Risks and determinants of firesetting behaviour: Characteristics, psychiatric morbidity and recidivism

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Doctorate of Clinical Psychology (Forensic Specialisation)

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ERRATA

Where reference is made to author 'Ciardha', this should be referenced as 'Ó Ciardha'.

The final references pertaining to this are:

Ó Ciardha, C. , & Gannon, T. A. (2012). The implicit theories of firesetters: A preliminary conceptualization. *Aggression and Violent Behavior, 17*, 122-128.

Gannon, T. A., Ó Ciardha, C., Doley, R. M., & Alleyne, E. (2012). The Multi-Trajectory Theory of Adult Firesetting (M-TTAF). *Aggression and Violent Behavior, 17*, 107-121.

Page 46 –Insert 'as' into sentence on second line so that it reads 'as well as criminally versatile.

Page 55- Final paragraph, second line: change 'will be' to 'was'.

Page 63 –Final paragraph: Remove brackets from reference Short, Thomas, Luebbers, Ogloff, & Mullen, 2010.

Page 203- Final paragraph, second last line: remove extra space between 'cognitions' and the semi-colon.

ADDENDA

Page 27- Add at the end of the paragraph after 'Table 1.': (derived from Gannon & Pina, 2010).

Page 39- Add at the end of the third sentence in paragraph 2:

,or who develop feelings of hope, personal control and strong social ties. The theory does make attempts at accounting for the internal and external factors that may increase opportunities for desistance. The authors hypothesise that desistence would occur when the offender undergoes particular cognitive transformations, such as the development of self-control, problem-solving skills, pro-social attitudes and internalisation of responsibility. However, they do note that these skills are most likely to be developed through treatment participation and they do not clearly explicate how these processes may occur for individuals who are not engaged in therapeutic interventions.

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GENERAL DECLARATION

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In accordance with Monash University Doctorate Regulation 17/ Doctor of Philosophy and Research Master's regulations the following declarations are made:

> *I, Lauren V. Ducat, hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.*

This thesis includes one original paper published in peer reviewed journals, and four unpublished manuscripts. The core theme of the thesis is understanding the psychological, criminogenic and psychiatric correlates of firesetting behaviour. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the Centre for Forensic Behavioural Science and School of Psychology and Psychiatry, Monash University under the supervision of Professor James R.P. Ogloff and Dr Troy E. McEwan. The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research. I have re-paginated sections of submitted or published papers in order to generate a consistent presentation within the thesis.

In the case of Chapters Two, Seven, Eight, Nine and Appendix J my contribution to the work involved the following:

Thesis chapter	Publication title	Publication status	Nature and extent of candidate's contribution
Chapter Two	Understanding and preventing bushfire-setting: A psychological perspective	Published	Reviewed literature, prepared and revised manuscript (75%)
Chapter Seven	Comparing firesetters and non-firesetters: Are firesetters a special case?	Accepted	Reviewed literature, collected data, coded data, conducted analysis, prepared and revised manuscript (75%)
Chapter Eight	A Comparison of Mental Illness and Psychiatric Treatment among Firesetters, Other Offenders, and the General Community.	In press	Reviewed literature, coded data, conducted analysis, prepared and revised manuscript (75%)
Chapter Nine	An investigation of firesetting recidivism: Factors related to repeat offending	Under review	Reviewed literature, coded data, conducted analysis, prepared and revised manuscript (75%)
Appendix J	The role of mental illness in firesetting behaviour (book chapter)	In press	Reviewed literature, prepared and revised manuscript (50%)

Signed: ……

Date: ……

ACKNOWLEDGEMENTS

Completing the doctoral program has been both a great source of pleasure and a test of my determination. There have been many people who have supported me through the process, including my husband, family, friends, colleagues and supervisors.

Two of the greatest contributors to this work have been my supervisors Professor James Ogloff and Dr Troy McEwan. Without their support, guidance and correction this research would not have been possible, nor would it have taken the form in which it is now found. I count myself as very fortunate to have received their assistance and mentoring. The execution of this research was greatly facilitated by the contribution and co-operation of Dr Karen Gelb and her team at the Sentencing Advisory Council whose contribution laid the foundation for the remainder of the data collection process. In addition, the contribution and assistance of both Victoria Police and the Department of Human Services, who maintain the criminal records and mental health databases in Victoria, and the accommodating team at the County Court of Victoria, enabled access to the official data used in this research.

I would also like to take the opportunity to thank all of my friends and family for their continued support, interest and encouragement to begin and finish this monumental task. The hours spent with my fellow students and friends at cafés discussing the intricacies of research were well spent and provided the much-needed sense of being in it together.

Finally, I am grateful to my family for teaching me to fight with determination to achieve my goals. Most significantly, I thank my husband for his unwavering support through the many years of university, the constant discussion about the progress of my thesis and for the vision of life after the doctorate.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

Firesetting has long captured the imagination of psychiatry and the public alike. The crime of arson has enormous potential for significant property damage and loss of life. Despite this, and the lengthy research history, arson remains one the least understood criminal behaviours in terms of the characteristics of the offenders and the development and maintenance of the behaviour. The dearth of knowledge about the unique characteristics of firesetters may be due to the lack of properly controlled studies using representative samples of firesetters. This research thesis sought to clarify the offending histories, and the psychological, psychiatric and social variables that may differentiate firesetters from other offenders. This information is important not only for forensic clinicians who assess and treat firesetters, but also for police and policy-makers who are charged with reducing the incidence of the crime.

A robust case-linkage methodology was adopted, linking information contained in state-wide mental health and criminal records databases to compare patterns of criminality and psychiatric morbidity in firesetters, other offenders and community controls. The firesetting sample comprised the population of offenders who had been convicted of arson or arson-related crimes between 2000 and 2009. In addition, a subsample of the population was examined using information contained in court files.

This thesis comprised three related empirical studies. The first study examined the demographic, criminological and clinical characteristics of firesetters and compared these with a random sample of non-firesetting offenders using information from court files. All firesetters who were convicted of arson between 2004 and 2009 (n = 207) were examined. In addition, the study sought to establish whether offenders with only arson (exclusive) in their offending histories differed from those who were versatile (firesetting and other offence types). The findings suggest that deliberate firesetters and

other offenders are similar on key characteristics, with the exception of employment and educational achievement in which firesetters had lower levels, and the higher level of psychological distress reported by firesetters. When comparing exclusive firesetters with the other groups few differences emerged, including in the incidence of past firesetting. However, the more criminally versatile firesetters reported poor occupational outcomes, more contact with the criminal justice system and reported higher levels of psychological distress or diagnosis than even the versatile non-firesetting offenders. It was concluded that firesetters are mostly versatile offenders, and this pattern of offending is associated with greater levels of criminogenic need than exists among non-firesetting offenders.

Firesetting is often reported to be associated with psychopathology, but frequently these conclusions are based on studies reliant on selective forensic psychiatric samples without the use of comparison groups. The second empirical study sought to compare the rates and types of mental illness, substance use disorders, personality pathology and psychiatric service usage of a population of convicted firesetters (n =1328), non-firesetting offenders (n = 421) and matched community members (n = 1328) to determine whether mental disorder was differentially associated with firesetting. While the majority of firesetters did not have any history of contact with psychiatric services or to have received diagnoses, they were significantly more likely to have been registered with psychiatric services compared with other offenders and community controls, and were more likely to have utilised a diverse range of public mental health services. Firesetters attracted psychiatric diagnoses more often than community controls and other offenders, particularly affective, substance use, and personality disorders.

The third empirical study examined the rate of firesetting recidivism in a representative sample of firesetters before the courts (n = 1052), and examined whether

the rates of firesetting recidivism differed between exclusive and versatile firesetters. Moving beyond description, the study then developed a model to predict reoffending, using factors that are available to police and mental health professionals. The rate of firesetting recidivism was very low (5.3%) compared with the rate of general recidivism (55.4%); the vast majority of firesetting recidivists were mixed (criminally versatile) offenders (91%). The study found that general criminality, firesetting history, and psychiatric disorder were associated with firesetting recidivism. However, the low base rate of firesetting recidivism precluded the development of a tool that could accurately identify individuals who were at increased or decreased risk of recidivistic firesetting.

Taken together, this research suggests that firesetters are versatile offenders who share many characteristics with non-firesetting offenders. However, congruent with past research, firesetters do exhibit greater levels of psychiatric impairment, socio-demographic disadvantage and tend to have extensive criminal careers. Implications of the results for forensic clinicians, mental health workers, police and policy-makers are considered.

PART A: BACKGROUND AND OVERVIEW

Chapter One: Setting the scene

Firesetting and firesetters have long captured the imagination of researchers and the public alike (Fessler, 2006; Geller, Erlen, & Pinkus, 1986). Fire is of inherent interest to humans and the use and presence of fire in daily life impacts on how it is viewed by individuals in different cultures (Pyne, 1995). Fire also has enormous destructive power. In Australia, the cost of arson has been estimated at $1.6 billion annually (Rollings, 2008). There is also a human cost. In 2009, devastating bushfires in Victoria Australia cost 173 people their lives and destroyed 3500 buildings. Subsequent investigations attributed four of these fires to arson. These four fires killed 52 people and burnt approximately 2000km² (McEwan, Doley, & Dolan, 2012; 2009 Bushfire Roayl Commission, 2010). Many of these communities have not re-built. Recent figures from the United States suggest that intentionally set structural fires are estimated to have resulted in at least 200 civilian deaths and cost the community $5.85 billion in 2010 (Karter, 2011). Thus, deliberate firesetting represents a significant issue for communities and policy developers (Dickens et al., 2009; Muller & Bryant, 2009).

Before providing an overview of the thesis and the literature, a note on terminology will be made as the various terms pertaining to firesetting are often confusing. Arson is the legal term to describe the criminal act of damaging property by fire. It assumes malicious intent or, at the least, negligence or recklessness as to the potential damage. Firesetting is the term used by clinicians and researchers to describe the deliberate behaviour of fire-lighting and does not imply intent nor criminality. Pyromania is a term used by mental health professionals to describe individuals who are

believed to set fires for pathological reasons and meet defined diagnostic criteria. While all of the individuals in the sample have been convicted of arson or arson-related crimes, the term firesetting will be used throughout this thesis as it does not infer motive, criminal responsibility or pathology.

Advancement of the firesetting literature appears to have been significantly hampered by an over-reliance on psychoanalytic and psychopathological explanations of the behaviour without sufficient evidence for these as explanatory theories (Geller, 1997). In addition, there is an over-utilisation of potentially biased samples of convenience (i.e., prison and forensic psychiatric samples) that limits the generalisability of findings. The over-reliance on such samples has so far precluded the consistent reporting of some demographic and psychopathological characteristics of firesetters, rates of reoffending, and the development of a clinically useful risk prediction tool for assessing the risk an individual offender poses of committing further firesetting offences. Some of the difficulty in developing a comprehensive understanding of firesetting can be attributed to the fact that firesetters are a heterogeneous group of offenders whose motivations, characteristics, personality structure, offending histories and developmental features differ greatly (Ciardha & Gannon, 2012). However, much of the literature considers firesetters as a homogenous group, potentially limiting the power of studies to find differences.

While other areas in forensic psychology have established prevalence and reoffending rates of various crimes, common characteristics of offenders, and the cognitive and developmental experiences peculiar to the population studied, the firesetting literature is in its infancy. Until recently, theories have focused on single factors (i.e., motivation, crime scene actions, psychopathology) to explicate the aetiology and maintenance of the behaviour. More recent developments have brought

together many of the supported elements of these theories leading to multi-factor theories for firesetting (Fineman, 1995; Gannon, Ciardha, Doley, & Alleyne, 2012; Jackson, Glass, & Hope, 1987), although many of these remain untested.

This thesis will begin by describing and critiquing the literature on firesetting behaviour, before outlining the rationale and aims of the thesis. It will then present the three empirical studies before providing an integrated discussion of the main findings. Important implications for clinicians and the mental health system, police and policy-makers are considered, and directions for future research are canvassed.

PART B: REVIEW OF THE LITERATURE

Chapter Two: The correlates of firesetting

2.1 Overview of Part B

The literature pertaining to the risk factors for and hypothesised correlates of firesetting will be examined in this section. First, a published article is presented in which the factors hypothesised as being associated with bushfire-setting are explored. The research literature in this area is scant and thus the firesetting literature in general is reviewed and extrapolated upon in order to postulate on factors that may be associated with such offending. Following the presentation of the published article, additional information that was not consistent with the structure of the published paper will be presented. Chapter Three will expand on the theoretical understandings of firesetting behaviour, explore in greater depth the issue of psychopathology amongst firesetters and examine the issue of criminal versatility in firesetting, an issue that has received little consideration to date.

2.2 Understanding the psychology of bushfire-setting

In 2009 devastating bushfires, of which four were deliberately lit, decimated entire towns in the State of Victoria, Australia. In the fires that were found to be the result of arson, 52 people lost their lives, and large portions of land were burned (2009 Bushfire Royal Commission, 2010). It became clear that the research literature was largely silent on the issue of bushfire-setting, and thus could not contribute with any conviction to the question overwhelmingly asked by politicians, law enforcers, community members and clinicians: Who are these people who deliberately light bushfires and why do they do it? The purpose of the following paper was thus to draw

links between the literature on firesetting, including the characteristics of those who light fires, the potential theories on why they do so, and to determine whether conclusions could be drawn regarding the nature of bushfire-setting. While the focus of this thesis is predominantly on adult firesetting, the paper remains an important and comprehensive review of the literature, while highlighting areas requiring further development.

2.3 Preamble to published paper: "Understanding the psychology of bushfire-setting"

The first publication in this thesis reviews the literature on the psychology of firesetting in general, with a particular focus on bushfire-setting. It examines what the literature tells us about these offenders, their characteristics and motivations, and reviews available treatment programs. Finally, it makes recommendations for future research and assessment procedures.

The following article was published in *Psychiatry, Psychology and Law.* This is a peer-reviewed journal of the Australian and New Zealand Association of Psychiatry, Psychology and Law (ISSN 1321-8719), which has been published since 1993 and now is published five times per year. In 2010 *Psychiatry, Psychology and Law* had an impact factor of 0.494.

2.4Declaration of Thesis Chapter Two

Monash University

Declaration by candidate for thesis Chapter Two

In the case of Chapter Two, the nature and extent of contributions to the work are as follows:

Name	Nature of contribution	Extent of contribution
Ms Lauren Ducat	Reviewed literature, prepared and revised manuscript	75%
Professor James R.P. Ogloff	Co-investigator, assisted with conceptualisation of paper, reviewed manuscript	25%

Candidate's Signature:		Date

Declaration by co-authors

The undersigned hereby certify that:

a) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
b) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
c) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
d) there are no other authors of the publication according to these criteria;
e) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
f) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

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Prof. J. R.P. Ogloff:		Date

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Understanding and Preventing Bushfire-Setting: A Psychological Perspective

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Deliberate fire-setting costs the community millions of dollars each year and comes at a great human cost. However, little is known about who commits arson and why or how fire-setting can be prevented and treated. This article provides a brief overview of the international literature on the rates, predictors, and prevention and treatment of fire-setting with a view to understanding the phenomenon in the Australian context. While much of the existing literature focuses on structural arson, current knowledge on bushfire-setting will also be explored, with some attention being paid to the issue of fire-fighter arson. This review highlights the current gaps in knowledge and shows that relatively little reliable information is available to guide law enforcement and mental health practitioners in their endeavours to reduce and treat the occurrence of fire-setting.

Keywords: arson; fire-setting; prevention; recidivism; treatment.

Introduction

Bushfire is a formidable aspect of life in Australia and other countries with significant bush and forest regions. It is troubling that in Australia a significant proportion of bushfires are intentionally lit by people or caused by reckless human activity. While comparable data do not exist for Australia, deliberately started fires caused on average two deaths a week in the United Kingdom between 1986 and 1996 (Home Office, 2007). It has been estimated that 50% of fires in Australia are classified as deliberate or suspicious, increasing up to 80% in some areas at specific times and months (Bryant, 2008). Of significant concern, it is generally accepted that at least one third of those who intentionally set fires will engage in repeat fire-setting (Brett, 2004).

Given the nature and scope of the difficulties with bushfires in Australia, it is perhaps surprising that so little is known about what causes a person to light fires, or even how often they light them. Much of what we know about fire-setting is gleaned from international research. Such studies may not be readily generalisable to the Australian context for a number of reasons. Firstly, many of the United States and United Kingdom studies focus on structural arsonists, who commit offences mainly in urban areas. In Australia, fires occur much more frequently on the urban-rural interface (Willis, 2004). Secondly, the landscape

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Authors' notes: Portions of the material presented in this article were provided to the 2009 Victorian Bushfire Royal Commission in evidence presented by Professor Ogloff.

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and importance of that landscape to the Australian identity means that arson, particularly bushfire arson, can have a much greater impact on the community. Thirdly, given the previous two factors, fire in the Australian landscape is likely to damage more property and bushland, and lead to a greater chance of personal injury than many other places (Muller, 2009).

The terminology pertaining to fire-setting is confusing and requires some clarification here. The term "fire-setter" is an umbrella term used by clinicians who work in the field to describe those who intentionally set fires. Arson is a criminal offence that applies to those whose behaviour and motivations satisfy the elements of the crime of arson. Pyromania, by contrast, is a term used in mental health settings to denote the very small proportion of people who set fires for pathological reasons. Unless otherwise stated, the term fire-setter will be used throughout this article since it is does not infer motive, criminal responsibility or pathology.

This review will focus on the extant literature pertaining to what is known of the psychology of fire-setters, predictors and risk factors for fire-setters, and prevention and intervention. The issue of firefighter arson will be briefly examined. Special attention will be paid to the issue of bushfire-setting in the context of the above topics.

The Psychology of Fire-Setters

"There is no one 'profile' or 'mindset' of a fire-setter; the reasons people set fires are varied and complex" (Ogloff, 2009, p. 16; see also Muller, 2009; Quinsey, Rice, Harris, & Cormier, 2006; Willis, 2004). Despite the variability among fire-setters, it is the case that some features are more commonly seen among fire-setters than other offenders. Fire-setters tend to be socially isolated (unmarried), shy and unassertive, less aggressive, less intelligent (borderline), less physically attractive, lacking in confidence and unable to deal effectively with face-to-face confrontation. Often difficulties in childhood are characteristic, including problems in school. As a group, they also tend to have higher rates of mental illnesses including schizophrenia, mood, and anxiety disorders. Personality disorders and substance misuse disorders are also common.

A number of classification systems of fire-setters have been proposed to assist in understanding their motives and behaviour. This information is helpful for law enforcement and mental health professionals alike in their endeavours to identify fire-setters and to prevent and treat fire-setting (Doley, 2003a). Reflective of the current understandings of fire-setting, existing typologies are somewhat limited, and rarely straightforward. This is due to a number of factors. First, there is a large degree of variability in the reported rates of fire-setting and those prosecuted with arson offences (Muller, 2009; Willis, 2004). Second, arson is a complex behaviour, and the motivations underlying the behaviour can be multifarious, even for a single offender (e.g., revenge, excitement, accident, pathology). Even when arsonists are categorised by their offending, there is often significant overlap between the characteristics of offenders (Kocsis, 1998). Third, in respect of bush-fire-setters little research has been conducted into the psychology of such offenders, and the work that has been done is only in the preliminary stages.

The typologies that have been developed are generally based on the underlying motive for committing the offence and the target of the fire-setting. Wherever possible, this information is typically inferred from the observed crime scene behaviours (Kocsis, 2001). Broadly speaking, the motivations can be categorised as instrumental, expressive, due to the effects of mental illness, and mixed or motiveless.

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Instrumental arson occurs where the fire-setter intentionally employs fire-setting as a means of achieving a desired goal. This may include arson for financial gain (often in the context of insurance fraud), crime concealment (where arson is committed to disguise the commission of another offence), or for political reasons (to make a statement).

Expressive arson is a means of emotional expression for individuals who may feel socially inadequate. In this way, arson may be viewed by the offender as the most effective means of communicating with the outside world, or of being empowered and feeling in control of an otherwise dismal existence. Commonly categorised in this group is arson for revenge, stimulation or boredom relief, vandalism, and self-immolation. Often repeat offenders in this group target structures or areas that are symbolically important to them (Cantor & Fritzon, 1998).

While the vast majority of fire-setters do not have a mental illness, it is believed that a disproportionate number of fire-setters are mentally ill or disordered. The actual rate of mental illness and disorder among fire-setters is unknown since most of the research that has been done has not sampled the known population of fire-setters, but has studied samples of "convenience" – for example, those referred to mental health services for assessment. With the methodological limitations in mind, it has been estimated that as many as one-third of fire-setters have a major mental illness (Harris & Rice, 1996). The most common mental illnesses associated with fire-setting are schizophrenia and alcohol or drug abuse (Quinsey et al., 2006). Personality disorders (particularly antisocial and histrionic) and depression have also been associated with fire-setting (Geller, 1987; Puri, Baxter, & Cordess, 1995; Ritchie & Huff, 1999; Rix, 1994; Shea, 2002).

Pathological fire-setters, known as pyromaniacs, form another distinct, albeit small, group of arsonists. Elements of the diagnosis include: deliberate and purposeful fire-setting on multiple occasions; an inability to resist setting fires; extreme interest in fire-related paraphernalia; increased tension or arousal before the act followed by an intense relief once committed; a lack of other motives or gain (for example, monetary gain, crime concealment, socio-political expression or anger or revenge); and is not better characterised by another disorder (American Psychiatric Association, 2000). Rates of pyromania have varied in the literature from one to 60% (Lewis & Yarnell, 1951; Ritchie & Huff, 1999). Contrary to the popular conceptions of serial arsonists, most are not pyromaniacs. There has been much disagreement in the literature as to the definition, existence and rate of pyromania, with some authors contending that it simply does not exist (Doley, 2003b).

Although it has some advantages, classifying offenders strictly by motive is limited in a number of ways. Most significantly motives are often inferred from crime-scene characteristics, which are thought to be representative of the offender's behaviour during the commission of the offence (Canter & Fritzon, 1998). While this may be the case, further research is needed to confirm whether this is indeed an accurate portrayal of the fire-setter's underlying motives. Alternatively, motive may be gleaned by interviewing apprehended (and usually charged and convicted) offenders. Two problems are inherent in this approach. Primarily, there is the underlying assumption that the offender is able to articulate his or her psychological motives for committing the offence. This of course assumes that the offender is aware of his or her motives for fire-setting. A recent study conducted by Jayaraman and Frazer (2006) found that just over half of their sample had some psychological reason for lighting the fire. In addition, all of the fire-setters in their sample were under the influence of

alcohol before and during the offence, with a significant proportion being under the influence of another substance. These factors limit the validity of attempts to determine motives. Secondly, by the nature of research conducted in this area, that is, interviewing charged and convicted offenders, the current understandings of motivations may not be representative of fire-setters as a whole.

The above categorisations have been based primarily on research conducted on structural fire-setters (e.g., setting fire to buildings, cars, rubbish bins, etc.). It has been argued that the motives underlying the commission of structural arson may not be the same as those that underlie bushfire arson. For example, lighting a bushfire is rarely committed for reasons of crime concealment, financial gain, anger or revenge, or mental illness (Kocsis, 2001; Shea, 2002; Willis, 2004). The nature of bushfire means that any material or political gain is likely to be irrelevant, and thus it has been argued that many bushfire arsonists are likely to be acting for psychological reasons, including a need for excitement or attention (Shea, 2002). Two common psychological reasons for committing arson are anger and revenge. These motives, however, require a specific target. The case for such a motive in bushfire arson is more tenuous and is likely to be directed at society as a whole, either as displaced anger or due to general antisocial tendencies. Attention-seeking might be common for volunteer fire-fighters, as will be discussed later.

Noting the need for a concise bushfire arson classification scheme, Willis (2004) put forward the only existing typology of bushfire arsonists, structured around five principle types of deliberately-lit bushfires:

(1) Bushfires lit to relieve boredom or create excitement: vandalism; stimulation; activity (something to do). The latter sub-category relates to fire-fighters and others who simply light fires for something to do.
(2) Recognition and attention: heroism (to gain positive recognition); pleading (a "cry for help").
(3) Specific purpose or gain: anger (often toward the government or land management bodies); pragmatic (for a purpose such as land clearing), or crime concealment; material (such as fire-fighters seeking overtime pay); altruistic (fire-setter believes the fire will benefit others).
(4) No motive: psychiatric (no other motive, no control over actions, and no malicious intent); children (play or experimentation but without malicious intent or awareness of the possible consequences).
(5) Mixed motives: multiple (a mixture of the above); incidental (the result of malicious intent, such as crime concealment but no notion that the fire may spread and result in a bushfire).

While many of the categories share some characteristics with the research on structural arson, the specifics vary. According to Willis (2004), this highlights the need to view bushfire arson as a separate crime to structural arson, and target intervention programs accordingly. While this model is an encouraging first step in the classification of bushfire arson, Willis concedes it is a preliminary model and is yet to be evaluated (Willis, 2004). Further research is needed to test the application of such a system. Furthermore, it may not be applicable across all age groups as motivations may be age-specific. For example, children who light fires may be doing so out of curiosity whereas adolescents may be more susceptible to peer pressure (Shea, 2002).

Little support can be found for any one existing typology. Of particular concern is sampling bias in many of the studies used to

develop and validate the models (Doley, 2003a). All research is based upon data collected from known offenders. Furthermore, participants are most often drawn from samples of convenience selected from groups of prisoners (Almond, Duggan, Shine, & Canter, 2005; Soothill & Pope, 1973), offenders referred for pre-trial psychiatric assessments (Dickens et al., 2009; Repo, Virkkunen, Rawlings, & Linnoila, 1997), and young males (Hanson, Mackay-Soroka, Staley, & Poulton, 1994). Differences are apparent between typologies developed using prison and psychiatric samples. Perhaps it is not surprising that one study has found that psychosis was a more common motive for psychiatric patients (Puri et al., 1995), while more rational motives were evident amongst prison samples (Ritchie & Huff, 1999). An offender who is caught may not necessarily hold the same motivations, or have the same mental capacity and resources to avoid apprehension as one who is not. Thus application of the models may be limited to the incompetent fire-setter (Doley, 2003a). As such, caution is necessary when applying these typologies and their assumptions to offenders outside their stated parameters.

Given the limitations in the current literature, it is a matter of priority that a framework within which to understand the complexities of bushfire arson is developed, because research and experience suggest that there is a small but solid core of offenders who will not desist from lighting fires until they are caught.

Predictors and Risk Factors for Fire-Setters

Having examined the possible psychological reasons underlying the decision to commit arson, the predictors and risk factors that may assist in differentiating those fire-setters who are at risk for setting additional fires and those who will not repeat the offending will be discussed. Importantly, as revealed in the previous section, fire-setting should not be thought of as a unitary construct due to the complex and varying range of behaviours, motivations and antecedents associated with fire-setting (Palmer, Caulfield, & Hollins, 2005).

A review of 24 studies drawn from the international literature on the incidence of fire-setting reoffending indicates the rate varies from 4% to 60% based on subsequent arsons (Brett, 2004). While it is difficult to identify an average rate, it is generally accepted at least 30% of arsonists will go on to subsequently set fires. Many more arsonists will go on to commit other crimes, suggesting overlap between risk factors for general offending and risk factors for arsonists. As with the research on motives, there are few reported predictors that could be used to differentiate arsonists from other offenders, let alone one-off fire-setters and serial fire-setters. The reported predictors for arson offenders tend to be similar to those for other offenders, and thus render very little predictive validity differentiating repeat arsonists from other offenders.

Most studies agree that fire-setters in general tend to be young males with both interpersonal difficulties and alcohol or drug addictions; show evidence of unstable childhoods and some form of mental health issue (Prins, 1995). The higher proportion of young males may be more indicative of their high visibility and inexperience in evading law enforcement than an actual indication of who is more likely to commit arson. Based on an analysis of crime scene characteristics observed by investigators, Canter and Fritzon (1998) noted a few common characteristics of repeat arsonists. These were: making several false alarm fire calls; personality disorder; prior arson; and contact with social services. In analysing the characteristics of repeat fire setters at the Oak Ridge forensic mental health facility in Ontario, Canada, Quinsey et al.

(2006) found a number of factors that were predictive of repeat fire-setting. These included a traumatic childhood and unstable home life; poor school adjustment; low intelligence; an extensive fire-setting history, particularly with an early onset of the behaviour; and a history of aggression. Similarly, Hanson et al. (1994), while reporting that delinquent and fire-setting youths could not be distinguished by antisocial behavioural traits, found that the strongest predictor of future fire-setting was past fire-setting. Despite the pervasive, and previously common, view that arson is sexually motivated little empirical evidence exists to support this notion (Muller, 2009).

In a recent study that employed a respectable sample size, Dickens et al. (2009) examined case files of 167 adult arsonists to identify factors that differentiated single episode and repeat arsonists. They also considered whether factors could differentiate those arsonists who set fires that caused more serious injury, loss of life or extensive damage. All of the arsonists were referred for a forensic mental health assessment, which is the norm in the United Kingdom. The researchers were only able to identify from the file material whether subjects had one or more incidents of arson in the past, hence limiting the results. Following arsonists over time to determine reoffending would have provided more compelling results.

