends with our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
118	My team leader helps the team to work well together to achieve the goals of the team under difficult conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
119	Team members do not feel that the team leader encourages them to express their opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
120	Our team leader is not interested in the personal welfare of team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
121	Team members are content with the level of encouragement provided by the team leader in completing tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	Don't Know
122	Team members feel that the team leader helps the team work well together to achieve its goals under difficult conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
123	Team members do not feel that our team leader looks out for them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
124	Our team leader does not set clear goals for the team to work towards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
125	My team leader helps the team to work well together to achieve the goals of the team under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
126	My team leader does not instil a sense of shared purpose within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
127	Team members value the support that our team leader gives them in their role.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
128	Team members believe that the team leader is committed to the long-term success of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
129	Team members' values of what is important in life are similar to those of the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Thank you for taking the time to complete this questionnaire.
All of your responses will be kept anonymous and strictly confidential**

Appendix K:
Email sent to subjects for the pilot phase

Dear all

The Multidimensional Team Cohesion Scale (MTCS)

I am currently studying a part-time PhD at the University of Leicester developing a measure of team cohesion. My research relies on obtaining a substantial number of responses to my questionnaire. Your assistance in giving your time to participate would be greatly appreciated.

Please find the questionnaire attached.

When you open the questionnaire, please click “Enable Macros” if prompted to activate it, otherwise the questionnaire will not work properly.

Please save the questionnaire to your computer. Once you have completed the questionnaire and saved your answers, please email the questionnaire back to:

hmsdavey@ginetiq.com

Or post to:

Hannah State-Davey
208 Alan Turing Building
Malvern Site

Unfortunately no cost code is available, and the questionnaire must therefore be completed in your own time. This will take approximately 15-20 minutes.

The success of this research is dependent on obtaining a large number of responses. Your help in achieving this would be very valuable to me.

Many thanks in advance.

Hannah State-Davey

Please note:

All data collected will be treated in the strictest confidence and anonymity of participants is guaranteed and responses will be reported as a collective response only. By submitting this questionnaire, you are agreeing that your data may be used as part of this research. Answers to the questionnaire will not be used to assess your performance or the performance of your team members or team leader. You are of course free to withdraw from this study at any time. If you would like any further information or feedback about this research please contact me using the following details:

hmsdavey@qinetiq.com

Appendix L

Table L1: Univariate statistics for pilot phase MTCS items

	N	Mean	Std. Deviation	Missing		No. of Extremes	
				Count	Percent	Low	High
Item1	204	5.9020	1.27507	0	.0	23	0
Item2	204	5.9510	1.41336	0	.0	21	0
Item3	195	5.7077	1.28901	9	4.4	6	0
Item4	203	5.9113	1.35779	1	.5	24	0
Item5	203	5.3350	1.60941	1	.5	38	0
Item6	203	6.0049	1.35522	1	.5	23	0
Item7	204	5.6520	1.64345	0	.0	35	0
Item8	204	5.9363	1.22005	0	.0	6	0
Item9	204	5.8284	1.53288	0	.0	27	0
Item10	202	5.9208	1.36176	2	1.0	24	0
Item11	201	5.3234	1.81656	3	1.5	28	0
Item12	202	6.0050	1.27157	2	1.0	22	0
Item13	202	5.5644	1.48234	2	1.0	12	0
Item14	203	5.7685	1.40035	1	.5	9	0
Item15	204	5.8284	1.26918	0	.0	23	0
Item16	200	5.9400	1.27062	4	2.0	23	0
Item17	204	6.2696	.95765	0	.0	11	0
Item18	204	5.2941	1.56997	0	.0	2	0
Item19	204	5.7402	1.49750	0	.0	16	0
Item20	204	6.0196	1.18679	0	.0	22	0
Item21	200	5.5150	1.27195	4	2.0	18	0
Item22	204	6.0588	1.00563	0	.0	13	0
Item23	204	5.4216	1.61237	0	.0	18	0
Item24	204	5.6471	1.26060	0	.0	14	0
Item25	204	5.9608	1.16112	0	.0	16	0
Item26	204	6.1078	1.25087	0	.0	15	0
Item27	204	5.9412	1.34877	0	.0	20	0
Item28	203	6.0837	1.06142	1	.5	16	0
Item29	204	6.0000	1.20753	0	.0	18	0
Item30	204	5.8775	1.23164	0	.0	19	0
Item31	201	4.9403	1.62370	3	1.5	5	0
Item32	202	5.0743	1.75330	2	1.0	5	0
Item33	204	5.8333	1.36878	0	.0	30	0
Item34	203	5.6798	1.35374	1	.5	13	0
Item35	200	5.3900	1.31398	4	2.0	32	0
Item36	198	5.6919	1.16246	6	2.9	13	0
Item37	204	5.6618	1.33476	0	.0	9	0
Item38	201	5.9502	1.23187	3	1.5	20	0
Item39	193	5.4249	1.22296	11	5.4	20	0
Item40	200	5.1150	1.52427	4	2.0	3	0

Item41	202	5.3564	1.71377	2	1.0	39	1
Item42	200	5.8900	1.04082	4	2.0	16	0
Item43	204	5.5245	1.43989	0	.0	28	0
Item44	201	5.8308	1.03983	3	1.5	.	.
Item45	204	5.6176	1.35766	0	.0	9	0
Item46	202	5.9604	1.01158	2	1.0	14	0
Item47	197	5.9289	1.20586	7	3.4	23	0
Item48	201	5.3483	1.63343	3	1.5	40	0
Item49	202	5.9010	1.25785	2	1.0	9	0
Item50	204	5.9265	1.12275	0	.0	16	0
Item51	202	5.3416	1.46507	2	1.0	33	0
Item52	198	5.3838	1.28409	6	2.9	23	0
Item53	203	5.4778	1.47025	1	.5	27	0
Item54	202	5.7723	1.37049	2	1.0	22	0
Item55	203	5.9113	1.22758	1	.5	22	0
Item56	203	5.7094	1.45536	1	.5	13	0
Item57	201	5.8557	1.09274	3	1.5	19	0
Item58	200	5.1300	1.57656	4	2.0	3	0
Item59	199	5.5879	1.28749	5	2.5	19	0
Item60	203	5.8966	1.31787	1	.5	27	0
Item61	198	5.3586	1.70925	6	2.9	31	0
Item62	202	5.2327	1.90582	2	1.0	0	0
Item63	198	5.0606	1.72658	6	2.9	4	0
Item64	199	5.6432	1.49015	5	2.5	15	0
Item65	193	5.0777	1.57757	11	5.4	5	0
Item66	197	5.4061	1.56086	7	3.4	31	0
Item67	196	5.4643	1.68363	8	3.9	20	0
Item68	195	6.0923	1.09436	9	4.4	9	0
Item69	197	5.2437	1.79328	7	3.4	28	0
Item70	194	5.2320	1.60724	10	4.9	4	0
Item71	195	5.1538	1.75185	9	4.4	7	0
Item72	197	5.1980	1.66181	7	3.4	4	0
Item73	198	5.4091	1.70973	6	2.9	21	0
Item74	197	5.5736	1.56522	7	3.4	14	0
Item75	195	4.6000	1.78019	9	4.4	0	0
Item76	196	5.7245	1.60946	8	3.9	33	0
Item77	197	5.5381	1.73347	7	3.4	25	0
Item78	183	5.0328	1.60665	21	10.3	6	0
Item79	195	5.6205	1.57611	9	4.4	16	0
Item80	194	5.0773	1.77174	10	4.9	5	0
Item81	196	5.5000	1.50043	8	3.9	15	0
Item82	195	5.2103	1.67514	9	4.4	4	0
Item83	196	5.3827	1.62086	8	3.9	18	0
Item84	195	4.6410	1.73632	9	4.4	0	0
Item85	195	5.5385	1.55063	9	4.4	26	0
Item86	197	5.4569	1.50997	7	3.4	26	0
Item87	195	5.6718	1.51453	9	4.4	17	0

Item88	194	5.8814	1.48964	10	4.9	24	0
Item89	195	5.3077	1.66767	9	4.4	9	0
Item90	187	4.7219	1.81324	17	8.3	0	0
Item91	194	5.1134	1.63115	10	4.9	6	0
Item92	190	5.0263	1.66646	14	6.9	6	0
Item93	173	5.1272	1.53108	31	15.2	2	0
Item94	169	5.3609	1.63842	35	17.2	31	0
Item95	171	5.3450	1.56552	33	16.2	26	0
Item96	185	5.5189	1.44121	19	9.3	22	0
Item97	193	5.3679	1.69693	11	5.4	22	0
Item98	173	5.4509	1.61539	31	15.2	17	0
Item99	171	4.8480	1.68042	33	16.2	4	0
Item100	184	5.7446	1.26101	20	9.8	.	.
Item101	164	5.1890	1.52513	40	19.6	2	0
Item102	186	5.3656	1.50160	18	8.8	29	0
Item103	174	5.1839	1.39387	30	14.7	2	0
Item104	168	5.4881	1.63417	36	17.6	27	0
Item105	172	5.6919	1.13082	32	15.7	11	0
Item106	186	5.4785	1.38801	18	8.8	19	0
Item107	166	5.5482	1.26758	38	18.6	12	0
Item108	168	5.7321	1.10780	36	17.6	10	0
Item109	157	5.0191	1.40727	47	23.0	0	0
Item110	191	5.4241	1.53666	13	6.4	28	0
Item111	166	5.5602	1.28605	38	18.6	17	0
Item112	187	5.3422	1.49209	17	8.3	24	0
Item113	166	5.5482	1.39069	38	18.6	21	0
Item114	170	5.4353	1.70933	34	16.7	22	0
Item115	170	5.2471	1.64195	34	16.7	30	0
Item116	169	5.4142	1.58679	35	17.2	27	0
Item117	166	5.0904	1.57181	38	18.6	6	0
Item118	194	5.3763	1.58610	10	4.9	26	0
Item119	168	5.5238	1.45162	36	17.6	21	0
Item120	182	5.4835	1.51138	22	10.8	14	0
Item121	163	5.3558	1.46009	41	20.1	23	0
Item122	167	5.2754	1.54711	37	18.1	25	0
Item123	166	5.2952	1.53847	38	18.6	29	0
Item124	187	5.4278	1.63920	17	8.3	31	0
Item125	192	5.5312	1.50011	12	5.9	13	0
Item126	193	5.3161	1.79078	11	5.4	26	0
Item127	165	5.2667	1.48625	39	19.1	22	0
Item128	167	5.7365	1.48163	37	18.1	13	0
Item129	153	5.0392	1.37593	51	25.0	2	0
JobCat	204			0	.0		
YrsExp	204			0	.0		
Gender	204			0	.0		
Age	204			0	.0		
LengthofMemb	204			0	.0		

NumMemb	204	0	.0
Position	204	0	.0
Organization	204	0	.0

Total missing data **1503**

Total No. of Data Points **26316**

Percentage **5.71%**

Number of items with missing data: **106**

Percentage: **82.17%**

Table L2: Scale items in each unique common missing data pattern

Common				Item	Item
Unique Pattern				No.	
A	B	C	D		
x				3	My values of what is important in life are similar to other team members.
	x			65	I am friends with my team leader.
	x			66	My team leader does not adequately recognise my contribution to the team.
	x			67	I value the role of my team leader.
	x			68	I am receptive to feedback from my team leader.
	x			69	My team leader is not interested in the way I feel about things.
	x			70	I do not enjoy socialising with my team leader.
	x			71	I do not feel that my team leader provides me with adequate guidance in my tasks.
	x			72	My team leader looks out for me.
	x			73	My team leader sets me clear goals to work towards.
	x			74	My team leader encourages me to express my opinions within the team.
	x			75	I feel close to my team leader.
	x			76	I am confident in my team leader's ability to do their job.
	x			77	My team leader is important to the success of the team.
	x			78	My values of what is important in life are similar to those of my team leader.
	x			79	I feel that my team leader treats people fairly.
	x			80	I do not feel that my team leader is there for me when I need advice.
	x			81	I value the support my team leader gives me in my role.
	x			82	I do not feel my team leader helps me to develop my skills within the team.
	x			83	My team leader supports me in my tasks through sharing information.
	x			84	My team leader goes out of their way to make me feel happy within the team.
	x			85	I do not feel that my team leader values my role.
	x			86	My team leader does not provide me with encouragement in my tasks.
	x			87	I do not share my work experiences with my team leader.
	x			88	My team leader is not committed to the long term success of the team.
	x			89	I am proud to be working with my team leader.
	x			90	I have similar experiences to my team leader.
	x			91	My team leader does not take an interest in my personal welfare.
	x			92	I do not share similar opinions about people or ideas, whether positive or negative, with my team leader.
x	x	x		93	Team members feel that the team leader helps them to develop their skills within the team.
x	x	x		94	Team members feel that the team leader sets clear rules for the team.
x	x	x		95	Team members do not get on socially with our team leader.
		x	x	96	Our team leader does not provide team members with advice when they need it.
			x	97	My team leader does not set clear rules for the team.
x	x	x		98	Team members feel that the team leader helps the team work well together to achieve its goals under easy conditions.

x	x	x	99	Team members do not feel close to our team leader.
	x	x	100	Our team leader values team members' roles within the team.
x	x	x	101	Team members are proud to be working with our team leader.
	x	x	102	Our team leader takes an interest in the way team members feel about things.
	x	x	103	Our team leader shares similar opinions about people or ideas, whether positive or negative, as members of the team.
x	x	x	104	Team members do not feel that the team leader treats people fairly.
x	x	x	105	Team members are receptive to feedback from the team leader.
	x	x	106	Our team leader adequately recognises team members' contributions to the team.
x	x	x	107	Team members regularly share their work experiences with the team leader.
x	x	x	108	Team members are not receptive to feedback provided by the team leader.
x	x	x	109	Team members have similar experiences with the team leader.
		x	110	My team leader does not share the same goals as the team members.
x	x	x	111	Team members feel that the team leader shares the same goals as the team.
	x	x	112	Our team leader tries to help team members feel happy within the team.
x	x	x	113	Team members do not value the role of our team leader.
x	x	x	114	Team members do not feel that the team leader is important to the success of the team.
x	x	x	115	Team members feel that the team leader supports them through sharing information.
x	x	x	116	Team members are unhappy with the guidance provided by the team leader.
x	x	x	117	Team members are friends with our team leader.
		x	118	My team leader helps the team to work well together to achieve the goals of the team under difficult conditions.
x	x	x	119	Team members do not feel that the team leader encourages them to express their opinions within the team.
	x	x	120	Our team leader is not interested in the personal welfare of team members.
x	x	x	121	Team members are content with the level of encouragement provided by the team leader in completing tasks.
x	x	x	122	Team members feel that the team leader helps the team work well together to achieve its goals under difficult conditions.
x	x	x	123	Team members do not feel that our team leader looks out for them.
	x	x	124	Our team leader does not set clear goals for the team to work towards.
		x	125	My team leader helps the team to work well together to achieve the goals of the team under easy conditions.
		x	126	My team leader does not instil a sense of shared purpose within the team.
x	x	x	127	Team members value the support that our team leader gives them in their role.
x	x	x	128	Team members believe that the team leader is committed to the long-term success of the team.
x	x	x	129	Team members' values of what is important in life are similar to those of the team leader.

Table L3: Cross tabulation of *gender* with missing value pattern variables

			Total	Male	Female
Item39	Present	Count	193	93	100
		Percent	94.6	91.2	98.0
	Missing	% Don't Know	5.4	8.8	2.0
Item65	Present	Count	193	93	100
		Percent	94.6	91.2	98.0
	Missing	% Don't Know	5.4	8.8	2.0
Item78	Present	Count	183	87	96
		Percent	89.7	85.3	94.1
	Missing	% Don't Know	10.3	14.7	5.9
Item90	Present	Count	187	89	98
		Percent	91.7	87.3	96.1
	Missing	% Don't Know	8.3	12.7	3.9
Item92	Present	Count	190	91	99
		Percent	93.1	89.2	97.1
	Missing	% Don't Know	6.9	10.8	2.9
Item93	Present	Count	173	84	89
		Percent	84.8	82.4	87.3
	Missing	% Don't Know	15.2	17.6	12.7
Item94	Present	Count	169	85	84
		Percent	82.8	83.3	82.4
	Missing	% Don't Know	17.2	16.7	17.6
Item95	Present	Count	171	86	85
		Percent	83.8	84.3	83.3
	Missing	% Don't Know	16.2	15.7	16.7
Item96	Present	Count	185	92	93
		Percent	90.7	90.2	91.2
	Missing	% Don't Know	9.3	9.8	8.8
Item97	Present	Count	193	95	98
		Percent	94.6	93.1	96.1
	Missing	% Don't Know	5.4	6.9	3.9
Item98	Present	Count	173	88	85
		Percent	84.8	86.3	83.3
	Missing	% Don't Know	15.2	13.7	16.7
Item99	Present	Count	171	86	85
		Percent	83.8	84.3	83.3
	Missing	% Don't Know	16.2	15.7	16.7
Item100	Present	Count	184	92	92
		Percent	90.2	90.2	90.2
	Missing	% Don't Know	9.8	9.8	9.8
Item101	Present	Count	164	81	83
		Percent	80.4	79.4	81.4

Item102	Missing	% Don't Know	19.6	20.6	18.6
	Present	Count	186	92	94
		Percent	91.2	90.2	92.2
Item103	Missing	% Don't Know	8.8	9.8	7.8
	Present	Count	174	87	87
		Percent	85.3	85.3	85.3
Item104	Missing	% Don't Know	14.7	14.7	14.7
	Present	Count	168	83	85
		Percent	82.4	81.4	83.3
Item105	Missing	% Don't Know	17.6	18.6	16.7
	Present	Count	172	87	85
		Percent	84.3	85.3	83.3
Item106	Missing	% Don't Know	15.7	14.7	16.7
	Present	Count	186	92	94
		Percent	91.2	90.2	92.2
Item107	Missing	% Don't Know	8.8	9.8	7.8
	Present	Count	166	83	83
		Percent	81.4	81.4	81.4
Item108	Missing	% Don't Know	18.6	18.6	18.6
	Present	Count	168	85	83
		Percent	82.4	83.3	81.4
Item109	Missing	% Don't Know	17.6	16.7	18.6
	Present	Count	157	78	79
		Percent	77.0	76.5	77.5
Item110	Missing	% Don't Know	23.0	23.5	22.5
	Present	Count	191	93	98
		Percent	93.6	91.2	96.1
Item111	Missing	% Don't Know	6.4	8.8	3.9
	Present	Count	166	83	83
		Percent	81.4	81.4	81.4
Item112	Missing	% Don't Know	18.6	18.6	18.6
	Present	Count	187	93	94
		Percent	91.7	91.2	92.2
Item113	Missing	% Don't Know	8.3	8.8	7.8
	Present	Count	166	84	82
		Percent	81.4	82.4	80.4
Item114	Missing	% Don't Know	18.6	17.6	19.6
	Present	Count	170	83	87
		Percent	83.3	81.4	85.3
Item115	Missing	% Don't Know	16.7	18.6	14.7
	Present	Count	170	85	85
		Percent	83.3	83.3	83.3
Item116	Missing	% Don't Know	16.7	16.7	16.7
	Present	Count	169	84	85
		Percent	82.8	82.4	83.3
Item117	Missing	% Don't Know	17.2	17.6	16.7
	Present	Count	166	84	82

		Percent	81.4	82.4	80.4
	Missing	% Don't Know	18.6	17.6	19.6
Item119	Present	Count	168	83	85
		Percent	82.4	81.4	83.3
	Missing	% Don't Know	17.6	18.6	16.7
Item120	Present	Count	182	92	90
		Percent	89.2	90.2	88.2
	Missing	% Don't Know	10.8	9.8	11.8
Item121	Present	Count	163	81	82
		Percent	79.9	79.4	80.4
	Missing	% Don't Know	20.1	20.6	19.6
Item122	Present	Count	167	82	85
		Percent	81.9	80.4	83.3
	Missing	% Don't Know	18.1	19.6	16.7
Item123	Present	Count	166	83	83
		Percent	81.4	81.4	81.4
	Missing	% Don't Know	18.6	18.6	18.6
Item124	Present	Count	187	93	94
		Percent	91.7	91.2	92.2
	Missing	% Don't Know	8.3	8.8	7.8
Item125	Present	Count	192	94	98
		Percent	94.1	92.2	96.1
	Missing	% Don't Know	5.9	7.8	3.9
Item126	Present	Count	193	95	98
		Percent	94.6	93.1	96.1
	Missing	% Don't Know	5.4	6.9	3.9
Item127	Present	Count	165	81	84
		Percent	80.9	79.4	82.4
	Missing	% Don't Know	19.1	20.6	17.6
Item128	Present	Count	167	84	83
		Percent	81.9	82.4	81.4
	Missing	% Don't Know	18.1	17.6	18.6
Item129	Present	Count	153	74	79
		Percent	75.0	72.5	77.5
	Missing	% Don't Know	25.0	27.5	22.5

Table L4: Cross tabulation of *job category* with missing value pattern variables

			Total	Admin / Secretarial	Building Industry	Engineering	Managerial	Marketing & PR	Public Sector	Sales	Scientific & Technical
Item39	Present	Count	193	16	92	10	9	3	5	3	40
		Percent	94.6	94.1	100.0	90.9	100.0	75.0	100.0	75.0	85.1
	Missing	% Don't Know	5.4	5.9	.0	9.1	.0	25.0	.0	25.0	14.9
Item65	Present	Count	193	17	88	10	8	4	4	4	43
		Percent	94.6	100.0	95.7	90.9	88.9	100.0	80.0	100.0	91.5
	Missing	% Don't Know	5.4	.0	4.3	9.1	11.1	.0	20.0	.0	8.5
Item78	Present	Count	183	16	90	9	7	3	4	3	36
		Percent	89.7	94.1	97.8	81.8	77.8	75.0	80.0	75.0	76.6
	Missing	% Don't Know	10.3	5.9	2.2	18.2	22.2	25.0	20.0	25.0	23.4
Item90	Present	Count	187	17	89	9	6	4	4	4	39
		Percent	91.7	100.0	96.7	81.8	66.7	100.0	80.0	100.0	83.0
	Missing	% Don't Know	8.3	.0	3.3	18.2	33.3	.0	20.0	.0	17.0
Item92	Present	Count	190	16	89	9	7	4	4	4	42
		Percent	93.1	94.1	96.7	81.8	77.8	100.0	80.0	100.0	89.4
	Missing	% Don't Know	6.9	5.9	3.3	18.2	22.2	.0	20.0	.0	10.6
Item93	Present	Count	173	16	76	9	7	3	4	4	40
		Percent	84.8	94.1	82.6	81.8	77.8	75.0	80.0	100.0	85.1
	Missing	% Don't Know	15.2	5.9	17.4	18.2	22.2	25.0	20.0	.0	14.9
Item94	Present	Count	169	15	72	8	8	3	4	4	41
		Percent	82.8	88.2	78.3	72.7	88.9	75.0	80.0	100.0	87.2
	Missing	% Don't Know	17.2	11.8	21.7	27.3	11.1	25.0	20.0	.0	12.8
Item95	Present	Count	171	15	74	10	8	3	4	4	39
		Percent	83.8	88.2	80.4	90.9	88.9	75.0	80.0	100.0	83.0
	Missing	% Don't Know	16.2	11.8	19.6	9.1	11.1	25.0	20.0	.0	17.0
Item96	Present	Count	185	16	83	10	7	4	4	4	42
		Percent	90.7	94.1	90.2	90.9	77.8	100.0	80.0	100.0	89.4
	Missing	% Don't Know	9.3	5.9	9.8	9.1	22.2	.0	20.0	.0	10.6
Item97	Present	Count	193	17	88	10	8	4	4	4	43
		Percent	94.6	100.0	95.7	90.9	88.9	100.0	80.0	100.0	91.5
	Missing	% Don't Know	5.4	.0	4.3	9.1	11.1	.0	20.0	.0	8.5
Item98	Present	Count	173	16	74	9	7	3	4	4	42
		Percent	84.8	94.1	80.4	81.8	77.8	75.0	80.0	100.0	89.4
	Missing	% Don't Know	15.2	5.9	19.6	18.2	22.2	25.0	20.0	.0	10.6
Item99	Present	Count	171	16	74	8	7	3	4	4	41
		Percent	83.8	94.1	80.4	72.7	77.8	75.0	80.0	100.0	87.2

Item100	Missing	% Don't Know	16.2	5.9	19.6	27.3	22.2	25.0	20.0	.0	12.8
	Present	Count	184	17	81	9	7	4	4	4	43
		Percent	90.2	100.0	88.0	81.8	77.8	100.0	80.0	100.0	91.5
Item101	Missing	% Don't Know	9.8	.0	12.0	18.2	22.2	.0	20.0	.0	8.5
	Present	Count	164	15	71	9	6	2	4	4	39
		Percent	80.4	88.2	77.2	81.8	66.7	50.0	80.0	100.0	83.0
Item102	Missing	% Don't Know	19.6	11.8	22.8	18.2	33.3	50.0	20.0	.0	17.0
	Present	Count	186	16	84	9	8	4	4	4	42
		Percent	91.2	94.1	91.3	81.8	88.9	100.0	80.0	100.0	89.4
Item103	Missing	% Don't Know	8.8	5.9	8.7	18.2	11.1	.0	20.0	.0	10.6
	Present	Count	174	16	82	9	6	2	4	4	36
		Percent	85.3	94.1	89.1	81.8	66.7	50.0	80.0	100.0	76.6
Item104	Missing	% Don't Know	14.7	5.9	10.9	18.2	33.3	50.0	20.0	.0	23.4
	Present	Count	168	16	72	9	6	3	4	3	41
		Percent	82.4	94.1	78.3	81.8	66.7	75.0	80.0	75.0	87.2
Item105	Missing	% Don't Know	17.6	5.9	21.7	18.2	33.3	25.0	20.0	25.0	12.8
	Present	Count	172	15	73	10	8	3	4	4	41
		Percent	84.3	88.2	79.3	90.9	88.9	75.0	80.0	100.0	87.2
Item106	Missing	% Don't Know	15.7	11.8	20.7	9.1	11.1	25.0	20.0	.0	12.8
	Present	Count	186	17	83	10	8	4	4	3	42
		Percent	91.2	100.0	90.2	90.9	88.9	100.0	80.0	75.0	89.4
Item107	Missing	% Don't Know	8.8	.0	9.8	9.1	11.1	.0	20.0	25.0	10.6
	Present	Count	166	14	71	10	8	3	4	4	38
		Percent	81.4	82.4	77.2	90.9	88.9	75.0	80.0	100.0	80.9
Item108	Missing	% Don't Know	18.6	17.6	22.8	9.1	11.1	25.0	20.0	.0	19.1
	Present	Count	168	15	72	10	6	2	4	4	41
		Percent	82.4	88.2	78.3	90.9	66.7	50.0	80.0	100.0	87.2
Item109	Missing	% Don't Know	17.6	11.8	21.7	9.1	33.3	50.0	20.0	.0	12.8
	Present	Count	157	14	69	9	6	1	4	3	38
		Percent	77.0	82.4	75.0	81.8	66.7	25.0	80.0	75.0	80.9
Item110	Missing	% Don't Know	23.0	17.6	25.0	18.2	33.3	75.0	20.0	25.0	19.1
	Present	Count	191	17	89	10	7	4	5	4	40
		Percent	93.6	100.0	96.7	90.9	77.8	100.0	100.0	100.0	85.1
Item111	Missing	% Don't Know	6.4	.0	3.3	9.1	22.2	.0	.0	.0	14.9
	Present	Count	166	15	71	10	6	4	4	4	38
		Percent	81.4	88.2	77.2	90.9	66.7	100.0	80.0	100.0	80.9
Item112	Missing	% Don't Know	18.6	11.8	22.8	9.1	33.3	.0	20.0	.0	19.1
	Present	Count	187	16	83	10	8	4	4	4	43
		Percent	91.7	94.1	90.2	90.9	88.9	100.0	80.0	100.0	91.5
	Missing	% Don't Know	8.3	5.9	9.8	9.1	11.1	.0	20.0	.0	8.5

Item113	Present	Count	166	14	71	10	7	2	4	4	40
		Percent	81.4	82.4	77.2	90.9	77.8	50.0	80.0	100.0	85.1
	Missing	% Don't Know	18.6	17.6	22.8	9.1	22.2	50.0	20.0	.0	14.9
Item114	Present	Count	170	15	71	10	8	4	5	4	39
		Percent	83.3	88.2	77.2	90.9	88.9	100.0	100.0	100.0	83.0
	Missing	% Don't Know	16.7	11.8	22.8	9.1	11.1	.0	.0	.0	17.0
Item115	Present	Count	170	15	72	10	8	3	4	4	40
		Percent	83.3	88.2	78.3	90.9	88.9	75.0	80.0	100.0	85.1
	Missing	% Don't Know	16.7	11.8	21.7	9.1	11.1	25.0	20.0	.0	14.9
Item116	Present	Count	169	15	72	10	7	3	5	4	39
		Percent	82.8	88.2	78.3	90.9	77.8	75.0	100.0	100.0	83.0
	Missing	% Don't Know	17.2	11.8	21.7	9.1	22.2	25.0	.0	.0	17.0
Item117	Present	Count	166	14	73	8	7	3	4	4	39
		Percent	81.4	82.4	79.3	72.7	77.8	75.0	80.0	100.0	83.0
	Missing	% Don't Know	18.6	17.6	20.7	27.3	22.2	25.0	20.0	.0	17.0
Item119	Present	Count	168	15	72	10	8	2	4	4	39
		Percent	82.4	88.2	78.3	90.9	88.9	50.0	80.0	100.0	83.0
	Missing	% Don't Know	17.6	11.8	21.7	9.1	11.1	50.0	20.0	.0	17.0
Item120	Present	Count	182	16	81	9	7	4	4	4	42
		Percent	89.2	94.1	88.0	81.8	77.8	100.0	80.0	100.0	89.4
	Missing	% Don't Know	10.8	5.9	12.0	18.2	22.2	.0	20.0	.0	10.6
Item121	Present	Count	163	15	71	8	7	2	4	4	38
		Percent	79.9	88.2	77.2	72.7	77.8	50.0	80.0	100.0	80.9
	Missing	% Don't Know	20.1	11.8	22.8	27.3	22.2	50.0	20.0	.0	19.1
Item122	Present	Count	167	15	71	9	8	4	4	4	38
		Percent	81.9	88.2	77.2	81.8	88.9	100.0	80.0	100.0	80.9
	Missing	% Don't Know	18.1	11.8	22.8	18.2	11.1	.0	20.0	.0	19.1
Item123	Present	Count	166	15	72	9	6	2	4	4	40
		Percent	81.4	88.2	78.3	81.8	66.7	50.0	80.0	100.0	85.1
	Missing	% Don't Know	18.6	11.8	21.7	18.2	33.3	50.0	20.0	.0	14.9
Item124	Present	Count	187	16	84	9	8	4	4	4	43
		Percent	91.7	94.1	91.3	81.8	88.9	100.0	80.0	100.0	91.5
	Missing	% Don't Know	8.3	5.9	8.7	18.2	11.1	.0	20.0	.0	8.5
Item125	Present	Count	192	17	89	10	7	4	4	4	42
		Percent	94.1	100.0	96.7	90.9	77.8	100.0	80.0	100.0	89.4
	Missing	% Don't Know	5.9	.0	3.3	9.1	22.2	.0	20.0	.0	10.6
Item126	Present	Count	193	17	88	10	8	4	4	4	43
		Percent	94.6	100.0	95.7	90.9	88.9	100.0	80.0	100.0	91.5
	Missing	% Don't Know	5.4	.0	4.3	9.1	11.1	.0	20.0	.0	8.5
Item127	Present	Count	165	15	69	9	7	3	4	4	40