However, Dickens et al. (2009) found that almost half (49%) of the arsonists were repeat arsonists. Repeat arsonists were found to be younger and more likely to be single. They commenced their criminal offending earlier and experienced school adjustment problems. They were also more likely to have had a learning disability or a personality disorder. The repeat arsonists were also more likely to have more extensive histories of property crime, and to have spent longer periods in prison. Although rare, those arsonists who experienced feelings of tension and excitement when engaged in fire-setting behaviour were more likely to be repeat arsonists. Importantly, and perhaps surprisingly, Dickens et al. (2009) did not find any relationship between repeat fire-setting and lighting fires that resulted in injury, extensive danger, or loss of life. In this regard, the authors concluded that:

> We consider that it may be a mistake to conflate recidivism and dangerousness; our data suggest that a repeat fire-setter is not necessarily one who causes the most harm, and the assumption that the concepts of recidivism and dangerousness among fire-setters are interchangeable should be challenged. (p. 635)

Given the number of juveniles who offend in this way (some figures suggest 50% of malicious fires are lit by children and adolescents (Palmer et al., 2005)), discussion of the risk factors for juveniles is warranted. In juveniles fire-setting is often part of a broad array of anti-social behaviour. There is an apparent overlap between children who are sexually abused, mentally ill, and engage in antisocial activities (fire-setting being one facet of this) (Stanley, 2002). Many of the factors found in adult fire-setters (externalising problems; heightened aggression; drug use; poor interpersonal skills; conduct disorder/antisocial personality disorder; family dysfunction and instability; poor academic record; and some evidence of physical or sexual abuse) can also be observed in young fire-setters. The overlap between adult and juvenile offenders may simply be explained by the fact that often fire-setting begins in childhood or adolescence, and may therefore continue on to adulthood. Nevertheless, some of these factors have found some discriminant validity in distinguishing between non-offenders and some other juvenile offenders who do not light fires.

All of these profiles offer some indicators for fire-setters in general but not for bush-fire-setters in particular. Unfortunately the literature in this area is limited.

One study examining the offending and reoffending rates of bushfire arson in New South Wales found that the "average" offender was male; with a mean age of 26.6 years (although 31% were under the age of 18 at the time of offence), and were overwhelmingly non-Indigenous. Moreover, prior offence histories were more likely to feature personal crimes, followed by property and drugs offences (Muller, 2008, pp. 4–5). However, little else was found to distinguish these offenders; nor were there any differences found in these factors between convicted structural arsonists and bushfire arsonists. Such work is limited to demographic and offending variables and could be extended by exploring the mental health histories and psychological reasons underlying offending. Indeed such a program of research is currently being developed by the authors. However, given the above findings it has been suggested that the focus should not be on developing profiles of the "typical" bushfire arsonist as in doing this an important range of characteristics may be overlooked, limiting the utility of the profile (Muller, 2009; Shea, 2002).

Prevention and Intervention

It is absolutely critical that programs and initiatives aimed at prevention of fire-setting and intervention with arsonists are developed and validated. Willis (2005) notes that preventative programs need to be based on empirical knowledge of the offence characteristics, as this can point toward the motivations behind the offence. This in turn will allow prevention programs to be focussed on particular areas, allowing resources to be appropriately utilised. Furthermore, due to the complexity of the behaviour and its underlying causes no single intervention will be effective in reducing the overall occurrence of fire-setting (Palmer et al., 2005; Prins, 1995). As has been noted in the previous section, bushfire arson may be one aspect of a repertoire of antisocial behaviour. As such, intervention programs must be multifocal and collaborative.

For the reasons discussed in the preceding sections, prevention can often be most successful when focussing on knowledge of the fires that are lit rather than the profile of the offenders (Muller, 2009). Muller (2008) argues that given the diverse offending histories of arsonists it may be counterproductive to conceptualise fire-setters as requiring a specific intervention program. Rather, prevention programs, whether they be educational, psychological, or behavioural need to be based on the extant knowledge of who commits arson offences (Muller, 2009). Given that the psychology of bush-fire-setters may not be the same as the psychology of structural arson offenders, prevention programs may need to be offender-specific. Furthermore, since many offenders are under the age of 18 years when they commit bushfire arson, preventative mechanisms need to be focussed on juveniles, and to target young offenders who have been identified as at-risk (Muller, 2008). Such programs should have links to other community services such as forensic mental health, community corrections, mental-health and social services to ensure that they are not just treating the symptom (fire-setting behaviour) but addressing underlying factors related to arson.

Intervention and prevention programs usually stem from one of two streams: situational or psychological. Each approach will be briefly outlined below. As with other aspects of this article, it is the case that very few approaches to prevention and intervention have any empirical base or proven validity.

Situational Interventions: The First Step in Prevention

Primary prevention is based on the assumption that changing elements in the

environment that may be attractive to would-be offenders will deter and prevent crime. Situational interventions are one form of prevention that is based upon this premise. Situational prevention is based upon the assumption that, at least to some extent, offenders weigh the risks and benefits of committing an offence, and therefore aims to increase the efforts involved in the crime and the perceived risk of being caught (Christensen, 2007). Prevention strategies should be specific to the geographical location; community characteristics; and the offence characteristics. The most effective strategies are multi-organisational and are best developed and managed by local government and fire and land management authorities. Local knowledge of the characteristics of the crime scene and where the fires are occurring can then be compiled allowing strategies to be targeted most specifically to problem areas, thereby increasing the program's efficacy. Bahr (2002) reports that the most effective situational prevention measures will be based upon wildfire threat analysis and knowledge of where fires occur, allowing pro-active targeted deployment of personnel.

Supporting this point, studies in the United States have produced equivocal results with regard to simply increasing overall police numbers in order to prevent bushfire arson (Donoghue & Main, 1985; Prestemon & Butry, 2005). It would seem from these studies that more targeted and efficient allocation of resources may be more effective in reducing bushfire arson. Such an observation is encouraging and more realistic for police and fire management, allowing for the most effective use of scarce resources.

As a case in point, Bryant (2008) recently conducted a study in Australia examining the temporal trends in deliberate bushfire lighting. She found that deliberate fire-setting was more likely to occur on Saturday and Sunday between 6:00 pm and 6:00 am. During weekdays, peak deliberate fire times were between 3 and 6 pm, while on weekends the peak was slightly earlier, between 1 and 4 pm. These findings suggest that operations could be targeted to certain times of the year and days where risk is greatest, producing more cost-effective results, while reducing the overall rate of bushfire arson. Police forces typically do use local intelligence on possible suspects and high-risk fire-setting times to manage bushfires.

Situational prevention may be particularly pertinent to reducing bushfire as many bushfire-setters have rational motives for committing the offence (Willis, 2004). Christensen (2007) conducted an analysis of deliberate bushfire trends in Queensland. He found that one particular area, the Beerburrum Forest District, was especially prone to deliberate fire-setting. Given the characteristics of the area, including: easy access, outdoor recreation facilities, and little to no surveillance, he concluded that situational prevention would be more effective in reducing the number of fires, rather than focusing on particular offenders (once they had been caught) for treatment. A number of recommendations were made that could easily apply to any densely forested area. These were:

(1) Reduce the fuel load in bushland. In doing so the effort required by the offender to light a fire increases, thereby increasing the risks of being caught and ultimately reducing the rewards, as the fire once started may not be as intense or sustained as it would previously have been.
(2) Target hardening by constructing a more elaborate system of fire trails. Other than restricting the spread of bushfire, and allowing easier access for fire-fighters it allows greater opportunity for surveillance. Furthermore, fewer or restricted

entry points could be designed, to be monitored by Forestry staff, to limit access to potential targets. Patrolling entry points and fire trails can act to deter offenders but may also increase the odds of apprehending them.

In combination with community awareness campaigns, such strategies may reduce the rewards for bushfire-setters seeking recognition or hero status, or for excitement, as the likely benefits of setting the fire will be reduced. With fewer fuel to burn, the fire may extinguish too quickly thus reducing the potential thrill associated with lighting the fire. Furthermore, the likelihood that fire crews would need to attend the blaze is lessened. For those setting fires for specific purposes the risks of setting the fire (getting caught, facing criminal conviction, paying fines, going to prison) may well outweigh the benefits. However, it is unlikely that these strategies would be effective for those who are acting as the result of mental illness or an irresistible impulse, as their decision to commit arson is not rational.

For the reasons stated above, police initiatives, undertaken in consort with fire authorities, targeting known offenders or problem areas may be successful in reducing the rate of deliberate fire-setting. Local police intelligence units and fire fighting agencies hold a plethora of knowledge on known and suspected arsonists in their region. Many have constructed profiles on offenders of interest. If this information could be shared between organisations, the likelihood of preventing or reducing the risk of bushfires would be significantly increased. Such intelligence can inform the development of operations targeting areas (and people) known to local personnel as being problematic for arson. By developing patrol zones based on the crime statistics for the region resources can be efficiently deployed to maintain a police presence in the area. The effects of this are twofold. Firstly, it may deter potential offenders, and secondly it allows members to keep an eye on reports of suspicious persons adding to regional intelligence. Moreover, there is the added benefit of monitoring the state of the bushland, enabling a decisive response if a fire is lit.

Other elements of effective arson control include high visibility and zero tolerance in combination with community collaboration. Community collaboration forms one point of the triangle in effective arson control. Programs where community members are engaged to be aware of the dangers of bushfire and asked to remain vigilant to report suspicious behaviour have been found to be effective (Muller, 2009). As such, establishing an operational partnership between law enforcement and community members is essential.

Preventative techniques centred on target hardening, environmental control, and an increased police presence in bushfire "hot-spots" are believed to be effective insomuch as the vast majority of arsonists make a rational decision to light the fire. The typology put forth by Willis (2004) suggests that bushfire arsonists may be most responsive to this type of strategy. However, even within that particular typology certain categories of fire-setters light fires due to irrational reasons, and thus may continue to do so even when situational prevention is in full force. Similarly, drug and alcohol abuse is common amongst caught or convicted arsonists, further limiting the applicability of situational prevention. It is the case that further research and evaluation is required before situational prevention and target hardening exercises can be deemed effective. Also it is important to learn what elements of the approaches are effective, since the overall programs may be labour and resource intensive. Nevertheless, when combined with community awareness and education campaigns such strategies can be

effective in reducing the risk of deliberate bushfire-setting.

Psychological/Educational Approaches

Reflecting the general state of the literature in this area, much of what is known about psychological intervention and psycho-education programs is based upon research on structural arsonists in North America and the United Kingdom. Applicability of such principles to bushfire arson in Australia is not yet known. Nevertheless, many programs have been developed based upon such principles, and as such stringent and standardised evaluation is required to establish their efficacy. Moreover, there is simply no validated treatment approach for fire-setters.

Muller (2008) contends that adult fire-setting may well be treated as a problem behaviour, where both the underlying causes and the manifest offending behaviours are addressed. This can be, and often is, addressed in the context of group or individual intervention. Currently in Victoria, the Victorian Institute of Forensic Mental Health Services (Forensicare) offers assessment and treatment of arson offenders on a limited basis as part of their Problem Behaviour Program. The problem behaviour model recognises that offenders with a range of problem behaviours (i.e., stalkers, threateners, sex offenders, problem gambler, and arsonists) share a range of characteristics which enables a common approach to assessment and treatment, while recognising unique aspects of the particular offences (Warren, MacKenzie, Mullen, & Ogloff, 2005).

Given that arson offending may tend to occur in the context of wider criminal offending patterns, and often offending behaviour occurs in the context of broader sociological, economic and psychological disadvantage, prevention programs need to be multi-faceted, and should focus not just on psycho-educational aspects but on cognitive behavioural interventions as well.

The effectiveness of current secondary prevention techniques, that is, those that target at-risk people, usually youths, is currently unknown as little if any evaluation has been done on the programs (Muller, 2009). Nevertheless, a number of programs have been developed for use with children and adolescents. Palmer et al. (2005) emphasise that effective interventions must be based upon sound assessment, and be individualised to take account of the person's intent, social context, personal circumstances, emotional reactions, and the consequences of the fire. Because fire-setting does not occur in a social vacuum it is important to focus not just on the individual but on family and environmental considerations also.

Prevention is usually approached in one of two ways: (a) educational, where the person is taught about safe fire use and the consequences of inappropriate fire-setting; (b) psychosocial, which attempts to address the underlying psychological and social factors that may have led to the offending behaviour in the first instance. This approach often utilises cognitive-behavioural techniques that are designed to enhance social skills and coping.

Some psycho-education programs have shown encouraging trends toward decreasing recidivism. Programs that have been evaluated as having some impact on reducing recidivism rates in young fire-setters internationally have included elements such as educating juveniles on the social and medical consequences of fire-setting (Franklin et al., 1991); fire skills training and safety awareness (Kolko & Kazdin, 1991); family participation and role-play to educate about the hazards of fire and how to use fire safely (DeSalvatore & Hornstein, 1991); and the use of fire service personnel in the delivery of the program (Eglintine, Horn, & Muckley, 1993).

A study by Kolko (2001) demonstrated that cognitive behavioural therapy, focussing on self-control, problem solving, coping skills, and pro-social behaviours significantly reduced fire interest. Children who received fire safety skills training from firefighters, including a discussion about the motives and reasons for fire-setting also showed significant increases in their fire safety awareness. The effectiveness of such a program may be that it is targeting the underlying reasons for the behaviour, hence removing the trigger for fire-setting incidents.

Evaluation of three longstanding community intervention programs in the United States and United Kingdom indicated that several factors characterised effective interventions. These included: good program management; appropriate screening and evaluation; appropriate referral procedures; publicity; good monitoring procedures; and inter-agency collaborations, particularly with juvenile justice where applicable (Palmer et al., 2005). Several of these types of interventions exist in Australia using fire, police and other emergency personnel to deliver the service. In Victoria the Juvenile Fire Awareness and Intervention Program (JFAIP), administered by the Metropolitan Fire Brigade and the Country Fire Authority, has been in operation for a number of years and has informed the development of similar programs across the country. Many of the programs are educational in nature and target young people who have demonstrated a risk of future fire-setting. Many of the programs hold collaborations with mental health and social services to address the underlying psychological and environmental roots of the behaviour.

Adler et al. (1994) examined the effectiveness of JFAIP and found that a home visit by a member of the Fire and Rescue Service, and the delivery of educational fire safety material was somewhat effective in reducing arson reoffending. Within the 12-month follow-up period 42.8% did not reoffend. Interestingly, groups who received intensive behaviour modification did not desist at a greater or lesser rate than the JFAIP group. This may support the notion that juvenile fire-setting is often committed without malicious intent indicating that education about consequences may be adequate to stop the behaviour from developing into a lifelong problem. It could also be that the behaviour may desist or reduce with the passage of time. A longer follow-up period would of course provide more definitive evidence of its efficacy.

While the approach may be helpful in reducing fires lit by children or young people without malicious intent, such an approach may have a limited impact on those who set fires with the intent to harm or cause damage, and may in fact provide a stimulus for some offenders (Muller, 2009). For vandals and politically motivated offenders penal sanctions may still be the most effective deterrent. Nevertheless, programs such as these can be especially effective in deterring children from committing bushfire arson, as many children light fire out of experimentation without any cognisance of the consequences of lighting fires.

Unfortunately, there has been no other systematic evaluation of these programs and so their effectiveness in reducing future fire-setting remains unknown (Muller & Stebbins, 2007). Furthermore, methodological issues such as short follow-up periods, small sample sizes, and the exclusive use of psychiatric samples, mean that the conclusions drawn from studies should be made with caution. In addition, by their nature intervention programs are based on the broad knowledge of the risk factors for fire-setting. As discussed above, this knowledge is limited and does not necessarily apply on an individual level, resulting in equivocal outcomes.

Willis (2005) argues that intervention programs will only produce lasting change

where the behaviour and its causes are addressed on an individual basis tailored to the unique factors relating to fire-setting in the individual case. Essentially, further research is needed to comprehensively prove their worth. It is also recommended that accreditation standards be developed by which all programs can be evaluated. This will provide consistency and the documentation of results that will afford a clearer picture of its impact on the reduction of reoffending.

Is There a Role for the Screening of Fire-Fighters?

Little research or statistics exist to adequately define the problem of fire fighter arson in Australia. By its nature the breach of trust and confidence amongst colleagues can lead to a denial of the problem and an unwillingness to investigate and address such issues from within fire services (Burgess, 2008). In New South Wales, Strike-force Tronto investigated 1,600 suspicious fires, of which 50 people were charged including 11 volunteers at the NSW Rural Fire Service (RFS). While this may seem an inordinate number of cases, it is important to consider the 69,000 other volunteers in the RFS who apparently never offend in this way. Furthermore, it is important to note the significant time and fiscal contributions volunteers make to bushfire management (Ellis, Kanowski, & Whelan, 2004).

The typology put forth by Willis (2004) acknowledges the real, albeit small, threat of fire-fighters becoming fire-setters. For example, he states that some fire-fighters may light fires simply to relieve boredom and stimulate activity. Others may light fires for material gain, such as overtime payments. Others still may light fires in order to achieve some perceived hero status in the eyes of the community and possibly their colleagues. Past research suggests that volunteer fire fighters, as opposed to career fire fighters, may be more prone to committing arson to achieve hero status (Lewis & Yarnell, 1951). Given that structural arsonists tend to have lives characterised by instability, antisocial behaviour and poor interpersonal skills fire-fighter arsonists may represent a distinct group of offenders. Doley (2003a) argues that fire fighters and volunteers who light fires tend to be higher functioning and of greater intelligence than other offenders. This suggests that screening fire-fighters based on the general risk factors for fire-setting may be counterproductive. As such, screening of these individuals must be diverse enough to capture the psychological elements that may predispose fire-fighters in particular to fire-setting.

Willis (2005) notes that it is important to recognise that people do not become fire-setters because they are fire service personnel but rather that they join in order to fulfil an existing psychological need. The latter group may afford the greatest opportunity for prevention by fire service management as there may be some indicators of this type of motive. Burgess (2008) notes that there are several "red flags" that may seem innocuous in isolation but combined can give some indication of fire-fighter arson. For example, the fire-fighter arsonist may seem to be always first on the scene, even when they have not been called to the job; they may have an uncanny ability to locate the fire's origin and any incendiary devices; or they may be able to locate and report fires that are not visible from road ways or common thoroughfares.

Although the incidence of bushfire arson committed by fire-fighters is relatively uncommon, the effect on the community perception of and trust in emergency response personnel can be significant (Doley, 2003c). Moreover, the effect on the morale of colleagues who fight fires next to the same person charged with lighting them can be devastating. There is the additional risk that fires lit by people who have specific

knowledge of the nature of fires may have more severe consequences (Doley, 2003c). So while there are difficulties in implementing screening protocols for prospective career or volunteer fire-fighters, it should be viewed as an integral part of the selection process. Screening of fire-fighters offers considerable opportunity for prevention as they are easily, and already are, subjected to screening and training measures (Willis, 2004).

However, inherent in the screening approach is the assumption of knowledge of the risk factors for fire-fighter arson, which is clearly very limited. The diffusion of predictors creates substantial difficulty in screening for these factors. Presuming that the predictors for fire-fighter arson are the same as other fire-setters (which we know may not be the case) the screening process must be broad enough to capture all prior offences. This is so because fire-setters are likely to have extensive criminal and antisocial histories (but not necessarily known fire-setting histories). Hence, simply concentrating on previous arson offences will be likely to lead to the under-detection of those prone to such behaviours. Furthermore, bushfire-setters are likely to have some combination of violent and/or and property offence histories, and as such any person with a criminal record should be employed with extreme caution. It is acknowledged that as the clear-up rate of arson is so disproportionate to the rate of its occurrence that it is inevitable that some prior histories will never come to light in the screening process. This is where the psychological screening of fire fighters should be used in conjunction with criminal record checks. Such screening can assist practitioners and officials in deciding who may have a predilection for fire-setting (if it is grounded in psychological causes), or other psychological disorders.

The screening of potential fire-fighters need not be negative. It is possible that some desirable outcomes may arise from the screening of potential fire fighters, in addition to removing them from a position where they may have the opportunity to meet their psychological need for fire-setting. Where prospective fire fighters are identified as being at-risk of future fire-setting behaviour, treatment can be recommended and offered to the individual rather than simply turning them away. This may also reduce the likelihood that the person will begin or continue to light fires in the community. It may also put them on the law enforcement radar. Where fires are lit out of a need to attain to some hero status, police and fire investigators can focus their investigation on individuals who appear to be inserting themselves into the investigation and are gaining particular public accolades for their role in extinguishing fires. Finally, screening may act as a deterrent to would-be offenders, and may put fire service personnel on notice for behaviours indicative of illegal fire-setting.

Beyond screening efforts, which would include criminal record checks and rudimentary reviews of prospective volunteers and employed fire-fighters, systems should be put into place that identify the so-called "red flags" that Burgess (2008) noted (e.g., the fire fighter arsonist may seem to be always first on the scene, even when they have not been called to the job; they may have an uncanny ability to locate the fire's origin and any incendiary devices; or they may be able to locate and report fires that are not visible from road ways or common thoroughfares). Mechanisms need to be implemented that allow for the report of such suspicious behaviour to enable further review in an appropriate manner.

Conclusions and Recommendations

The economic, social and psychological results of bushfire arson can be devastating. Although some international research

has been conducted on the characteristics and motives of structural arsonists, little research has examined how these models apply to bushfire-setters, particularly in the Australian context.

Prevention of deliberate bushfire-setting will be most effective when a multi-modal approach is undertaken, incorporating situational principles, psycho-educational programs, police and emergency response personnel, and criminal justice sanctions. The characteristics of the fire, fire-prone areas, and knowledge of who commits bushfire arson must all be taken into account.

It is clear that no single approach will be effective. Initiatives that have taken a multi-modal approach may have merit depending on the outcome of evaluations. Furthermore, the screening of prospective fire fighters needs to be incorporated into any prevention plan as they represent a discrete group who are already subject to processes of training and education regarding the risks of bushfire and thus access is guaranteed. Where an individual is screened in this context and deemed to be at-risk of future fire-setting, appropriate procedures must be undertaken to ensure they are given the help needed to desist from or prevent future fire-setting.

Given the disproportion of arsonists who are mentally ill, personality disordered, and otherwise disaffected, it is essential that convicted arsonists should be comprehensively assessed by psychiatrists and/or psychologists prior to sentencing and in anticipation of tailoring interventions to them. Resources are required to assist relevant service providers (i.e., adult corrections, juvenile justice, adult and juvenile forensic mental health services, disability forensic assessment and treatment services, etc.) to develop viable and effective treatment programs. Resources are also required to develop systematic prevention and early intervention initiatives.

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Chapter Three: Additional literature

3.1 Overview of Chapter Three

Chapter Two provided an overview of the literature on firesetting, with a particular focus on how the existing knowledge can be applied to the Australian context, and with a specific examination of bushfire-setting. The paper detailed many of the characteristics of firesetters, potential risk factors, explanatory typologies and current treatment options for firesetters. It concluded that further research is required to understand the behaviour in order to inform assessment and treatment practices. *Chapter Three* will provide a broader review of the firesetting literature, with a view to highlighting areas of need. Specific attention will be paid to the extant theories of firesetting, and more broadly explore the factors that predispose an individual to firesetting. The issue of criminal versatility amongst firesetters will be highlighted, and the difficulties involved in the risk assessment of firesetting behaviour will also be canvassed.

3.2 Theoretical understandings of firesetting

The development of theories attempting to understand firesetting behaviour have their origins in nineteenth century psychiatry and, until recently, this has kept modern understanding of firesetting grounded in psychoanalytic explanations of the behaviour. Firesetting has long been associated with psychiatric disorder, due to the historical relationship between firesetting and specific diagnostic categories, particularly pyromania (Broadhurst & Maller, 1992; Fineman, 1995; Smallbone, Wheaton, & Hourigan, 2003; Vreeland & Levin, 1980). Within this categorisation, firesetting was

viewed originally as mania, then sexual deviance and, more recently, deficits in impulse control (APA, 2000; Lewis & Yarnell, 1951). Contemporary psychological theories of criminal behaviour now explicitly address the roles of cultural, social and individual factors in offending (Andrews & Bonta, 2010). In this context, firesetting researchers have begun to question earlier assumptions and have appropriately examined firesetters' early developmental experiences, social learning, motivations, crime scene actions and fire-related cognitions or schema (Canter & Fritzon, 1998; Fineman, 1995; Gannon et al., 2012; Gannon & Pina, 2010; Jackson et al., 1987). While it is outside the scope of this thesis to provide a description of the development of all of the theories that have emerged to explain firesetting behaviour, the major theories will be briefly examined, with a focus on the more recent multi-factor theories. A summary of the main defining features, theoretical underpinnings, and strengths and weaknesses of some of the theories is presented in Table 1.

Table 1. Summary of firesetting theories

Theory	Theoretical underpinning	Target population	Conceptualisation of firesetting	Strengths	Limitations	Implications
Taxonomies						
Lewis and Yarnell (1951)	Observation of reported motivation	Adult with a single "child" category	Firesetting is the result of distinct motivational categories: unintentional, delusions, erotic pleasure and revenge	• First classification system • Large participant pool	• No psychological implications • Focus on psychic explanations • Poor conceptual clarity • Does not allow for overlapping motivations	• Initial formulation of behaviour • Spurred further research and classification systems based on motivation
Inciardi (1970)	Observation of motivations and demographic information	Adult	Firesetting is the result of both motivational types and demographic characteristics: revenge, excitement, institutionalised, insurance claim, vandalism and crime concealers	• Inclusive and extensive classification system • Large participant pool • Provided likely demographic characteristic of offenders in each type	• Poor conceptual clarity • Does not allow for overlapping motivations	• Started formulating risk according to types
Crime scene classificatory systems						
Canter and Fritzon (1998)	Criminal profiling	Adult	Four main themes of	• Based on details available to	• Motive inferred from	• Useful for investigators

Theory	Theoretical underpinning	Target population	Conceptualisation of firesetting	Strengths	Limitations	Implications
			firesetting based on the combination of motive (instrumental or expressive) and target (person or property): instrumental person, instrumental object, expressive person, expressive object	investigators and courts, therefore practical utility • Inclusion of extensive variables, both crime scene and criminal characteristics • Validated using both adult prisoners and juveniles	crime scene actions • Unable to speculate on psychological factors i.e. cognitions underlying behaviour	but unlikely to be of assistance to clinicians due to the type of variables utilised
Single factor						
Psychoanalytic theory e.g., Macht & Mack (1968); Barnett & Spitzer (1994); Vreeland & Levin (1980)	Psychoanalytic theory	Adult and juvenile	Firesetting results from urethral or oral fixated sexual drive; firesetting as driven by sexual urges	• May account for a small proportion of disturbed offenders	• Little empirical validation i.e., firesetting usually not found to be related to sexual urges • Only accounts for a single variables and does not account for diversity in firesetting samples • Ignores other hypotheses	• Of little clinical utility, due to restrictive focus and lack of explanatory depth

Theory	Theoretical underpinning	Target population	Conceptualisation of firesetting	Strengths	Limitations	Implications
Biological disorder e.g., (Virkkunen, DeJong, Bartko, Goodwin, & Linnoila, 1989); Virrkunen, Goldman, Neilson, & Linnoila, 1995; Calev, 1995)	None	Adult and juvenile	Firesetting results from underlying neurobiological impairment or deficit	• Possible explanation for repeat or impulsive firesetting • Evidence garnered from several studies	• Findings support general impulsivity, not necessarily firesetting per se • Cannot account for the range of firesetting behaviour and is less useful for one-off firesetting • Not extensively studied with large or representative samples • Does not account for contributing sociological impacts on firesetting behaviour	• May lead to development of biological treatments to assist with highly recidivistic firesetters • Assists with formulating potential underlying bases of behaviour
Social learning theory e.g., Kolko & Kazdin (1986); Vreeland & Levin (1980);	Social learning theory	Adult and Juvenile	Firesetting results from the combination of reinforcement and learning (i.e. modelling and imitation)	• Empirical evidence for elements of the theory i.e. history of firesetting in families	• Useful only for various types of firesetting i.e., fire interest or expression of emotional	• Provides a good baseline for developing a formulation based on developmental experiences in

Theory	Theoretical underpinning	Target population	Conceptualisation of firesetting	Strengths	Limitations	Implications
				• Provides explanations for skills deficits i.e., poor coping or lack of assertiveness • Highlights developmental experiences	states • Does not account for interacting factors such as mental illness or substance abuse	certain types of firesetting
Multi-factor						
Functional Analytic Model of recidivistic arson (Jackson, Glass and Hope, 1987)	Functional analysis, behaviour theory, social learning theory	Adult and juvenile	Firesetting results from a complex combination of antecedents and behavioural consequences	• Draws together validated theories and research, and clinical observation of firesetters i.e. poor self-esteem, social isolation and poor social skills • Provides basis for explanation of different firesetting trajectories • Clear focus on developmental experiences • Provides a life course perspective • Explanation of	• Does not explicate reasons why an individual may chose fire • Less clear on proximal factors such as cognitions and attitudes • Does not explore desistance	• Clinical utility in terms of formulation and intervention

Theory	Theoretical underpinning	Target population	Conceptualisation of firesetting	Strengths	Limitations	Implications
				maintaining factors		
Dynamic Behavioural Model (Fineman ,1995)	Dynamic-behaviour theory; behaviour theory (i.e., conditioning)	Adult, although tends to focus on juvenile offending	Firesetting is the product of formative psychosocial influences and immediate environmental contingences	• Includes proximal and distal risk factors and areas for investigation by clinicians • Includes consideration of crime scene actions and recognition of firesetting as an offence-chain • Includes cognitions and affective states	• Not empirically validated • Less focus on maintaining factors • Not clear if cognitions are conceptualised as aetiological or justification for firesetting • Does not provide prototypes to explain commonalties between firesetters	• Provides a framework for assessment of firesetters and areas for intervention • Understanding of unique risk factors pertinent to individuals to varying degrees.
Multi-Trajectory Theory of Adult Firesetting (Gannon, et al., 2012)	Integrative functional analytic, dynamic-behavioural, social learning, and biological theory using theory knitting	Adult firesetters	Firesetting is the result of a complex interplay of developmental, biological, cultural, social learning, and contextual factors.	• Draws together existing research and empirical knowledge using theory knitting • Provides prototypical presentations for individuals with a various combination of vulnerabilities	• Does not explore in detail the structure, function or content of cognitions that play an aetiological role in firesetting • Not sufficient	• Provides key clinical features and risk factors to assess • Clear guidance on the elements to include in formulating risk • Areas for intervention

Theory	Theoretical underpinning	Target population	Conceptualisation of firesetting	Strengths	Limitations	Implications
				• Accounts for the heterogeneity of firesetters • Recognises that vulnerabilities and deficits lie on a continuum • Hypothesises on potential crime scene actions of offenders within specified trajectories • Accounts for the role of cognitions and attitudes in firesetting behaviour	attention to how mental illness moderates other vulnerabilities • Explores desistance from a treatment perspective • Not yet validated	and their potential impact upon desistance

(Gannon & Pina, 2010)

While several theories have emerged more recently postulating on the reasons individuals deliberately light fires, many have continued to focus on single dimensions. Some of these have been based on offence characteristics, mostly used to infer motive (Prins, 1994a; Rix, 1994; Vreeland & Levin, 1980); others have attempted to classify offenders based on crime scene actions (Canter & Fritzon, 1998; Kocsis, 2007; Kocsis & Cooksey, 2002); and others still have focused on factors such as biological disorder or social learning (Kolko & Kazdin, 1986; Virkkunen, DeJong, Bartko, Goodwin, & Linnoila, 1989). While each of these theories attempt to explain the onset of firesetting they do not account for the factors that maintain it, nor do they acknowledge that firesetting is multifaceted and thus unlikely to have its genesis in a single cause.