Item128	Missing	Percent	80.9	88.2	75.0	81.8	77.8	75.0	80.0	100.0	85.1
		% Don't Know	19.1	11.8	25.0	18.2	22.2	25.0	20.0	.0	14.9
	Present	Count	167	15	73	9	6	2	4	4	40
Item129	Missing	Percent	81.9	88.2	79.3	81.8	66.7	50.0	80.0	100.0	85.1
		% Don't Know	18.1	11.8	20.7	18.2	33.3	50.0	20.0	.0	14.9
	Present	Count	153	14	71	8	6	2	4	3	31
	Missing	Percent	75.0	82.4	77.2	72.7	66.7	50.0	80.0	75.0	66.0
		% Don't Know	25.0	17.6	22.8	27.3	33.3	50.0	20.0	25.0	34.0

Note:

Indicator variables with less than 5% missing are not displayed.

The job categories *Accountancy*, *Armed Forces*, *Automotive*, *Finance & Banking*, *Government*, *Human Resources*, and *Other* that have either 100% values present or missing across all indicator variables have been hidden for ease of reference.

For each indicator variable, the response percentages most notably different from those of other job categories have been highlighted.

Table L5: Cross tabulation of *organization* with missing value pattern variables

			Total	QinetiQ	Worcester County Council	Network Rail
Item39	Present	Count	193	69	112	12
		Percent	94.6	86.3	100.0	100.0
	Missing	% Don't Know	5.4	13.8	.0	.0
Item65	Present	Count	193	75	106	12
		Percent	94.6	93.8	94.6	100.0
	Missing	% Don't Know	5.4	6.3	5.4	.0
Item78	Present	Count	183	62	109	12
		Percent	89.7	77.5	97.3	100.0
	Missing	% Don't Know	10.3	22.5	2.7	.0
Item90	Present	Count	187	68	107	12
		Percent	91.7	85.0	95.5	100.0
	Missing	% Don't Know	8.3	15.0	4.5	.0
Item92	Present	Count	190	71	107	12
		Percent	93.1	88.8	95.5	100.0
	Missing	% Don't Know	6.9	11.3	4.5	.0
Item93	Present	Count	173	70	91	12
		Percent	84.8	87.5	81.3	100.0
	Missing	% Don't Know	15.2	12.5	18.8	.0
Item94	Present	Count	169	71	86	12
		Percent	82.8	88.8	76.8	100.0
	Missing	% Don't Know	17.2	11.3	23.2	.0
Item95	Present	Count	171	71	88	12
		Percent	83.8	88.8	78.6	100.0
	Missing	% Don't Know	16.2	11.3	21.4	.0
Item96	Present	Count	185	72	101	12
		Percent	90.7	90.0	90.2	100.0
	Missing	% Don't Know	9.3	10.0	9.8	.0
Item97	Present	Count	193	74	107	12
		Percent	94.6	92.5	95.5	100.0
	Missing	% Don't Know	5.4	7.5	4.5	.0
Item98	Present	Count	173	72	89	12
		Percent	84.8	90.0	79.5	100.0
	Missing	% Don't Know	15.2	10.0	20.5	.0
Item99	Present	Count	171	70	89	12
		Percent	83.8	87.5	79.5	100.0
	Missing	% Don't Know	16.2	12.5	20.5	.0
Item100	Present	Count	184	72	100	12
		Percent	90.2	90.0	89.3	100.0
	Missing	% Don't Know	9.8	10.0	10.7	.0
Item101	Present	Count	164	66	86	12

		Percent	80.4	82.5	76.8	100.0
	Missing	% Don't Know	19.6	17.5	23.2	.0
Item102	Present	Count	186	72	102	12
		Percent	91.2	90.0	91.1	100.0
	Missing	% Don't Know	8.8	10.0	8.9	.0
Item103	Present	Count	174	62	101	11
		Percent	85.3	77.5	90.2	91.7
	Missing	% Don't Know	14.7	22.5	9.8	8.3
Item104	Present	Count	168	69	87	12
		Percent	82.4	86.3	77.7	100.0
	Missing	% Don't Know	17.6	13.8	22.3	.0
Item105	Present	Count	172	73	87	12
		Percent	84.3	91.3	77.7	100.0
	Missing	% Don't Know	15.7	8.8	22.3	.0
Item106	Present	Count	186	72	102	12
		Percent	91.2	90.0	91.1	100.0
	Missing	% Don't Know	8.8	10.0	8.9	.0
Item107	Present	Count	166	69	85	12
		Percent	81.4	86.3	75.9	100.0
	Missing	% Don't Know	18.6	13.8	24.1	.0
Item108	Present	Count	168	70	86	12
		Percent	82.4	87.5	76.8	100.0
	Missing	% Don't Know	17.6	12.5	23.2	.0
Item109	Present	Count	157	62	83	12
		Percent	77.0	77.5	74.1	100.0
	Missing	% Don't Know	23.0	22.5	25.9	.0
Item110	Present	Count	191	70	109	12
		Percent	93.6	87.5	97.3	100.0
	Missing	% Don't Know	6.4	12.5	2.7	.0
Item111	Present	Count	166	68	86	12
		Percent	81.4	85.0	76.8	100.0
	Missing	% Don't Know	18.6	15.0	23.2	.0
Item112	Present	Count	187	74	101	12
		Percent	91.7	92.5	90.2	100.0
	Missing	% Don't Know	8.3	7.5	9.8	.0
Item113	Present	Count	166	69	85	12
		Percent	81.4	86.3	75.9	100.0
	Missing	% Don't Know	18.6	13.8	24.1	.0
Item114	Present	Count	170	71	87	12
		Percent	83.3	88.8	77.7	100.0
	Missing	% Don't Know	16.7	11.3	22.3	.0
Item115	Present	Count	170	72	86	12
		Percent	83.3	90.0	76.8	100.0
	Missing	% Don't Know	16.7	10.0	23.2	.0
Item116	Present	Count	169	70	87	12
		Percent	82.8	87.5	77.7	100.0
	Missing	% Don't Know	17.2	12.5	22.3	.0

Item117	Present	Count	166	67	87	12
		Percent	81.4	83.8	77.7	100.0
	Missing	% Don't Know	18.6	16.3	22.3	.0
Item119	Present	Count	168	70	86	12
		Percent	82.4	87.5	76.8	100.0
	Missing	% Don't Know	17.6	12.5	23.2	.0
Item120	Present	Count	182	71	99	12
		Percent	89.2	88.8	88.4	100.0
	Missing	% Don't Know	10.8	11.3	11.6	.0
Item121	Present	Count	163	66	85	12
		Percent	79.9	82.5	75.9	100.0
	Missing	% Don't Know	20.1	17.5	24.1	.0
Item122	Present	Count	167	69	86	12
		Percent	81.9	86.3	76.8	100.0
	Missing	% Don't Know	18.1	13.8	23.2	.0
Item123	Present	Count	166	68	86	12
		Percent	81.4	85.0	76.8	100.0
	Missing	% Don't Know	18.6	15.0	23.2	.0
Item124	Present	Count	187	73	102	12
		Percent	91.7	91.3	91.1	100.0
	Missing	% Don't Know	8.3	8.8	8.9	.0
Item125	Present	Count	192	72	108	12
		Percent	94.1	90.0	96.4	100.0
	Missing	% Don't Know	5.9	10.0	3.6	.0
Item126	Present	Count	193	74	107	12
		Percent	94.6	92.5	95.5	100.0
	Missing	% Don't Know	5.4	7.5	4.5	.0
Item127	Present	Count	165	70	83	12
		Percent	80.9	87.5	74.1	100.0
	Missing	% Don't Know	19.1	12.5	25.9	.0
Item128	Present	Count	167	68	87	12
		Percent	81.9	85.0	77.7	100.0
	Missing	% Don't Know	18.1	15.0	22.3	.0
Item129	Present	Count	153	56	85	12
		Percent	75.0	70.0	75.9	100.0
	Missing	% Don't Know	25.0	30.0	24.1	.0

Note: Indicator variables with less than 5% missing are not displayed.

Table L6: Cross tabulation of *position* with missing value pattern variables

			Total	Team Member	Team Leader
Item39	Present	Count	193	139	54
		Percent	94.6	92.7	100.0
	Missing	% Don't Know	5.4	7.3	.0
Item65	Present	Count	193	149	44
		Percent	94.6	99.3	81.5
	Missing	% Don't Know	5.4	.7	18.5
Item78	Present	Count	183	138	45
		Percent	89.7	92.0	83.3
	Missing	% Don't Know	10.3	8.0	16.7
Item90	Present	Count	187	145	42
		Percent	91.7	96.7	77.8
	Missing	% Don't Know	8.3	3.3	22.2
Item92	Present	Count	190	146	44
		Percent	93.1	97.3	81.5
	Missing	% Don't Know	6.9	2.7	18.5
Item93	Present	Count	173	145	28
		Percent	84.8	96.7	51.9
	Missing	% Don't Know	15.2	3.3	48.1
Item94	Present	Count	169	145	24
		Percent	82.8	96.7	44.4
	Missing	% Don't Know	17.2	3.3	55.6
Item95	Present	Count	171	145	26
		Percent	83.8	96.7	48.1
	Missing	% Don't Know	16.2	3.3	51.9
Item96	Present	Count	185	147	38
		Percent	90.7	98.0	70.4
	Missing	% Don't Know	9.3	2.0	29.6
Item97	Present	Count	193	148	45
		Percent	94.6	98.7	83.3
	Missing	% Don't Know	5.4	1.3	16.7
Item98	Present	Count	173	146	27
		Percent	84.8	97.3	50.0
	Missing	% Don't Know	15.2	2.7	50.0
Item99	Present	Count	171	145	26
		Percent	83.8	96.7	48.1
	Missing	% Don't Know	16.2	3.3	51.9
Item100	Present	Count	184	147	37
		Percent	90.2	98.0	68.5
	Missing	% Don't Know	9.8	2.0	31.5
Item101	Present	Count	164	141	23
		Percent	80.4	94.0	42.6
	Missing	% Don't Know	19.6	6.0	57.4
Item102	Present	Count	186	146	40
		Percent	91.2	97.3	74.1

Item103	Missing	% Don't Know	8.8	2.7	25.9
	Present	Count	174	137	37
		Percent	85.3	91.3	68.5
Item104	Missing	% Don't Know	14.7	8.7	31.5
	Present	Count	168	145	23
		Percent	82.4	96.7	42.6
Item105	Missing	% Don't Know	17.6	3.3	57.4
	Present	Count	172	147	25
		Percent	84.3	98.0	46.3
Item106	Missing	% Don't Know	15.7	2.0	53.7
	Present	Count	186	146	40
		Percent	91.2	97.3	74.1
Item107	Missing	% Don't Know	8.8	2.7	25.9
	Present	Count	166	143	23
		Percent	81.4	95.3	42.6
Item108	Missing	% Don't Know	18.6	4.7	57.4
	Present	Count	168	146	22
		Percent	82.4	97.3	40.7
Item109	Missing	% Don't Know	17.6	2.7	59.3
	Present	Count	157	135	22
		Percent	77.0	90.0	40.7
Item110	Missing	% Don't Know	23.0	10.0	59.3
	Present	Count	191	145	46
		Percent	93.6	96.7	85.2
Item111	Missing	% Don't Know	6.4	3.3	14.8
	Present	Count	166	144	22
		Percent	81.4	96.0	40.7
Item112	Missing	% Don't Know	18.6	4.0	59.3
	Present	Count	187	148	39
		Percent	91.7	98.7	72.2
Item113	Missing	% Don't Know	8.3	1.3	27.8
	Present	Count	166	144	22
		Percent	81.4	96.0	40.7
Item114	Missing	% Don't Know	18.6	4.0	59.3
	Present	Count	170	145	25
		Percent	83.3	96.7	46.3
Item115	Missing	% Don't Know	16.7	3.3	53.7
	Present	Count	170	146	24
		Percent	83.3	97.3	44.4
Item116	Missing	% Don't Know	16.7	2.7	55.6
	Present	Count	169	145	24
		Percent	82.8	96.7	44.4
Item117	Missing	% Don't Know	17.2	3.3	55.6
	Present	Count	166	142	24
		Percent	81.4	94.7	44.4
Item119	Missing	% Don't Know	18.6	5.3	55.6
	Present	Count	168	144	24
		Percent	82.4	96.0	44.4
Item120	Missing	% Don't Know	17.6	4.0	55.6
	Present	Count	182	146	36
		Percent	89.2	97.3	66.7

Item121	Missing	% Don't Know	10.8	2.7	33.3
	Present	Count	163	141	22
		Percent	79.9	94.0	40.7
Item122	Missing	% Don't Know	20.1	6.0	59.3
	Present	Count	167	143	24
		Percent	81.9	95.3	44.4
Item123	Missing	% Don't Know	18.1	4.7	55.6
	Present	Count	166	144	22
		Percent	81.4	96.0	40.7
Item124	Missing	% Don't Know	18.6	4.0	59.3
	Present	Count	187	148	39
		Percent	91.7	98.7	72.2
Item125	Missing	% Don't Know	8.3	1.3	27.8
	Present	Count	192	147	45
		Percent	94.1	98.0	83.3
Item126	Missing	% Don't Know	5.9	2.0	16.7
	Present	Count	193	148	45
		Percent	94.6	98.7	83.3
Item127	Missing	% Don't Know	5.4	1.3	16.7
	Present	Count	165	143	22
		Percent	80.9	95.3	40.7
Item128	Missing	% Don't Know	19.1	4.7	59.3
	Present	Count	167	144	23
		Percent	81.9	96.0	42.6
Item129	Missing	% Don't Know	18.1	4.0	57.4
	Present	Count	153	133	20
		Percent	75.0	88.7	37.0
	Missing	% Don't Know	25.0	11.3	63.0

Note: Indicator variables with less than 5% missing are not displayed.