Jackson, Glass and Hope (1987) attempted to rectify this by developing a functional analytic model for recidivistic arson. In an attempt to unify many of the individual factors presented in the disparate theories, they proposed a model of firesetting in which both the predisposing and maintaining factors for recidivistic arson are considered. In this model, firesetting is viewed as an attempt by a disenfranchised individual to exert some influence over his or her life when other behaviours seem ineffective. While psychosocial stimuli, in the context of certain setting conditions, predispose the individual to firesetting, it is the longer-term consequences that maintain and intensify the antecedent problems that the firesetting was enacted to resolve (p. 175).

Jackson and colleagues suggested five main antecedent factors that may predispose and precipitate deliberate firesetting. These are: 1) psychosocial disadvantage (e.g., adverse social conditions and personal inadequacies); 2)

dissatisfaction with life and self (e.g., depression, suicidal inclination, and low self-esteem stemming from psychosocial disadvantage); 3) ineffective social interaction (e.g., social isolation and rejection, antisocial behaviours, occupational, marriage and sexual maladjustment, poor conflict resolution); 4) factors determining the individual's experiences with fire (e.g., previous vicarious or actual fire experiences); and 5) triggering stimuli (e.g., affective states or opportunity and context). Consistent with the functional analytic framework, this model does not infer motive but rather examines the antecedents and consequences associated with firesetting to predict future behaviour. The model lends itself to examining the maintaining factors for recidivistic firesetting, but does not explain why fire was chosen as the method of communication. However, the advantage of this theory is that it can be easily applied to the mentally ill, intellectually disabled or otherwise 'normal' firesetter. The core assumptions underpinning the theory have been validated by a number of researchers and used to develop treatment programs (see for example Canter & Fritzon, 1998; Dickens et al., 2009; Doley, 2009; Swaffer, Haggert, & Oxley, 2001).

Taking a similarly multi-factorial approach, Fineman (1980; 1995) developed the Dynamic Behaviour Theory of firesetting. Fineman conceptualised firesetting as having its genesis in formative psychosocial influences that direct and reinforce an individual's propensity toward the act. Included in the explanation are key psychological factors that contribute to both the development and maintenance of firesetting behaviour.

Fineman describes the theory using the following formula:

FS + G1 + G2 + E

Where E = C + CF + D1 + D2 + D3 + F1 + F2 + F3 + Rex + Rin

That is, firesetting is the result of dynamic historical factors predisposing the offender toward a variety of maladaptive and antisocial behaviours (G1; e.g., social

ineffectiveness and antisocial attitudes), previous and current environmental factors that predispose and reinforce firesetting as acceptable (G2; e.g., lack of parental supervision around fire or history of firesetting), and immediate environmental reinforcers that foster firesetting behaviour (E). He further breaks E down into several factors such as: crisis or trauma preceding the first firestart (C; e.g., impulsivity, victimisation, sudden loss), the crime scene characteristics and offender behaviour (CF; e.g., incendiary device used, harm intended), cognitive distortions before, during and after the firesetting (D1, D2, D3) that justify the act, and affective states before, during and after the firesetting (F1, F2, F3). In addition, both external reinforcers (Rex; e.g., financial reward, evasion of detection for another crime) and internal reinforcers (Rin; e.g., feelings of excitement, tension reduction, admiration from peers/professional group) are thought to operate with every act of firesetting.

Fineman hypothesises that firesetting originates from the interactions between any and all of the factors, and thus each needs careful exploration during assessment. To do this Fineman (1995) provided a checklist designed for use by non-clinical and clinical interviewers about the important predisposing, precipitating and reinforcing factors pertinent to the formulation of firesetting risk. Of particular importance, he encourages clinicians to consider the offence chain to identify specific reinforcing factors that are pertinent to relapse prevention for an individual offender. In addition, it considers the crime scene actions of the offender as a relevant outcome of the unique combination of antecedents for each individual. However, as Gannon and Pina (2010) point out, the theory is heavily weighted toward juvenile firesetting, where the correlates of firesetting and the motivations for doing so are thought to diverge from adult firesetting, making it less useful for understanding adult firesetting. While the dynamic behavioural model explicates the origins of firesetting behaviour, it is less clear on the exact mechanisms

that maintain it or the factors that may lead a person to desist from the behaviour (Doley, 2009; Gannon & Pina, 2010).

In an attempt to overcome the shortcomings of earlier theories, Gannon and colleagues (2012) developed the Multi-Trajectory Theory of Firesetting (M-TTAF). Although it is yet to be empirically tested, this theory provides the most comprehensive conceptualisation of firesetting to date, incorporating elements from both the functional analytic (Jackson, 1994; Jackson et al., 1987) and dynamic behavioural (Fineman, 1995) paradigms.

The M-TTAF posits that four key psychological elements underlie all firesetting behaviours, and lie on a continuum from relatively intact to severely deficient: 1) Inappropriate fire interest/scripts, 2) offence-supportive cognitions, 3) self/emotional regulation issues, and 4) communication problems. It is the acuteness of and interaction between these variables that purportedly contribute to the wide variation in the presentation of firesetters and firesetting behaviours. In addition to these psychological vulnerabilities several other factors may interact to result in firesetting. These are: developmental factors (i.e., caregiver environment or abusive experiences), biological factors (i.e., brain structure and temperament), cultural factors (i.e., societal beliefs and attitudes toward fire), social learning factors (i.e., fire experiences, coping scripts), and contextual factors (i.e., life events, peer group). Each of these factors may interact with the psychological vulnerabilities that operate as either distal or proximal influences and may become critical risk factors in and of themselves. Mental illness and self-esteem are seen to be moderators upon the existing vulnerabilities.

The unique combination of the above factors gives rise to a number of trajectories associated with firesetting behaviour. The factors influencing the particular trajectory into which an individual may fit include: motivators, potential crime scene

characteristics, likely risk factors, clinical features and reinforcing factors. These trajectories are: antisocial, grievance, fire interest, emotionally expressive/need for recognition and multi-faceted. Each are associated with a certain type of firesetting in terms of target and specific actions, which may be influenced by particular implicit beliefs held by individuals based upon their experiences, and have different implications for risk of recidivism. Treatment targets are identified for each of the prototypical trajectories, providing the theory with considerable clinical utility.

The M-TTAF makes a significant contribution to the understanding of firesetting behaviour, the factors that contribute to its maintenance, the core psychological vulnerabilities and cognitions underlying the behaviour, and the various trajectories associated with the combination of diverse predisposing factors. There are a number of advantages to this system. Firstly, it lends itself to assisting investigators and the courts, not just clinicians or researchers, to consider how an individual's historical and developmental experiences may manifest in particular risk trajectories and crime scene actions. Many of the proposed factors can be inferred from information available to investigators at the crime scene or through victim and witness statements. Of course this information is greatly complemented by clinical interview and psychological assessment of the offender. Additionally, the theory is flexible enough to recognise that firesetting behaviour may adapt over time in accordance with learning and circumstances. However, it is also assumed that the offender will maintain a pattern of behaviours which has been supported by previous research (Doley, 2009; Grubin, 1995; Holmes, 1996). Identifying these unique features may assist with formulation and relapse-prevention planning for individual offenders. Finally, such a model can assist clinicians in identifying the triggers that may precipitate offending by providing a framework within which to understand an individual's behaviour when it would

otherwise remain unclear. This is important for identifying the treatment targets for problem behaviours such as firesetting. Identifying those events that may lead to offending behaviour provides an important point for intervention (Gannon & Pina, 2010).

However, there are some limitations. The M-TTAF conceptualises mental health as a moderating factor, but does not explicate the processes by which mental disorder may moderate pre-existing vulnerabilities. McEwan and Ducat (in press) make this point and consider some of the possible mechanisms by which mental disorder may impact upon firesetting behaviour (See Appendix J for relevant chapter). A further limitation of the M-TTAF is how it considers desistance, which is only discussed insofar as it pertains to offenders who happen to be in some form of psychological treatment. While providing useful guidance about potential factors to target in treatment, and the possible risk reducing impact of targeting those factors, the theory does not yet attempt to account for those who spontaneously desist. Put another way, it fails to account for the individuals who are not life-course persistent firesetters (Doley, 2003b). The question thus remains: what distinguishes those who persist in this way from those who do not? This question surely has implications for treatment targets that the M-TTAF is yet to address.

As outlined in this section, several theories have been developed to attempt to explain the aetiology and/or maintenance of firesetting behaviour. Some of these theories have focused on single factors reported in the literature to be of relevance to and commonly associated with firesetting behaviour (i.e., offence characteristics, motivations, crime scene actions, biological disorder or social learning). Others have developed multi-factor theories of firesetting by unifying elements from the various single-factor theories and using broad theoretical underpinnings to postulate on the

predisposing, precipitating and maintaining factors of firesetting behaviour (i.e., Functional Analytic, Dynamic-Behavioural and the Multi-Trajectory Theory of Adult Firesetting). The strengths and limitations of each of these approaches were discussed, with consideration given to the clinical implications of the theories.

3.3 Characteristics of Firesetters

Several socio-demographic, criminogenic and psychiatric factors thought to characterise firesetters were discussed briefly in *Chapter Two*. However, due to the structure of the published article some detail was not included. The following sections will thus expand upon the literature presented in *Chapter Two*, highlighting areas requiring further investigation. In addition, consideration will be given to the risk assessment of firesetters.

3.3.1 Socio-demographic characteristics

Although the strength of the firesetting literature is hampered by reliance on selective samples of convenience, some preliminary conclusions can be drawn about the characteristics of this population (Doley, 2003a; Gannon & Pina, 2010). Research has found that firesetters are more likely to be young, single males with interpersonal difficulties, unstable childhoods, and early onset of criminal convictions (Dickens et al., 2009; Prins, 1994a & b). Poor school achievement and less schooling, lower occupational status and poor work record are also evident (Barnett & Spitzer, 1994; Bradford, 1982; Hurley & Monahan, 1969; Jackson et al., 1987; Rice & Harris, 1996; Stewart & Culver, 1982). Additional behavioural characteristics such as aggression, impulsivity, and antisocial behaviour have also been consistent risk markers for firesetting (Dickens et al., 2009).

These types of characteristics are also common among non-firesetting offenders and it is difficult to conclude that there are differences between firesetters and other offenders as very few studies have compared representative samples of both groups (Doley, Fineman, Fritzon, Dolan, & McEwan, 2011; Ducat & Ogloff, 2011; Gannon & Pina, 2010). One of the few studies to do so identified no difference between groups in psychiatric diagnosis, occupational or educational history, socioeconomic status or substance abuse history (Quinsey, Rice, Harris, & Cormier, 2006; Rice & Harris, 1996). Quinsey and colleagues (2006) concluded that, when compared with other forensic psychiatric patients, firesetters (n = 243) were less likely to have a generally criminal lifestyle (e.g., less prior violence, less physically aggressive) but had a greater incidence of fire-specific past behaviour including firesetting and fire interest. Unfortunately, this study was based on a selective sample of forensic psychiatric inpatients, limiting its generalisability, and most other research has not employed a comparison sample that would allow for differentiation between those who set fires and other offenders.

3.3.2 Psychological Features

Much of our understanding of the psychological features of firesetters has developed through a rather circuitous process, in which one particular theory regarding the genesis of firesetting behaviour has given rise to the frequent reporting of certain features that fit the hypothesis. The maladaptive childhood and social ineffectiveness hypothesis for example, has led to certain factors being reported more frequently among arsonists. This hypothesis reasons that individuals who deliberately set fires come from impoverished backgrounds and as a result fail to develop adaptive social and affective self-regulatory skills (Kennedy, Vale, Khan, & McAnaney, 2006; Mackay et al., 2006). Commonly reported factors include: inadequate relationships with parents; at least one absent biological parent, often the father; family psychiatric history; disrupted family

life (i.e., divorce, desertion, foster care or fighting); harsh punishing parenting; early age of being taken into care; high rates of abuse, especially sexual abuse among female firesetters; and intellectual impairment (Bradford, 1982; Hurley & Monahan, 1969; Jackson et al., 1987; Kolko & Kazdin, 1986, 1991; McCarty & McMahon, 2005; Murphy & Clare, 1996; Sakheim & Osborn, 1999; Shea, 2002; Slavkin, 2000; Stewart & Culver, 1982). Frequently, these conclusions are based on studies of juvenile offenders and it is thus difficult to determine whether the described features continue to be of importance in predicting adult firesetting.

More recent studies of adult arsonists suggest that family dysfunction and overall psychiatric disturbance on psychometric measures may distinguish repeat firesetters from one-time firesetters and non-firesetters (Doley, 2009). In support of Quinsey, Rice, Harris and Cormier's (2006) findings, serial firesetters from Doley's (2009) sample of incarcerated firesetters experienced greater levels of social isolation and unemployment, more frequent suicidal ideation than non-arsonists, were more psychiatrically disturbed, and have particular difficulties controlling anger. The childhoods of serial arsonists were characterised by greater fire interest and fire-play than non-arsonists. These findings suggest that repeat firesetters are more likely to suffer from impoverished backgrounds while one-time firesetters may share more in common with other offenders.

Perhaps because of such impoverished backgrounds, it is common to find factors such as lack of assertiveness (Rice & Harris, 2008) and low self-esteem (Swaffer et al., 2001) reported among firesetters in the research literature. Jackson, O'Kane and Hossack (1991) found arsonists from the Moss Side Special Hospital in England rated themselves as higher in negative evaluation, and lower in assertiveness than did violent offenders. These findings have been interpreted as explaining the onset of firesetting, as

opposed to other criminal outlets, as arsonists may tend to avoid face-to-face confrontation due to a lack of confidence in their ability to deal effectively with conflict (Ciardha & Gannon, 2012; Jackson, 1994).

While these factors are evident across a range of studies, it is difficult to conclude that they are unique to firesetters. Indeed, Gannon and Pina (2010), in their review of the literature, note that poor attachment and interpersonal social functioning characterise many other non-firesetting offenders. The dearth of studies using comparison groups means that this assertion is true of much of what is 'known' about firesetters.

3.3.3 Psychopathology

Several studies were presented in *Chapter Two* regarding mental illness and firesetting. In review, preliminary research on the nature and rates of psychiatric illnesses among firesetters has yielded inconsistent results, with some studies suggesting that general psychopathology (MacKay, Paglia-Boak, Henderson, Marton, & Adlaf, 2009), alcohol and substance use disorders (Ritchie & Huff, 1999; Vinkers, De Buers, Barendregt, Rinne, & Hoek, 2011), intellectual disability (Devapriam, Raju, Singh, Collacott, & Bhaumik, 2007; Enayati, Grann, Lubbe, & Fazel, 2008), personality disorders (Barnett, Richter, Sigmund, & Spitzer, 1997; Wallace et al., 1998) and psychosis (Anwar, Langstrom, Grann, & Fazel, 2011; Lindberg, Holi, Tani, & Virkkunen, 2005) are associated with higher levels of firesetting. Other studies, including those where community samples are utilised, show that the rate of psychosis and general psychopathology in samples of firesetters is not necessarily higher than non-firesetting offenders (Enayati et al., 2008; Labree, Nijman, Van Marle, & Rasin, 2010; Stewart, 1993), or is only evident when substance misuse is also present (Wallace et al., 1998). To date there has been no empirical investigation of the prevalence of mental illness among firesetters and certainly not using a comparative design.

In addition to mental illness, intellectual disability (ID) has traditionally been associated with firesetting and recidivistic arson (Hayes & Craddock, 1992; Read & Read, 2008). Indeed, firesetting was once thought to be committed predominantly by teenaged girls with sub-optimal intelligence or other socially odd people (i.e., autistic or schizoid) who were considered to be of low IQ (Geller et al., 1986). Some authors have argued that arson and sexual offences are over-represented crimes among offenders with ID (Day, 1993; Dickens et al., 2009; Ho, 1996; Kearns & O'Connor, 1988; Lindberg et al., 2005; Lund, 1991; Samsom & Cumella, 1995; Simpson & Hogg, 2001). It is important to note, however, that most of these studies did not provide a comparison with non-ID offenders in relation to the prevalence of offences, and many of the samples were obtained from psychiatric hospitals where it is more likely statistically to chance upon offenders with an ID (Riches, Parmenter, Wiese & Stancliffe, 2006). Perhaps because of these methodological flaws several studies have reported equivocal and contradictory results, calling into question the link between ID and firesetting (see for example Hayes, 1993; Klimecki, Jenkinson, & Wilson, 1994). Due to such inconsistencies in the literature and the strong link between mental illness, personality disorder and ID (Read & Read, 2008) there is a need for research into the prevalence of ID and mental illness in a representative sample of arsonists.

3.3.4 Offending history

Past behaviour is the best predictor of future behaviour and this appears to be as true for firesetting as it is for other forms of offending behaviour (Quinsey et al., 2006). Recidivist firesetters are more likely to have committed past acts of deliberate firesetting than one-time and non-firesetters (Del Bove & Mackay, 2011; Doley, 2009; Gannon et al., 2012; Gannon & Pina, 2010; Rice & Harris, 1996). In addition to firesetting, individuals who set fires are likely to commit a range of other crimes

(Soothill et al., 2004; refer to section 3.4 below for further discussion). Research into the types of offences committed by firesetters is surrounded by conjecture about the most common types of offences found in the histories of firesetters, which may have implications for risk assessment and treatment. Most studies suggest that arsonists are 'most similar' to property offenders (e.g., Hill et al., 1982; Rice & Harris, 1996). Jackson, Glass and Hope (1987) found that arsonists had a significantly lower incidence of violence than violent offenders both prior to admission to a secure hospital and after. Hill and colleagues (1982) compared the offence histories of individuals referred for psychiatric assessment for firesetting with those of individuals referred for either property or violent offences. The sample sizes were small but they found that 60 per cent of arsonists were predominantly property offenders. While the firesetters were less violent than violent offenders, they were more violent than property offenders. This finding has also been replicated by Quinsey and colleagues (2006) in their sample of forensic psychiatric patients.

Contradicting these results, however, some studies have found that some firesetters do recidivate violently. For example, Rice and Harris (1996) found that 31% of the firesetters in their sample recidivated violently over a mean follow-up period of 7.8 years. Again, this was a unique sample in a secure forensic mental health facility, thereby limiting the generalisability of the findings. Gannon and Pina (2010) note that such a finding may be indicative of the fact the aggression does play a significant role in firesetting but that the aggression tends to be avoidant in nature. Other studies have found that primary arsonists (arson as the main offence) tend to be less aggressive than secondary arsonists (where arson was not the main offence at time of sentencing) (Stewart & Culver, 1982). This is an important factor to consider in assessing risk for

firesetters, and speaks to the need to differentiate between serial and one-off firesetters, as well criminally versatile and specialist firesetters.

Firesetting can be committed across a wide array of situations and with different motives, possibly explaining why there are discrepancies in the level of violence perpetrated by different groups of firesetters across studies. Samples of firesetters include such qualitatively different behaviours as setting fire to a vacant building and igniting a building in which people are thought to be present. Similarly, for offenders whose primary motive for firesetting is revenge, one might expect them to harbour more violent intent and thoughts that the individual feels unable to express, than those who set fires for the purpose of monetary gain or crime concealment (Ciardha & Gannon, 2012; Gannon et al., 2012). As noted above, there are many proposed typologies explaining firesetting behaviour, each of which place importance on different elements of the firesetter's behaviour and developmental experiences to explain the actions observed in the present. Jackson (1994) notes the differences in potential underlying motivations and thus conceptualises pathological firesetting as:

1. Recidivism
2. Fire to property as opposed to fire against persons
3. Fire-setting alone or repetitively with a single identified accomplice
4. Evidence of personality, psychiatric, or emotional problems
5. The absence of financial or political gain as a motive for fire-setting

Such a conceptualisation is perhaps useful for considering risk amongst firesetters, and differentiating between groups of firesetters.

3.4 Firesetting and criminal versatility

Much of the research on risk factors for firesetting has focussed only on firesetting, suggesting that those who light fires are somehow different to other offenders and thus at greater risk of repeat firesetting. However, research has in fact indicated that firesetters are more likely to commit a number of other crimes, especially property-related crimes, than they are to commit arson (Barnett & Spitzer, 1994; Ritchie & Huff, 1999). Soothill and Pope (1973) found the rate of reconviction amongst a group of arsonists who appeared at court in 1951 was lower for arson-related crimes than for other crimes. More than half of their sample reoffended with at least one offence within the follow up period, but only three were reconvicted for arson. Soothill, Ackerley and Francis (2004), in replicating the Soothill and Pope study, found a similarly small proportion of previously convicted arsonists who reoffended with arson, despite the fact that there was a significant increase in the number of arson offences from 1951 to 1981. Theft and burglary remained the offences for which the offenders were most likely to be reconvicted. More recently, Doley (2009) conducted a study on the characteristics of serial arsonists in the Australian states of Victoria and Queensland using police records of solved cases. She found that of the total sample of 187 offenders, only 43 (23%) were recidivist arson offenders. These offenders were responsible for just over half of the total number of offences committed by the group. She also reported that firesetters had more violent, drug and property offences in their criminal histories than non-arsonists in her control group.

While the existing research tends to indicate that arsonists are likely to be versatile offenders, there has been very little research to examine whether this varies between one-off and serial arsonists. Doley (2009) examined this issue and found little difference in the criminal histories of the two groups, although serial arsonists were

found to have more significant property related criminal histories than did one-time offenders. In addition, no difference was found in the demographic characteristics or level of employment of serial and one-time arsonists. Such lack of differentiation may be indicative that most arsonists are first and foremost general criminals who employ firesetting at times during their offending, and thus would be expected to have similar offending histories and characteristics to other offenders.

The issue of criminal versatility perhaps gives some answer to the question that much of the firesetting literature has asked but failed to answer- "Why firesetting?" Jackson (1994) hypothesises that the underlying psychological factors that lead to a person choosing fire as their criminal outlet are not significant in themselves. Rather, he argues that at some stage the person has chanced upon fire as an effective means of impacting upon a situation where no other method seems available. This has been internally or externally reinforced, in the absence of negative consequences, and the behaviour becomes entrenched. Such an argument naturally takes account of criminal versatility in that it assumes that the offender is likely to have tried many other outlets before finding that firesetting in particular meets a certain need.

3.5 Risk Assessment

Jackson (1994) argues that due to the variability in the genesis, development and maintenance of recidivistic arson a standardised assessment approach may not be possible, and in fact it may be misleading to suggest that one can adequately assess firesetting risk. Perhaps, this is one reason why there are currently no risk assessment tools specific to firesetting risk. As discussed above, arsonists tend to be versatile offenders for whom firesetting forms one part of their criminal repertoire. As such, general risk assessment tools may well be effective in identifying level of risk for future

firesetting as well as other forms of offending. Given the heterogeneity of firesetters and criminal versatility other authors have suggested that general risk assessment tools may be suitable for structuring an assessment of firesetters (see for example McEwan et al., 2012) for a discussion of using the Level of Service Inventory- Revised or the Level of Service Inventory/ Case Management Inventory for this purpose; Andrews, Bonta, & Wormith, 2004; Doley & Fritzon, 2008). Gannon and Pina (2010) have also asserted that using tools such as the HCR-20 (Webster, Douglas, Eaves, & Hart, 1997) may be warranted on occasions where the intentions for and actions surrounding the firesetting are violent.

However, while general risk assessment tools are necessary to provide a broad assessment of general risk they often do not take account of the more specific risk factors that are thought to be predictive of arson risk (Gannon & Pina, 2010). The importance of developing a standardised assessment for firesetters was identified by Rice and Harris (1996) who found that among mentally disordered firesetters, fire-specific variables were the most pertinent predictors of recidivistic firesetting. These factors were found to differentiate between risk of firesetting and factors predictive of other forms of reoffending within the same sample, leading them to conclude that the development of a fire-specific risk assessment tool was possible and in fact necessary.

One of the major difficulties with the risk assessment of firesetting is that very little is reliably known about firesetters. This is particularly true in the Australian context where only a handful of studies have been published (see for example, Doley, 2009; Muller, 2008). Furthermore, recidivism rates are complicated by the fact that arson-related offences are often subsumed under the auspices of property damage, thereby reducing the number of apparent arsons in crime statistics (Brett, 2004; Doley, 2009; Soothill & Pope, 1973). This leads to an underrepresentation and skewing of the

actual rates and types of offenders captured. Furthermore, there are inherent difficulties in identifying and apprehending arson offenders because the evidence is often destroyed at the scene (Willis, 2004). This is compounded in the Australian context with bushfires, where identification of the ignition point can be difficult due to the large area of land affected by the fire (Muller, 2008).

In addition to the absence of clear risk factors there is a general dearth of research examining the psychological factors associated with firesetting. As with sexual and violent offending, offence-related cognitions are likely to play an important part in the aetiology and maintenance of firesetting as is the case in other areas of offending (Ciardha & Gannon, 2012; Gannon et al., 2012; Gilbert & Daffern, 2011; Thakker & Ward, 2012). However, there is currently no research systematically examining the cognitions of firesetters. Until the role of fire-related cognitions and immediate triggering environmental conditions is better understood, a broad based assessment of the types of developmental, fire experience and antecedent events outlined Fineman (1995) and Jackson (1994) is likely to be of use. These include historical events, general psychopathology and behaviour, characteristics and motivations during firesetting, cognitions and affective states, substance abuse, and reinforcers for firesetting. In most cases this information would be obtained through clinical interview. The M-TTAF also provides a framework for conducting such assessments and future research, including identifying relevant cognitive domains and trajectories associated with various types of firesetting. These trajectories could provide guidance for the assessment and treatment of firesetters, providing clinicians and researchers with greater clarity in formulating the problem of firesetting. In any case, it is clear that more work needs to be done to understand firesetting in a way that would allow for accurate risk assessment.

3.6 Summary

Chapter Two examined the literature pertaining to bushfire-setting. Lessons from the firesetting literature were taken and applied to the Australian context to provide a broad understanding of the psychology of firesetters, the predictors and risk factors for firesetting, and prevention and intervention. The issue of fire-fighter arson was briefly examined. Chapter Three focused more broadly on the relevant theories of firesetting, the known characteristics and criminal versatility of firesetters, and the relevance of existing risk assessment tools for the assessment of firesetting risk.

The advancement of the firesetting literature is significantly hampered by a lack of properly controlled comparative studies. This has resulted in a somewhat assumptive literature about the characteristics of firesetters and if and how they differ from other offenders. Therefore, there is a need to develop an understanding of the unique risk factors for firesetting, including the clinical and criminogenic needs of offenders. Part of this examination needs to establish the prevalence of psychopathology in populations of firesetters in comparison to other offenders and community members. Such analysis could have important implications for intervention with mentally ill firesetters and for the assessment of psychiatric patients.

There is conjecture about the rate of general offending by firesetters and whether this incorporates violent or non-violent offences. The type of offending in an individual's history is likely to differ depending upon the particular developmental, social learning and psychological vulnerabilities of individual offenders, but this needs to be tested empirically. While the issue of criminal versatility and specialisation has been tentatively raised in the firesetting literature, there has been little research conducted which examines this issue in detail. The research that exists tends to focus on the exclusive (specialist) firesetters, implying that firesetters, especially those who

recidivate, are more likely to specialise in firesetting than they are to be versatile offenders.

Despite this assumption, there has been little systematic and controlled research examining rates of recidivism in representative samples of firesetters, nor has there been an examination of whether firesetting recidivists are more likely to be specialist or versatile offenders. The rates of firesetting recidivism are yet to be established definitively and thus the predictors for firesetting recidivism are somewhat influenced by the samples employed. This has led some authors to conclude that it is not possible to develop risk prediction tools for firesetting, while others conclude the opposite. To this end, research needs to be conducted that establishes the rate of firesetting recidivism in a representative sample, illuminates the unique risk factors associated with firesetting recidivism, and examines the level of criminal versatility in recidivists, which may move the firesetting literature toward the development of a predictive model for recidivistic firesetting.

In sum, this review has shown that explanations for firesetting are relatively under-developed. It seems fair to surmise that this may be due to the general state of the firesetting literature which is typically reliant on selective samples drawn from either psychiatric or imprisoned populations. In addition, few studies have utilised adequate comparison groups, and thus much of the extant knowledge is descriptive in nature. This limits the conclusions that can be drawn, and thus hampers efforts at developing predictive models and risk assessment tools.