Appendix M:
Skewness and kurtosis values for pilot phase MTCS items

		Skewness		Kurtosis	
		Statistic	Std. Error	Statistic	Std. Error
	Job Category.	.526	.170	-1.497	.339
	Number of years experience in current job role.	.518	.170	-.925	.339
	Male or female.	.000	.170	-2.020	.339
	Current age.	.157	.170	-1.025	.339
	Length of membership in current team converted to months.	1.916	.170	6.136	.339
	Number of members in current team.	4.632	.170	34.305	.339
	Position held in current team - team member or team leader.	1.075	.170	-.854	.339
	Organization the trial sample is drawn from	.222	.170	-.648	.339
1	I am content with the tasks that I do within the team.	-1.658	.170	2.242	.339
2	I feel a part of what happens in the team.	-1.921	.170	3.418	.339
3	My values of what is important in life are similar to other team members.	-1.482	.174	2.383	.346
4	I share a similar commitment to the overall objective of the team as other team members.	-1.647	.171	2.182	.340
5	I do not share the same way of thinking as my fellow team members about how to achieve the goals of the team.	-1.026	.171	-.104	.340
6	The rules of the team do not make sense to me.	-1.974	.171	3.405	.340
7	I do not feel a sense of belonging to the team.	-1.473	.170	1.094	.339
8	I am enthusiastic about the team.	-1.537	.170	2.553	.339
9	I do not feel that I am encouraged to express my opinions within the team.	-1.813	.170	2.449	.339
10	I am not proud of my team.	-1.909	.171	3.549	.341

11	I do not feel that my contributions to the team are adequately recognised.	-1.082	.172	-.130	.341
12	I feel that the team work well together to achieve the goals of the team under difficult conditions.	-1.784	.171	2.867	.341
13	I do not enjoy socialising with members of the team.	-1.228	.171	.813	.341
14	I share the same levels of commitment in conducting the team's tasks as my fellow team members.	-1.393	.171	1.255	.340
15	I feel that the other members of the team value my role within the team.	-1.732	.170	2.850	.339
16	I have a shared understanding of the goals of the team as other team members.	-1.609	.172	2.182	.342
17	I value the roles of other team members.	-2.161	.170	6.162	.339
18	My team members do not help me develop new skills.	-.968	.170	-.036	.339
19	The team provides me with good opportunities to improve my existing skills.	-1.405	.170	.981	.339
20	I am proud to be part of the team.	-1.502	.170	2.144	.339
21	I share similar opinions about people or ideas, whether positive or negative, as other team members.	-1.188	.172	1.515	.342
22	I enjoy the opportunity to work with other team members.	-2.203	.170	6.757	.339
23	The social contact that I have in the team is important to me.	-.986	.170	.048	.339
24	I am good friends with my fellow team members.	-1.335	.170	1.908	.339
25	I value the support my team members give me in my role.	-1.849	.170	3.990	.339
26	I do not like being part of the team.	-2.539	.170	7.344	.339

27	I do not feel that the team work well together to achieve the goals of the team under easy conditions.	-1.924	.170	3.663	.339
28	My team members make me feel an accepted member of the team.	-2.025	.171	5.528	.340
29	I am proud of my role within the team.	-1.780	.170	4.048	.339
30	I do not feel that my team members adequately support me in achieving my tasks.	-1.777	.170	3.632	.339
31	I have similar experiences to others in the team.	-.858	.172	-.363	.341
32	I feel I can go to most members of my team when I need personal support.	-.847	.171	-.524	.341
33	I am unhappy with my role in the team.	-1.616	.170	2.291	.339
34	I feel I can offer personal support to team members when it is needed.	-1.493	.171	1.863	.340
35	Members of the team do not enjoy the tasks conducted.	-.993	.172	.047	.342
36	Team members are proud of their roles within the team.	-1.512	.173	2.676	.344
37	We are all good friends in this team.	-1.306	.170	1.594	.339
38	Members of the team work well together to achieve the goals of the team under easy conditions.	-1.590	.172	2.303	.341
39	Team members' values of what is important in life are similar to one another.	-1.205	.175	1.441	.348
40	Members of the team feel very close to one another.	-.703	.172	-.311	.342
41	Members of the team do not share the same levels of commitment in conducting the team's tasks.	-.981	.171	.700	.341
42	Team members value the support they receive in their role from other team members.	-1.776	.172	4.601	.342

43	Team members generally agree on what to do to reach team goals.	-1.374	.170	1.272	.339
44	Team members enjoy each others company.	-1.488	.172	3.233	.341
45	We help each other develop new skills within the team.	-1.068	.170	.530	.339
46	Team members do not value each other's role within the team.	-1.551	.171	3.110	.341
47	The rules of the team do not make sense to team members.	-1.538	.173	2.140	.345
48	Team members do not feel adequately recognised for their contribution to the team.	-1.068	.172	.028	.341
49	Members of the team help each other in their tasks through sharing information.	-1.781	.171	3.585	.341
50	Members of the team do not support each other in their role.	-1.731	.170	3.686	.339
51	Team members share the same way of thinking about how to achieve the goals of the team.	-1.060	.171	.253	.341
52	Members of the team share similar opinions about people or ideas, whether positive or negative, as one another.	-1.258	.173	1.080	.344
53	Team members provide each other with encouragement in completing their tasks.	-1.301	.171	1.005	.340
54	Members of the team regularly share their experiences with one another.	-1.807	.171	3.061	.341
55	Team members do not encourage one another to express their opinions within the team.	-1.873	.171	3.795	.340
56	Members of the team do not look out for each other.	-1.585	.171	2.196	.340
57	Team members are not receptive to feedback from team members.	-1.544	.172	2.746	.341
58	Members of the team have similar experiences to one another.	-.963	.172	-.133	.342
59	Members of the team are happy with their roles.	-1.230	.172	1.210	.343

60	Members of the team work well together to achieve the goals of the team under difficult conditions.	-1.459	.171	1.591	.340
61	Team members are not proud to be part of the team.	-1.330	.173	.740	.344
62	There is not a sense of shared purpose within the team.	-.956	.171	-.462	.341
63	Members of the team do not see the team as an important social unit.	-.728	.173	-.639	.344
64	Team members do not have a shared understanding of the goals of the team.	-1.572	.172	1.759	.343
65	I am friends with my team leader.	-.934	.175	.040	.348
66	My team leader does not adequately recognise my contribution to the team.	-1.349	.173	.903	.345
67	I value the role of my team leader.	-1.507	.174	1.401	.346
68	I am receptive to feedback from my team leader.	-2.521	.174	8.075	.346
69	My team leader is not interested in the way I feel about things.	-1.010	.173	-.254	.345
70	I do not enjoy socialising with my team leader.	-.929	.175	-.107	.347
71	I do not feel that my team leader provides me with adequate guidance in my tasks.	-.860	.174	-.382	.346
72	My team leader looks out for me.	-.973	.173	-.122	.345
73	My team leader sets me clear goals to work towards.	-1.210	.173	.415	.344
74	My team leader encourages me to express my opinions within the team.	-1.283	.173	.899	.345
75	I feel close to my team leader.	-.482	.174	-.826	.346
76	I am confident in my team leader's ability to do their job.	-1.556	.174	1.541	.346
77	My team leader is important to the success of the team.	-1.371	.173	.789	.345
78	My values of what is important in life are similar to those of my team leader.	-.978	.180	.017	.357

79	I feel that my team leader treats people fairly.	-1.565	.174	1.808	.346
80	I do not feel that my team leader is there for me when I need advice.	-.841	.175	-.575	.347
81	I value the support my team leader gives me in my role.	-1.311	.174	1.114	.346
82	I do not feel my team leader helps me to develop my skills within the team.	-1.008	.174	-.253	.346
83	My team leader supports me in my tasks through sharing information.	-1.163	.174	.476	.346
84	My team leader goes out of their way to make me feel happy within the team.	-.431	.174	-.857	.346
85	I do not feel that my team leader values my role.	-1.569	.174	1.656	.346
86	My team leader does not provide me with encouragement in my tasks.	-1.358	.173	1.258	.345
87	I do not share my work experiences with my team leader.	-1.552	.174	1.603	.346
88	My team leader is not committed to the long terms success of the team.	-1.914	.175	3.285	.347
89	I am proud to be working with my team leader.	-1.152	.174	.459	.346
90	I have similar experiences to my team leader.	-.541	.178	-.969	.354
91	My team leader does not take an interest in my personal welfare.	-.937	.175	-.048	.347
92	I do not share similar opinions about people or ideas, whether positive or negative, with my team leader.	-.881	.176	-.301	.351
93	Team members feel that the team leader helps them to develop their skills within the team.	-.944	.185	-.121	.367
94	Team members feel that the team leader sets clear rules for the team.	-1.212	.187	.431	.371
95	Team members do not get on socially with our team leader.	-1.203	.186	.484	.369

96	Our team leader does not provide team members with advice when they need it.	-1.481	.179	1.573	.355
97	My team leader does not set clear rules for the team.	-1.140	.175	.214	.348
98	Team members feel that the team leader helps the team work well together to achieve its goals under easy conditions.	-1.263	.185	.704	.367
99	Team members do not feel close to our team leader.	-.570	.186	-.818	.369
100	Our team leader values team members' roles within the team.	-1.672	.179	2.766	.356
101	Team members are proud to be working with our team leader.	-1.070	.190	.230	.377
102	Our team leader takes an interest in the way team members feel about things.	-1.147	.178	.552	.355
103	Our team leader shares similar opinions about people or ideas, whether positive or negative, as members of the team.	-.800	.184	.096	.366
104	Team members do not feel that the team leader treats people fairly.	-1.403	.187	.946	.373
105	Team members are receptive to feedback from the team leader.	-1.751	.185	3.708	.368
106	Our team leader adequately recognises team members' contributions to the team.	-1.322	.178	1.334	.355
107	Team members regularly share their work experiences with the team leader.	-1.953	.188	4.471	.375
108	Team members are not receptive to feedback provided by the team leader.	-1.966	.187	5.119	.373
109	Team members have similar experiences with the team leader.	-.482	.194	-.511	.385
110	My team leader does not share the same goals as the team members.	-1.346	.176	.929	.350

111	Team members feel that the team leader shares the same goals as the team.	-1.641	.188	2.297	.375
112	Our team leader tries to help team members feel happy within the team.	-1.261	.178	.941	.354
113	Team members do not value the role of our team leader.	-1.449	.188	1.675	.375
114	Team members do not feel that the team leader is important to the success of the team.	-1.269	.186	.455	.370
115	Team members feel that the team leader supports them through sharing information.	-1.288	.186	.613	.370
116	Team members are unhappy with the guidance provided by the team leader.	-1.347	.187	1.001	.371
117	Team members are friends with our team leader.	-.966	.188	.267	.375
118	My team leader helps the team to work well together to achieve the goals of the team under difficult conditions.	-1.282	.175	.932	.347
119	Team members do not feel that the team leader encourages them to express their opinions within the team.	-1.397	.187	1.256	.373
120	Our team leader is not interested in the personal welfare of team members.	-1.182	.180	.595	.358
121	Team members are content with the level of encouragement provided by the team leader in completing tasks.	-1.156	.190	.660	.378
122	Team members feel that the team leader helps the team work well together to achieve its goals under difficult conditions.	-1.093	.188	.385	.374
123	Team members do not feel that our team leader looks out for them.	-1.255	.188	.579	.375
124	Our team leader does not set clear goals for the team to work towards.	-1.288	.178	.671	.354

125	My team leader helps the team to work well together to achieve the goals of the team under easy conditions.	-1.344	.175	1.271	.349
126	My team leader does not instil a sense of shared purpose within the team.	-1.084	.175	-.028	.348
127	Team members value the support that our team leader gives them in their role.	-1.190	.189	.716	.376
128	Team members believe that the team leader is committed to the long-term success of the team.	-1.685	.188	2.368	.374
129	Team members' values of what is important in life are similar to those of the team leader.	-.732	.196	.160	.390

Appendix N:

Little's MCAR for MTCS dimensions UPHIPO, UPHIPS, UPVIIPS and VRHIPO

Highlighted values indicate those items whose estimation values vary the most.

Little's MCAR for UPHIPO

Estimated Means

	Item38	Item39	Item43	Item47	Item51	Item52	Item54	Item55	Item58	Item60	Item62	Item64
Listwise	5.9839	5.4516	5.5108	5.9462	5.3871	5.4032	5.7742	5.9462	5.2527	5.9301	5.2796	5.6613
All Values	5.9502	5.4249	5.5245	5.9289	5.3416	5.3838	5.7723	5.9113	5.1300	5.8966	5.2327	5.6432
EM	5.9537	5.3823	5.5245	5.9020	5.3372	5.3710	5.7635	5.9071	5.1268	5.8858	5.2281	5.6172

Note: Based on a normal distribution

	Item38	Item39	Item43	Item47	Item51	Item52	Item54	Item55	Item58	Item60	Item62	Item64
Listwise	5.9839	5.4516	5.5108	5.9462	5.3871	5.4032	5.7742	5.9462	5.2527	5.9301	5.2796	5.6613
All Values	5.9502	5.4249	5.5245	5.9289	5.3416	5.3838	5.7723	5.9113	5.1300	5.8966	5.2327	5.6432
EM	5.9557	5.3851	5.5250	5.9047	5.3402	5.3726	5.7644	5.9077	5.1309	5.8880	5.2326	5.6214

Note: Based on a non-normal distribution

Estimated standard deviations

	Item38	Item39	Item43	Item47	Item51	Item52	Item54	Item55	Item58	Item60	Item62	Item64
Listwise	1.21911	1.20823	1.46763	1.19789	1.46699	1.28769	1.39209	1.22907	1.51947	1.29467	1.89089	1.45873
All Values	1.23187	1.22296	1.43989	1.20586	1.46507	1.28409	1.37049	1.22758	1.57656	1.31787	1.90582	1.49015
EM	1.23381	1.22920	1.43989	1.21710	1.46524	1.28205	1.37057	1.22815	1.57296	1.32494	1.91228	1.49504

Note: Based on a normal distribution

	Item38	Item39	Item43	Item47	Item51	Item52	Item54	Item55	Item58	Item60	Item62	Item64
Listwise	1.21911	1.20823	1.46763	1.19789	1.46699	1.28769	1.39209	1.22907	1.51947	1.29467	1.89089	1.45873
All Values	1.23187	1.22296	1.43989	1.20586	1.46507	1.28409	1.37049	1.22758	1.57656	1.31787	1.90582	1.49015
EM	1.23104	1.22729	1.43883	1.21503	1.46306	1.28086	1.37036	1.22781	1.57030	1.32213	1.90914	1.49114

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 182.710, DF = 128, Sig. = .001 (Norm)

Little's MCAR test: Chi-Square = 184.141, DF = 128, Sig. = .001 (NonNorm)

Split 1 (items 38, 39, 43, 47, 51, 52, 54):

Estimated means

	Item38	Item39	Item43	Item47	Item51	Item52	Item54
Listwise	5.9893	5.4385	5.5187	5.9519	5.3904	5.3957	5.7701
All Values	5.9502	5.4249	5.5245	5.9289	5.3416	5.3838	5.7723
EM	5.9548	5.4001	5.5245	5.9127	5.3417	5.3713	5.7647

Note: Based on a normal distribution

	Item38	Item39	Item43	Item47	Item51	Item52	Item54
Listwise	5.9893	5.4385	5.5187	5.9519	5.3904	5.3957	5.7701
All Values	5.9502	5.4249	5.5245	5.9289	5.3416	5.3838	5.7723
EM	5.9572	5.4020	5.5260	5.9150	5.3445	5.3731	5.7656

Note: Based on a non-normal distribution

Estimated standard deviations

	Item38	Item39	Item43	Item47	Item51	Item52	Item54
Listwise	1.21810	1.21824	1.46773	1.19714	1.46372	1.28832	1.38950
All Values	1.23187	1.22296	1.43989	1.20586	1.46507	1.28409	1.37049
EM	1.23069	1.22241	1.43989	1.21044	1.46206	1.28469	1.37068

Note: Based on a normal distribution

	Item38	Item39	Item43	Item47	Item51	Item52	Item54
Listwise	1.21810	1.21824	1.46773	1.19714	1.46372	1.28832	1.38950
All Values	1.23187	1.22296	1.43989	1.20586	1.46507	1.28409	1.37049
EM	1.22781	1.22113	1.43861	1.20873	1.45974	1.28333	1.37001

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 66.384, DF = 50, Sig. = .060 (Norm)

Little's MCAR test: Chi-Square = 66.676, DF = 50, Sig. = .057 (NonNorm)

Split 2 (55, 58, 60, 62, 64):

Estimate Means

	Item55	Item58	Item60	Item62	Item64
Listwise	5.9184	5.1531	5.9133	5.2347	5.6276
All Values	5.9113	5.1300	5.8966	5.2327	5.6432
EM	5.9113	5.1300	5.8966	5.2388	5.6266

Note: Based on a normal distribution

	Item55	Item58	Item60	Item62	Item64
Listwise	5.9184	5.1531	5.9133	5.2347	5.6276
All Values	5.9113	5.1300	5.8966	5.2327	5.6432
EM	5.9112	5.1302	5.8964	5.2388	5.6266

Note: Based on a non-normal distribution

Estimates standard deviation

	Item55	Item58	Item60	Item62	Item64
Listwise	1.23764	1.57774	1.31953	1.92314	1.49497
All Values	1.22758	1.57656	1.31787	1.90582	1.49015
EM	1.22758	1.57379	1.31787	1.90602	1.49086

Note: Based on a normal distribution

	Item55	Item58	Item60	Item62	Item64
Listwise	1.23764	1.57774	1.31953	1.92314	1.49497
All Values	1.22758	1.57656	1.31787	1.90582	1.49015
EM	1.22748	1.57357	1.31765	1.90575	1.49071

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 13.368, DF = 15, Sig. = .574 (Norm)

Little's MCAR test: Chi-Square = 13.373, DF = 15, Sig. = .574 (NonNorm)

Little's MCAR for UPHIIPS

Estimated means

	Item3	Item4	Item5	Item6	Item9	Item12	Item16	Item21	Item27	Item31
Listwise	5.7243	5.9946	5.3514	6.0757	5.8378	6.0541	5.9838	5.5405	5.9784	4.9459
All Values	5.7077	5.9113	5.3350	6.0049	5.8284	6.0050	5.9400	5.5150	5.9412	4.9403
EM	5.6765	5.8994	5.3303	6.0095	5.8284	5.9950	5.9271	5.5082	5.9412	4.9338

Note: Based on a normal distribution

	Item3	Item4	Item5	Item6	Item9	Item12	Item16	Item21	Item27	Item31
Listwise	5.7243	5.9946	5.3514	6.0757	5.8378	6.0541	5.9838	5.5405	5.9784	4.9459
All Values	5.7077	5.9113	5.3350	6.0049	5.8284	6.0050	5.9400	5.5150	5.9412	4.9403
EM	5.6782	5.9020	5.3310	6.0122	5.8296	5.9983	5.9288	5.5084	5.9430	4.9343

Note: Based on a non-normal distribution

Estimated standard deviations

	Item3	Item4	Item5	Item6	Item9	Item12	Item16	Item21	Item27	Item31
Listwise	1.29157	1.29589	1.61878	1.27888	1.56235	1.24119	1.25748	1.28102	1.35517	1.64426
All Values	1.28901	1.35779	1.60941	1.35522	1.53288	1.27157	1.27062	1.27195	1.34877	1.62370
EM	1.28955	1.36654	1.60895	1.35512	1.53288	1.27718	1.27279	1.27049	1.34877	1.62329

Note: Based on a normal distribution

	Item3	Item4	Item5	Item6	Item9	Item12	Item16	Item21	Item27	Item31
Listwise	1.29157	1.29589	1.61878	1.27888	1.56235	1.24119	1.25748	1.28102	1.35517	1.64426
All Values	1.28901	1.35779	1.60941	1.35522	1.53288	1.27157	1.27062	1.27195	1.34877	1.62370
EM	1.28875	1.36289	1.60896	1.35151	1.53237	1.27430	1.27133	1.27113	1.34776	1.62308

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 97.100, DF = 76, Sig. = .052 (Norm)

Little's MCAR test: Chi-Square = 97.523, DF = 76, Sig. = .049 (NonNorm)

Split 1 (items 3, 5, 9, 12, 21, 27, 31):

Estimated means

	Item3	Item5	Item9	Item12	Item21	Item27	Item31
Listwise	5.7143	5.3492	5.8519	6.0582	5.5291	5.9735	4.9524
All Values	5.7077	5.3350	5.8284	6.0050	5.5150	5.9412	4.9403
EM	5.6849	5.3303	5.8284	5.9981	5.5074	5.9412	4.9382

Note: Based on a normal distribution

	Item3	Item5	Item9	Item12	Item21	Item27	Item31
Listwise	5.7143	5.3492	5.8519	6.0582	5.5291	5.9735	4.9524
All Values	5.7077	5.3350	5.8284	6.0050	5.5150	5.9412	4.9403
EM	5.6858	5.3312	5.8292	5.9996	5.5078	5.9422	4.9390

Note: Based on a normal distribution

Estimated standard deviations

	Item3	Item5	Item9	Item12	Item21	Item27	Item31
Listwise	1.29354	1.62257	1.55031	1.24277	1.28222	1.35047	1.63175
All Values	1.28901	1.60941	1.53288	1.27157	1.27195	1.34877	1.62370
EM	1.29005	1.60954	1.53288	1.27263	1.27341	1.34877	1.62400

Note: Based on a normal distribution

	Item3	Item5	Item9	Item12	Item21	Item27	Item31
Listwise	1.29354	1.62257	1.55031	1.24277	1.28222	1.35047	1.63175
All Values	1.28901	1.60941	1.53288	1.27157	1.27195	1.34877	1.62370
EM	1.28960	1.60894	1.53205	1.27069	1.27328	1.34744	1.62367

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 27.580, DF = 33, Sig. = .734 (Norm)

Little's MCAR test: Chi-Square = 27.632, DF = 33, Sig. = .731 (NonNorm)

Split 2 (items 4, 6, 16):

Estimated means

	Item4	Item6	Item16
Listwise	5.9146	6.0101	5.9347
All Values	5.9113	6.0049	5.9400
EM	5.9041	6.0074	5.9332

Note: Based on a normal distribution

	Item4	Item6	Item16
Listwise	5.9146	6.0101	5.9347
All Values	5.9113	6.0049	5.9400
EM	5.9043	6.0077	5.9334

Note: Based on a non-normal distribution

Estimated standard deviations

	Item4	Item6	Item16
Listwise	1.36616	1.34836	1.27158
All Values	1.35779	1.35522	1.27062
EM	1.36090	1.35456	1.27133

Note: Based on a normal distribution

	Item4	Item6	Item16
Listwise	1.36616	1.34836	1.27158
All Values	1.35779	1.35522	1.27062
EM	1.36080	1.35427	1.27124

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 7.450, DF = 5, Sig. = .189 (Norm)

Little's MCAR test: Chi-Square = 7.453, DF = 5, Sig. = .189 (NonNorm)

Little's MCAR for UPVIIPS

Estimated means

	Item73 Scor	Item74 Scor	Item78 Scor	Item79 Scor	Item87 Scor	Item90 Scor	Item92 Scor	Item97 Scor	Item110 scor	Item118 Scor	Item124 Scor	Item125 Scor	Item126 Scor
Listwise	5.4699	5.6386	5.0723	5.5964	5.7229	4.8313	5.1024	5.3855	5.4398	5.4578	5.5060	5.6024	5.3735
All Values	5.4091	5.5736	5.0328	5.6205	5.6718	4.7219	5.0263	5.3679	5.4241	5.3763	5.4278	5.5312	5.3161
EM	5.4038	5.5583	5.0158	5.6261	5.6736	4.7255	5.0284	5.3367	5.3929	5.3725	5.4353	5.5108	5.3040

Note: Based on a normal distribution

	Item73 Scor	Item74 Scor	Item78 Scor	Item79 Scor	Item87 Scor	Item90 Scor	Item92 Scor	Item97 Scor	Item110 scor	Item118 Scor	Item124 Scor	Item125 Scor	Item126 Scor
Listwise	5.4699	5.6386	5.0723	5.5964	5.7229	4.8313	5.1024	5.3855	5.4398	5.4578	5.5060	5.6024	5.3735
All Values	5.4091	5.5736	5.0328	5.6205	5.6718	4.7219	5.0263	5.3679	5.4241	5.3763	5.4278	5.5312	5.3161
EM	5.4130	5.5639	5.0230	5.6270	5.6811	4.7345	5.0347	5.3436	5.4007	5.3803	5.4417	5.5207	5.3121

Note: Based on a non-normal distribution

Estimated standard deviations

	Item73	Item74	Item78	Item79	Item87	Item90	Item92	Item97	Item110	Item118	Item124	Item125	Item126
Listwise	1.66123	1.53408	1.59380	1.63291	1.47967	1.77402	1.62790	1.70796	1.51537	1.54764	1.58304	1.42650	1.78350
All Values	1.70973	1.56522	1.60665	1.57611	1.51453	1.81324	1.66646	1.69693	1.53666	1.58610	1.63920	1.50011	1.79078
EM	1.70924	1.57016	1.58281	1.57295	1.51380	1.80327	1.65607	1.70571	1.54668	1.58203	1.64299	1.49450	1.78194

Note: Based on a normal distribution

	Item73	Item74	Item78	Item79	Item87	Item90	Item92	Item97	Item110	Item118	Item124	Item125	Item126
Listwise	1.66123	1.53408	1.59380	1.63291	1.47967	1.77402	1.62790	1.70796	1.51537	1.54764	1.58304	1.42650	1.78350
All Values	1.70973	1.56522	1.60665	1.57611	1.51453	1.81324	1.66646	1.69693	1.53666	1.58610	1.63920	1.50011	1.79078
EM	1.70393	1.56798	1.57942	1.57329	1.50859	1.80084	1.65274	1.70198	1.53998	1.57661	1.63986	1.48831	1.77880

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 260.390, DF = 219, Sig. = .029 (Norm)

Little's MCAR test: Chi-Square = 263.545, DF = 219, Sig. = .021 (NonNorm)

UP-VI-IPS was split into two further subsets:

Split 1 (items 73, 78, 79, 87, 97, 110, 118, 124, 125, 126):

Estimated means

	Item73	Item78	Item79	Item87	Item97	Item110	Item118	Item124	Item125	Item126
Listwise	5.4611	5.0778	5.5928	5.7186	5.3832	5.4192	5.4431	5.5090	5.5868	5.3533
All Values	5.4091	5.0328	5.6205	5.6718	5.3679	5.4241	5.3763	5.4278	5.5312	5.3161
EM	5.4039	5.0430	5.6265	5.6735	5.3311	5.3995	5.3750	5.4325	5.5122	5.3066

Note: Based on a normal distribution

	Item73	Item78	Item79	Item87	Item97	Item110	Item118	Item124	Item125	Item126
Listwise	5.4611	5.0778	5.5928	5.7186	5.3832	5.4192	5.4431	5.5090	5.5868	5.3533
All Values	5.4091	5.0328	5.6205	5.6718	5.3679	5.4241	5.3763	5.4278	5.5312	5.3161
EM	5.4119	5.0498	5.6279	5.6800	5.3372	5.4054	5.3805	5.4390	5.5198	5.3128

Note: Based on a non-normal distribution

Estimated standard deviations

	Item73	Item78	Item79	Item87	Item97	Item110	Item118	Item124	Item125	Item126
Listwise	1.66012	1.59061	1.62864	1.47626	1.70307	1.53407	1.55465	1.57873	1.43638	1.79718
All Values	1.70973	1.60665	1.57611	1.51453	1.69693	1.53666	1.58610	1.63920	1.50011	1.79078
EM	1.70922	1.58943	1.57213	1.51285	1.71283	1.54272	1.58176	1.64812	1.49427	1.78303

Note: Based on a normal distribution

	Item73	Item78	Item79	Item87	Item97	Item110	Item118	Item124	Item125	Item126
Listwise	1.66012	1.59061	1.62864	1.47626	1.70307	1.53407	1.55465	1.57873	1.43638	1.79718
All Values	1.70973	1.60665	1.57611	1.51453	1.69693	1.53666	1.58610	1.63920	1.50011	1.79078
EM	1.70376	1.58539	1.57171	1.50822	1.70848	1.53759	1.57745	1.64407	1.48973	1.78021

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 122.574, DF = 134, Sig. = .751 (Norm)

Little's MCAR test: Chi-Square = 123.625, DF = 134, Sig. = .729 (NonNorm)

Split 2 (items 74, 90 & 92):

Estimated means

	Item74	Item90	Item92
Listwise	5.5730	4.7405	5.0432
All Values	5.5736	4.7219	5.0263
EM	5.5674	4.7216	5.0157

Note: Based on a normal distribution

	Item74	Item90	Item92
Listwise	5.5730	4.7405	5.0432
All Values	5.5736	4.7219	5.0263
EM	5.5676	4.7219	5.0161

Note: Based on a non-normal distribution

Estimated standard deviations

	Item74	Item90	Item92
Listwise	1.58331	1.80209	1.66755
All Values	1.56522	1.81324	1.66646
EM	1.56614	1.80700	1.66468

Note: Based on a normal distribution

	Item74	Item90	Item92
Listwise	1.58331	1.80209	1.66755
All Values	1.56522	1.81324	1.66646
EM	1.56611	1.80684	1.66445

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 10.445, DF = 7, Sig. = .165 (Norm)

Little's MCAR test: Chi-Square = 10.448, DF = 7, Sig. = .165 (NonNorm)

Little's MCAR for VRHIPO

Estimated means

	Item36	Item42	Item46	Item48	Item50	Item59
Listwise	5.7026	5.9128	5.9846	5.4308	5.9538	5.6410
All Values	5.6919	5.8900	5.9604	5.3483	5.9265	5.5879
EM	5.6584	5.8761	5.9610	5.3375	5.9265	5.5672

Note: Based on a normal distribution

	Item36	Item42	Item46	Item48	Item50	Item59
Listwise	5.7026	5.9128	5.9846	5.4308	5.9538	5.6410
All Values	5.6919	5.8900	5.9604	5.3483	5.9265	5.5879
EM	5.6602	5.8781	5.9625	5.3395	5.9274	5.5698