PART C: RESEARCH METHODS

Chapter Four: The current study

4.1 Overall approach to research methods

This thesis comprises a number of empirical papers examining elements of firesetting behaviour. While a detailed methodology pertaining to each paper is presented in Chapters seven to nine, this and the following chapter will provide an overview of the overarching research methods used in the three studies. Detailed explanation will be provided regarding sample selection, description of the linkage databases, research protocol and analyses, before delineating the aims of the three empirical papers and the research questions.

4.2 Rationale

The first attempts to explain firesetting used nineteenth century psychiatric knowledge in which firesetting was viewed as a 'moral insanity'; behaviours committed by individuals who were considered to have lost their moral compass but were otherwise thought to retain all of their other mental faculties (Eigen, 1995; Geller et al., 1986). Unfortunately, this perspective remained influential until well into the twentieth century when more contemporary understandings of the behavioural, social and cognitive psychology underpinnings of criminal behaviour became prominent. This limited research efforts to identifying pyromania and other psychopathologies within firesetting samples. In addition, although typologies have recognised heterogeneity among firesetters, these typologies have typically not driven research or been validated

in ways that assist with assessment, formulation and treatment. The impact of these influences, and the use of selective samples, has limited the body of work in this area to research that is mostly descriptive in nature and rarely representative of the firesetting population. As such the current studies aim to overcome these deficiencies by examining a large population of firesetters, who are considered to be representative of convicted arsonists, and by comparing this group to other offenders and community members. In addition, groups of firesetters will be compared to determine whether and what differences exist between firesetters who only set fires and those who are more criminally versatile.

The current studies also provide an important intersection between characterising firesetters for clinical and investigative purposes. By using the information available to investigators and the courts in sentencing, as well information available from large policing and mental health databases, the methodology lends itself to real practical uses. Canter and Fritzon (1998) examined the crime scene actions of arsonists taken from both crime reports and witness statements in order to categorise them according to motivation and offence characteristics. The themes underlying the observable differences in the crime scenes were then used to develop an understanding of the nature of the offence, and thus a typology of arsonists. Such information provides guidance as to the types of individuals investigators may target when investigating particular types of firesetting. Beyond the investigative purposes lies the opportunity to learn about the mental health and criminogenic needs of firesetters in order to divert offenders from the criminal justice system into mental health services where appropriate, and develop more targeted assessment and treatment processes that will benefit both the offender and the community.

Unlike studies that use purely police or investigative data (Canter & Fritzon, 1998) or data collected as part of court proceedings (i.e., psychological and psychiatric reports, social histories; e.g. Barnett, Renneberg & Richter, 1999; Soothill & Pope, 1973; Soothill, Ackerley & Francis, 2004) the current studies will combine these and data taken from other databases in order to form conclusions. In addition, few studies have utilised adequate comparison samples (some exceptions being Hill et al., 1982; Jackson et al., 1987; Labree et al., 2010). Without the use of comparison samples it is impossible to definitively state that a various set of characteristics common to arsonists actually differentiates them from other offenders.

To meet these aims three empirical studies were conducted. The first empirical study examined a subsample of people convicted of arson and arson-related offences between 2000 and 2009 in the state of Victoria who appeared before the Victorian courts to provide an in-depth analysis of the psychological, social and criminogenic risk factors associated with fire-setting. An equal number of non-arson cases were utilised for comparison in this study. This was achieved through analysis of the relevant court files. This study (described in Chapter Seven) extended upon the framework developed by Canter and Fritzon (1998) to include some additional antecedent and predisposing factors (as identified by Jackson, Glass and Hope (1987)) to address the question of what factors may predispose and precipitate firesetting in certain individuals. In addition, criminal versatility and exclusivity were examined in the sample, with unique risk factors investigated for each group. All information available to the presiding judge at the time of sentencing will be analysed.

The second study employed a case linkage design in which data from public mental health registers will be obtained for all individuals convicted of arson and arson-related offences between 2000 and 2009 in the state of Victoria. Data were also

obtained for an equal number of general community members and a sample of non-arson offenders to provide for a comparative analysis. The rates of psychopathology and public mental health service usage amongst firesetters will be explored to provide accurate prevalence rates of mental illness and personality disorder and intellectual disability.

The third empirical study also employed a data linkage design, in which data from both the police register and the public psychiatric register was used to draw conclusions about the risk factors for recidivistic firesetting. After establishing the rate of recidivism in the representative sample, firesetting recidivists and non-recidivists were compared to determine if differences existed in the mental health and criminogenic needs of the two groups. The issue of criminal versatility and exclusivity was explored to determine whether exclusive firesetters were more likely to be repeat offenders. The study went on to describe a model and risk screening tool for recidivistic firesetting.

These studies drew on the strengths of previous research (i.e., Anwar et al., 2011; Canter & Fritzon, 1998; Soothill et al., 2004; Soothill & Pope, 1973) using a representative sample of firesetters before the courts. As Soothill and Pope (1973) note, samples of arsonists appearing from courts provide a more representative sample than those often employed in arson research; psychiatric or prison samples. Furthermore, use of comparison samples in each of the studies provided a unique contribution to the firesetting literature.

4.3 Aims of the research

The research aims to redress the dearth of knowledge in the psychological literature pertaining to the risk factors associated with fire-related offending and reoffending. Specifically, the research aims to identify and examine the demographic, mental health characteristics and criminal histories of a large sample of convicted Australian arsonists. This will contribute significantly to the Australian research context where few studies have been conducted (exceptions being Doley, 2009; Muller, 2008), and thus the nature of firesetting remains relatively unknown. Given the large sample size and use of comparative samples the research will also contribute to the growing body international research in which few studies have had access to such a comprehensive sample.

Given the emerging evidence of criminal versatility amongst firesetters, the research aims to examine criminal versatility in a representative sample and to compare offenders who only light fires with those who are criminally versatile. The research will thus determine whether there are groupings of firesetters who share a number of characteristics and risk/needs but are distinct from other types of firesetters. This will have important implications for both the assessment of firesetters and the treatment approaches selected for use with this population. It is hoped that the research will lead to further exploration of the criminal versatility of firesetters within the research literature and set clinicians on the path to considering what the underlying bases for firesetting might be and how firesetters are similar to other offender groups.

The studies also aim to determine whether the rate of mental illness is higher in arsonists compared with other offenders and the general community, and to determine what disorders are most prevalent. By examining the rates of mental illness, substance use disorders, personality pathology and service usage in a population of convicted

firesetters compared with other offenders and community controls, the research may assist in targeting areas for intervention with mentally disordered firesetters and provide guidance about the allocation of resources to those most at need.

The results of these studies will also increase our understanding of the risk factors associated with firesetting, particularly recidivistic firesetting. Importantly, the final study will compare and contrast these factors with firesetters who do not recidivate. Again this study aims to determine if and how the risk factors for recidivistic arson differ between firesetters who are criminally versatile and those who are not, and whether those who are not criminally versatile (exclusive firesetters) are more likely to recidivate than those who are versatile.

Importantly, in bringing each of the studies together, the research aims to develop a model of recidivistic firesetting that will aid in both the identification of potential firesetters and will provide clinicians with guidance as to the assessment of firesetters, as well as potential targets for interventions aimed at reducing firesetters' risk of reoffending. Where important differences do exist, for example in prevalence or nature of mental illness, recommendations can be made for how the courts view and handle such individuals, and how the criminal justice system as a whole manages them. Additionally, developing a better understanding of the known risk factors for arson will assist police to better identify, track and apprehend arsonists, a particular frustration for investigators given the low clearance rates for arson (Victoria Police, 2009). It is also hoped that this research can inform policy decisions regarding the legislative management of arsonists.

4.4 Research Questions and Hypotheses

There are several key research questions that will be explored in the current research:

1. What are the demographic, mental health, and criminogenic characteristics of firesetters? Do these characteristics distinguish them from other offenders?;
2. Are firesetters criminally versatile (as opposed to specialist firesetters) based on the presence or absence of other offences in their histories?;
3. Is there a group of firesetters who are not versatile (only light fires) and are these individuals distinguishable from more versatile firesetters and other offenders in terms of mental health, criminogenic and demographic characteristics?;
4. Are firesetters more likely to have a mental disorder than other offenders and community members? What is the nature of that disorder and how might it impact upon the firesetting behaviour?;
5. What are the mental health service needs of firesetters when compared to other offenders and the general community?;
6. What is the rate of general and firesetting recidivism amongst firesetters? Does this differ between versatile and non-criminally versatile offenders, especially with regard to firesetting recidivism?;
7. What are the mental health and criminogenic risk factors associated with recidivistic firesetting?;

8. Can broad mental health and criminogenic factors identify firesetters who will reoffend and those who do not; can a predictive model for recidivistic be established?

A number of hypotheses were developed to test these research questions:

1. Firesetters will differ to non-firesetting offenders on a range of risk/need factors, specifically: higher rates of personality and psychiatric disorder, substance abuse, psychosocial disadvantage, and past offending,
2. A group of exclusive firesetters will be differentiated from both versatile firesetting and non-firesetting groups in the following ways:
   a) higher frequency of psychosis;
   b) more incidents of firesetting prior to the index offence;
   c) higher prevalence of suicidal ideation or attempts; and,
   d) lower rates of substance use disorders and personality disorders,
3. There will be higher rates of mental health service usage among arsonists compared with community members and offenders,
4. There will be higher rates of mental disorder, including childhood disorder diagnoses, psychotic disorders, personality disorder and substance use diagnoses among arsonists compared with the other groups,
5. The rate of firesetting recidivism will be less than the rate of general recidivism,
6. Firesetting recidivists will be versatile offenders, who commit a number of other offences in addition to arson,

7. Recidivists will differ from non-recidivists in the following ways: more psychopathology, especially personality disorder and substance misuse, and will have earlier and more diverse offending histories,
8. It will be possible to develop a clinically meaningful risk assessment tool for firesetting risk based on the clinical and criminogenic variables found to distinguish recidivist from non-recidivist firesetters.

Chapter Five: Methodology

5.1 Approach to literature review

Part A of this thesis outlined the literature on the characteristics of and theories attempting to explain firesetting. In the development and completion of this research a comprehensive literature review was conducted. The initial search was conducted in 2010 and reviewed at regular intervals up to April 2013. References were searched using the PsychINFO and Scopus databases using search terms such as "arson", "arsonist", "firesetting", "firesetter", "bushfire", bushfire-setting", "prevention", "mental illness" , "mental disorder", "intellectual disability", "pyromania", "recidivism", "treatment", "risk factors", and "typology". Further references were obtained by searching for prominent authors in the field and reviewing the bibliographies of book chapters and peer-reviewed articles using a snowballing technique.

5.2 Overview of methodology

The research questions outlined in Chapter Three were addressed in three separate, but related, empirical studies. Two of the studies adopted an epidemiological approach, employing a robust case-linkage design. The other utilised data from court files to provide more detailed information on psychosocial and offence-related factors associated with a sub-group of arson offending. As such, there were no active participants in this research; all data were obtained from information extracted from state-wide databases and information available to the courts at the time of sentencing. The overall sample comprised all individuals convicted of arson in the Magistrates', County and Supreme Courts of Victoria, Australia, between 2000 and 2009.

Victoria is the southern-most state in mainland Australia with a population of just over 5.6 million people, nearly four million of whom live in the capital city, Melbourne Victoria (Australian Bureau of Statistics, 2012).

The cases were extracted from the Sentencing Advisory Council's (SAC) Higher Courts Database. In the first study, a subsample of the arson group and a randomly selected sample of other non-arson offenders was provided by the Sentencing Advisory Council who extracted the data from the Higher Courts Database. The variables extracted were the names, dates of birth, age at time of sentence, sex, date upon which the offender was sentenced, the name of the presiding judge, total effective sentence type handed down, effective sentence length in months, the statutory reference in Victorian legislation for the particular offence, the description of the offence and the court type. This information was provided to ensure the correct file was reviewed and analysed. Each relevant court file was then accessed and the data manually collected.

In studies two and three the individual cases were linked with the state-wide criminal records database, the Victorian public mental health database, and for study three, the National Coronial Services database. Community and offender samples were also used in study two. These were randomly selected from a de-identified database of community members extracted from the Victorian electoral roll, and linked manually with the state-wide public mental health register and the criminal records database. This linkage procedure had previously been completed by (Short, Thomas, Luebbers, Ogloff, & Mullen, 2010), and ethical approval was given for its use in the current sample.

5.3 Description of databases

5.3.1 Law Enforcement Assistance Program (LEAP)

Criminal histories were obtained from the Law Enforcement Assistance Program (LEAP) maintained by Victoria Police. LEAP is a state-wide operational policing database that stores particulars of all crimes, as well as victim data, family incidents and missing persons reports. It is online and updated daily by Victoria Police members who enter details of contacts between police and members of the community. The database holds detailed information about crime incidents, including broad offence categories and charges, the date and location of the incident, information pertaining to vehicles and persons involved, legal and judicial outcomes, and any other relevant information. It also stores information regarding field contacts: contacts between police members and members of the public that do not necessarily result in a formal action. These may include welfare checks or the execution of a search warrant. In relation to field contacts, information is recorded pertaining to the date, location and reason for the field contact and persons involved. Individual police members and investigating teams are responsible for updating the database when new information arises.

The LEAP database was implemented by Victoria Police on 1 March 1993. Previous police data were recorded on Information Bureau of Records (IBR) cards in hard copy, which were centrally located. Since LEAP became operational a limited amount of information from the IBRs was transferred to the LEAP database, with scanned copies of the cards attached to the LEAP file. As such, information recorded prior to 1993 may be more limited in nature than those created after 1993.

5.3.2 Victorian Psychiatric Case Register (VPCR)

Psychiatric histories and mental health information were obtained from the Victorian Psychiatric Case Register (VPCR). The VPCR is one of the world's oldest and most comprehensive psychiatric registers, and has been used in both Australian and international research (Burgess et al., 2007; Cutajar et al., 2010; Short et al., 2010; Wallace, Mullen, & Burgess, 2004). It was first developed in 1961 and has undergone several changes since that time, the most recent in 2000. Thus, any person who has had contact with the public mental health system since 2000 will have had their full psychiatric history transferred to the most current electronic version of the database. Those persons who had contact with the system prior to, but not since, 2000 have had their records retained in archive. Originally developed as a research tool, it now functions primarily as a service management tool and there are funding incentives for services to maintain accurate data entry.

All contacts with the public mental health service are recorded, including contacts in emergency rooms, patient admissions, and outpatient or community services, and forensic mental health services. The contacts range from one-off assessments to extended stays in community care units and compulsory treatment orders. The VPCR records the date, nature and duration of the contact, diagnosis if made and treatment, if any, that was provided.

Any contacts with private services, including general practitioners and private clinicians or admissions to private hospitals, are not recorded on the register. However, in Victoria all involuntary admissions and mandated psychiatric treatment services occur exclusively within the public sector (Mental Health Act, 1986). As a result, the vast majority of individuals with a severe psychotic disorder will have contact with the public mental health system at some point during the course of their illness (Wallace et

al., 2004). Currently, approximately 80% of Australia's psychiatric beds are located within the public sector (Department of Health and Ageing, 2007), with only 7.5% of hospitalised psychosis patients entering a private facility during the course of their illness (Jablensky et al., 1999). As such, the VPCR provides an accurate estimate of lifetime prevalence of schizophrenia disorders (Krupinski, Alexander, & Carson, 1982; Wallace et al., 2004), but will not necessarily provide prevalence rates for high prevalence disorders such as mood, substance use and personality disorders (Department of Health and Ageing, 2010).

Diagnoses in the VPCR represent actual clinical diagnoses made by a qualified mental health professional (usually a consultant psychiatrist) at the time of service discharge, or within one month of admission. All diagnoses are made according to criteria in the relevant version of the *International Classification of Diseases* for mental and behavioural disorders (codes F00-F99 (World Health Organization, 1977, 1992).

5.3.3 AEC Community database

This database was developed for the purposes of past research and permission was granted for its use in the current study. It was initially sourced from the Victorian electoral roll. Registration for voting is compulsory in Australia and the electoral roll includes identifying information about 90.6% of the Australian population who are eligible to vote (Australian Electoral Commission, 2012). A total of 5,000 cases (2,500 males and 2,500 females) were randomly selected from the 2008 electoral roll. Eligible cases were aged between 18 – 65 years, although individuals can register on the electoral roll from age 17. Due to access restrictions imposed by the Victorian Electoral Commission, it was not possible to extract the date of birth or exact age at extraction for the community sample; rather, a two-year age band (for example, 30 – 31 years) was provided for each case. The approximated age at extraction was taken to be the lower of

these two years (i.e., 30 – 31 years was taken as 30 years). Once all the relevant fields were retrieved all identifying information was removed so that the data set could be identified by the unique study number only (personal communication T. Short, September 2011). The data have since been stored in de-identified form.

In the initial extraction, date of birth was calculated in one of two ways. For those cases identified on the VPCR (n = 513) or LEAP (n = 2,920) databases, date of birth was extracted from these databases and used to calculate exact age at extraction (on July 31, 2008). If a case could not be identified after searching the VPCR, LEAP and State driver's licence databases, year of birth was calculated from the age at extraction. The month and day were taken as July 31 (consistent with the date of extraction).

5.3.4 National Coronial Information Service (NCIS)

The National Coronial Information Service, managed by the Victorian Department of Justice, is a national online storage and retrieval system for Australian coronial cases. Since its inception in July 2000, information about every death reported to an Australian coroner has been recorded. The NCIS is both an operational prevention tool used by coroners as well as a research tool utilised by external organisations. Extensive information pertaining to each case is recorded including personal and identifying information, time and location of the fatal incident, activity at the time of incident, type of injury, medical cause of death, intent, and more in-depth information such as toxicology and autopsy reports, police narratives of the incident, and the final finding. The current research analysed data pertaining to date and cause of death to provide an accurate representation of recidivism (study three).

5.4 Sample Selection

5.4.1 Firesetters

The study group comprised all adult offenders convicted for a principle proven fire-related offence (excluding cases with outstanding appeals). Cases were identified using records from the Sentencing Advisory Council (SAC) who had previously collected the names for the purposes of their own research.

The SAC provided data pertaining to 952 individuals convicted of arson or arson-related offences in the Magistrates' Court. This data was only available from 2004-05 until December 2009. In addition, data pertaining to 467 individuals convicted of arson offences in the County Courts of Victoria, and four convicted in the Supreme Court between 2000 and 2009 were provided. This provided a sample of 1,423 individuals. After removal of duplicates and erroneous inclusions the final sample was reduced to 1328 individuals (Supreme Court n = 4; County Court n = 418; Magistrates' Court n = 906). The distribution of individuals across the three courts represents the operational nature of the courts and the types of cases they hear. As the Magistrates' Court hears all summary and low level indictable offences, they preside over a greater volume of hearings. The County Court of Victoria is the middle tier court and can hear all indictable offences, except treason, murder and related offences. The broad ranges of offences dealt with include serious theft, armed robbery, drug trafficking, sexual offences, fraud and dishonesty offences, culpable driving, serious assault and income and sales tax offences. It can also hear appeals from the Magistrates' Court. Finally, the Supreme Court is the superior court in the state and only hears the most serious criminal matters such as homicide, and also hears appeals from cases heard in the lower courts or a single justice of the Supreme Court.

To facilitate matching of the cases to other databases several variables were obtained from the SAC. These included: name, date of birth, sex, the individual charge the offender was sentenced for, the statutory reference for the offence in Victorian legislation, the date on which the offender was sentenced, the financial year in which the sentence was handed down, the location of the court in which the sentence was handed down, the offender's age at the time of sentencing, the sentence type handed down for each particular offence, and other offences for which the offender was convicted at the time of sentencing the index offence.

For the present study only cases where arson was the principle proven offence (PPO), that is the offence proven that received the most severe sentence according to the sentencing hierarchy, were selected. This process ensured that the firesetting was likely to be the most serious offending behaviour adjudicated on at the time, while excluding relatively few cases that would be considered more serious (homicide or attempted homicide).

Offenders were charged with a range of arson and arson-related offences (see Table 2.). Many of the arson-related crimes pertain to lighting fires on days deemed too dangerous to have a fire alight due to hazardous weather conditions. Others may relate to negligence in lighting and maintaining fires that have the potential to spread and cause damage to surrounding property (usually bushland). Descriptive information for each of the samples is provided in greater depth in Chapters Seven, Eight and Nine, and thus will not be repeated in this chapter.

Table 2. Arson and arson-related offences included in the firesetting sample

Arson	Arson-related
Arson causing death	Light fire in open air without authority
Criminal damage by fire (arson),	Light fire during prohibited period
Criminal damage by fire- view to gain	Wilfully give false fire alarm
Criminal damage by fire- endanger life	Light fire in open air- country fire danger
Intentionally cause a bushfire	Light fire on total fire ban day
Light fire on public transport commission vehicle or premises	Light fire in day of acute fire danger
Light/use fire to damage or destroy property	Fail to extinguish fire
Light/use fire to endanger property/life	Leave fire unattended
Set fire to litter receptacle	Allow fire to remain alight
	Cause false fire alarm to be given
	Allow fire in the open air to remain alight (total fire ban)
	Fail to extinguish fire on Country Fire Authority direction
	Light fire in country during extreme weather conditions
	Fail to prevent fire from spreading
	Maintain fire during prohibited period
	Fail to inform authorities of fire
	Use unsafe equipment during country fire period
	Cause fire to intentionally destroy
	Bomb hoax
	In open air throw or drop burning material

5.4.2 Court sample/firesetting subsample (Study One)

To facilitate a more in-depth analysis of the psychological, psychiatric and criminogenic factors associated with firesetting, a subsample of the firesetters were selected for analysis of the information available in the court files used for sentencing. Initially, 200 of the above sample were selected for analysis. This included cases that were heard before the County Court between 2004 and 2009 and all cases heard by the Supreme Court within the 2000 to 2009 date range, a total of four cases. The date range selected was intended to provide some overlap with the comparison sample which comprised cases heard between 2006 and 2009. The offences committed by the offenders included: Arson causing death, arson with intent, arson, criminal damage by fire (arson), causing fire in a country area with intent to cause damage or destroy vegetation or produce, stock, fodder, or other property, and intentionally/recklessly cause a bushfire. There were a number of offenders who were convicted of arson although they did not actually light the fire (were merely accessories). These cases were included in the sample to ensure that it was an accurate representation of the types of offenders convicted of arson and arson-related offences.

In the process of data collection, it was noted that several cases attracted a charge of 'Intentionally destroy/damage property (criminal damage)' and these were not in fact arson-related. There were approximately 45 such cases, fifty percent of which were reviewed by the researcher to determine the relevance of the charges to the current study. None of the principle proven offences in the 24 files reviewed were arson-related and thus all of the 45 cases were excluded from the overall sample. A further 13 files could not be located. In such cases the next available file was located and included in the sample. As such the date range in the final sample extended from 2003 to 2009 and comprised 204 arson offenders. As one of the aims of the research was to examine the

risk factors associated with and characteristics of bushfire arsonists all cases that were defined as being bushfire-related were included in the sample, whether they fell within the date range or not. There were four such cases, incorporating charges such as: causing fire in a country area with intent to cause damage/destroy vegetation/produce/stock/crop/fodder/other property or Intentionally/recklessly cause a bushfire (only after 2006 when that crime was introduced). Any cases that were being appealed at the time of collection were excluded from the sample. There was only one such occurrence.

To locate the file a name search was conducted using the County Court's Case List Management System (CLMS) (County Court Practice Note, 1999). In the first instance a person query was run to obtain the case identification number. A scheduling query was then run to determine the location of the file and the status of the case i.e., whether it was finalised, going to appeal, and whether there were any upcoming events relating to the case, for example a case conference. Once the identification number was obtained the file could be retrieved from storage or ordered from the rural courts.

5.4.3 Community comparison group (Study Two)

The community comparison group utilised in study two was drawn from the AEC community sample database described in section 5.1.3 above. Within the sample a small percentage had some form of criminal history (8.9%). These cases were extracted to form part of the offending control sample utilised in study two (as described below), and so s were not matched to the firesetters. After exclusion of these cases, the community controls were matched to the firesetters on gender and two-year age bands, with the exception of two bandings where there were insufficient cases to match in smaller age groupings (under 18 year olds and over 60 years). Thus, there were 1328 matched community controls for study two.

5.4.4 Non-firesetting offender samples

5.4.4.1 Court offending control sample (Study One)

In study one an offender comparison sample was utilised to provide robust conclusions about the nature of firesetting behaviour and perpetrators. The offender comparison sample used in study one was sourced from the Sentencing Advisory Council's Higher Courts Database. The data was case-based and included the principal proven offence for cases sentenced in the 2006-07, 2007-08 and 2008-09 financial years as the criteria for extraction. Data were extracted from the Higher Courts database by a trained data analyst at the SAC and then moved into Excel, where a randomly generated number was issued to each case; the cases with the first 200 randomly generated numbers made up the dataset. In the first derivation of the data, 10 cases (5%) from the Supreme Court were included. These were excluded and a new random sample of 200 County Court cases was selected. Supreme Court cases were excluded to provide for direct comparison between offences of similar severity according to the jurisdiction of the County Court of Victoria. The reduced date range was selected to allow for a meaningful number of cases in each date band. Certain offence types were excluded from the analysis; specifically, arson (to avoid duplication), and homicide and sexual offences. Homicide and sexual offenders were excluded from this sample because research suggests they are least similar to arsonists (Dickens et al., 2009). Moreover, the County Court hears all of the sexual offence cases in the State of Victoria, and thus such offences are over-represented. It would thus be difficult to obtain a truly random sample if sexual offences were included. A further case was excluded from the sample as the defendant was a company. In total 35 cases were excluded from the sample and the next randomly generated cases were selected. People in the comparison group were convicted of a range of crimes (PPO), the majority being violence (46%), drug (17.2%),

deception (14.1%) and property offences (9.6%), with the remainder of the sample (13.1%) having been convicted of a mix of weapons, stalking, theft, kidnap and public order offences.

5.4.4.2 Offending control sample (Study Two)

An offender sample was used as a comparison to the firesetters in study two. These were taken from the AEC community database described above (Section 5.1.3 and 5.1.8). Of the 4830 community cases described above 429 (8.9%) people had received a criminal charge in their lifetime. Eight individuals (1.85% of those with criminal history, 0.17% of the total community sample) in this group had a prior charge for arson and were thus excluded from the sample, reducing the number to 421. The most frequent offences recorded within this sample were violence, drug, deception, and theft offences, followed by a range of others such as weapons, threats, and bad public behaviour. The least common offences were sexual and homicide offences.

5.5 Case linkage procedure

After identification of the cases, they were linked to the databases previously described. In each case the full name, including any known aliases, date of birth and gender, and a unique identifier (to allow for de-identification at a later date) was provided to a trained staff member at the respective organisations. The linkage procedures differed slightly between the databases, which will be outlined below.

5.5.1 Linking with VPCR

In order to obtain psychiatric histories, each of the cases was linked manually using a deterministic approach, whereby exact identifying details were sought. Where an exact match was not made a probabilistic approach was used whereby exact date of

birth was sought but names were searched using the phonetic algorithm Soundex. Soundex is a phonetic algorithm for indexing names by sound, as pronounced in English. This allows for matching even when there are minor differences in spelling.

Matching of females required some additional criteria, as several were unable to be matched using the surnames provided. In each of these cases the demographic data suggested that the identified individual had been married since their previous contact with services. Where the birth date, first name, and middle name corresponded, these cases were deemed to be matches and all were retained. Additional verification of these cases was manually performed using the information obtained from the other databases.

5.5.2 Linking with LEAP

In order to obtain Victorian criminal histories, a similar linkage procedure was used, although some additional search criteria were added. Using the same deterministic and then probabilistic searches described above, the initial iteration returned a match rate of only 49%, despite the cases coming from a sample of convicted offenders. Subsequently, the search criteria were broadened to include several additional criteria:

1. Exact first name, last name and exact date of birth (DOB)
2. Soundex name and exact DOB
3. Exact first name, last name and one DOB factor different (i.e. day, month or year different)
4. Soundex name and one DOB factor different (i.e. day, month or year different)
5. Exact first name, last name and two- year DOB range and previous arson charge
6. SOUNDEX name and two-year DOB range and previous Arson charge

The revised procedure achieved a match rate with LEAP data of 85%. It is not known why 15% of the cases could not be matched.

5.5.3 Linking with NCIS

To obtain information from the coronial database manual searches were conducted by trained staff at the organisation. Two confidence levels were used: 1) Individuals were matched on surname, both given names and date of birth; 2) Individuals were matched on surname, first given name and date of birth (within a two-day range; excluded any cases where both second given names were provided and did not match). Date of death notification and cause of death from any coroner in Australia was extracted and individuals who were found to have died during the study period were excluded from analysis in study three (n = 20).

5.6 Data coding protocols

5.6.1 Collection and coding of court data (Study One)

The court files of the convicted arsonists were examined and coded to provide for a more in-depth analysis of the demographic, social, psychiatric, and psychological risk factors for firesetting. In addition, extensive information about the actual arson was collected. The protocol was developed from Canter and Fritzon's (1998) framework which provides for the coding of both offender characteristics and offence details. A review of the psychiatric, psychological and criminological literature on firesetting showed some additional variables of interest and these were included in the final protocol. A ten percent subsample of the files was also examined to determine if there were additional factors consistently reported that would be of use to the analysis. Information from the literature review, the Canter and Fritzon model and court files were collated into an objective coding protocol, and a computerized data-collection database was designed with guidance notes to ensure accuracy and consistency with coding (refer to Appendix A for coding protocol, including full definitions of the items).

The author retrieved and analysed the court files for the individuals. Although the nature of information varied from file to file, all information available to the sentencing judge was included in every court file and thus was examined and coded. Information that might be available included, but was not limited to, criminal histories, pre-sentence psychological or psychiatric reports, the police summary of charges and description of the events in question, the judges' sentencing comments summarising the evidence and reasons for sentencing, and other information deemed to be relevant to the courts such as employment record and letters from service providers like disability services.

Due to constraints on data collection, it was not possible to have files rated by multiple reviewers. However, care was taken to define the variables using objective criteria so that a clear decision could be made about its presence or absence, and variables were coded dichotomously, further ensuring clarity and reliability. Past research using a similar approach to the coding of potentially unreliable data has produced reliable and meaningful results (Canter & Fritzon, 1998; Canter & Heritage, 1990; Fritzon, Canter, & Wilton, 2001). Unfortunately a small number of relevant variables could not be adequately coded due to the inconsistency in reporting in the files and were therefore not included in analyses (e.g., reports of childhood fire interest and making false alarm calls, and family history of fire interest or criminality). Given the variability of information reported in the court files, there were significant levels of missing data in some variables. A further two variables were excluded from analyses as the missing data exceeded 60% (i.e., age at onset of firesetting behaviour and number of prior fires the offender admitted to lighting).

All information obtained formed part of the court record that was assembled as part of the sentencing procedures. As such, all psychiatric diagnoses were the opinion of a psychiatrist or psychologist who was retained to provide an opinion to the court.

Coding of factors such as contact with psychiatric services included all contacts with a professional sought for the treatment of mental health issues, including public mental health services, general practitioners, private psychiatrists and psychologists, counselors, treatment groups and drug and alcohol counseling. These definitions were necessarily broad to account for inconsistency in the level of reporting across the reports.

5.6.2 Coding of LEAP data (Study Three)

5.6.2.1 Operationalisation of offence history

Criminal history was operationalized as having been convicted of any crime during adult life (18+ years). Offences were coded as either violent or non-violent using the Cormier-Lang System included in Appendix B (Quinsey et al., 2006). Within this system, firesetting is usually coded as a property offence but was coded separately for this research since it was the offence type being investigated. Violence included homicide, sexual assault, assault, cruelty to animals and kidnap. Non-violent offences were weapons offences, threats of violence, property damage, stalking, drug offences, deception, theft, breach a legal order or bad public behaviour. Certain exceptions to this coding are possible where collateral evidence from the files suggested that a non-violent offence was associated with violence. For example, robbery is usually coded as a non-violent offence but when there is evidence of use of violence in the commission of the act it would be coded as violent. This coding was performed and checked manually.

This system also provides a hierarchical approach to coding offence history, allowing for the coding and analysis of the most serious offence for which a person may have been charged. The categories, in order of severity, were: homicide, sexual assault, physical violence, kidnapping, weapons offences, threats of violence, property damage,

stalking, drug offences, deception offences, theft offences, breaches of legal orders and bad public behaviour. This system was used to simplify the large number of distinct charges that individuals in the sample were charged with. It also transcends differences in the operational definitions of offences between jurisdictions, both within Australia and internationally, providing consistency in coding with other similar epidemiological studies (for a summary of several studies making use of this system see (Ogloff et al., 2013) and well-known risk-assessment tools (e.g. Violence Risk Assessment Guide (VRAG); Quinsey, Rice, Harris & Cormier, 2006).

5.6.2.2 Information extracted

The LEAP database records information about all contacts between members of the public and Victoria Police members. For the current studies information about criminal behaviours resulting in a formal charge was collected. This information included the description of the charge, date and time of charge, the relationship of the offender to the victim, the location of the offence and the method of processing, that is, how the police formally acted upon the charge being laid (e.g. arrest, summons to appear before court, caution).

5.6.3 Coding of VPCR data (Study Two)

5.6.3.1 Types of contact with the pubic mental health service

When an individual makes contact with the Victorian public mental health system, each contact s/he has with any service under the public system is recorded. A contact includes indirect contact (for example, a clinician discussing the case at clinical review meetings) and direct contact (for example, a psychiatrist interviewing the patient). Contacts may also be with the clients themselves or with persons involved in

their care (for example, a family member or general practitioner). For the purposes of this research only direct contacts with the client (either in person or via the telephone) were coded as a contact, irrespective of whether others were also present at the time of the contact. An individual may have a large number of contacts during one period of care. When contacts occurred within a period of care (i.e. from admission to separation from a service) these were termed and coded as episodes. For example, an individual who has been admitted to an inpatient unit may have several separate contacts with a number of clinicians. These would be coded as one episode and not as several contacts.

The type of service was also coded; these could be within the child and adolescent, adult or aged persons' services. Categories included: inpatient (hospital), outpatient (community), mobile psychiatric crisis services (community), supported accommodation (community) and legal orders, such as involuntary treatment orders (community). For each case the number and type of contact was coded.

5.6.3.2 Types of psychiatric diagnosis

The lifetime diagnostic history of the individuals in the sample was coded and analysed. All DSM-IV-TR (American Psychiatric Association, 2000) Axis I and Axis II diagnoses were coded (see Appendix C for full coding protocol). Primary psychiatric diagnoses were coded into categories, replicating previous research (Cutajar et al., 2010; Short et al., 2010; Wallace et al., 2004). The primary psychiatric diagnoses were coded (in order from most severe to least severe) as schizophrenia-spectrum, other psychoses, bipolar affective disorder, depressive disorder, anxiety disorder, eating disorder, substance use disorder, or other Axis I disorder. In cases where multiple primary diagnoses were present, the most serious diagnosis was coded. For example, if primary diagnoses of both bipolar affective disorder and anxiety disorder were recorded, the diagnosis would be coded as bipolar affective disorder.

The category 'schizophrenia-spectrum disorders' included schizophrenia, schizoaffective disorder, schizotypal disorder, shared psychotic disorder, delusional disorders, and unspecified non-organic psychosis (ICD-9 codes 295 and 297, plus ICD-10 codes F20, F21, F22, F24, F25 and F29). The latter excluded organic or transient forms of psychosis, such as substance-induced psychosis, depression with psychotic features, or senile psychotic conditions. Given the large number of potential diagnoses an individual may receive over a lifetime, diagnoses were only coded when they were upheld in 75% of the diagnoses given, or there was a clear diagnostic progression over time resulting in a clear diagnosis. An example of a clear diagnostic progression would be evidenced by diagnoses of depression with psychotic features to bipolar affective disorder and finally schizoaffective disorder. Where schizoaffective disorder was upheld in subsequent diagnoses it would be coded as a schizophrenia-spectrum disorder. Schizophrenia diagnoses not meeting these criteria were coded as 'other psychoses'. This method has been used by several studies demonstrating good reliability (Bennett et al., 2011; Krupinski et al., 1982; Short et al., 2010; Short, Thomas, Mullen, & Ogloff, in press).

A 'substance-use disorder' was defined as any type of substance dependence, substance abuse, or substance-induced disorder, with the exception of nicotine-related disorders. Substance intoxication was not included because acute intoxication is not necessarily indicative of a substance-use problem, however, substance-induced psychosis was.

5.7 Reliability of linkage and coding procedure

Wherever possible, SPSS (Version 20.0) syntax and Microsoft Access (2010) data queries were used to extract relevant fields and automatically count the number of

cases in each variable (for example, the number of offenders with a charge of arson prior to the index date). A subsample of each of the variables was then manually counted to ensure accuracy of the queries. This procedure reduced potential errors by negating the need to manually count all cases and ensuring accuracy of the developed queries.

5.8 Data analysis

Data entry and management was performed using Microsoft Access databases, which were password protected. Upon completion of collection, data were imported into the Statistical Package for Social Sciences (SPSS) version 20 for Windows. Prior to data analysis, all variables were manually examined and underwent basic data cleaning. This involved deleting any cells with implausible values (such as an age less than zero years) or missing values. The percentage of missing data was examined for variables and cases. Where missing data exceeded 60% of the cases in a variable the variable was excluded from analysis. Tolerance levels for percentage missing in individual cases was higher (75%) to preserve the sample size, and percent of missing data was reported in all analyses conducted for Study One.

Descriptive statistics were used to characterise the samples. A range of parametric and non-parametric tests were conducted to determine whether differences between the samples were statistically significant at the $p = 0.05$ level. Odds ratios were used to determine the likelihood of an outcome occurring in firesetting cases compared with controls. Specific details of the statistical analyses utilised in each study are reported in depth in Chapters seven to nine, and will not be repeated here.

5.9 Ethical considerations

Ethical approval was granted by the Monash University Human Research Ethics Committee, the Department of Justice Human Research Ethics Committee, and the Victoria Police Human Research Ethics Committee under a joint agreement (Appendices D - F). The Department of Health, Mental Health and Drugs Division also granted ethics approval based on the above approvals (see Appendix G). Letters of permission were received from the Chief Magistrate and Chief Judge of the County Court to collect and use data amassed for the courts for each participant (Appendix H - I). A letter of request was sent to the Chief Justice of the Supreme Court but no reply was received. As such, the original court files for cases heard in the Supreme Court were not accessed. However, the presiding Judges' Sentencing Comments are publicly available via the online database AustLII and these were used in study one.

Several ethical considerations specific to epidemiological research designs were raised and considered. Specifically, the issues of informed consent and application of privacy principles were relevant. The current research required the extraction and use of identifiable information from databases maintained by Victoria Police (LEAP), Department of Health (RAPID), the National Coronial Information Services and information available in court files without receiving consent from the individuals to whom the data pertains.

While researchers should always endeavour to obtain informed consent from research participants, the *National Statement on the Ethical Conduct in Human Research* (NHMRC, 2007) outlines that the requirements for consent may be justifiably waived in certain circumstances to ensure that the data linkage is accurate and the integrity of the research is upheld. Specifically, where the potential benefits of the research outweigh any risks of harm associated with not seeking consent, if involvement

in the research constitutes no more than low risk to participants, and if it is impracticable to obtain consent from participants, the imperative to obtain consent may be waived. In addition, the guidelines stipulate that the researchers have a responsibility to protect the privacy and confidentiality of the data. The research was carefully designed to ensure that the study constituted no more than low risk to individuals. Careful consideration was given to ensure that participants' privacy was safeguarded and no information beyond that which was sought was disclosed. Furthermore, the benefits of the research outweigh the potential harms to participants.

PART D: EMPIRICAL STUDIES

Chapter Six: Overview of the empirical papers

To this point, this thesis has reviewed the extant literature on firesetting, outlined the aims and research questions and described the research methods used to meet these aims. Part D of this thesis presents the empirical studies that were undertaken to answer the research questions. Each of these studies has been prepared for publication in peer reviewed journals; they will thus be presented in manuscript form in the format required by the specific journals, although the pages have been re-numbered for consistency with the thesis. There are three papers, each addressing one or several of the aims.

Using a case review method, paper one (presented in Chapter Seven) examines the criminal histories and psychological and social factors that may distinguish firesetters from other offenders. In addition, it explores whether groups of exclusive and criminally versatile firesetters exist in the sample. The aim of this analysis was to determine whether exclusivity in firesetting is related to an increased number of risk factors for firesetting and thus a greater risk of firesetting than those who are more criminally versatile.

Paper two (presented in Chapter Eight) extends upon the first paper to provide an in-depth examination of mental illness and firesetting within a larger sample of firesetters. It describes psychiatric morbidity and public mental health service usage of firesetters, and compares these to other offenders and community members. The paper seeks to consider how mental illness may uniquely impact upon firesetting behaviour and speculate on what types of interventions may be targeted toward individuals who are at an elevated risk of firesetting behaviour and who are mentally ill.

The final paper (presented in Chapter Nine) examines the criminal histories and mental health correlates of recidivistic firesetting. It compares the presence of these factors between recidivist firesetters and non-recidivist firesetters in order to determine whether they can distinguish the two groups. In addition, it examines whether the rates and risk factors for recidivism differ between exclusive and criminally versatile firesetters. The practical utility of this examination is explored in the development of a screening measure that may be used by investigators and clinicians to identify individuals who have a number of the risk factors associated with firesetting recidivism. Use of this tool would provide forensic clinicians with a foundation for developing a more targeted and in-depth assessment where indicated.

Chapter Seven: Understanding and comparing firesetters with non-firesetters

7.1 Exploration of the similarities and differences between firesetters and other offenders.

Over the past two decades understandings of criminal behaviour have moved away from nineteenth century psychiatry's 'moral insanities' (Eigen, 1995; Geller et al., 1986), and psychoanalytic narratives toward behavioural, cognitive and social learning explanations (Andrews & Bonta, 2010; Gannon et al., 2012; Gannon & Pina, 2010). This has resulted in an explosion of research into a number of areas of offending behaviour (e.g. sexual and violent offending). Accordingly, a number of well-developed theories of offending have proliferated, examining not just the risk/needs and characteristics of offenders but the predisposing and maintaining cognitive states and implicit assumptions that may contribute to offending in a particular way (Polaschek & Ward, 2002; Ventura & Davis, 2004; Ward, 2000). Unfortunately, firesetting research remains relatively under-developed in these areas, resulting in a body of research that is descriptive in nature and not particularly informative for clinical and investigative purposes (Doley et al., 2011).

While there is a growing understanding of the factors found more frequently amongst firesetters, the lack of comparative studies means that conclusions drawn about the 'typical' firesetter are tenuous at best. It may be that the persistent search for the elusive 'firebug' (as they are popularly termed), or the 'typical' firesetter, is drawing research efforts away from understanding the underlying commonalities between firesetters and other offenders; an understanding that has been developed in other areas

of offending behaviour (see the Psychology of Criminal Conduct, Andrews and Bonta (2010) or Warren, MacKenzie, Mullen, & Ogloff (2005) for explication of the Problem Behaviour Model). An examination of this sort would enable firesetting researchers and clinicians to utilise the extensive knowledge about the psychological underpinnings of criminal behaviour, while also taking account of the factors that may be unique to firesetters. Such an approach may answer the question of why an individual may choose fire over other means and consequently how to assess and treat such behaviours.

In addition to understanding the underlying commonalities and differences between firesetters and other offenders, several authors have contended that firesetters are not a homogenous group and thus should not be analysed as one (Ciardha & Gannon, 2012; Geller, 1992a). In response to this realisation, a number of researchers have developed typologies based on groupings of firesetters who share a number of characteristics and risk/needs but are distinct from other types of firesetters (Barnett et al., 1997; Canter & Fritzon, 1998; Lindberg et al., 2005; Quinsey et al., 2006). The results of these various studies support the notion that the heterogeneity of firesetters' characteristics and risk/needs should be considered in risk formulations and intervention planning. It would seem that such distinctions are important as risk of firesetting and other offending varies depending on the particular trajectory of the individual firesetter. Thus, it is vital to develop an understanding of not just how firesetters are similar to and how they differ from other offenders, but also how different types of firesetters differ from one another. This understanding has the potential to inform clinical practice in a more guided and useful way.

7.2 Preamble to accepted manuscript: "Comparing the characteristics of firesetting and non-firesetting offenders: Are firesetters a special case?"

The second publication analyses information available to the courts at the time of sentencing the individual, and provides the framework for analysis of groups of firesetters in subsequent articles (Chapter Nine). It details the criminal histories and the social, psychological and psychiatric characteristics of convicted arsonists and compares these with a random sample of other convicted offenders, before examining the issue of criminal versatility amongst firesetters. The paper concludes that criminal versatility is indeed the norm among firesetters, and the implications of this for future firesetting and other offending are explored.

The following article has been accepted for publication in the *Journal of Forensic Psychiatry and Psychology* (ISSN 1478-9949). This is a peer-reviewed journal which has been published bi-monthly since 1990. In 2011 the *Journal of Forensic Psychiatry and Psychology* had an impact factor of 0.884 (Thomson Reuters, 2012).

7.3 Declaration of Thesis Chapter Seven

Monash University
Declaration by candidate for thesis Chapter Seven

In the case of Chapter Seven, the nature and extent of contributions to the work are as follows:

Name	Nature of contribution	Extent of contribution
Ms. Lauren Ducat	Reviewed literature, obtained ethics approval, collected and coded data, conducted analysis, prepared and revised manuscript	75%
Dr Troy McEwan	Co-investigator, assisted with conceptualisation of paper and data analysis, reviewed manuscript	15%
Professor James R.P. Ogloff	Co-investigator, assisted with conceptualisation of paper and data analysis, reviewed manuscript	10%

Candidate's Signature:		Date

Declaration by co-authors

The undersigned hereby certify that:

a) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.

b) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

c) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

d) there are no other authors of the publication according to these criteria;

e) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

f) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s):

Centre for Forensic Behavioural Science, School of Psychology & Psychiatry, Monash University 505 Hoddle Street, Clifton Hill Victoria, Australia

Prof. J. Ogloff:		Date:
Dr Troy McEwan		Date:

Comparing the characteristics of firesetting and non-firesetting offenders: Are firesetters a special case?

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Centre for Forensic Behavioral Science, Monash University

and the Victorian Institute of Forensic Mental Health

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Abstract

This study investigated unique risk factors for firesetting in a population of deliberate firesetters (n = 207) who appeared before courts between 2004 and 2009. It aimed to investigate differences between firesetting and non-firesetting offenders and determine whether offenders with only arson offences (exclusive) differed from those with more versatile (firesetting and other offence types) offending careers. Four-way comparisons were made between non-firesetters, exclusive firesetters, predominant firesetters and mixed firesetters. The demographic, criminological and clinical characteristics of firesetters were compared with a random sample of non-firesetting offenders using information from court files. The findings suggest that deliberate firesetters and other offenders are similar on key characteristics, although firesetters are more likely to be unemployed and to have a greater prevalence of psychiatric disorders. When comparing exclusive firesetters with the other groups few differences emerged, including the incidence of past firesetting. It was concluded that firesetters are mostly versatile offenders, and this pattern of offending is associated with greater levels of criminogenic need than exists among non-firesetting offenders.

Keywords: arson, firesetting, comparative, risk factors, characteristics, versatility

Comparing the characteristics of firesetting and non-firesetting offenders: Are firesetters a special case?

Attempts to describe the 'typical' arsonist or deliberate firesetter[1] are common, both in the popular media and the research literature (Doley, 2003a; McCallum, 2013). In attempting to understand the mindset of firesetters, the media, public and law-makers often turn to commonly held notions of the 'firebug' or 'pyromaniac' arsonist with its implicit assumption that firesetters are somehow unique and present a high risk of recidivism (Lewis & Yarnell, 1951; Tomazin, 2012). Unfortunately, empirical investigation of this notion is lacking, and studies of firesetters have rarely employed comparison samples or investigated recidivism rates in representative samples (Brett, 2004). Given the societal costs of deliberate firesetting, the dearth of knowledge about the unique characteristics of firesetting offenders is surprising. In Australia, the cost of arson has been estimated at $1.6 billion annually (Rollings, 2008). There is also a human cost. In 2009, devastating bushfires in Victoria Australia cost 173 people their lives and destroyed 3500 buildings. Subsequent investigations attributed four of these fires to arson. These four fires killed 52 people and burnt approximately 2000km² (McEwan, Doley & Dolan, 2012; 2009 Bushfire Roayl Commission, 2010). Similarly high figures have been reported in the United States where intentionally set structural fires are estimated to have resulted in at least 200 civilian deaths and cost the community $5.85 billion in a single year (Karter, 2011), while in the UK 451 people died in fire-related incidents in 2008 (Department for Communties and Local

[1] Arson is a legal term defining the crime of deliberately and/or malicious setting of fires. Pyromania is a diagnostic label to describe pathological firesetting. Elements of the diagnosis include: deliberate and purposeful firesetting on multiple occasions; an inability to resist setting fires; extreme interest in fire-related paraphernalia; increased tension or arousal before the act followed by an intense relief once committed; a lack of other motives or gain (for example, monetary gain, crime concealment, socio-political expression or anger or revenge); and is not better characterised by another disorder (American Psychiatric Association, 2000). In this article, the term firesetter will be used as it describes people who intentionally set fires regardless of motivation, pathology or legal status.

Government, 2010), at an estimated cost of £2.53 billion (Office of Deputy Prime Minister, 2006). Cases such as the 2009 deliberate bushfires in Australia, where several individuals were charged with arson over these events but none had previously been detected by police as potential arsonists, highlight the costs of an incomplete understanding of who sets fires and why.

Describing firesetters

The perception of firesetters as a unique group with specific needs (i.e., sexual dysfunction, impulse control deficits) may originate in the historical relationship between firesetting and specific diagnostic categories, particularly pyromania (Broadhurst & Maller, 1992; Fineman, 1995; Smallbone, Wheaton, & Hourigan, 2003; Vreeland & Levin, 1980). The diagnosis of pyromania (see footnote 1) conceptualises firesetting in a very particular way: as a repeated behaviour attributable to an internal psychological flaw, originally mania, then sexual deviance and, more recently, deficits in impulse control (Lewis & Yarnell, 1951). The diagnostic category makes the explicit but circular assumption that those with pyromania are at higher risk of setting repeated fires, because they have to have recurrently set fires to qualify for such a diagnosis (Lindberg, Holi, Tani & Virkkunen, 2005). This approach has its origins in 19th century psychiatry's 'moral insanities' (Geller, 1986; Eigen, 1995), and the subsequent psychoanalytic tradition. It pre-dates the behavioural, social and cognitive psychology revolutions that occurred in the latter half of the 20th century and so ignores principles from behavioural, social learning and social cognition theories that are likely quite relevant to the criminogenic needs of firesetting offenders. This is wholly inconsistent with contemporary psychological theories of criminal behaviour, which explicitly address the roles of cultural, social and individual factors in offending (Andrews &

Bonta, 2010). In this context, firesetting researchers have begun to question earlier assumptions, and have appropriately examined firesetters' early developmental experiences, social learning, motivations, crime scene actions and fire-related cognitions or schema (Canter & Fritzon, 1998; Fineman, 1995; Gannon, Ciardha, Doley, & Alleyne, 2012; Gannon & Pina, 2010; Jackson, Glass, & Hope, 1987).

Although the strength of the firesetting literature is hampered by reliance on selective samples of convenience, some preliminary conclusions about the characteristics of this population can be drawn (Doley, 2003a; Gannon & Pina, 2010). Research has found that firesetters are more likely to be young, single males with interpersonal difficulties, unstable childhoods, and early onset of criminal convictions (Dickens et al., 2009; Prins, 1994a,1994b). Poor school achievement and less schooling, lower occupational status and poor work record, mental illness, including psychosis, substance use and personality disorder are also evident (Anwar, Langstrom, Grann, & Fazel, 2011; Barnett & Spitzer, 1994; Bradford, 1982; Hurley & Monahan, 1969; Jackson et al., 1987; Rice & Harris, 1996; Stewart & Culver, 1982). Additional behavioural characteristics such as aggression, impulsivity, and antisocial behaviour have also been consistent risk markers for firesetting (Dickens et al., 2009).

These types of characteristics are also common among non-firesetting offenders and it is difficult to conclude that there are differences between firesetters and other offenders as very few studies have compared representative samples of both groups (Doley, Fineman, Fritzon, Dolan, & McEwan, 2011; Ducat & Ogloff, 2011; Gannon & Pina, 2010). One of the few studies to do so identified no difference between groups in psychiatric diagnosis, occupational or educational history, socioeconomic status or substance abuse history (Quinsey, Rice, Harris & Cormier, 2006; Rice & Harris, 1996).

Quinsey and colleagues (2006) concluded that, when compared with other psychiatric patients, firesetters (n = 243) were less likely to have a generally criminal lifestyle (e.g., less prior violence, less physically aggressive) but had a greater incidence of fire-specific past behaviour including firesetting and fire interest. Unfortunately, this study was based on a selective sample of forensic psychiatric inpatients, limiting its generalisability, and most other research has not employed a comparison sample that would allow for differentiation between those who set fires and other offenders.

Exclusivity and criminal versatility amongst firesetters

Despite doubts about the validity of the concept and diagnosis of pyromania (Doley, 2003b; Greenberg, 2005), and a sizeable body of research pointing towards the criminal versatility of firesetters (Brett, 2004; Broadhurst & Loh, 2003; Klein & Robbin, 2005; Quinsey et al., 2006; Smallbone & Wortley, 2004; Ventura & Davis, 2004), the idea persists that those who set fires in the absence of other offending are pathological and thus at greater risk of recidivistic firesetting (Barnett, 1997). In response, some researchers have investigated whether the number of firesetting incidents differs depending on the presence or absence of other offences (Barnett, Richter & Renneberg, 1999; Lindberg et al., 2005). Using samples of mentally disordered offenders, these authors have found evidence of exclusivity in firesetting behaviour, leading some to conclude that exclusive firesetters may have different firesetting and offending trajectories (Quinsey et al., 2006). In a sample of 90 mentally disordered recidivist firesetters, Lindberg et al. (2005) found that 48% were exclusive firesetters who had only firesetting in their offending histories. Psychosis and intellectual disability were found to distinguish the exclusive group while personality disorder and alcohol dependence was more likely to distinguish the non-exclusive

group. Similarly, Barnett and colleagues (1999) identified that 33% of 470 firesetters with diminished responsibility due to mental impairment were exclusive offenders. In this sample, firesetters who committed no crimes other than firesetting (n = 24) showed the highest number of firesetting incidents. No other comparisons between the groups were made to identify other differentiating characteristics.

Where exclusive and versatile firesetting behaviour has been examined, the findings suggest that this pattern of behaviour may be more closely attributable to deficits associated with various mental illnesses. This does not support the diagnostic category of pyromania, which cloaks a problematic behaviour in the mask of mental illness, but it does suggest that particular symptoms of mental illness may have a causative role in some individual's firesetting. Moreover, these individuals appear to have a somewhat different pattern of firesetting behaviour and so findings from samples of mentally disordered offenders may not be generalizable to non-disordered firesetting samples. Given the different risk trajectories for versatile and exclusive offenders in general (Chu & Thomas, 2010; Harris, Knight, Smallbone & Dennison, 2011), it would be remiss to assume that such a finding does not translate into the field of firesetting. Despite the limitations in the firesetting studies, the findings do highlight possible differences in risk trajectories, and thus management, of exclusive and versatile firesetters, which warrants further investigation.

Aims and hypotheses

Given the absence of comparative studies and a general lack of clarity around the exclusivity or versatility of firesetters, the current study had three aims. First, it sought to describe the demographic, psychiatric and criminal histories of a large and representative sample of firesetters. Second, it aimed to compare these offenders with a

non-firesetting offender group on a range of criminogenic factors. Finally, the study sought to investigate whether groups of exclusive firesetters and criminally versatile firesetting offenders existed in this sample, and whether differences emerged between these groups and non-firesetting offenders across a range of variables. With these aims in mind, it is hypothesised that firesetters will differ to non-firesetting offenders on a range of risk/need factors, specifically: higher rates of personality and psychiatric disorder, substance abuse, psychosocial disadvantage, and past offending. Based on Lindberg and colleagues (2005) findings, a group of exclusive firesetters will be differentiated from both versatile firesetting and non-firesetting groups by more incidents of firesetting prior to the index offence, higher frequency of psychosis, higher prevalence of suicidal ideation or attempts; and lower rates of substance use disorders and personality disorders

Method

Participants

Between 2004 and 2009, 207 offenders were convicted of firesetting offences by higher courts (i.e., County and Supreme Courts) in the State of Victoria, Australia. For the present study only cases where firesetting was the principle proven offence (PPO) were selected. The PPO is the offence proven that received the most severe sentence according to the sentencing hierarchy. This process ensured that the firesetting was likely to be the most serious offending behaviour adjudicated at the time and would exclude relatively few cases as few offences are viewed as more serious than arson in the sentencing hierarchy (e.g. homicide or attempted homicide). All available court files for offenders convicted between mid-2004 and mid-2009 were retrieved.

The control group comprised 197 randomly selected non-firesetting offenders drawn from offenders convicted across a similar time period in Victoria. Consideration was given to using a matched comparison sample, but, given the scant literature on the relevant characteristics of firesetters, it was impossible to determine which variables to match; thus a random sample was deemed most appropriate.

Procedure

The first author retrieved and analyzed the court files for the individuals. All information available to the sentencing judge was in the court file including, but not limited to: criminal history, pre-sentence psychological or psychiatric reports, police summaries of charges and descriptions of the events in question, and other information deemed to be relevant to the courts such as employment record and letters from service providers like disability services. Variables of interest were generated from an examination of the psychiatric, psychological and criminological literature on firesetting and a sub-sample of the court files. An objective coding protocol was developed based on both previous research (Canter & Fritzon, 1998; Canter & Heritage, 1990) and consultation among the authors on the factors to be included and definitions, and a computerized data-collection database was designed with guidance notes to ensure accuracy and consistency with coding. Due to constraints on data collection, it was not possible to have files rated by multiple reviewers. However, care was taken to define the variables using objective criteria so that a clear decision could be made about its presence or absence, and variables were coded dichotomously, further ensuring clarity and reliability. Past research using a similar approach to the coding of potentially unreliable data has produced reliable and meaningful results (Canter & Fritzon, 1998; Canter & Heritage, 1990; Fritzon, Canter, & Wilton, 2001). Unfortunately a small

number of relevant variables could not be adequately coded due to the inconsistency in reporting in the files (e.g., reports of childhood fire interest and making false alarm calls, and family history of fire interest). Given the variability of information reported in the court files, there were significant levels of missing data in some variables. A further two variables were excluded due to there being more than 60% missing data (i.e., age at onset of firesetting behaviour and number of prior fires the offender admitted to lighting). Variables included in the final analyses were: demographic variables (i.e., age at index offence, gender, relationship status, employment status and type of job, mean years of education); criminal history (i.e., none, violence, non-violent offending, both violent and non-violent offending, mean age at first conviction, number of past firesetting convictions, number of other offences convicted); psychiatric/psychological variables (i.e., axis I clinical diagnosis, axis II personality diagnosis, intellectual disability, suicidal ideation or acts, delusions at time of offending, substance or alcohol misuse disorders, recipient of psychiatric care); childhood factors (i.e., contact with social services as a child, being in the care of people other than family, suffering abuse or neglect, exhibiting behavioural problems, parental divorce, father absent, conflictual home environment, family criminal history).