Note: Based on a non-normal distribution

Estimated standard deviations

	Item36	Item42	Item46	Item48	Item50	Item59
Listwise	1.16378	1.01412	.99212	1.56938	1.11823	1.24120
All Values	1.16246	1.04082	1.01158	1.63343	1.12275	1.28749
EM	1.18015	1.04476	1.00883	1.63659	1.12275	1.29586

Note: Based on a normal distribution

	Item36	Item42	Item46	Item48	Item50	Item59
Listwise	1.16378	1.01412	.99212	1.56938	1.11823	1.24120
All Values	1.16246	1.04082	1.01158	1.63343	1.12275	1.28749
EM	1.17913	1.04191	1.00725	1.63527	1.12261	1.29369

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 50.491, DF = 24, Sig. = .001 (Norm)

Little's MCAR test: Chi-Square = 50.639, DF = 24, Sig. = .001 (NonNorm)

Subset Split:

Despite items 36, 48 and 59 being most problematic, further analysis on splitting the subset by these items still revealed a significant result:

Little's MCAR test: Chi-Square = 19.916, DF = 6, Sig. = .003 (Norm)

Little's MCAR test: Chi-Square = 19.938, DF = 6, Sig. = .003 (NonNorm)

Therefore viable subsets were determined:

Subset 1 (items 36, 42):

Estimated means

	Item36	Item42
Listwise	5.7005	5.9086
All Values	5.6919	5.8900
EM	5.6789	5.8854

Note: Based on a normal distribution

	Item36	Item42
Listwise	5.7005	5.9086
All Values	5.6919	5.8900
EM	5.6798	5.8866

Note: Based on a non-normal distribution

Estimated standard deviations

	Item36	Item42
Listwise	1.15910	1.01105
All Values	1.16246	1.04082
EM	1.17531	1.04190

Note: Based on a normal distribution

	Item36	Item42
Listwise	1.15910	1.01105
All Values	1.16246	1.04082
EM	1.17438	1.03981

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 6.250, DF = 2, Sig. = .044 (Norm)

Little's MCAR test: Chi-Square = 6.270, DF = 2, Sig. = .043 (NonNorm)

Subset 2 (items 46, 50, 59):

Estimated means

	Item46	Item50	Item59
Listwise	5.9648	5.9397	5.5879
All Values	5.9604	5.9265	5.5879
EM	5.9609	5.9265	5.5804

Note: Based on a normal distribution

	Item46	Item50	Item59
Listwise	5.9648	5.9397	5.5879
All Values	5.9604	5.9265	5.5879
EM	5.9611	5.9268	5.5807

Note: Based on a non-normal distribution

Estimated standard deviations

	Item46	Item50	Item59
Listwise	1.00693	1.11300	1.28749
All Values	1.01158	1.12275	1.28749
EM	1.00906	1.12275	1.29145

Note: Based on a normal distribution

	Item46	Item50	Item59
Listwise	1.00693	1.11300	1.28749
All Values	1.01158	1.12275	1.28749
EM	1.00888	1.12235	1.29127

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 2.613, DF = 3, Sig. = .455 (Norm)

Little's MCAR test: Chi-Square = 2.615, DF = 3, Sig. = .455 (NonNorm)

Subset 3 (items 42, 46, 48, 50):

Estimated means

	Item42	Item46	Item48	Item50
Listwise	5.8894	5.9698	5.3819	5.9447
All Values	5.8900	5.9604	5.3483	5.9265
EM	5.8796	5.9610	5.3460	5.9265

Note: Based on a normal distribution

	Item42	Item46	Item48	Item50
Listwise	5.8894	5.9698	5.3819	5.9447
All Values	5.8900	5.9604	5.3483	5.9265
EM	5.8798	5.9612	5.3466	5.9268

Note: Based on a non-normal distribution

Estimated standard deviations

	Item42	Item46	Item48	Item50
Listwise	1.04342	1.00960	1.60645	1.11553
All Values	1.04082	1.01158	1.63343	1.12275
EM	1.04377	1.00882	1.62993	1.12275

Note: Based on a normal distribution

	Item42	Item46	Item48	Item50
Listwise	1.04342	1.00960	1.60645	1.11553
All Values	1.04082	1.01158	1.63343	1.12275
EM	1.04362	1.00870	1.62941	1.12243

Note: Based on a non-normal distribution

Little's MCAR test: Chi-Square = 10.117, DF = 8, Sig. = .257 (Norm)

Little's MCAR test: Chi-Square = 10.123, DF = 8, Sig. = .257 (NonNorm)

Appendix O:
Intercorrelations between MTCS subscales

	TCHIIPS	VRHIIPS	VRHIPO	VRVIIPS	VRVIPO	TCHIIPO	TCVIIPS	TCVIPO	SCHIIPS	SCHIIPO	SCVIIPS	SCVIPO	UPHIIPS	UPHIPO	UPVIIPS	UPVIPO
TCHIIPS	.819															
VRHIIPS	.865(**)	.857														
VRHIPO	.854(**)	.792(**)	.895													
VRVIIPS	.562(**)	.629(**)	.498(**)	.890												
VRVIPO	.576(**)	.578(**)	.584(**)	.781(**)	.911											
TCHIIPO	.813(**)	.731(**)	.839(**)	.462(**)	.547(**)	.746										
TCVIIPS	.566(**)	.599(**)	.521(**)	.839(**)	.790(**)	.474(**)	.886									
TCVIPO	.581(**)	.590(**)	.622(**)	.720(**)	.868(**)	.605(**)	.769(**)	.880								
SCHIIPS	.802(**)	.870(**)	.758(**)	.591(**)	.561(**)	.693(**)	.572(**)	.612(**)	.912							
SCHIIPO	.621(**)	.617(**)	.736(**)	.328(**)	.430(**)	.713(**)	.360(**)	.563(**)	.723(**)	.775						
SCVIIPS	.517(**)	.582(**)	.478(**)	.793(**)	.756(**)	.485(**)	.805(**)	.734(**)	.626(**)	.457(**)	.899					
SCVIPO	.496(**)	.544(**)	.526(**)	.730(**)	.837(**)	.519(**)	.732(**)	.869(**)	.560(**)	.530(**)	.840(**)	.921				
UPHIIPS	.848(**)	.854(**)	.854(**)	.588(**)	.637(**)	.793(**)	.609(**)	.677(**)	.850(**)	.711(**)	.623(**)	.603(**)	.878			
UPHIPO	.805(**)	.784(**)	.896(**)	.483(**)	.564(**)	.851(**)	.529(**)	.637(**)	.785(**)	.793(**)	.537(**)	.551(**)	.880(**)	.913		
UPVIIPS	.653(**)	.684(**)	.649(**)	.857(**)	.824(**)	.553(**)	.889(**)	.809(**)	.672(**)	.487(**)	.809(**)	.811(**)	.732(**)	.660(**)	.945	
UPVIPO	.614(**)	.601(**)	.648(**)	.752(**)	.877(**)	.577(**)	.796(**)	.878(**)	.598(**)	.526(**)	.726(**)	.841(**)	.699(**)	.636(**)	.878(**)	.944

Appendix R

Table R1: Four factor structure of the MTCS

	Dimension	Factor				Extraction	Initial
		1	2	3	4		
Item 71	TCVIIPS	0.715				0.576	0.722
Item 76	TCVIIPS	0.891				0.751	0.826
Item 77	TCVIIPS	0.84		-0.329		0.706	0.808
Item 82	TCVIIPS	0.833				0.727	0.808
Item 86	TCVIIPS	0.774				0.679	0.76
Item 88	TCVIIPS	0.434				0.295	0.444
Item 66	VRVIIPS	0.759				0.712	0.798
Item 67	VRVIIPS	0.671				0.524	0.651
Item 81	VRVIIPS	0.923				0.749	0.776
Item 85	VRVIIPS	0.797				0.743	0.81
Item 73	UPVIIPS	0.857				0.758	0.812
Item 74	UPVIIPS	0.658				0.667	0.737
Item 79	UPVIIPS	0.725				0.58	0.695
Item 87	UPVIIPS	0.526				0.557	0.661
Item 90	UPVIIPS	0.498				0.437	0.611
Item 97	UPVIIPS	0.857				0.804	0.84
Item 110	UPVIIPS	0.685				0.607	0.705
Item 118	UPVIIPS	0.785				0.749	0.808
Item 124	UPVIIPS	0.716				0.754	0.836
Item 125	UPVIIPS	0.656				0.759	0.821
Item 126	UPVIIPS	0.735				0.751	0.848
Item 1	TCHIIPS		0.545			0.493	0.622
Item 14	TCHIIPS		0.761			0.57	0.718
Item 18	TCHIIPS		0.43			0.36	0.498
Item 19	TCHIIPS		0.653			0.477	0.595
Item 22	TCHIIPS		0.646			0.577	0.672
Item 30	TCHIIPS		0.639			0.508	0.709
Item 11	VRHIIPS		0.399			0.484	0.64
Item 15	VRHIIPS		0.789			0.657	0.746
Item 17	VRHIIPS		0.781			0.717	0.738
Item 25	VRHIIPS		0.721			0.7	0.77
Item 29	VRHIIPS		0.685	0.397		0.689	0.713
Item 33	VRHIIPS		0.638			0.622	0.709
Item 4	UPHIIPS		0.819			0.668	0.748
Item 5	UPHIIPS		0.523			0.507	0.668
Item 6	UPHIIPS		0.68			0.507	0.64
Item 9	UPHIIPS		0.386			0.479	0.641
Item 12	UPHIIPS		0.727			0.524	0.566
Item 16	UPHIIPS		0.873			0.706	0.762
Item 27	UPHIIPS		0.579			0.608	0.733
Item 31	UPHIIPS					0.256	0.512

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

Table R2: Six factor structure of the MTCS

Dimensions		Factor						Extraction	Initial
		1	2	3	4	5	6		
Item 71	TCVIIPS	0.516						0.657	0.722
Item 77	TCVIIPS	0.663						0.724	0.808
Item 82	TCVIIPS	0.481						0.751	0.808
Item 88	TCVIIPS	0.469						0.309	0.444
Item 73	UPVIIPS	0.504						0.753	0.812
Item 97	UPVIIPS	0.584						0.804	0.84
Item 118	UPVIIPS	0.508						0.747	0.808
Item 124	UPVIIPS	0.604						0.747	0.836
Item 125	UPVIIPS	0.661						0.753	0.821
Item 126	UPVIIPS	0.796						0.824	0.848
Item 1	TCHIIPS		0.383					0.508	0.622
Item 19	TCHIIPS		0.454					0.521	0.595
Item 29	VRHIIPS		0.598					0.681	0.713
Item 6	UPHIIPS		0.58					0.565	0.64
Item 9	UPHIIPS		0.66					0.584	0.641
Item 12	UPHIIPS		0.415					0.541	0.566
Item 27	UPHIIPS		0.646					0.653	0.733
Item 22	TCHIIPS			-0.563				0.594	0.672
Item 11	VRHIIPS			-0.413				0.499	0.64
Item 15	VRHIIPS			-0.534				0.674	0.746
Item 17	VRHIIPS			-0.602				0.717	0.738
Item 25	VRHIIPS			-0.713				0.757	0.77
Item 14	TCHIIPS				0.595			0.686	0.718
Item 4	UPHIIPS				0.523			0.696	0.748
Item 16	UPHIIPS				0.499			0.723	0.762
Item 86	TCVIIPS					0.396		0.682	0.76
Item 66	VRVIIPS					0.689		0.761	0.798
Item 67	VRVIIPS					0.642		0.598	0.651
Item 85	VRVIIPS					0.669		0.784	0.81
Item 74	UPVIIPS					0.355		0.672	0.737
Item 79	UPVIIPS					0.567		0.644	0.695
Item 90	UPVIIPS						0.565	0.535	0.611
Item 31	UPHIIPS						0.859	0.653	0.512
Item 76	TCVIIPS	0.508				0.377		0.75	0.826
Item 81	VRVIIPS	0.487				0.42		0.747	0.776
Item 87	UPVIIPS			-0.337		0.423		0.582	0.661
Item 110	UPVIIPS	0.362				0.383		0.615	0.705
Item 18	TCHIIPS							0.368	0.498
Item 30	TCHIIPS		0.508	-0.419				0.613	0.709
Item 33	VRHIIPS		0.42			0.34		0.674	0.709
Item 5	UPHIIPS							0.526	0.668

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

The Multidimensional Team Cohesion Scale (MTCS)

Instructions

Please read the instructions below carefully before completing the questionnaire.

Purpose: This questionnaire seeks to develop an understanding of how well your team works together.

Contents: The questionnaire contains FOUR sections.

Section one: Background and About Your Team.

Section two: The Individual - relating to how well you and your fellow team members get on with each other.

Section three: The Team - relating to how well you feel your team members get on with each other.

Section four: The Team Leader - relating to how well you and your fellow team members get on with the team leader.

If you are the team leader, please answer the questions about your own immediate team leader.

Please respond to all items within the questionnaire as honestly as possible, rating your level of agreement or disagreement along the scale below, for example:

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

If you do not know the answer to any of the items then please check the 'Don't Know' box at the end of the scale

Please read each item carefully and provide your first thoughts and strength of feeling. There are no right or wrong answers.

Please complete the questionnaire for the team you CURRENTLY work in for the majority of your time, i.e. for the team members and team leader you work with on a regular basis.

The questionnaire should take no longer than 15 minutes to complete.

Confidentiality:

All answers to the questionnaire will be made anonymous and treated in the strictest confidence. Answers to the questionnaire will not be used to assess your performance or the performance of your team members or team leader.

Section 1: Background & About Your Team

Background

1. What is your current job category?

Accountancy	<input type="radio"/>	Finance & Banking	<input type="radio"/>	Marketing & PR	<input type="radio"/>
Admin / Secretarial	<input type="radio"/>	Government	<input type="radio"/>	Public Sector	<input type="radio"/>
Armed Forces	<input type="radio"/>	Health	<input type="radio"/>	Retail	<input type="radio"/>
Automotive	<input type="radio"/>	Human Resources	<input type="radio"/>	Sales	<input type="radio"/>
Building Industry	<input type="radio"/>	Legal	<input type="radio"/>	Scientific & Technical	<input type="radio"/>
Education	<input type="radio"/>	Managerial	<input type="radio"/>	Other	<input type="radio"/>
Engineering	<input type="radio"/>	Manufacturing	<input type="radio"/>		

2. How many years experience do you have in your current job role?

0-5 yrs	<input type="radio"/>	6-10 yrs	<input type="radio"/>	11-15 yrs	<input type="radio"/>	16-20 yrs	<input type="radio"/>	21 + yrs	<input type="radio"/>
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3. Are you male or female?

Male	<input type="radio"/>	Female	<input type="radio"/>
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4. What is your current age?

16-20 yrs	<input type="radio"/>	21-30 yrs	<input type="radio"/>	31-40 yrs	<input type="radio"/>	41-50 yrs	<input type="radio"/>	51-60 yrs	<input type="radio"/>
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61 yrs +	<input type="radio"/>
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About Your Team (i.e. the team with which you spend the majority of your time)

1. How long have you been a member of your current team?

<input type="text"/> Years	and	<input type="text"/> Months
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2. How many members are in your current team?

<input type="text"/> members

3. What position do you hold within your current team?

Team Member	<input type="radio"/>	Team Leader	<input type="radio"/>
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Have there been any factors that have contributed to a change (if any) to the level of cohesion within your team (i.e. the team in which you conduct your work) since you last completed the Multidimensional Team Cohesion Questionnaire (MTCS)?