All data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 19 (SPSS, 2010). Between-group comparisons on categorical variables were made using Pearson's chi-square and Fisher's exact test (where cell size was less than five), and independent samples *t*-tests or Mann-Whitney *U* and Kruskal-Wallis *H* tests for continuous variables (age at conviction, age at first conviction, number of prior firesetting and other convictions, and years of education). The Mann-Whitney *U* effect

size statistic θ was estimated by U/mn, where m and n are the sample size of each group and $\theta = 0.5$ is analogous to $d = 0$ (Newcombe, 2006a, 2006b).

Definition of terms

Criminal history was operationalized as having been convicted of any crime during adult life (18+ years). Offences were coded as either violent or non-violent using the Cormier-Lang System (Quinsey, Rice, Harris, & Cormier, 2006). Within this system, firesetting is usually coded as a property offence but was coded separately for this study. Violence included homicide, sexual assault, violence, cruelty to animals and kidnap. Non-violent offences were weapons offences, threats of violence, property damage, stalking, drug offences, deception, theft, breach a legal order or bad public behaviour.

Five *a priori* offender categories were defined to test Hypothesis 2, based on level of criminal versatility (Low Versatile and Versatile) and the presence and extent of firesetting history (Exclusive, Predominant and Mixed Firesetters and Non-firesetters). Criminal versatility was based on the definition provided in the Psychopathy Checklist-Revised (Hare, 2003). Low versatility offenders had less than three (of 15) offence types in their histories (in addition to the PPO). Versatile offenders were those with more than three offence types in addition to the PPO. Firesetting behaviour was therefore categorized as: Exclusive (low versatility: only past or present firesetting), Predominant firesetters (low versatility: PPO of firesetting and up to two other offence types), Mixed (high versatility: PPO of firesetting and more than three offence types) or Non-firesetting (low and high versatility groups using the above definitions and with no current or former firesetting offences).

All information obtained was part of the court record that was assembled as part of the sentencing procedures. As such, all psychiatric diagnoses were the opinion of a psychiatrist or psychologist who was retained to provide an opinion to the court. Coding of factors such as contact with psychiatric services included all contacts with a professional sought for the treatment of mental health issues, including public mental health services, general practitioners, private psychiatrists and psychologists, counselors, treatment groups and drug and alcohol counseling. These definitions were necessarily broad to account for inconsistency in the level of reporting across the reports.

Results

Comparisons between firesetters and non-firesetters

The firesetting sample consisted of 207 people (167 males, 80.6%; 40 females, 19.4%) with a mean age at the time of the index offending of 30.5 years (SD = 11.32; range 17-68 years). The comparison sample consisted of 197 people (174 males, 88.4%; 23 females, 11.6%) with a mean age of 30.7 years (SD = 10.64; range 17-64 years). Age was not significantly different between groups (U = 18,373, p = 0.63); although gender was (χ^2 = 4.67, p < 0.05), with more females in the firesetting group than the non-firesetting group (40, 19.4% versus 23, 11.6%). The number of past offences ranged from 0 to 33 and 0 to 31 for the firesetting and non-firesetting groups respectively (firesetting M = 4.07, SD = 5.90; non-firesetting M= 4.30 SD = 6.04), with no significant difference between the groups (U = 20,155.5, p = 0.90). Mean age at first conviction was 23.62 (SD 9.80) years for the firesetters and 23.70 (SD 10.56) years, which was not significantly different (U = 18, 537.5, p = 0.67). People in the comparison group were convicted of a range of crimes (PPO), the majority being

violence (46%), drug (17.2%), deception (14.1%) and property offences (9.6%), with the remainder of the sample (13.1%) having been convicted of a mix of weapons, stalking, theft, kidnap and public order offences.

Both the firesetting and non-firesetting groups were more likely to be single than in an intimate relationship (38.7% vs. 34.8% respectively, $\chi^2 = 2.28$, $p = 0.52$). Mean years of education did not differ between groups (firesetting group = 9.92 years, (SD = 1.60; range 4-15 years); comparison group = 10.30 years (SD = 2.17; range 5-18 years) ($U = 6043.5$, $p = 0.26$). Significantly more people in the non-firesetting group (61.8%) than the firesetting group (46.9%) were employed at the time of the index offence ($\chi^2 = 6.47$, $p < 0.05$). Type of employment also differed significantly ($\chi^2 = 21.58$, $p < 0.001$), with the non-firesetting group holding more professional positions (those requiring formal training beyond a trades certificate) than the firesetting group (13.3% vs. 2.1% respectively). Of the total firesetting sample, only one person was identified as having been rejected by local fire authorities to assist as a volunteer firefighter. There were two cases of firesetting by fire service employees or volunteers.

Comparisons of criminal history and mental health variables showed few overall differences between the firesetting and non-firesetting groups (see Table 1). Individuals in the firesetting sample were more likely to have experienced suicidal ideation and/or attempted suicide (48.7% v. 29.4%), or exhibited behavioral problems in childhood (34.1% v. 22.4%) and were also more likely to be the recipient of psychiatric or psychological treatment across the lifespan (42.5% v. 27.8%). Firesetters were significantly more likely than others to have received an Axis II personality diagnosis (21.7% vs. 11.2%, $\chi^2 = 4.97$, $p < 0.05$, OR 0.45, CI 0.23 – 0.92) and Cluster B

personality traits were significantly more prevalent in the firesetting group (18% vs. 8.6%, $\chi^2 = 4.68$, $p < 0.05$, OR 2.33 CI 1.07-5.07).

A broad comparison revealed a significant difference between firesetters and non-firesetters in the incidence of an Axis I mental disorder at the time of assessment, although the effect size was small ($\chi^2 = 4.05$, $p < 0.05$) (see Table 2). Specific analyses of individual disorders showed that firesetters were significantly more likely to have received a diagnosis of depression at the time of assessment than others (30% vs. 18.9%, $\chi^2 = 4.41$, $p < 0.05$).

While no specific hypotheses were made about high versatility offenders, comparisons between these groups did reveal significant between-group differences. Mixed firesetters were more likely than Non-firesetters (of a similar level of criminal versatility) to have a personality disorder (22 (31.4%) vs. 12 (14.6%), 6.1, $p < 0.01$ OR 2.7, CI 1.2 – 5.9). Where a personality disorder was present, Mixed firesetters were more likely to be diagnosed with Cluster B types (18 (25.4%) vs. 10 (12.2%), 4.41, $p < 0.05$, OR 0.41, CI 0.2 – 0.9) when compared to Non-firesetters. They were also more likely to have experienced suicidal ideation or to have made suicide attempts (32 (52.5%) vs. 27 (34.6%), 4.5, $p < 0.05$, OR 0.5, CI 0.24 – 0.9), to have been the recipient of psychiatric care (35 (53%) vs. 23 (28%), 9.6, $p < 0.01$, OR 0.4, CI 0.2 – 0.7), and to have an alcohol use disorder (27 (38%) vs. 19 (21.1%), 5.6, $p < 0.05$, OR 0.4, CI 0.2 – 0.9). Non-firesetters were more likely to have no offending history (53 (34.9%) vs. 0, 42.97 $p < 0.001$, OR 1.5, CI 1.4 – 1.7). They were also more likely to be employed at the time of the commission of the PPO (68 (62.4%) vs. 29 (40.3%) 8.5, $p < 0.01$, OR 2.5, CI 1.3 – 4.5).

Comparisons between firesetting groups

The exclusive firesetting group comprised 43 offenders (20.9% of the firesetting group), with a mean age of 31.0 years (SD = 12.5, range 17-61) who were mostly male (n = 30, 69.8%). The predominant firesetting group comprised 67 offenders (32.5% of total firesetters) with a mean age of 28.9 years (SD = 11.1, range 17-57), 47 (70.1%) male. Ninety-seven offenders were categorized as mixed firesetters (46.6%), with a mean age of 30.4 (SD = 11.0, range 10-68), the vast majority of whom were male (n = 89, 92.7%). Age did not significantly differ among groups. Due to the categorical nature of the data, actual frequency counts of historical offences were not possible. The mean number of offence types (past and current, excluding the index offence) was zero in the exclusive group was, 0.8 (SD = 0.6) in the predominant firesetting group, and 3.9 (SD = 1.6) in the mixed group.

Comparisons of exclusive firesetters to all other groups on each of the variables listed in Table 1 were conducted. Due to space, only significant results are reported below. The results of all comparisons are available on request. There were no differences between exclusive and predominant firesetters on demographic or clinical variables. While few factors differentiated exclusive firesetters from the other two groups, female gender was significantly more common in the former group compared to both Mixed (30 male (69.8%) vs. 89 male (92.7), $\chi^2 = 12.7$, $p < 0.001$, OR 0.2, CI 0.1-0.5) and Non-firesetters (30 male (69.8%) vs. 174 male (88.3%), $\chi^2 = 9.6$, $p < 0.01$, OR 0.3, CI 0.1 – 0.7). Exclusive firesetters were also older at the time of their first conviction compared with Mixed firesetters (M = 30.97 SD 12.47 vs. M = 18.8, U = 566, $p < 0.001$, $\theta = 0.2$) and Non-firesetters (M = 30.97 SD 12.47 vs. M = 23.74 SD 9.81, U = 1743, $p < 0.001$, $\theta = 0.2$). There was a higher prevalence of suicidal

acts/ideation in the Exclusive group when compared with the Non-firesetters (13 (52%) vs. 32 (29.4%; 89 missing), $\chi^2 = 4.7$, $p < 0.05$ OR 0.4, CI 0.2 – 0.9).Compared with the Mixed firesetters, those in the Exclusive group were significantly less likely to have a personality disorder (2 (7.4%) v 22 (31.4%), $\chi^2 = 6.0$, $p < 0.05$, OR 0.2, CI 0.04 – 0.8), or to have a substance use diagnosis (3 (10.3%) v 43 (58.9%; 23 missing), $\chi^2 = 19.8$, $p < 0.001$, OR 12.42, CI 3.4 – 44.8). The Exclusive group were also less likely to have a substance use diagnosis than Non-firesetters (3 (10.3) vs. 59 (47.2; 73 missing), $\chi^2 = 13.3$, $p < 0.001$ OR 7.8, CI 2.2 – 26.9). There were no significant differences between Exclusive, Predominant and Mixed firesetters in the prevalence of psychotic disorders.

The Exclusive group had fewer past convictions (including firesetting offences) than either the Mixed firesetting (M 0 SD= 0 v M 8.2, SD= 6.5; $U = 0$, $p < 0.001$), or the Non-firesetting group (M 4.2, SD 6.0; $U = 1743$, $p < 0.001$, $\theta = 0.2$). There were no significant differences between Exclusive, Predominant and Mixed firesetters in the number of previous firesetting incidents.

Discussion

The current study investigated similarities and differences between firesetting and non-firesetting offenders and compared exclusive firesetters with those who had greater criminal versatility. Very few differences were identified between firesetters and non-firesetters; however, some meaningful differences emerged when comparing exclusive firesetters with other firesetters and non-firesetters. The findings indicated that firesetters are mostly versatile offenders, and this pattern of offending is associated with greater levels of criminogenic need than exists among non-firesetting offenders.

Firesetters versus non-firesetters

The first hypothesis that firesetting and non-firesetting offenders would differ in the presence of a range of criminogenic risks/needs was partly supported, although several factors previously suggested to be associated with specific risk of firesetting did not differentiate the groups. Firesetters were no more likely to have a history of offending than non-firesetters (consistent with Brett, 2004, and Dickens et al., 2009). While the two groups had similar criminogenic needs overall, people in the firesetting group were more likely to have a history of mental disorder and social disadvantage than other offenders.

Consistent with findings from psychiatric samples, firesetters in this more representative forensic sample tended to have more contact with psychiatric or psychological treatment services (Rice & Harris, 2008; Quinsey et al., 2006), were more likely to have engaged in suicidal ideation or acts, and to have alcohol use disorders than non-firesetters (Rasanen, Puumalainen, Janhonen, & Vaisanen, 1996; Ritchie & Huff, 1999). Findings in studies of psychiatric populations have suggested that psychosis and other mental illness is specifically associated with firesetting (Barnett & Spitzter, 1994; Barnett et al., 1999; Lindberg et al., 2005). The current study found no evidence for greater prevalence of psychosis in the firesetting sample, but did find higher levels of general mental disorder and depression. This divergence in results may indicate that the prevalence of psychosis amongst firesetters in previous studies may be an artifact of data collected in psychiatric settings. However; these findings do suggest that mental disorder does need to be considered when conducting assessments and formulation of firesetters in any context (Doley & Watt, 2012). Notably, there was only one diagnosed case of pyromania in the sample, which may reflect under-diagnosis of the disorder due the recognized lack of diagnostic sensitivity of the criteria and strict

exclusionary criteria (American Psychiatric Association, 2012), or could be attributable to genuine low prevalence of the disorder. The lack of utility of the pyromania diagnosis supports the conclusion that firesetting should be first and foremost understood as a problem behaviour rather than psychiatric disorder, even where there is some direct or indirect relationship with psychopathology (Lindberg et al., 2005; Ritchie & Huff, 1999).

Firesetters in this sample had poorer educational and occupational outcomes, being less likely to achieve tertiary education and fewer being employed at the time of the index offence (Doley, 2009; Rice & Harris, 2008). This is consistent with several past studies (Enayati, Grann, Lubbe, & Fazel, 2008; Quinsey et al., 2006; Vaughn et al., 2010) and could reflect individual traits hypothesized to be of relevance to firesetting, such as poor assertiveness and communication skills, low self-esteem and impulsivity, which may impair educational and occupation achievement (Rasanen et al., 1996; Rice & Harris, 2008; Swaffer, Haggert, & Oxley, 2001). These findings have been used in past studies to suggest that some firesetters may use fire as a method of emotional expression in the absence of more adaptive skills (see for example Canter & Fritzon, 1998).

Exclusive firesetters

Consistent with lay perceptions, the results of this study support the notion that there is a group of deliberate firesetters who are exclusive in their problematic behaviour. Previous research has attempted to examine this group in mentally disordered samples, concluding that exclusive firesetters set more fires and thus may be at greater risk of repeat firesetting (Lindberg et al., 2005; Barnett et al., 1999). The current results show that while such a group does exist in a more representative forensic

sample, they are otherwise less distinctive than might be thought. Contrary to previous findings, exclusive firesetters in this sample were less likely to have any previous offending than others and were no more or less likely to have deliberately set multiple fires. For many of the exclusive firesetters the index offence was their first convicted offence of any type, which was not accounted for by time at risk as age was not significantly different between groups. They were also no more or less likely to be diagnosed with a psychotic disorder. Some of the factors hypothesized to differentiate exclusive firesetters from others were supported (lower prevalence of substance use and personality disorders, and more suicidal ideation or attempts (only when compared with non-firesetters), which offers some clues as to the motivation of the firesetter.

Mixed (versatile) firesetters

The largest subset of firesetters were categorized as versatile (mixed), supporting research that has shown firesetters to be more likely to have diverse offending careers than they are to be exclusive (Brett, 2004; Broadhurst & Loh, 2003; Klein & Robbin, 2005; Quinsey et al., 2006; Soothill et al., 2004; Soothill & Pope, 1973; Smallbone & Wortley, 2004; Ventura & Davis, 2004). The results of the comparisons between mixed firesetters and the other groups largely mirror the overall firesetter/non-firesetter comparisons, suggesting that the mixed firesetters may have accounted for much of the variance in those results. Consistent with findings from previous, less representative samples (Repo & Virkkunen, 1997; Rice & Harris, 1996; Dickens et al., 2009), highly versatile firesetters had significantly more prior offending and were more often diagnosed with personality disorder. It may be that the majority of moderate to high risk offenders are first and foremost ‘rule violators’ rather than firesetters, violent or property offenders *per se*. Over time they engage in a variety of

different offence types, and cannot be neatly classified into categorical behavioural groups based on psychosocial characteristics (Gannon & Barrowcliffe, 2012; Vaughn et al., 2012). The findings suggest that versatile firesetters may have a more chronic course of antisocial behaviour and may require more intensive or longer term interventions focusing on a wider variety of criminogenic needs to change that behaviour.

Criminal versatility in firesetters

The overall lack of differentiation between firesetters and non-firesetters in this study may be explained by criminal versatility. The criminal versatility of most offenders has been recognized in relation to other types of problem behaviour such as violence and sexually harmful behaviour (Harris et al., 2011). It is widely recognised that risk of all types of offending is increased by the same constellation of characteristics, known as the 'Central Eight' risk/need factors (Andrews & Bonta, 2010): antisocial personality, attitudes supportive of crime, criminal history, social support for crime, substance abuse, low social involvement, low work engagement and family dysfunction. Individuals who have this combination of characteristics tend to engage in a variety of antisocial behaviours (Andrews & Bonta, 2010; Bonta, Law, & Hanson, 1998; Gendreau et al., 1996; Phillips et al., 2005). Generally speaking, the more of these baseline factors present, the more likely the person is to offend, and to be criminally versatile. Several of these factors were found to differentiate the more versatile firesetters in this sample, including personality disorder (cluster B), extensive and early criminal careers, substance abuse and low work engagement, indicating a general predilection to offending behaviours.

While the prevalence of criminal versatility among firesetters suggests that they are generally not a particularly unique offending group, it does not explain why some

criminally versatile individuals choose to light fires while others do not. Findings from the sexual offending literature may give some clues about co-occurrence of criminal versatility and specific types of offending behaviour. While the Central Eight risk factors are associated with general offending, it seems likely that more offence-specific factors are relevant to particular types of problem behaviour. For example, sexual deviance has been highlighted as particularly relevant to sexually harmful behaviour (Hanson & Bussiere, 1998; Hanson & Morton-Bourgon, 2005). Similarly, specific aggression scripts have been linked to violent behaviour (see Gilbert & Daffern, 2011 for review). In the case of fire-setting, such offence-specific factors are likely to include early fire interest, characterized by false alarm or bomb hoaxes, coming to police notice for fire lighting or fire play, fire-related cognitions and behaviours related to type of firesetting, such as lighting a number of small fires in remote areas in firesetters (Ciardha & Gannon, 2012; Fineman, 1995; Jackson, 1994; McEwan, Doley, & Dolan, 2012).

Given the evidence of criminal versatility among those who set fires, firesetting might best be conceptualized as one of a group of problem behaviours, not unlike violence and sexual offending, in which the broad range of factors relevant to the assessment and treatment of all such behaviours needs to be considered (e.g., criminogenic factors, social context, behavioural elements, mental disorder; Warren et al., 2005). While the behavioural manifestations of various offences are obviously different, many of the factors that are related to offending may be the same; as such, a narrow focus on searching for the defining features of exclusive offenders may yield little information that is useful to assessment and treatment.

Limitations

These findings need to be considered in light of some methodological limitations. In particular, as with other retrospective case review studies, we were limited in the nature and number of variables available in the case files. Thus, the variables were quite general in nature and it is possible that more in-depth information may have identified other between-group differences. This particularly affects potentially psychologically and behaviourally relevant variables such as offence-related cognitions and behaviours. For example, factors that are thought to be indicative of a problematic fire interest (i.e., making a false alarm or bomb hoaxes, coming to police notice for fire lighting or early fascination in fire) were found in such small numbers as to render them statistically meaningless. In addition, given the nature of the information, it is assumed that there are inconsistencies in the collation and reporting of certain data (in particular diagnostic information) for which the authors cannot account. It is also possible that the rates of severe mental illness in firesetters are underrepresented as these individuals may have been informally diverted from the criminal justice system. While a comparison sample was used it was not possible to match the comparison sample with the firesetting sample due to the absence of clear indicators on which factors to match.

While other studies have used samples of exclusive firesetters (Barnett et al., 1999; Lindberg et al., 2005), no other studies have considered degree of criminal versatility of offenders, meaning that some comparability with past research may be limited. However, we believe that the categorization of criminal versatility using the PCL-R criteria provides reliable and objective group definitions, and enhances the replicability of this study.

Future directions

While a group of exclusive firesetters was identified in this study, overall, the results point more towards similarities between firesetters and other offenders. General criminogenic factors that underlie diverse types of offending also appear to be relevant to deliberate firesetting, although perhaps with a slightly greater emphasis on psychological and psychiatric needs. However, these results do not answer the complex question of why an individual lights fires rather than engaging in other types of offending behaviour. While there is clearly a core combination of risk/need factors that contribute to increased risk of offending overall, there is evidence that behaviour-specific factors are relevant to some types of offending (Bonta et al., 1998; Hanson, 2005; Hanson & Morton-Bourgon, 2005; Mann et al., 2010). At the very least it seems likely that firesetters may have predisposing experiences with fire, cognitions associated with the use of fire and individual traits that may have governed the choice of fire as one part of their offending repertoire, and these may provide useful avenues for clinicians assessing firesetters (Fineman, 1995; Ciardha & Gannon, 2012). Although the variables studied in this research are relatively broad-based, the findings do suggest that individual firesetters are likely to present with different trajectories into firesetting behaviour, as has been proposed by Gannon and colleague's (2012) Multi-Trajectory Theory of Firesetting (M-TTAF). These trajectories would be associated with specific psychological vulnerabilities, attitudes and cognitions supportive of firesetting and/or criminality, offence behaviour, criminogenic need and developmental experiences that speak to areas for intervention. To answer the question of why a person lights fires, future research should focus on investigating the hypothesized role of the cognitions of firesetters, and how fire-related and other offender-specific cognitions might evolve and

interact with developmental, biological, cultural, social learning and contextual factors to result in psychological vulnerabilities predisposing an individual to using fire (see Gannon and colleague's (2012) M-TTAF).

Implications and conclusions

While other studies have used samples of firesetters before the courts (see for example, Barnett et al., 1999 and Soothill & Pope, 1973), this study is the first of its kind to use the entire population of individuals convicted of firesetting within a specified time period, and a control sample of randomly selected non-firesetting offenders. It is also in the minority of studies to make use of information available to the courts at the time of sentencing. It is clear from these results that, rather than being a special case, firesetting behaviour is associated with the complex interplay of the same baseline risk factors that are relevant to all forms of problem behaviour.

These findings strongly suggest that future research into firesetting should move away from trying to describe firesetters using general criminogenic factors and towards ascertaining the presence of fire-specific factors such as early fire interest and behaviours related to type of firesetting (such as lighting a number of small fires in remote areas). Understanding these factors and how they might interact with more general criminogenic needs would be of significant clinical use (Doley & Fritzon, 2008; Fineman, 1995; Kocsis & Cooksey, 2002; McEwan, Doley, & Dolan, 2012). While the M-TTAF remains unvalidated it does provide a framework for conducting such research, including identifying relevant cognitive domains and trajectories associated with various types of firesetting. These trajectories could provide guidance for the assessment and treatment of firesetters, providing clinicians and researchers with greater clarity in formulating the problem of firesetting.

Until the role of fire-related cognitions and immediate triggering environmental conditions is better understood, a broad based assessment of the types of developmental, fire experience and antecedent events outlined by Fineman (1995) and Jackson et al. (1987; 1994) will likely provide the best basis for any formulation of firesetting behaviour. With regards to risk assessment, this research indicates that firesetters are predominantly general offenders who also light fires, suggesting that general risk assessment tools may be suitable to structure an assessment (see McEwan et al., 2012 for a discussion of using the Level of Service Inventory- Revised or the Level of Service Inventory/ Case Management Inventory for this purpose; Doley & Fritzon, 2008). Therefore, the assessment and treatment of arson offenders would likely be improved by applying learnings from the substantial offender rehabilitation literature (Gendreau et al., 1996; Hanson, 2005). Such approaches may be effective in reducing the overall risk of recidivism, including firesetting recidivism, in this population. However, if specific firesetting behaviours are to be reduced in frequency, it is also crucial to consider the contextual and psychological factors that lead a person to employ firesetting when they do. In combination with a baseline assessment of reoffending risk, this approach could provide direction on the most appropriate treatment targets for an individual firesetter.

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Table 1. Comparison between firesetters and non-firesetters

	Firesetting *n* = 207 (%)	Non-firesetting *n* = 197 (%)	χ^2, *p*	OR (95% CI)
Criminal history				
None	80 (38.8)	82 (41.6)	0.33, 0.57	1.12 (0.75-1.67)
Violence	81 (39.3)	91 (46.2)	1.94, 0.16	0.76 (.51-1.12)
Non-violent offending	165 (80.1)	156 (79.6)	0.16, 0.90	1.0 (0.63- 1.68)
Violent and non-violent	77 (37.4)	83 (42.3)	1.04, 0.31	0.81 (0.55-1.21)
Psychiatric/psychological				
Intellectual disability and level	12 (8.5) (all mild)	4 (3.9) (all mild)	2.40, 0.12	2.29 (0.78-6.69)
Personality disorder/traits	30 (21.7)	13 (11.2)	4.97, 0.03*	0.45 (0.23-0.92)
Delusional	7 (5.7)	9 (6.5)	0.07, 0.79	1.15 (0.41-3.18)
Suicidal ideation or acts	57 (48.7)	32 (29.4)	8.86, 0.003**	2.29 (1.32-3.96)
Substance Diagnosis	54 (37.5)	59 (47.2)	2.58, 0.11	0.67 (0.41-1.09)
Alcohol use disorder	43 (30.3)	25 (20.2)	3.56, 0.06	1.72 (0.98-3.03)
Recipient of psychiatric or psychological treatment	54 (42.5)	32 (27.8)	5.69, 0.02*	1.92 (1.12-3.28)
Childhood factors				
Social services	14 (10.7)	11 (8.8)	0.26, 0.61	1.24 (0.54-2.85)
Lived with people other than family	25 (18.5)	20 (15.9)	0.32, 0.57	1.21 (0.63-2.30)
Abuse or neglect	48 (39.7)	40 (34.2)	0.77, 0.38	1.27 (0.75- 2.15)
Behavioral problems	43 (34.1)	26 (22.4)	4.07, 0.04*	1.79 (1.01-3.17)
Parental divorce	64 (49.2)	49 (40.8)	1.78, 0.18	1.41 (0.85-2.32)
Father absent	43 (32.8)	38 (31.1)	0.08,0.78	1.08 (0.64-1.83)
Conflictual home environment	53 (46.9)	54 (50.0)	0.21, 0.65	0.88 (0.52-1.50)
Family criminal history	21 (24.4) (58.8% missing)	25 (32.5) (61% missing)	1.30, 0.25	0.67 (0.34 – 1.33)

* $p<0.05$, ** $p < 0.01$, *** $p < 0.001$. p values are obtained from chi square analysis and Fisher's exact test

Table 2. Comparison of Axis 1 disorders between the firesetting and comparison groups

Primary Axis 1 Disorder	Firesetting n = 207 (%)	Non-Firesetting n = 197 (%)	χ^2, p	OR (95% CI)
Any	79 (56.4)	56 (44.4)	4.05, 0.04*	0.61 (0.38-0.99)
Schizophrenia/other psychosis	15 (10.7)	10 (7.9)	0.63, 0.43	1.40 (0.61-3.25)
Bipolar	1 (0.7)	5 (3.9)	3.15, 0.08	0.18 (0.02-1.52)
Depressive	42 (30.0)	24 (18.9)	4.41, 0.04*	1.84 (1.04-3.26)
Anxiety	5 (3.6)	7 (5.5)	0.58, 0.45	0.64 (0.20-2.05)
Autism Spectrum	4 (2.9)	0 (0)	3.68, 0.06	1.03 (1.0-1.06)
Impulse Control	1 (0.7)	2 (1.6)	0.44, 0.51	0.45 (0.04-5.02)
Other	11 (7.9)	8 (6.3)	0.25, 0.62	1.27 (0.49-3.26)

* $p<0.05$, ** $p < 0.01$, *** $p < 0.001$. p values were obtained using the Chi square test

Chapter Eight: Firesetting and psychopathology

8.1Mental illness amongst firesetters

As demonstrated in Chapter Seven, firesetters tend to have higher rates of mental disorder or distress than other offenders. In particular, they more commonly present with of suicidal ideation, Axis I clinical diagnoses, especially depression, and Cluster B personality disorders than other offenders. The findings of this thesis support past research that highlights the over-representation of mental illness amongst firesetters (Anwar et al., 2011; Geller, Fisher, & Moynihan, 1992; Lindberg et al., 2005; Tyler & Gannon, 2012; Vinkers et al., 2011) but thus far has only provided a preliminary examination of mental illness as one risk factor amongst many. In the following section the relationship between firesetting and psychopathology will be explored in greater detail.

Despite findings from past research about the link between firesetting and psychopathology, conclusions drawn from past studies are often limited by the use of potentially biased samples in which mental illness is over-represented (i.e., forensic psychiatric and prison samples). Thus the exact rate of mental illness and its impact on firesetting in the population of firesetters remains unclear. In addition, little exploration of the mental health service usage of firesetters has been undertaken, which would provide evidence for the severity of firesetters' mental health needs. The little research that has been conducted suggests that individuals who set fires tend to have a higher rate of contact with psychiatric services in the days leading up to a firesetting event (Geller, Fisher, & Moynihan, 1992; Koson & Dvoskin, 1982; Ritchie & Huff, 1999). Examination of service usage by firesetters would thus provide some indication as to

when an individual may be at risk of firesetting and provide support for early intervention with such individuals. By directly exploring the mental health needs of firesetters and comparing these to other offenders and community members, it may be possible to develop an understanding of the impact of mental illness on firesetting where such a link exists (for example, by examining acuity of mental illness at the time of firesetting). It may also provide support for the psychiatric screening of firesetters when they attend court, which would allow for appropriate referral and intervention where necessary, or at the very least, identify individuals who may be at risk of firesetting when they are first identified by mental health services. Given the general lack of comparative studies it is crucial to investigate the rate and type of mental illness and lifetime mental health service usage amongst a population of convicted firesetters, allowing conclusions to be drawn that are applicable to most of the firesetters who are assessed and treated by forensic and general mental health clinicians.

8.2 Preamble to 'in press' manuscript: "Mental illness and psychiatric treatment amongst firesetters, other offenders, and the general community"

The second study from this thesis provides a comprehensive analysis of the rates of public mental health services usage and psychiatric diagnoses amongst the known population of convicted arsonists in Victoria, Australia. It then moves beyond description to compare firesetters with a random sample of other offenders and community members to determine if firesetters have higher rates of psychiatric morbidity and service usage.

The following manuscript is in press in the *Australian and New Zealand Journal of Psychiatry*. The *Australian and New Zealand Journal of Psychiatry* (ISSN: 0004-8674) is a peer-reviewed academic journal of the Royal Australian and New Zealand College of Psychiatrists, which has been published on a quarterly, and now monthly, basis since 1967. In 2011, the *Australian and New Zealand Journal of Psychiatry* had an impact factor of 2.929; it is ranked 43 out of 128 in Psychiatry (Thomson Reuters, 2012).

8.3 Declaration of Thesis Chapter Eight

Monash University
Declaration by candidate for thesis Chapter Eight

In the case of Chapter Eight, the nature and extent of contributions to the work are as follows:

Name	Nature of contribution	Extent of contribution
Ms. Lauren Ducat	Reviewed literature, obtained ethics approval, coded data, conducted analysis, prepared and revised manuscript	75%
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Declaration by co-authors

The undersigned hereby certify that:

a) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.

b) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

c) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

d) there are no other authors of the publication according to these criteria;

e) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

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Mental illness and psychiatric treatment amongst firesetters, other offenders, and the general community.

Running title: Psychiatric morbidity in firesetters

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Key words

Arson, firesetting, mental illness, psychiatric treatment

Abstract

Objective

Firesetting is often reported to be associated with psychopathology, but frequently these conclusions are based on studies reliant on selective forensic psychiatric samples without the use of comparison groups. The aim of the study was to examine the rates of mental illness, substance use disorders, personality pathology and psychiatric service usage in a population of convicted firesetters compared with other offenders and community controls.

Methods

Using a data linkage design the study examined the psychiatric histories and usage of public mental health services by 1328 arsonists convicted between 2001 and 2009 in Victoria, Australia. These were compared with 1328 matched community controls and 421 non-firesetting offenders.

Results

Firesetters were significantly more likely to have been registered with psychiatric services (37%) compared with other offenders (29.3%) and community controls (8.7%). The firesetters were also more likely to have utilised a diverse range of public mental health services. Firesetters attracted psychiatric diagnoses more often than community controls and other offenders, particularly affective, substance use, and personality disorders.

Conclusions

This study confirms that there is a link between firesetting and psychopathology, suggesting that there is a role for the psychiatric screening of known firesetters, and a need to consider psychopathology in formulating the risk for further firesetting.

Introduction

Psychiatric disorders are purported to play a role in the aetiology of violent crime (Arseneault et al., 2000; Douglas et al., 2009), and offenders are more likely to come into contact with psychiatric services than community members (Short et al., in press; Wallace et al., 1998; Wallace et al., 2004). However, evidence for the role of psychopathology in firesetting is less clear. This information is pertinent to understanding the potential aetiology of firesetting and in formulating and managing firesetters'[2] risk of such behaviour in the future. Moreover, having a greater knowledge of the prevalence and nature of mental illness among firesetters will assist in highlighting areas of treatment need.

Previous research on the nature and rates of psychiatric illnesses among firesetters has yielded inconsistent results, with some studies suggesting that general psychopathology (MacKay et al., 2009), alcohol and substance use disorders (Ritchie and Huff, 1999; Vinkers et al., 2011), intellectual disability (Devapriam et al., 2007; Enayati et al., 2008), personality disorders (Barnett et al., 1997; Wallace et al., 1998) and psychosis (Anwar et al., 2011; Lindberg et al., 2005) are associated with a greater incidence of firesetting and recidivism. Other studies, including those using community samples, find that the rate of psychosis and general psychopathology in samples of firesetters is not necessarily higher than non-firesetting offenders (Enayati et al., 2008; Labree et al., 2010; Stewart, 1993), or is only evident when substance misuse is also present (Wallace et al., 1998).

There is also a dearth of research examining the lifetime use of public mental health services by firesetters, and whether service usage increases at the time of

[2] In this article, the term firesetters will be used to include people who intentionally set fires regardless of motivation or legal status. Arsonists, by contrast, are firesetters who have been convicted of intentionally setting fires.

offending. Understanding service usage patterns is vital as it determines whether psychiatric services may be in a position to assist with the prevention of firesetting behaviour. Koson and Dvoskin (1982) found in their sample of incarcerated mentally disordered firesetters that most were either receiving mental health treatment or had recently discontinued treatment at the time of lighting a fire for which they were apprehended. Others reporting on the rates of firesetting amongst offenders and general psychiatric inpatients in secure psychiatric facilities suggest that both a history of firesetting (Quinsey et al., 2006; Rasanen et al., 1995; Swaffer et al., 2001), and the experience of acute psychiatric symptoms in the days prior to a firesetting offence, are common (Ritchie and Huff, 1999). Examination of the patterns of service usage of firesetters thus has important implications for intervention with acutely unwell individuals who may also be at increased risk of firesetting.

A significant disadvantage in the quest for obtaining valid information about mental illness and service usage among firesetters is that the firesetting literature is typically limited by the use of selective forensic psychiatric samples. Furthermore, only two, now dated, studies have made use of adequate offender comparison samples (e.g. Jackson et al., 1987; Rasenen et al., 1995). It is thus difficult to determine whether firesetters are any more or less likely to suffer from a mental disorder than other offenders, whether this has any impact on their offending, and thus whether firesetters should receive specialist psychiatric attention.

The current study is the first to examine the entire population (N = 1328) of convicted arsonists within a jurisdiction over an eight year period. A data-linkage design was used to link the sample of arsonists, a matched sample of non-firesetting offenders, and a general community sample to the state-wide public mental health database. This allowed for examination of the patterns of psychiatric disorder and public

mental health service usage of firesetters in comparison to offenders and community members.

Aims and hypotheses

The current study attempted to overcome some of the methodological limitations of previous research by comparing the rates of mental illness, substance use disorders, personality pathology and service usage among arsonists, other offenders and community controls. The following hypotheses were made:

1. There will be higher rates of mental health service usage among arsonists compared with community members and offenders
2. There will be a higher rate of mental disorder, including childhood disorder diagnoses, personality disorder and substance use diagnoses among arsonists compared with the other groups

Method

Firesetters

The study group was identified using records from the Sentencing Advisory Council of Victoria (SAC) who provided the names, dates of birth, charges and conviction dates for all 1328 people convicted of arson and other firesetting offences in the State of Victoria, Australia between 2000 and 2009. Where offenders were convicted of more than one offence concurrently, they were included in the sample where arson was the most serious offence conviction. This would exclude only a few cases in which other charges were viewed as more serious than arson (e.g. homicide, attempted homicide or serious personal injury offences).

Arson offences in the sample included: arson causing death, criminal damage by fire (arson), criminal damage by fire - view to gain, criminal damage by fire - endanger

life, intentionally cause a bushfire, light fire on public transport commission vehicle or premises, light/use fire to damage or destroy property, light/use fire to endanger property/life, set fire to litter receptacle. Arson-related offences included: light fire in open air without authority, light fire during prohibited period, wilfully give false fire alarm, light fire in open air - country fire danger, light fire on Total Fire Ban day, light fire during prohibited period, light fire in day of acute fire danger, light fire in open air without authority, fail to extinguish fire, leave fire unattended, allow fire to remain alight, cause false fire alarm to be given, allow fire in the open air to remain alight (Total Fire Ban), fail to extinguish fire on Country Fire Authority direction, light fire in country during extreme weather conditions, fail to prevent fire from spreading, maintain fire during prohibited period, fail to inform authorities of fire, use unsafe equipment during country fire period, cause fire to intentionally destroy, bomb hoax, and in open air throw or drop burning material. Many arson-related offences concern lighting fires on days where the weather conditions make it a hazardous behaviour, typically on days of extremely hot and windy weather. Such behaviour has been criminalised in Victoria as it is one of the most fire-prone environments in the world (Pyne, 1995).

Community comparison sample

The comparison group was drawn from a random sample of 4830 Victorian residents (total population approximately five million) on the electoral roll. Voting is mandatory in Australia and registration on the electoral roll is compulsory for those 18 years and over. 92.28% of those aged 18 and above are on the rolls (Victorian Electoral Commission, 2012). Only limited information on the comparison group from the electoral roll was available, including first name, surname, gender, and age range within two year bandings. Firesetters were matched on gender and age band to subjects in the comparison group, to constitute 1328 matched controls.

Non-firesetting offender sample

Of the 4830 community cases, 429 (8.9%) people had received a criminal charge. These individuals were selected for use as an offender comparison sample. Eight individuals (1.85% of those with criminal history, 0.17% of the community sample) in this group had a prior charge for arson and were thus excluded from the sample, reducing the number to 421. Given the small sample size of offenders, it was not possible to match them to the larger sample of firesetters.

Ethics

Ethics approval was granted to conduct data linkages without the express consent of the individuals whose information was obtained. This methodology was developed in accordance with the Australian National Health and Medical Research Centre guidelines (2007), and steps were taken to ensure the anonymity of participants by deleting all personal identifiers and only reporting on aggregate, group-level data. This methodology was considered appropriate and approved by four independent ethical committees: the Victorian Department of Justice Human Research Ethics Committee, Victoria Police Human Research Ethics Committee, Monash University Human Research Ethics Committee, and the Victorian Department of Health Human Research Ethics Committee.

Mental health histories

The Victorian Case Psychiatric Register (VPCR) is one of the world's oldest and most comprehensive psychiatric registers. All contacts with the public mental health service are recorded, including contacts in emergency, inpatient units, or community services, and forensic mental health services. The VPCR records the date, nature and duration of the contact, diagnosis if made and treatment, if any, that was provided. Mental disorders are recorded according to International Classification of Diseases

(ICD-10), and are typically diagnosed by psychiatrists. Any contacts with private services, including general practitioners and private clinicians, are not recorded on the register. Since most people with psychotic illnesses receive public health care at some point (Department of Health and Ageing, 2010; Jablenksy et al., 1999) the dataset represents the prevalence of those illnesses. However, since most people with low prevalence disorders, substance misuse, and personality disorders do not receive public mental health care, the data do not represent the prevalence of these disorders (Wallace et al., 2004). Nonetheless, the data do allow for a comparison across the samples for low prevalence and related disorders.

Primary psychiatric diagnoses were coded into categories, replicating previous research (Cutajar et al., 2010; Short et al., 2010; Wallace et al., 2004). For example, the category 'psychotic disorders' included schizophrenia, schizoaffective disorder, schizotypal disorder, shared psychotic disorder, delusional disorders, and unspecified non-organic psychosis (ICD-9 codes 295 and 297, plus ICD-10 codes F20, F21, F22, F24, F25 and F29). The latter excluded organic or transient forms of psychosis, such as substance-induced psychosis, depression with psychotic features, or senile psychotic conditions. Given the large number of potential diagnoses an individual may receive over a lifetime, diagnoses were only coded when they were upheld in 75% of the diagnoses given, or there was a clear diagnostic progression over time resulting in a clear diagnosis. This method has been used by several studies and demonstrates good reliability (Bennett et al., 2009; Krupinski et al., 1982; Short et al., 2010).

A 'substance-use disorder' was defined as any type of substance abuse, substance dependence, or substance-induced disorder (such as substance induced psychosis), excluding nicotine-related disorders.

Data linkage

The data linkage procedure first involved a deterministic then probabilistic approach; extracting exact and then probable linkages from VPCR using identifying information (first name, surname, aliases, date of birth, age range and gender). Where there were matches, de-identified psychiatric records were obtained for contacts made prior to 21 September 2011.

Analyses

Descriptive statistics and frequencies were used to characterise the sample. Continuous data were compared using independent t-tests or Mann-Whitney *U* tests, and categorical variables were compared using chi squared tests of association, using phi correlations as an estimate of effect size. Odds ratios (OR) were calculated with 95% confidence intervals. Age for the firesetters was calculated at the time of the index date, while for the community and non-firesetting offender groups it was calculated at the date of extraction from the database (01 September 2009). The Mann-Whitney *U* effect size statistic θ was estimated by $1\text{-}U/mn$, where m and n are the sample size of each group and $\theta = 0.5$ is analogous to $d = 0$ (Newcombe, 2006a; Newcombe, 2006b). Data analyses were undertaken using the Statistical Package for the Social Sciences version 20 (SPSS, 2012).

Results

Characteristics

The firesetting group comprised 1328 individuals (1140 males, 85.85%; 188 females, 14.15%) mean age 33.44 years (range 9 – 83 years; SD 14.4). The community sample comprised an equal number of individuals with the same gender distribution and a similar mean age 34.67 (range 14.67- 77.08; SD 12.42). The offender sample

comprised 421 individuals (343 male, 81.5%), mean age 35.03 years (range 15 – 62.33; SD 11.58). In total, 492 (37%) firesetters, 116 (8.7%) of the community sample and 123 (29.3%) of the offenders were registered on VPCR. The number of individuals registered on VPCR differed significantly between firesetters and offenders ($\chi^2 = 8.6$, $p < 0.01$, φ 0.07), and firesetters and community members ($\chi^2 = 301.56$, $p < 0.001$, φ 0.34). Of those who were registered, gender did not differ significantly between the firesetters and offenders ($\chi^2 = 0.70$, $p = 0.41$, φ -0.03), nor between firesetters and community members ($\chi^2 = 2.28$, $p = 0.13$, φ 0.06). Age of those registered was significantly different between firesetters and offenders ($U = 17347$, $p < 0.001$, $\theta = 0.71$), and firesetters and community members ($U = 20674.5$, $p < 0.001$, $\theta = 0.64$). Of note, 96 (7.2%) of the firesetters received their first diagnosis only after being charged with the index offence.

Service Usage

The age at first contact with mental health services did not differ significantly across groups (firesetters (M = 30.61 years, SD = 12.41, range 10-82), other offenders (M = 31.15 years, SD = 11.35, range 12-59) and community members (M = 30.12 years, SD = 13.69, range 8-59, SD 13.69 (firesetters v. offenders $U = 15747$, $p = 0.53$, firesetters v. community $U = 13840$, $p = 0.54$)).

Firesetters had an average of 2.13 (range 0 - 214; SD = 9.31) episodes of contact with public mental health services, with an average of 616.20 days (range 0 – 3466; SD = 733.64) between the last registered contact and the index offence. As shown in Table 1, firesetters had significantly more contacts across a range of services than both community members and offenders (firesetters vs. community: outpatient contacts ($U = 651474$, $p < 0.001$, $\theta = 0.63$), inpatient admissions ($U = 743624.5$, $p < 0.001$, $\theta = 0.58$), and outpatient contacts with child or adolescent services ($U = 580557.5$, $p <$

0.001, θ = 0.52); firesetters vs. offenders: outpatient contacts (U = 231892, p < 0.001, θ = 0.59), inpatient admissions (U = 257227.5, p < 0.001, θ =0.54), and outpatient contact with child or adolescent services (U = 270238, p < 0.01, θ = 0.52). Firesetters were admitted to inpatient facilities on average 3.16 (SD 10.48) times, offenders 0.71 times (SD 1.46), and community members 0.49 times (SD 1.45) times.

Diagnoses

Tables 2 and 3 compare the clinical and personality diagnoses of firesetters and offenders, and firesetters and community controls. Firesetters had higher rates of all diagnoses than other offenders, with the exception of psychotic disorders and bipolar affective disorder. The most marked between-group differences were found for affective disorders, substance misuse disorders, childhood disorders and personality disorders (especially antisocial and borderline types). Although the type of childhood disorder was only available for the firesetters, the most common diagnosis received was conduct disorder (n = 19, 1.4%). Very few people received a diagnosis of intellectual disability (ID) (n = 20, 1.5%; 17 mild, 8.5%) and they were all in the firesetting group[3]. There were only two diagnosed cases of pyromania, both in the firesetting sample. Examination of schizophrenia diagnoses alone showed that this category of disorder was more prevalent amongst firesetters than both offenders (89 (6.7%) v. 10 (2.4%), χ^2 = 11.21, p < 0.001, φ 0.08, OR 2.95 (1.52 – 5.73)) and community members (89 (6.7%) v. 8 (0.6%), χ^2 = 70.20, p < 0.001, φ 0.16, OR 11.85 (5.73- 24.54)).

Discussion

This is the first study to report on psychiatric morbidity and public mental health service usage in an entire population of convicted firesetters. The study is also unique in

[3] Contacts with ID services are recorded on a separate database and thus the figures represented here are vast underestimates of the prevalence of ID in this sample

that it includes comparisons with other offenders and a matched general community sample. More than one-third (37%) of firesetters were registered on the psychiatric register, significantly more than other offenders (29.3%) or community members (8.7%). Firesetters were more likely to have had contact with public mental health services, and they tended to do so at a greater rate and across a more diverse range of services than both comparison groups.

Firesetters had higher rates of virtually all mental disorders when compared to community members. Given the literature that exists on the over-representation of offenders among psychiatric service users in general (Stevens et al., 2012), and firesetters in particular (Blanco et al., 2010; Tyler and Gannon, 2012) this finding was expected. The rate of psychotic disorders in the community sample is consistent with past international and Australian research reporting the lifetime prevalence estimate for schizophrenia (Perala et al., 2007; Saha et al., 2005; Short et al., 2010; Wallace et al., 2004), suggesting that the higher lifetime prevalence of psychotic disorders amongst firesetters is likely to be an accurate representation.

Also as expected, mental disorders were more prevalent amongst firesetters than other offenders, with the exception of bipolar affective disorder and psychotic disorders (when examined as a category). The lack of statistical significance when comparing bipolar disorder has also been reported by Anwar and colleagues (2009) who conjectured that the symptoms of schizophrenia may be more related to firesetting than those associated with bipolar affective disorder (i.e., command hallucinations, delusions of mind/body). When schizophrenia was examined in isolation, firesetters were shown to be more commonly diagnosed with this disorder than other offenders. The higher prevalence of schizophrenia amongst firesetters may have implications for both firesetting motivations and the contexts in which fires occur for this subgroup of

firesetting offenders, and may also explain the level of both acute and chronic service usage by firesetters.

Despite the focus on psychosis in the firesetting literature, it was not diagnoses of psychotic disorders that were most commonly received by any of the groups, but mood disorders. While one would expect this to be the case if diagnoses by private practitioners were included, the nature of the public mental health system is such that it tends to capture the more severe psychopathologies, with less than 10% of individuals with a primary diagnosis of depression or anxiety being treated by the public mental health system (Burgess et al., 2007). Several studies have provided estimates of psychosis in firesetting samples to be as high as 15-37%, while mood disorders are usually diagnosed at a lower rate (Enayati et al., 2008, Puri et al., 1995; Rasanen et al., 1995; Repo et al., 1997; Vinkers et al., 2011). This suggests that past research, particularly where selective psychiatric samples are utilised, may overstate the rate of psychosis in firesetters. Pyromania was only diagnosed in two cases, but these figures may under-represent the true prevalence of the disorder given that it would be rare for an individual to be presenting to psychiatric services with such a disorder (Grant et al., 2005), outside of a court-mandated assessment. However, the low prevalence of pyromania in the sample is consistent with the literature (Koson and Dvoskin, 1982; Ritchie and Huff, 1999); indeed, the lack of empirical evidence for the disorder has seen it considered for removal from the latest version of the Diagnostic and Statistical Manual- 5 (American Psychiatric Association, 2012).

Several researchers have asserted that psychiatric disturbance is more frequent in the histories of adolescent firesetters; an assertion supported by the current study, although the rates are low. However, past studies have defined disturbance variously as drug use, suicidal and self-harming behaviour, depressive symptomatology and

antisocial behaviour (MacKay et al., 2009; Martin et al., 2004). None of these would necessarily be captured by the VPCR and thus these findings may represent the more severely disordered individuals who required adolescent inpatient admissions or outpatient follow-up. Previous research has also relied on adolescents' self-reports of both their firesetting behaviour and psychological difficulties, which is fraught with inconsistencies. While the numbers were few, the current findings suggest that there may be scope to identify and intervene via mental health services in cases where young people are at risk of firesetting.

Limitations

This study relied upon data routinely collected for non-research purposes, which impacts upon the level of detail available. For example, only limited demographic information was available from the databases, thereby limiting the degree to which potential confounds could be controlled for. It is also reliant on diagnoses being made by psychiatrists who are trained in the DSM/ICD system of diagnosis. Given the nature of the psychiatric register, high prevalence disorders, such as mood and substance misuse, as well as personality disorders, are under-represented since they are less likely to come to public mental health services than to be treated by general practitioners and other private health professionals, including psychologists. However, there is no reason to believe that this under-representation would differ between the groups and thus the VPCR still provides a valid comparative measure even though it cannot provide a measure of prevalence. Furthermore, inherent in case-linkage methodologies is a level of error attributable to both the original data entry and data-matching procedures.

Clinical implications

Perhaps the most important implication of the current findings is that while a large proportion of firesetters have had contact with mental health services and have

received diagnoses, most did not. Contrary to some existing research drawn from psychiatric samples, it is not the case that most firesetters are mentally ill (for review see Tyler and Gannon, 2012). As such, it is important to realize that firesetting is not merely the product of mental illness and a variety of other factors are likely to contribute to the behaviour (e.g. biological factors, developmental experiences, culture, social learning and psychological vulnerabilities such as inappropriate fire interest and offence-supportive cognitions (Gannon et al., 2012; Tyler and Gannon, 2012).

Notwithstanding the information above, this research has important implications for both the early detection of and intervention with the sizeable sub-group of mentally disordered firesetters. More than one third of the firesetters were known to the public mental health service prior to committing their index offence of arson, and a further seven per cent came to its notice after committing the firesetting offence. Doubtless many others receive services from general practitioners and other private health care professionals. As such, there are clearly opportunities to treat and assess firesetting risk when individuals become known to psychiatric services. Unfortunately, experience shows that general mental health professionals are unlikely to have expertise in dealing with firesetters and, in most cases, do not even canvass with patients the possibility of firesetting behaviour (Schwartzman et al., 1999).

These findings also strongly suggest a role for routine psychiatric review prior to sentencing for firesetting offences. While mental illness does not necessarily explain firesetting behaviour in all cases, it is clear that is correlated and thus needs to be considered by the courts when sentencing. In the UK, while there is no specific statutory requirement to obtain a psychiatric report, judges often refer to *R. v Calladine* 1975 in which Justice Boreham recommended that psychiatric reports be obtained before sentencing in all arson cases, reflecting the view that psychopathology

is directly related to arson. As a consequence, as Tyler and Gannon (2012) report, approximately 2% of arsonists receive hospital orders from the courts in the UK and 10% of those arrested for arson are recognised as having a mental illness. The effect of such a process is to detect offenders who are mentally disordered, potentially providing the opportunity for diversion into mental health services where appropriate, or at least for including assessment and treatment options in sentencing.

A causal relationship between mental disorder and firesetting is unlikely to exist in the majority of cases but there is certainly evidence to suggest that it impacts on firesetting behaviours and may interact with other vulnerabilities, and thus, as suggested by Fineman (1995) and Jackson (1994), and more recently Gannon et al (2012), mental illness should be considered in formulating risk of firesetting. These findings provide solid evidence that while there is strong concordance between firesetting and mental disorder (i.e., clinical diagnoses and personality pathology), firesetting is not confined to those individuals with severe mental disorders, such as schizophrenia or bipolar affective disorder, and in fact, mental illness is not present in the majority of cases. Clinicians therefore need to assess for the presence of all types of mental disorder and to consider their influence when formulating the aetiology and ongoing risk of firesetting. Given the average length of time between last contact with services and index offence date, it would appear that firesetting is not necessarily associated with acute psychiatric symptomatology, even when it occurs in the context of a wider mental illness. Therefore consideration should be given to the chronic impacts of mental disorder on executive functioning, impulsivity and inhibitive processes in addition to acute symptoms, especially given the preponderance of individuals with personality disorders and substance misuse problems.

Future directions

While psychiatric disorders are likely to be over-represented within populations of firesetters, there is still a need to understand the motivating and cognitive factors that may lead a person to lighting fires. Therefore further research needs to determine how psychiatric disorder may impact upon firesetting risk, which will provide answers as to the appropriate management of risk in such offenders. In addition, prospective studies are still required to provide a true prevalence rate of psychiatric disorder in firesetters. With a greater understanding of the prevalence of mental disorder among firesetters compared with other offenders, there is a need to examine whether and how this may impact upon recidivism or the types of fires lit. While there is some research examining the motives of mentally disordered firesetters there is no research examining if and how these may differ to non-mentally disordered firesetters.

Conclusions

The cost of firesetting is considerable, and the price of processing individuals through the criminal justice system burdensome (Teague et al., 2010). While psychiatric disorders do not account for the entirety, or even the majority, of firesetting behaviour, the over-representation of mental illness among firesetters suggests that it should be an important consideration when assessing firesetting behaviour. There may be opportunities for early detection and diversion of individuals who are suffering from psychiatric disorders and at risk of firesetting. For this to occur, adequate assessments of both the firesetting behaviour and psychiatric disturbance need to be conducted, and future research needs to establish whether there are differences in the rate and type of fires lit by mentally disordered firesetters.

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Table 1. Type of contacts with the public mental health service

Type of service	Firesetting n = 1328 *n (%)*	Offender n = 421 *n (%)*	Community n = 1328 *n (%)*	Firesetting v. offender χ^2, OR, 95% CI, *p*	Firesetting v. community χ^2, OR, 95% CI, *p*
Inpatient	231 (17.4)	42 (10)	23 (1.7)	13.36*** Phi 0.09 OR 1.9 (1.34 – 2.69)	188.34*** Phi 0.27 OR 11.95 (7.73 – 18.48)
Outpatient	408 (30.7)	62 (14.7)	67 (5)	41.62*** Phi 0.15 OR 2.57 (1.91 – 3.44)	298.12*** Phi 0.34 OR 8.35 (6.36 – 10.96)
Extended care or supervision	116 (8.7)	3 (0.7)	1 (0.1)	32.44*** Phi 0.14 OR 13.34 (4.22 – 42.18)	118.24*** Phi 0.21 OR 127.01 (17.71 – 910.66)
Supported accommodation	26 (2)	3 (0.7)	4 (0.3)	3.04 Phi 0.04 OR 2.78 (0.84 – 9.24)	16.32*** Phi .08 OR 6.61 (2.3 – 18.99)
Community treatment order[4]	65 (4.9)	8 (1.9)	4 (0.3)	7.16** Phi 0.06 OR 2.66 (1.26 – 5.58)	55.37*** Phi 0.14 OR 17.04 (6.19 – 46.89)
Child/adolescent services	60 (4.5)	7 (1.7)	13 (1)	7.07** Phi 0.06 OR 2.79 (1.26– 6.17)	31.12*** Phi 0.11 OR 4.79 (2.62 – 8.76)

[a] Fisher's exact test * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

[4] Under the *Mental Health Act (1986)* patients with a serious mental illness can be compelled to receive treatment in the community via a Community Treatment Order

Table 2. Frequency and comparison of clinical disorders between groups

Diagnostic category	Firesetting n = 1328 *n (%)*	Offender n = 421 *n (%)*	Community n = 1328 *n (%)*	Firesetting v. offender χ^2, OR, 95% CI, *p*	Firesetting v. community χ^2, OR, 95% CI, *p*
Primary Axis I clinical diagnosis	357 (26.9)	77 (18.3)	65 (4.9)	12.65*** Phi 0.09 OR 1.64 (1.25 – 2.16)	240.21*** Phi 0.30 OR 7.14 (5.41 – 9.43)
Psychotic disorders	91 (6.9)	21 (5)	13 (1)	1.85 Phi 0.03 OR 1.4 (0.86 – 2.82)	60.88*** Phi 0.15 OR 7.44 (4.14 – 13.37)
Bipolar affective disorder	17 (1.3)	2 (0.5)	5 (0.4)	1.93 [a] Phi 0.03 OR 2.71 (0.63 – 11.81)	6.6** Phi 0.05 OR 3.43 (1.26 – 9.33)
Depressive disorder	109 (8.2)	20 (4.8)	22 (1.7)	5.59* Phi 0.06 OR 1.79 (1.1 – 2.93)	60.78*** Phi 0.15 OR 5.31 (3.34 – 8.45)
Anxiety disorders	99 (7.5)	17 (4.0)	13 (1)	6.03** Phi 0.06 OR 1.91 (1.13 – 3.24)	68.94*** Phi 0.16 OR 8.15 (4.54 – 14.60)
Childhood disorders	62 (4.7)	2 (0.5)	3 (0.2)	15.95*** Phi 0.1 OR 10.26 (2.50– 42.13)	54.9*** Phi 0.14 OR 21.63 (6.77 – 69.08)
Substance misuse (all)	206 (15.5)	40 (9.5)	16 (1.2)	9.56** Phi 0.07 OR 1.75 (1.22 – 2.50)	177.44*** Phi 0.26 OR 15.06 (9 – 25.19)

[a] Fisher's exact test

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 3. Comparison of the frequency of personality disorders between groups

Diagnostic category	Firesetting n = 1328 *n (%)*	Offender n = 421 *n (%)*	Community n = 1328 *n (%)*	Firesetting v. offender χ^2, OR, 95% CI, *p*	Firesetting v. community χ^2, OR, 95% CI, *p*
Personality disorder	135 (10.2)	12 (2.9)	7 (0.5)	22.22*** Phi 0.11 OR 3.86 (2.12 – 7.04)	121.90*** Phi 0.21 OR 21.36 (9.95 – 45.84)
Antisocial type	56 (4.2)	5 (1.2)	4 (0.3)	8.71** Phi 0.07 OR 3.66 (1.46 – 9.21)	46.11*** Phi 0.13 OR 14.57 (5.27 – 40.30)
Borderline type	33 (2.5)	3 (0.7)	2 (0.2)	4.98* Phi 0.05 OR 3.55 (1.08 – 11.64)	27.82*** Phi 0.10 OR 16.9 (4.05 – 70.55)
Type unspecified	19 (1.4)	2 (0.50)	2 (0.2)	2.46 Phi 0.04 OR 3.04 (0.71 – 13.11)	13.87*** Phi 0.07 OR 9.62 (2.24 – 41.4)

[a] Fisher's exact test

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Chapter Nine: Risk factors for and correlates of recidivistic firesetting

9.1 The myth of the inherently recidivistic firesetter

Earlier research examining recidivism amongst firesetters suggested that as a group, firesetters were likely to be recidivists (Geller, Fisher, & Bertsch, 1992; Hurley & Monahan, 1969; Tennent, McQuaid, Loughnane, & Hands, 1971). However, researchers have subsequently questioned these conclusions, suggesting that high rates of recidivism may be more indicative of the samples studied than the actual criminality of the group (i.e., forensic psychiatric and prison samples; Brett, 2004; Soothill & Pope, 1973; Soothill et al., 2004). Despite intervening years of research the rate of recidivism amongst firesetters remains somewhat unclear with estimates varying from 4-40% (Brett, 2004; Doley et al., 2011); this variance may be somewhat attributable to sample selection and the definition of recidivism used, which differs from study to study (Brett, 2004; Dickens et al., 2009). Ogloff (2009) suggested that the accepted rate of firesetting recidivism is roughly 30%, which suggests that firesetting is not synonymous with recidivism; at worst 70% do not light multiple fires.