Section 2: The Individual

Please read the following items carefully and rate your level of agreement or disagreement based on how well you feel you get on in within the team. Please answer the items for the SAME team.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1 I am content with the tasks that I do within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2 I feel a part of what happens in the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 I share a similar commitment to the overall objective of the team as other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4 I do not share the same way of thinking as my fellow team members about how to achieve the goals of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5 The rules of the team do not make sense to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6 I do not feel a sense of belonging to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7 I am enthusiastic about the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 I do not feel that I am encouraged to express my opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9 I am not proud of my team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10 I do not feel that my contributions to the team are adequately recognised.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 I feel that the team work well together to achieve the goals of the team under difficult conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12 I share the same levels of commitment in conducting the team's tasks as my fellow team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13 I feel that the other members of the team value my role within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14 I have a shared understanding of the goals of the team as other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15 I value the roles of other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
16 My team members do not help me develop new skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17 The team provides me with good opportunities to improve my existing skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18 I enjoy the opportunity to work with other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19 The social contact that I have in the team is important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20 I am good friends with my fellow team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21 I value the support my team members give me in my role.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22 I do not like being part of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23 I do not feel that the team work well together to achieve the goals of the team under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24 My team members make me feel an accepted member of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25 I am proud of my role within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26 I do not feel that my team members adequately support me in achieving my tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27 I have similar experiences to others in the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28 I feel I can go to most members of my team when I need personal support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29 I am unhappy with my role in the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30 I feel I can offer personal support to team members when it is needed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 3: The Team

Please read the following items carefully and rate your level of agreement or disagreement based on how well your team members get on with one another. Please answer the items for the SAME team.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
31 Members of the team do not enjoy the tasks conducted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32 Team members are proud of their roles within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33 We are all good friends in this team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34 Members of the team work well together to achieve the goals of the team under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35 Members of the team feel very close to one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36 Members of the team do not share the same levels of commitment in conducting the team's tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37 Team members value the support they receive in their role from other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38 Team members generally agree on what to do to reach team goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39 Team members enjoy each others company.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40 We help each other develop new skills within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
41 Team members do not value each other's role within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42 The rules of the team do not make sense to team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43 Team members do not feel adequately recognised for their contribution to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44 Members of the team do not support each other in their role.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45 Team members share the same way of thinking about how to achieve the goals of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
46 Team members provide each other with encouragement in completing their tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
47 Members of the team regularly share their experiences with one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
48 Team members do not encourage one another to express their opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
49 Members of the team have similar experiences to one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
50 Members of the team are happy with their roles.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
51 Members of the team work well together to achieve the goals of the team under difficult conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
52 There is not a sense of shared purpose within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
53 Members of the team do not see the team as an important social unit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
54 Team members do not have a shared understanding of the goals of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 4: The Team Leader

Please read the following items carefully and rate your level of agreement or disagreement based on how well you feel you and your fellow team members get on with the team leader. Please answer the items for the SAME team.

PART A

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
55 I am friends with my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
56 My team leader does not adequately recognise my contribution to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
57 I value the role of my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
58 I do not feel that my team leader provides me with adequate guidance in my tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
59 My team leader sets me clear goals to work towards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
60 My team leader encourages me to express my opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
61 I feel close to my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
62 I am confident in my team leader's ability to do their job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
63 My team leader is important to the success of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
64 I feel that my team leader treats people fairly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
65 I value the support my team leader gives me in my role.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
66 I do not feel my team leader helps me to develop my skills within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
67 My team leader goes out of their way to make me feel happy within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
68 I do not feel that my team leader values my role.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
69 My team leader does not provide me with encouragement in my tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
70 I do not share my work experiences with my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
71 My team leader is not committed to the long term success of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
72 I am proud to be working with my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
73 I have similar experiences to my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
74 My team leader does not take an interest in my personal welfare.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PART B

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
75 Team members feel that the team leader helps them to develop their skills within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
76 Team members feel that the team leader sets clear rules for the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
77 My team leader does not set clear rules for the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
78 Team members feel that the team leader helps the team work well together to achieve its goals under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
79 Team members do not feel close to our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
80 Our team leader values team members' roles within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
81 Team members are proud to be working with our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
82 Team members do not feel that the team leader treats people fairly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
83 Team members are receptive to feedback from the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
84 Our team leader adequately recognises team members' contributions to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
85 Team members regularly share their work experiences with the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
86 Team members have similar experiences with the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
87 My team leader does not share the same goals as the team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
88 Team members feel that the team leader shares the same goals as the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
89 Our team leader tries to help team members feel happy within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
90 Team members do not value the role of our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
91 Team members do not feel that the team leader is important to the success of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
92 Team members are unhappy with the guidance provided by the team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
93 Team members are friends with our team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
94 My team leader helps the team to work well together to achieve the goals of the team under difficult conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
95 Team members do not feel that the team leader encourages them to express their opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
96 Our team leader is not interested in the personal welfare of team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
97 Team members are content with the level of encouragement provided by the team leader in completing tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
98 Team members feel that the team leader helps the team work well together to achieve its goals under difficult conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
99 Our team leader does not set clear goals for the team to work towards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
100 My team leader helps the team to work well together to achieve the goals of the team under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
101 My team leader does not instil a sense of shared purpose within the team.	<input type="radio"/>	<input type="radio"/> </					

Appendix T:
Full list of Group Environment Questionnaire (GEQ) items

Item No.	GEQ Items	Dimension
1	I do not enjoy being a part of the social activities of this team	ATG-S
2	I am not happy with the amount of playing time I get.	ATG-T
3	I am not going to miss the members of this team when the season ends.	ATG-S
4	I am unhappy with my team's level of desire to win.	ATG-T
5	Some of my best friends are on this team.	ATG-S
6	This team does not give me enough opportunities to improve my personal performance.	ATG-T
7	I enjoy other parties more than team parties.	ATG-S
8	I do not like the style of play on this team.	ATG-T
9	For me, this team is one of the most important social groups to which I belong.	ATG-S
10	Our team is united in trying to reach its goals for performance.	GI-T
11	Members of our team would rather go out on their own than get together as a team.	GI-S
12	We all take responsibility for any loss or poor performance by our team.	GI-T
13	Our team members rarely party together.	GI-S
14	Our team members have conflicting aspirations for the team's performance.	GI-T
15	Our team would like to spend time together in the off season.	GI-S
16	If members of our team have problems in practice, everyone wants to help them so we can get back together again.	GI-T
17	Members of our team do not stick together outside of practices and games.	GI-S
18	Members of our team do not communicate freely about each athlete's responsibilities during competition or practice.	GI-T

Appendix U:

The full list of items of the Team Performance Questionnaire (TPQ)

In our team...

SECTION A

1. We are clear about the team's goals.
2. Our goals are inspiring to team members.
3. Members understand their responsibilities and accountability.
4. We set high standards for our team's performance.
5. We continually strive to improve our performance and product.

SECTION B

6. Members collaborate with one another.
7. Members feel a sense of belonging to the team.
8. We are able to share information and ideas freely and honestly.
9. The ideas of every team member are valuable.
10. Team members work well together.

SECTION C

11. The team is organized effectively to do our work.
12. Each team member is able to fully use his/her skills and abilities.
13. We capitalize on the strengths of team members.
14. Each team member is encouraged to develop new competencies.
15. Team meetings are efficient and productive.

SECTION D

16. Members are able to communicate easily with one another.
17. Each member is able to influence the team's decisions.
18. We accept each other's opinions as valid and important.
19. We are able to discuss and resolve conflicts.
20. We solve team problems as a group.

SECTION E

21. We demonstrate our desire to do our best.
22. Each member demonstrates commitments to the team.
23. Members go out of their way to get things done.
24. Each member is clear about and identifies with the team's values.
25. Members demonstrate a high level of energy and enthusiasm.

Answer the following items about your team leader:

26. Our leader demonstrates a high level of integrity.
27. Our leader keeps the team informed.
28. Our leader sets clear expectations for individuals and the team.
29. Our leader confronts performance problems.
30. Our leader rewards superior performance.
31. Our leader expresses appreciation for members' contributions.
32. Our leader involves members in decision making.

Appendix V:

Screenshots of the final version of the MTCS and criterion measures selected for the validation phase, administered via SurveyMonkey

The Multidimensional Team Cohesion Scale (MTCS)

INSTRUCTIONS

Please read the instructions below carefully before completing the questionnaire.

PURPOSE: This questionnaire seeks to develop an understanding of how well your team works together.

CONTENTS: The questionnaire contains FOUR sections.

- Section One:** Background and About Your Team
- Section Two:** The Individual - relating to how well you and your fellow team members get on with each other.
- Section Three:** The Team - relating to how well you feel your team members get on with each other.
- Section Four:** The Team Leader - relating to how well you and your fellow team members get on with the team leader. If you are the team leader, please answer the questions about your own immediate team leader.

Please read each item carefully and provide your first thoughts and feeling. There are no right and wrong answers.

Please complete the questionnaire for the team you CURRENTLY work in for the majority of your time, i.e. for the team members and team leader you work with on a regular basis.

Any repetitive questions are intentional and are an important aspect of this research.

CONFIDENTIALITY: All answers to the questionnaire will be made anonymous and treated in the strictest confidence. Answers to the questionnaire will not be used to assess your performance or the performance of your team members or team leader.

Please respond to all items within the questionnaire as honestly as possible, rating your level of agreement or disagreement along the scale below, for example:

Strongly Disagree Disagree Slightly Disagree Neutral Slightly Agree Agree Strongly Agree

Section 1: Background & About Your Team

Background:

What is your current job role?

<input type="radio"/> Accountancy	<input type="radio"/> Finance & Banking	<input type="radio"/> Marketing & PR
<input type="radio"/> Admin / Secretarial	<input type="radio"/> Government	<input type="radio"/> Public Sector
<input type="radio"/> Armed Forces	<input type="radio"/> Health	<input type="radio"/> Retail
<input type="radio"/> Automotive	<input type="radio"/> Human Resources	<input type="radio"/> Sales
<input type="radio"/> Building Industry	<input type="radio"/> Legal	<input type="radio"/> Scientific & Technical
<input type="radio"/> Education	<input type="radio"/> Managerial	<input type="radio"/> Other
<input type="radio"/> Engineering	<input type="radio"/> Manufacturing	

How many years experience do you have in your current job role?

<input type="radio"/> 0 - 5 yrs	<input type="radio"/> 11 - 15 yrs	<input type="radio"/> 21 + yrs
<input type="radio"/> 6 - 10 yrs	<input type="radio"/> 16 - 20 yrs	

Are you male or female?

☐ Male

☐ Female

What is your current age?

<input type="radio"/> 16 - 20 yrs	<input type="radio"/> 31 - 40 yrs	<input type="radio"/> 51 - 60 yrs
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About Your Team (i.e. the team with which you spend the majority of your time):

How long have you been a member of your current team?

Years

Months

How many members are in your current team?

What position do you hold within your current team?

☐ Team Member

☐ Team Leader

Have there been any factors that have contributed to a change (if any) to the level of cohesion within your team (i.e. the team in which you conduct your work) since you last completed the Multidimensional Team Cohesion Questionnaire (MTCQ)?

Prev Next

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Section 2: The Individual

***Please read the following items carefully and rate your level of agreement or disagreement based on how well you feel you get on in within the team. Please answer the items for the SAME team.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
I share a similar commitment to the overall objective of the team as other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not feel a sense of belonging to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am content with the tasks that I do within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not share the same way of thinking as my fellow team members about how to achieve the goals of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not feel that I am encouraged to express my opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am enthusiastic about the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The rules of the team do not make sense to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel a part of what happens in the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* -							
I do not feel that my contributions to the team are adequately recognised.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that the other members of the team value my role within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Section 3: The Team

***Please read the following items carefully and rate your level of agreement or disagreement based on how well your team members get on with one another. Please answer the items for the SAME team.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
Members of the team feel very close to one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team members are proud of their roles within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Members of the team work well together to achieve the goals of the team under easy conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Members of the team do not share the same levels of commitment in conducting the team's tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team members enjoy each others company.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Members of the team do not enjoy the tasks conducted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team members value the support they receive in their role from other team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are all good friends in this team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team members generally agree on what to do to reach team goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*-

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
Members of the team share similar opinions about people or ideas,	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Section 4: The Team Leader

***Please read the following items carefully and rate your level of agreement or disagreement based on how well you feel you get on with your team leader. Please answer the items for the SAME team.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
I feel close to my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am receptive to feedback from my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My team leader sets me clear goals to work towards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am friends with my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My team leader encourages me to express my opinions within the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I value the role of my team leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not feel that my team leader provides me with adequate guidance in my tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My team leader does not adequately recognise my contribution to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*-

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
I do not feel that my team leader values my role.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My team leader does not provide me with encouragement in my tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My team leader goes out of their way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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The Group Environment Questionnaire (GEQ)

*The following questions relate to your team experience. Please provide a response to each of the questions presented below:

	Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9
I do not enjoy being a part of the social activities of this team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our team is united in trying to reach its goals for performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am not going to miss the members of this team when the team disbands.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy other social events more than team social events.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am unhappy with my team's level of commitment to the task.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For me, this team is one of the most important social groups to which I belong.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This team does not give me enough opportunities to improve my personal performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Some of my best friends are in this team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* -

	Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9
Our team members rarely socialise together.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Members of our team do not communicate freely about each other's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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The Team Performance Questionnaire (TPQ)

*Please answer section A through E below about your team:

SECTION A

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We set high standards for our team's performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our goals are inspiring to team members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We continually strive to improve our performance and product.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are clear about the team's goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Members understand their responsibilities and accountability.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

***SECTION B**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Members collaborate with one another.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are able to share information and ideas freely and honestly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team members work well together.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Members feel a sense of belonging to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The ideas of every team member are valuable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

***SECTION C**

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Google Search

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The Overall Job Satisfaction Measure

***Please rate your level of agreement with the following items:**

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
All in all, I am satisfied with my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In general, I like working here.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In general, I don't like my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Appendix W:
The modified version of the GEQ

Background

Background to the Development of the GEQ:

The Group Environment Questionnaire (GEQ) presented in the following pages was developed by Albert Carron, Lawrence Brawley, and Neil Widmeyer (1985)¹⁹ to measure team cohesion. They define team cohesion as:

'a dynamic process reflected in the tendency for a group to stick together and remain united in the pursuit of instrumental objectives and/or the satisfaction of member affective needs'

Their questionnaire was developed specifically for use within recreational and competitive sports teams. Its validity in this context has been established for both male and female athletes aged between 18 and 30 within North America. Its validity within work teams has independently been established by Carless & De Paola (2000)²⁰ within Australian public sector retail outlets.

Purpose of the Research:

The purpose of this research is to investigate whether the validity of Carless & De Paola's (2000) adapted version of the GEQ with some additional modifications holds within a UK organizational work team context. The research aims to collect feedback from members of organizational work teams on the relevance of the items within this context.

Contents:

This document contains THREE sections.

Instructions for your assistance in this research are provided in Section 1.

The GEQ: Carless & De Paola's (2000) adapted version of the GEQ is presented in section 2 with some additional modifications.

The GEQ Feedback Proforma: The feedback proforma provides a number of questions about the content of the modified items in the GEQ.

Information to Respondents:

Please send replies back via the following email address: hmsdavey@qinetiq.com by no later than **29th August 2008**.

¹⁹ Carron, A.V., Widmeyer, W.N., and Brawley, L.R. (1985). The development of an instrument to assess cohesion in sport teams. The Group Environment Questionnaire. *Journal of Sport Psychology*, 7, 244-266.

²⁰ Carless, S.A., and De Paola, C. (2000). The Measurement of Cohesion in Work Teams. *Small Group Research*, 31(1), 71-88.

For further information about this research, I will be glad to answer any questions that you have about this study at any time. I can be contacted at the email address above.

Section1: Instructions

The modified version of the GEQ provided in Section 2 presents 16 items tapping social and task based aspects of cohesion reflecting both the individual's feelings about their own role within the group as well as their feelings about the team as a whole. Level of cohesion is rated on a 9-point Likert scale shown below, ranging from 1 (Strongly Disagree) to 9 (Strongly Agree).

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

Please carefully review all of the items within the scale thinking about the following:

- The relevance of their wording to the organizational context in which you work
- The clarity of the wording of the items.
- Any modifications that you feel may be required to enhance their relevance and comprehensibility.

Once you have reviewed all items, please provide answers to the questions in the feedback proforma provided in Section 3 as fully as possible.

Section 2: The Group Environment Questionnaire (GEQ)

1. I do not enjoy being a part of the social activities of this team.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

2. I am not going to miss the members of this team when the team disbands.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

3. I am unhappy with my team's level of commitment to the task.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

4. Some of my best friends are in this team.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

5. This team does not give me enough opportunities to improve my personal performance.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

6. I enjoy other social events more than team social events.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

7. For me, this team is one of the most important social groups to which I belong.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

8. Our team is united in trying to reach its goals for performance.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

9. Members of our team would rather go out on their own than get together as a team.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

10. We all take responsibility for any loss or poor performance by our team.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

11. Our team members rarely socialise together.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

12. Our team members have conflicting aspirations for the team's performance.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

13. Our team would like to spend time together outside of work hours.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

14. If members of our team have problems in work, everyone wants to help them so we can get back together again.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

15. Members of our team do not stick together outside work time.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

16. Members of our team do not communicate freely about each other's responsibilities during work time.

Strongly Disagree 1	2	3	4	5	6	7	8	Strongly Agree 9

Section 3: GEQ Feedback Proforma

Current Job Role:

Years Experience:

0-5 yrs ☐ 6-10 yrs ☐ 11-15 yrs ☐

16-20 yrs ☐ 21 + yrs ☐

From your background and experience, please consider the following questions about the Group Environment Questionnaire (GEQ), answering as fully as you can. All replies will be rendered anonymous and treated in confidence. Many thanks for your assistance.

5. Are there any items within the GEQ which you feel are ambiguous and require further clarification (for example, any parts that need rewording to make them more relevant to all levels of personnel in an organization)? If yes, please explain.

6. Do the items in the modified GEQ appear representative of work team cohesion as you understand it? If no, please explain.

7. Is there anything that you feel is missing from the GEQ or incorrect? If yes, please explain.

8. Is there anything else that you would like to comment on that you feel has not been covered?

Thank you for participating in this research study.

Appendix X:
Skewness and kurtosis values for the validity phase MTCS items

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
JobCat	-1.462	.166	.918	.331
YrsExp	.520	.166	-1.082	.331
Gender	1.011	.166	-.987	.331
Age	.013	.166	-.825	.331
LengthofMemb	2.179	.166	5.477	.331
NumMemb	5.395	.166	36.594	.331
Position	1.618	.166	.622	.331
Organization
Item1	-1.024	.166	-.154	.331
Item2	-1.214	.166	.703	.331
Item4	-1.637	.166	2.542	.331
Item5	-.547	.166	-.766	.331
Item6	-.976	.166	-.069	.331
Item7	-1.120	.166	.036	.331
Item8	-1.080	.166	.428	.331
Item9	-1.325	.166	.473	.331
Item10	-1.446	.166	1.592	.331
Item11	-.784	.166	-.580	.331
Item12	-1.139	.166	.911	.331
Item14	-1.114	.166	.257	.331
Item15	-1.650	.166	3.211	.331
Item16	-1.241	.166	1.641	.331
Item17	-1.712	.166	5.878	.331
Item18	-.637	.166	-.534	.331
Item19	-.877	.166	-.038	.331
Item22	-1.083	.166	3.232	.331
Item23	-.850	.166	.149	.331
Item24	-.798	.166	.344	.331
Item25	-1.378	.166	2.688	.331
Item26	-1.575	.166	2.094	.331
Item27	-1.232	.166	.667	.331
Item28	-1.639	.166	3.764	.331
Item29	-1.209	.166	1.220	.331
Item30	-1.218	.166	.820	.331
Item31	-.205	.166	-1.126	.331
Item32	-.559	.166	-.802	.331
Item33	-.868	.166	-.633	.331
Item34	-1.226	.166	2.161	.331
Item35	-.649	.166	-.709	.331
Item36	-.992	.166	.392	.331
Item37	-.918	.166	.410	.331
Item38	-1.245	.166	.985	.331
Item40	-.409	.166	-.585	.331
Item41	-.581	.166	-1.010	.331
Item42	-1.312	.166	1.583	.331
Item43	-1.406	.166	1.762	.331

Item44	-1.229	.166	1.128	.331
Item45	-.931	.166	.033	.331
Item46	-1.261	.166	1.408	.331
Item47	-.553	.166	-.814	.331
Item48	-.006	.166	-1.243	.331
Item50	-1.345	.166	1.670	.331
Item51	-.469	.166	-1.086	.331
Item53	-1.129	.166	.847	.331
Item54	-1.203	.166	1.093	.331
Item55	-1.162	.166	.694	.331
Item58	-.257	.166	-1.098	.331
Item59	-.666	.166	-.675	.331
Item60	-1.479	.166	2.019	.331
Item62	-1.006	.166	-.159	.331
Item63	-.127	.166	-1.083	.331
Item64	-.941	.166	-.077	.331
Item65	-.553	.166	-.056	.331
Item66	-.716	.166	-.671	.331
Item67	-1.225	.166	.887	.331
Item71	-.672	.166	-.736	.331
Item73	-.594	.166	-.645	.331
Item74	-1.196	.166	.649	.331
Item75	-.409	.166	-.658	.331
Item76	-1.056	.166	.226	.331
Item77	-1.026	.166	.337	.331
Item79	-1.183	.166	.501	.331
Item81	-1.056	.166	.615	.331
Item82	-.491	.166	-.839	.331
Item84	-.272	.166	-.775	.331
Item85	-1.012	.166	.071	.331
Item86	-.928	.166	-.052	.331
Item87	-.969	.166	.317	.331
Item88	-1.493	.166	1.644	.331
Item89	-.831	.166	.319	.331
Item90	.001	.166	-1.003	.331
Item91	-.917	.166	.135	.331
Item93	-.475	.166	-.504	.331
Item94	-.556	.166	-.590	.331
Item97	-.538	.166	-.783	.331
Item98	-.590	.166	-.649	.331
Item99	-.252	.166	-.919	.331
Item100	-1.237	.166	1.147	.331
Item101	-.669	.166	-.075	.331
Item104	-.899	.166	-.178	.331
Item105	-1.235	.166	1.303	.331
Item106	-.924	.166	.081	.331
Item107	-.834	.166	.311	.331
Item109	-.408	.166	-.771	.331
Item110	-.958	.166	.180	.331
Item111	-.929	.166	.161	.331
Item112	-1.161	.166	.788	.331
Item113	-.813	.166	-.241	.331
Item114	-.738	.166	-.384	.331

Item116	-.668	.166	-.650	.331
Item117	-.439	.166	-.431	.331
Item118	-.799	.166	-.195	.331
Item119	-.962	.166	.251	.331
Item120	-1.054	.166	.385	.331
Item121	-.514	.166	-.615	.331
Item122	-.833	.166	-.231	.331
Item124	-.614	.166	-.714	.331
Item125	-.826	.166	-.074	.331
Item126	-.661	.166	-.779	.331
Item127	-.841	.166	.128	.331
Item128	-1.172	.166	1.234	.331

[illegible]

Appendix Z:

Factor loadings and communalities for the 103 items of the validation version of the MTCS based on an eight factor structure

	Factors								Communalities
	1	2	3	4	5	6	7	8	
Item 125: UPVIIPS	0.71								0.73 (0.83)
Item 77: TCVIIPS	0.69								0.64 (0.78)
Item 98: UPVIIPO	0.64								0.77 (0.82)
Item 126: UPVIIPS	0.63								0.75 (0.84)
Item 128: TCVIIPO	0.62								0.62 (0.75)
Item 118: UPVIIPS	0.61								0.78 (0.88)
Item 122: UPVIIPO	0.61								0.78 (0.85)
Item 76: TCVIIPS	0.60								0.70 (0.81)
Item 101: SCVIIPO	0.60								0.78 (0.85)
Item 124: UPVIIPS	0.59								0.73 (0.83)
Item 114: TCVIIPO	0.59								0.70 (0.80)
Item 94: UPVIIPO	0.58								0.73 (0.82)
Item 127: VRVIIPO	0.57								0.78 (0.86)
Item 81: VRVIIPS	0.57								0.76 (0.85)
Item 113: VRVIIPO	0.55								0.69 (0.84)
Item 73: UPVIIPS	0.54								0.68 (0.78)
Item 97: UPVIIPS	0.54								0.68 (0.82)
Item 67: VRVIIPS	0.53								0.62 (0.77)
Item 107: UPVIIPO	0.53								0.54 (0.70)
Item 89: SCVIIPS	0.52								0.81 (0.88)
Item 88: TCVIIPS	0.50								0.35 (0.52)
Item 111: UPVIIPO	0.50								0.64 (0.76)
Item 110: UPVIIPS	0.50						0.33		0.64 (0.74)
Item 106: VRVIIPO	0.48								0.68 (0.80)
Item 116: TCVIIPO	0.47								0.65 (0.78)
Item 71: TCVIIPS	0.46								0.53 (0.71)
Item 121: TCVIIPO	0.45								0.69 (0.81)
Item 119: UPVIIPO	0.40						0.39		0.70 (0.81)
Item 105: TCVIIPO	0.39								0.42 (0.64)
Item 82: TCVIIPS	0.38						0.39		0.74 (0.79)
Item 93: TCVIIPO	0.38					-0.41			0.66 (0.74)
Item 100: VRVIIPO	0.37						0.32		0.71 (0.81)
Item 86: TCVIIPS	0.34						0.34		0.74 (0.83)
Item 79: UPVIIPS	0.33								0.64 (0.78)
Item 45: TCHIPO		0.51							0.68 (0.79)
Item 54: UPHIPO		0.42		0.35					0.58 (0.70)
Item 53: TCHIPO		0.38		0.35					0.61 (0.76)
Item 50: VRHIPO		0.38							0.69 (0.78)
Item 19: TCHIIPS		0.36			0.52				0.59 (0.72)
Item 18: TCHIIPS		0.34							0.45 (0.64)
Item 42: VRHIPO		0.34							0.64 (0.74)
Item 63: SCHIPO		0.34							0.56 (0.68)
Item 43: UPHIPO		0.33						0.34	0.52 (0.70)
Item 58: UPHIPO			0.78						0.68 (0.73)
Item 31: UPHIIPS			0.71						0.48 (0.62)
Item 90: UPVIIPS			0.62						0.53 (0.67)
Item 109: UPVIIPO			0.60						0.54 (0.71)
Item 51: UPHIPO			0.36						0.63 (0.74)
Item 40: SCHIPO			0.34						0.77 (0.83)
Item 24: SCHIIPS			0.34	0.51			-0.35		0.61 (0.74)
Item 34: SCHIIPS				0.67					0.50 (0.64)
Item 22: TCHIIPS				0.61					0.61 (0.70)
Item 25: VRHIIPS				0.59					0.70 (0.76)
Item 17: VRHIIPS				0.56					0.60 (0.70)
Item 23: SCHIIPS				0.48					0.47 (0.64)
Item 26: SCHIIPS				0.42	0.32				0.58 (0.68)
Item 28: SCHIIPS				0.42					0.62 (0.73)
Item 15: VRHIIPS				0.37					0.56 (0.73)
Item 29: VRHIIPS					0.73				0.64 (0.76)
Item 1: TCHIIPS					0.66				0.55 (0.68)

Item 2: SCHIIPS	0.65		0.64 (0.75)
Item 6: UPHIIPS	0.62		0.59 (0.72)
Item 33: VRHIIPS	0.53		0.55 (0.68)
Item 9: UPHIIPS	0.52		0.51 (0.65)
Item 8: SCHIIPS	0.49		0.60 (0.72)
Item 27: UPHIIPS	0.46		0.60 (0.72)
Item 7: SCHIIPS	0.45		0.39 (0.58)
Item 10: SCHIIPS	0.41		0.38 (0.55)
Item 12: UPHIIPS	0.41		0.58 (0.68)
Item 47: UPHIIPO	0.40		0.68 (0.77)
Item 59: VRHIIPO	0.40		0.68 (0.79)
Item 30: TCHIIPS	0.39		0.55 (0.69)
Item 11: VRHIIPS	0.36	0.35	0.52 (0.71)
Item 64: UPHIIPO	0.34		0.69 (0.79)
Item 38: UPHIIPO	0.32		0.68 (0.78)
Item 117: SCVIIPO	-0.61		0.69 (0.80)
Item 65: SCVIIPS	-0.54		0.75 (0.82)
Item 99: SCVIIPO	-0.53		0.67 (0.75)
Item 75: SCVIIPS	-0.51		0.59 (0.71)
Item 120: SCVIIPO	-0.44	0.47	0.73 (0.82)
Item 112: SCVIIPO	-0.39	0.38	0.74 (0.82)
Item 91: SCVIIPS	-0.37	0.49	0.63 (0.75)
Item 84: SCVIIPS	-0.33	0.33	0.59 (0.74)
Item 85: VRVIIPS		0.53	0.78 (0.85)
Item 66: VRVIIPS		0.48	0.70 (0.82)
Item 74: UPVIIPS		0.42	0.65 (0.78)
Item 104: UPVIIPO		0.40	0.67 (0.81)
Item 87: UPVIIPS		0.32	0.47 (0.63)
Item 41: TCHIIPO		0.54	0.50 (0.68)
Item 14: TCHIIPS		0.41	0.53 (0.69)
Item 46: VRHIIPO		0.38	0.66 (0.78)
Item 4: UPHIIPS		0.37	0.50 (0.69)
Item 36: VRHIIPO		0.32	0.66 (0.76)
Item 5: UPHIIPS			0.40 (0.57)
Item 16: UPHIIPS			0.57 (0.69)
Item 32: SCHIIPS			0.50 (0.64)
Item 35: TCHIIPO			0.38 (0.58)
Item 37: SCHIIPO			0.73 (0.84)
Item 44: SCHIIPO			0.64 (0.76)
Item 48: VRHIIPO			0.52 (0.73)
Item 55: UPHIIPO			0.46 (0.65)
Item 60: UPHIIPO			0.59 (0.76)
Item 62: UPHIIPO			0.42 (0.59)

Note. Factor loadings < .32 are suppressed; initial communalities or SMC's shown in parenthesis.

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