To date, few studies have examined the characteristics of recidivist firesetters (see for example Dickens et al., 2009; Lindberg et al., 2005; Rice & Harris, 1996) and even fewer have compared these with non-recidivist firesetters to determine whether there is a definable set of characteristics that may classify who reoffends (exceptions being Dickens et al., 2009; Doley, 2009; Rice & Harris, 1996; Sapp, Huff, Gary, Icove, & Horbert, 1994). In addition, researchers have scarcely attempted to develop a predictive model that may have practical utility in identifying individuals who are at

risk of repeat firesetting before they become recidivists (exceptions being Rice & Harris, 1996; Sapsford, Banks, & Smith, 1978).

Each of these explorations is necessary and provides a baseline of understanding imperative for the identification and management of, and intervention with firesetters. For example, clinicians require clear guidelines on what factors to take into account and in what contexts when making risk judgements about the likelihood of an offender setting further fires. For investigators charged with identifying individuals who are setting multiple fires and from preventing identified firesetters from reoffending, there needs to be a common understanding of the likely criminogenic characteristics of repeat firesetters. Once an offender has been apprehended and charged, Judges are interested in the likelihood of an individual reoffending based on given characteristics and offence details. Currently, the research literature provides little guidance for these purposes, and thus, the current study aimed to not only characterise reoffenders but to develop a model to differentiate firesetting recidivists from non-recidivists.

9.2 Preamble to submitted manuscript: "An investigation of firesetting recidivism: Factors related to repeat offending"

In the final study in this thesis, the rate and patterns of recidivism amongst a representative sample of firesetters are explored, in addition to an examination of the rate of firesetting amongst pure (arson only) and mixed (arson and more than three other offence types) firesetters to determine if the rates of recidivism vary. Finally, the factors that were found to differentiate recidivist firesetters from non-recidivists were entered into a model with the aim of predicting recidivism. Several factors, when combined, were found to differentiate the two groups, providing guidance on the factors to consider when assessing firesetting risk. Unfortunately, the low base rate of the behaviour reduced statistical power to such an extent that it was concluded that it is not possible to use the tool to predict recidivism.

The following manuscript has been submitted to *Legal and Criminological Psychology* and is currently under peer review. *Legal and Criminological Psychology* (ISSN: 2044-8333) is a peer-reviewed academic journal, which has been published twice per year since 1996. In 2011, *Legal and Criminological Psychology* had an impact factor of 1.286; it is ranked 48 out of 125 in psychology multidisciplinary and 15 out of 50 in Criminology (Thomson Reuters, 2012).

9.3 Declaration for Thesis Chapter Nine

Monash University
Declaration by candidate for thesis Chapter Nine

In the case of Chapter Nine, the nature and extent of contributions to the work are as follows:

Name	Nature of contribution	Extent of contribution
Ms. Lauren Ducat	Reviewed literature, obtained ethics approval, coded data, conducted analysis, prepared and revised manuscript	75%
Dr Troy E. McEwan	Co-investigator, assisted with conceptualisation of paper and data analysis, reviewed manuscript	15%
Professor James R.P. Ogloff	Co-investigator, assisted with conceptualisation of paper and data analysis, reviewed manuscript	10%

Candidate's Signature:		Date:

Declaration by co-authors

The undersigned hereby certify that:

a) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.

b) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

c) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

d) there are no other authors of the publication according to these criteria;

e) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

f) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s):

Centre for Forensic Behavioural Science, School of Psychology & Psychiatry, Monash University 505 Hoddle Street, Clifton Hill Victoria, Australia

Dr T. McEwan		Date:
Prof. J. Ogloff		Date:

An investigation of firesetting recidivism: Factors related to repeat offending

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Abstract

Firesetters have traditionally been considered dangerous repeat offenders; however, the specific risks factors associated with firesetting recidivism have not been consistently tested in representative samples. It is also unclear whether individuals whose offending is limited to firesetting are at increased risk of reoffending when compared with firesetters who have more versatile offending. The study aimed to: 1) Determine the rate of firesetting recidivism in a representative sample of firesetters before the courts; 2) determine the psychiatric and criminogenic factors that are related to firesetting recidivism; and 3) develop a clinically meaningful triage tool for identifying fire-setters at increased risk of recidivism. The study compared firesetting recidivists with general recidivists, employing a data linkage approach to examine the psychiatric and criminal histories of 1052 firesetters who were convicted of arson between 2000 and 2009 in Victoria, Australia. The rate of firesetting recidivism was very low (5.3%) compared with the rate of general recidivism (55.4%); the vast majority of firesetting recidivists were mixed (criminally versatile) offenders (91%). The study found that general criminality, firesetting history, and psychiatric disorder were associated with firesetting recidivism. Further work is required to validate and develop this model predicting firesetting recidivism. When assessing risk of firesetting recidivism, clinicians need to consider general criminality in addition to fire-specific history, and be cognisant of the potential impacts of mental disorder on recidivism.

Keywords: Firesetting, arson, recidivism, prediction, risk assessment

An investigation of firesetting recidivism: Factors related to repeat offending

Despite the human and fiscal costs associated with arson, and the relatively lengthy research history studying the behaviour, arson remains one of the least understood criminal behaviours especially with regard to reoffending (Davis & Lauber, 1999). Indeed, some authors have contended that "there is probably no simple formula to identify these cases [the small minority who do commit further arson offences]" (Soothill & Pope, 1973, p. 138). In any case, there is a lack of consistency in the literature that hampers efforts at developing such a formula (Davis & Lauber, 1999).

There is significant evidence to suggest that sample selection plays a key role in the reported rates of recidivism amongst arsonists. Brett (2004) found that the rates of firesetting recidivism in studies vary from 4-40%, depending on the sample used and the definition of recidivism employed. Studies using forensic psychiatric samples typically report higher levels of recidivism by firesetters than studies using more representative samples (Barnett, Richter, Sigmund, & Spitzer, 1997; Dickens et al., 2009; Quinsey, Rice, Harris, & Cormier, 2006; Repo, Virkkunen, Rawlings, & Linnoila, 1997). Soothill, Ackerley and Francis (2004) noted that samples developed from psychiatric hospitals and prisons are not representative of the wider firesetting population and thus may not reflect the overall characteristics of arsonists before the courts. Unfortunately, very few studies have examined more representative samples (exceptions being Barnett, Richter, & Renneberg, 1999; Soothill et al., 2004; Soothill & Pope, 1973).

One of the earliest studies of firesetters with 1145 male and 200 female firesetters from a psychiatric sample, found recidivism rates of 28% of males and 13% of females, although this included firesetting that did not eventuate in prosecution (Lewis & Yarnell, 1951). Arguably, it is more accurate to obtain evidence of firesetting

beyond that which is prosecuted, however, a clear definition of recidivism and standard of proof is required. Since that time other researchers have examined recidivism based on criminal records and reported similar rates of recidivism, concluding that firesetting is most likely to be a crime that is repeated (Hurley & Monahan, 1969). For example, Rice and Harris (1996) found that 23% of firesetters in a forensic psychiatric facility had set multiple fires, similar to the 22% reported by Lindberg, Holi, Tani and Virkkunen (2005) in their sample of firesetters referred for pre-trial psychiatric assessment. Using a similar sample, Dickens and colleagues (2009) reported that 49% of the firesetters in their sample were multi-firesetters. The few studies of imprisoned populations appear to produce similar results to those in forensic psychiatric settings (i.e., 23%; Doley, 2009).

Studies of more representative samples collected outside institutions produce far lower estimates of arson recidivism. Soothill and Pope (1973) examined recidivism amongst arsonists before the courts in England and Wales in 1951. In a 20 year follow-up period, they found only 3 out of 67 (4%) were reconvicted of an arson offence and only one had a prior conviction for arson. Rates of general recidivism were higher (34% for whom the index was the first conviction and 66% for whom the index was not the first conviction). They found that there was significant overlap between the recidivist firesetters and those who had a prior criminal history, concluding that prior offending and age at onset of offending is a risk factor for future offending and firesetting recidivism. Such findings indicate that firesetting history alone is unlikely to yield useful predictive results.

In a replication of Soothill and Pope's (1973) study, Soothill and colleagues (2004) compared the original series of arsonists convicted in 1951 with all those convicted of arson in England and Wales in 1963-1965 (n = 1352), 1980-1981 (n =

5584) and 2000-2001 (n = 3335). In their comprehensive sample, they found 8% males and 10% females had more than one conviction for arson but found a general recidivism rate of between 52% and 70% depending on the time series. A similarly large Australian sample (n = 933) of individuals who appeared before courts charged with arson found that while more than half of the sample had a prior conviction of any type, the most common being personal offences, followed by property and drug offences, only three percent had a prior conviction for arson (Muller, 2008). Unfortunately, no recidivism results were reported. Similarly, Barnett and colleagues (1999) found a recidivism rate of 4% in their subsample of arsonists from West Germany who were deemed fully responsible for their actions.

Taken together, the literature indicates that arsonists are more likely to go on to commit other crimes, especially property-related crimes, than they are to commit repeated arson (Barnett & Spitzer, 1994; Ritchie & Huff, 1999) and may even do so at a greater rate than non-arsonists (Doley, 2009; Ducat, McEwan & Ogloff, in press). Unfortunately, none of the aforementioned studies examined demographic or historical factors other than criminal history and thus provide no guidance as to other potential risk factors for recidivistic firesetting.

Are recidivist firesetters distinguishable from non-recidivists?

Given the dearth of relevant research in the firesetting area, clinicians are often forced to rely on their "clinical common sense" when assessing firesetters and generalise from approaches to other offenders (Brett, 2004, p. 424). Several researchers have noted a lack of differentiation between the demographic or criminal histories of one-time and serial arsonists (Sapp, Huff, Gary, Icove, & Horbert, 1994). Doley (2009) found no difference in the demographic characteristics or level of employment of 187 imprisoned serial and one-time arsonists in Australia. Little difference was found in the

criminal histories of the two groups, although, serial arsonists were found to have more significant property related criminal histories than one-time offenders. Such lack of differentiation may be due to the level of criminal versatility reported amongst firesetters as a group (Del Bove & Mackay, 2005; Ducat et al., in press; Muller, 2008; Quinsey et al., 2006). However, it may also be that treating firesetters as a homogenous group masked potential differences in characteristics, as was found by Ducat et al. (in press). Ducat and colleagues examined this issue in a population of convicted firesetters (n = 207), finding that criminal versatility was the norm and criminally versatile firesetters had a greater criminogenic need than versatile non-firesetting offenders. In line with this, Gannon and Pina (2010) suggest that general criminality may be the foremost factor to distinguish recidivist from non-recidivist firesetters.

Despite the lack of methodologically sound research on the risk factors for repeat firesetting there are some consistent findings reported in studies of forensic psychiatric samples. Rice and Harris (1996) found that personality disorder, criminal history, younger age at index and at first firesetting, past history of firesetting, firesetting alone, lower intelligence and being less likely to have a history of aggression differentiated samples of serial and one-time firesetters from a secure forensic psychiatric facility. They also found that psychotic offenders were less likely to be recidivist firesetters. Dickens and colleagues (2009) also reported some significant differences between repeat and one-time firesetters: younger age and single status, family history of violence or substance misuse, and school adjustment issues measured by attendance at a special school. As with Rice and Harris (1996), repeat firesetters were less likely to have a psychotic illness but were more likely to have a personality disorder and intellectual disability. Such findings are congruent with the general offending literature that suggests that offenders who commence offending earlier have

greater criminal versatility and are more likely to persist (Loeber & Hay, 1997; Moffitt, 1993), while extensive history of fire involvement may be more predictive of firesetting recidivism (Del Bove & Mackay, 2011; Gannon, Ciardha, Doley, & Alleyne, 2012; Gannon & Pina, 2010).

In addition to distinguishing between recidivist and non-recidivist firesetters, authors have found that certain subtypes of firesetters are at greater risk of reoffending. In particular, previous research has shown that there are some differences between those who only set fires and those who also offend in other ways (Barnett et al., 1999; Ducat et al., in press; Lindberg et al., 2005). These studies have reported differences in the characteristics, number of fires lit and risk of offending between those who only set fires and those who are criminally versatile. There is debate in the literature as to whether rates of recidivism are higher in pure arsonists or mixed (versatile) arsonists. Thus, this question will be further explored in the current study.

The current study

The studies described above tend to be descriptive or exploratory in nature and very few have used a prospective framework. The lack of research comparing one-time and serial arsonists means that there is little knowledge about whether risk factors for arson in general are useful in formulating risk for repeat arson. The current study attempted to overcome these limitations by examining a large sample of known firesetters who came before the courts over a 10 year period. Those who reoffended were compared with those who did not to determine whether recidivistic arsonists could be differentiated from one-time offenders on a range of demographic, behavioural and clinical variables. The current study also examined the rate of firesetting amongst pure (arson only) and mixed (arson and more than three other offence types) firesetters to

determine if the rates of recidivism varied. The final aim of the study was to develop a model that could be used to differentiate firesetting recidivists from non-recidivists.

Method

Firesetters

The study sample of arsonists was identified using records from the Sentencing Advisory Council of Victoria (SAC) which provided the names, dates of birth, charges and conviction dates for all people convicted of arson and other firesetting offences[5] in the State of Victoria, Australia between 2000 and 2009. Following the linkage procedure and matching and exclusion of individuals who had no opportunity to recidivate (through death), we obtained a final sample of 1052 individuals. Offenders convicted of more than one offence concurrently where arson was not the most serious offence at sentencing were excluded (e.g., homicide, attempted homicide or serious personal injury offences).

[5] Arson offences in the sample included: arson causing death, criminal damage by fire (arson), criminal damage by fire - view to gain, criminal damage by fire - endanger life, intentionally cause a bushfire, light fire on public transport commission vehicle or premises, light/use fire to damage or destroy property, light/use fire to endanger property/life, set fire to litter receptacle. Arson-related offences included: light fire in open air without authority, light fire during prohibited period, wilfully give false fire alarm, light fire in open air - country fire danger, light fire on Total Fire Ban day, light fire during prohibited period, light fire in day of acute fire danger, light fire in open air without authority, fail to extinguish fire, leave fire unattended, allow fire to remain alight, cause false fire alarm to be given, allow fire in the open air to remain alight (Total Fire Ban), fail to extinguish fire on Country Fire Authority direction, light fire in country during extreme weather conditions, fail to prevent fire from spreading, maintain fire during prohibited period, fail to inform authorities of fire, use unsafe equipment during country fire period, cause fire to intentionally destroy, bomb hoax, and in open air throw or drop burning material. Many arson-related offences concern lighting fires on days where the weather conditions make it a hazardous behaviour, typically on days of extremely hot and windy weather. Such behaviour has been criminalised in Victoria as it is one of the most fire-prone environments in the world (Pyne, 1995).

Criminal history

Criminal histories were obtained from the Law Enforcement Assistance Program (LEAP) maintained by Victoria Police. LEAP is a state-wide operational policing database that stores particulars of all crimes involving police response. It is online and updated daily by Victoria Police members who enter details of all contacts between police and members of the community. Criminal history was extracted for the current study, including the charge date and time, the date the offence was committed, the location of the offence, and how the individual was processed (i.e., summonsed to appear, arrested, cautioned). LEAP histories were obtained up to March 2012, providing for a 2.5 – 11 year follow-up period.

Mental health history

The Victorian Case Psychiatric Register (VPCR) is one of the world's oldest and most comprehensive psychiatric registers. All contacts with the public mental health service are recorded, including contacts in emergency, inpatient units, or community services, and forensic mental health services. The VPCR records the date, nature and duration of the contact, diagnosis if made and treatment, if any, that was provided. Mental disorders are recorded according to International Classification of Diseases (ICD-10), and are typically diagnosed by psychiatrists. Any contacts with private services, including general practitioners and private clinicians, are not recorded on the register. Since most people with psychotic illnesses receive public health care at some point (Department of Health and Ageing, 2010; Jablenksy et al., 1999) the dataset represents the prevalence of those illnesses. However, since most people with low prevalence disorders, substance misuse, and personality disorders do not receive public mental health care, the data do not represent the prevalence of these disorders (Short,

Thomas, Luebbers, Ogloff, & Mullen, 2010). Irrespective of prevalence, the data do allow for a comparison between the samples for the relative rates of mental disorder.

Primary psychiatric diagnoses were coded into categories, in accordance with previous research (Cutajar et al., 2010; Ducat, Ogloff, & McEwan, in press; Short et al., 2010). For example, the category 'psychotic disorders' included schizophrenia, schizoaffective disorder, schizotypal disorder, shared psychotic disorder, delusional disorders, and unspecified non-organic psychosis (ICD-9 codes 295 and 297, plus ICD-10 codes F20, F21, F22, F24, F25 and F29). The latter excluded organic or transient forms of psychosis, such as substance-induced psychosis, depression with psychotic features, or senile psychotic conditions. Given the large number of potential diagnoses an individual may receive over a lifetime, diagnoses were only coded when they were upheld in 75% of the diagnoses given, or there was a diagnostic progression over time resulting in a clear diagnosis. This method has been used by several studies and demonstrates good reliability (Bennett et al., 2011; Krupinski, Alexander, & Carson, 1982; Short et al., 2010).

A 'substance-use disorder' was defined as any type of substance abuse, substance dependence, or substance-induced disorder (such as substance induced psychosis), excluding nicotine-related disorders.

Coronial information

The National Coronial Information Service (NCIS), managed by the Victorian Department of Justice, is a national online storage and retrieval system for Australian coronial cases. The current research analysed data pertaining to date and cause of death to remove those individuals who had died, to provide an accurate representation of recidivism.

Data linkage

The data linkage procedure first involved a deterministic then probabilistic approach; extracting exact and then probable linkages from VPCR, LEAP and NCIS using identifying information (first name, surname, aliases, date of birth, age range and gender). Where there were matches, de-identified records were obtained for psychiatric contacts made prior to 21 September 2011, LEAP records up to March 2012, and closed coronial cases up to March 2013.

Definition of recidivism

In this study, recidivism was operationally defined as having any subsequent charge for arson or arson-related offences (see footnote 1). In order to be charged with an offence, police must have sufficient evidence to suspect an individual and be confident that the case would be successful at obtaining a conviction in court. It is thus more reliable than depending on offenders' self-reports of firesetting behaviour. On the other hand, it means that the evidence has not been tried before a court and there is a possibility of including some false positives, that is, individuals who have been charged but later found to be innocent. However, it is also likely to be more inclusive than relying on convictions which may underestimate the actual number of offences, as the conviction rate for arson is very low, with some estimates suggesting that an individual is convicted in less than 1 percent of the 18,000 deliberately-lit fires that occur in Australia each year (2009 Bushfire Royal Commission, 2010).

Analyses

Univariate analyses using chi-square, with phi and odds ratio for measures of effect size, and Mann-Whitney U tests, using theta as a measure of effect size, were used to determine variables that were significantly related to arson recidivism. The base rate of arson recidivism was very low and non-parametric regression methods are both

sensitive to base rate and have reduced power in such cases (Swets, 1986). Therefore, the significant univariate predictors were combined to develop an improper model which was then tested for validity. An improper model is one where the weights assigned to the variables are obtained by a non-optimal method. The weights were made equal to one, and the direction of the relationship to the criterion variable was retained, thereby reducing the influence of sample-specific variance, allowing greater applicability outside the originating sample (Dawes, 1979; McEwan, Mullen, & MacKenzie, 2009). The validity of the improper model was tested using the Area Under the Curve (AUC) in a Receiver Operator Characteristic (ROC) curve. The AUC can be taken as an index for interpreting the overall accuracy of the predictor. AUCs can range from 0 (perfect negative prediction) to .50 (chance prediction) to 1.00 (perfect positive prediction). The AUC represents the probability that a randomly chosen person that scores positive on the dependent measure (in this study, actually commits a subsequent arson offence) will score higher on the predictor measure than a randomly chosen person who did not commit a subsequent arson offence. Generally, AUC of > 0.70 are considered to be large effect sizes (Rice & Harris, 2005). ROC is independent of the base rate of behaviour and thus can be used where other non-parametric measures would render little statistical power. It is the primary method of assessment of violence and sexual risk assessment tools for this reason (Mossman, 2013). Measures of negative predictive power (NPP) and positive predictive power (PPP) were calculated to determine the accuracy of the model at various cut-points. These values take account of the low base rate and are therefore more accurate indices of risk prediction than sensitivity and specificity.

Results

Comparisons between recidivist firesetters and non-recidivist firesetters

The sample comprised 1052 firesetters (909 males, 86.4%; 143 females, 13.6%) whose mean age was 33.02 years (SD 14.40; range 9 – 83 years). While 55.37% (n = 592) of the firesetters had subsequent charges for any offence, the firesetting recidivism rate was substantially lower at 5.3% (n = 56). Only 6.7% (n = 71) of all firesetters had a history of firesetting prior to the index offence, and only 11.4% (n = 8) of this sub-group of offenders went on to set further fires after the index offence (14.3% of the recidivists had priors for arson).

Of the firesetting recidivists, 82.1% (n = 46) were male, a frequency not significantly different to the 86.6% (n = 863) of non-recidivists who were male (χ^2 = 0.92, p = 0.34, OR 1.41 (95% CI 0.70 – 2.87). Recidivists were significantly younger than non-recidivists at the time of their index offending (mean 30.13 years (SD 14.99) vs. mean 33.14 years (SD 14.39); U = 21844, $p < 0.05$, θ =0.58). They were also younger when they were first charged with any offence (mean 24.69 years (SD 14.81) vs. 29.26 years (15.43), U =20684.5, $p < 0.01$, θ = 0.60) and with their first arson offence (mean 29.36 years (SD 15.46) vs. 32.56 years (14.80), U = 22510, $p < 0.05$, θ = 0.58). The criminal histories revealed that recidivist firesetters had a greater number of prior charges for any offence (mean 12.80 (SD 17.61) vs. 9.31 (20.95), U = 18652.5, $p < 0.001$, θ =0.67) and a marginally greater number of past arson charges (mean 0.41 (SD 1.42) vs. 0.08 (0.35), U = 25575, $p < 0.05$, θ =0.54). A large proportion (94.6% (n = 53)) of the arson recidivists went on to be charged with other offences compared with just over half of the (53.2% (n = 528)) non-recidivist firesetters (χ^2 = 37.16, $p < 0.001$, φ = 0.19, OR 15.66, CI 4.86 – 50.04).

Comparisons of criminal history and mental health variables showed several significant differences between the recidivist and non-recidivist firesetting groups (see Table 1). Recidivists were significantly more likely to have set multiple fires during the index offending, to be criminally versatile and to have experienced greater levels of psychiatric disturbance (with the exception of depression and anxiety diagnoses) or mental health service registration across the lifespan.

Predicting recidivism

Significant univariate predictors were used to develop an improper model of recidivistic firesetting. Only those variables that positively predicted recidivism were included to avoid reduction in power (for example, while pure arson was significant it was higher in the non-recidivist group). Continuous variables were collapsed into categorical variables based on the median point in the data and frequency distributions. Each individual's scores on the variables were summed into a total predictive score which was then tested using the Area Under the Curve (AUC) of a Receiver Operator Characteristic (ROC) curve. The variables and their association to recidivism are displayed in Table 2. None were correlated more than 0.5. The improper model produced an AUC of 0.74 (95% CI 0.674 – 0.796), $p < 0.001$ (see Figure 1.), indicating that the combination of variables successfully predicted who recidivated and those who did not. Given the low base rate for recidivism it was not possible to identify cut-scores with moderate positive predictive power, although all scores had excellent negative predictive power (see Table 3.).

Discussion

Key findings

Consistent with past research, the rate of general recidivism (55.37%) amongst the sample of firesetters was higher than the rate of firesetting recidivism (5.3%) (Puri,

Baxter, & Cordess, 1995; Quinsey et al., 2006; Rasanen, Hakko, & Vaisanen, 1995; Soothill et al., 2004; Soothill & Pope, 1973). Amongst firesetting recidivists, the rate of general recidivism was very high (94.6%) indicating the criminal versatility of this sample. The rate of firesetting recidivism in this sample is in accordance with other large criminal justice samples from different jurisdictions (Barnett et al., 1999; Soothill et al., 2004; Soothill & Pope, 1973). Doubtless, the recidivism rates returned are an underestimation of the true rate of firesetting. Both Gannon and Barrowcliffe (2012) and Doley (2009), for example, found that the number of self-reported firesetting incidents in both offenders and the community was higher than the number of official charges or cases of firesetting for which the individual was formally apprehended.

The majority of firesetting recidivists were found to be mixed arsonists whose rate of firesetting recidivism exceeded that of the pure arsonists. This is in contrast to previous reports (e.g. Barnett et al., 1999; Lindberg et al., 2005); however, one of these studies reported that pure arsonists were mostly psychotic and/or mentally retarded, while those with personality disorders were less likely to be pure arsonists. This finding may in part be due to the forensic psychiatric sample used. In the current sample, more of the recidivists were diagnosed with personality diagnoses than psychotic illnesses. In Barnett and colleague's sample, although certain groups of pure arsonists were more likely to be recidivists, the actual number of firesetting incidents amongst pure arsonists who were fully responsible was lower than all groups except those who were pure arsonists and not responsible for their offending, the group most comparable to the current sample.

A number of factors were found to distinguish recidivist from non-recidivist firesetters and, when combined, several of these factors were found to predict recidivism. Many of these factors are consistent with previous research (Dickens et al.,

2009; Quinsey et al., 2006), including number of firesetting incidents, mental disorder and general criminality. It is evident that, in addition to past firesetting behaviour, general antisociality, especially from a young age, remains the best predictor of firesetting behaviour. This finding is increasingly being reported by researchers across both the adolescent and adult firesetting literature in recent years (Dickens et al., 2009; Ducat, McEwan, & Ogloff, in press; Gannon & Barrowcliffe, 2012; Kennedy, Vale, Khan, & McAnaney, 2006; Mackay et al., 2006; Soothill et al., 2004). As with previous research, recidivist firesetters were more likely to have a clinical diagnosis, especially a serious mental illness, such as bipolar disorder or schizophrenia (Anwar, Langstrom, Grann, & Fazel, 2011; Geller, 1987; Ritchie & Huff, 1999), a substance misuse history (Brett, 2004; Dickens et al., 2009; Labree, Nijman, Van Marle, & Rasin, 2010), personality disorder (Rice & Harris, 1996) and childhood behaviour disorders or contact with child and adolescent psychiatric services (MacKay, Paglia-Boak, Henderson, Marton, & Adlaf, 2009; Martin, Bergen, Richardson, Roeger, & Allison, 2004). While the majority of those who reoffended had not received a formal diagnosis, the vast majority (73%) did have some form of contact with public psychiatric services over their lifetime. Taken together these results suggest that repeat firesetters are generally disadvantaged and likely to have a number of underlying traits and experiences that predispose them to repeat firesetting.

Limitations

These findings need to be considered in light of the study's limitations. The use of charges to define recidivism may on the one hand inflate the perceived occurrence of firesetting events because an individual can attract two charges of arson relating to one event (e.g., when two houses are damaged in the one event), but on the other hand may under-represent their actual occurrence as individuals may light many more fires than

what they come to police notice for. It is also possible that once firesetters come to the notice of police they may be more likely to be charged with further firesetting incidents in the future. In addition, the follow-up time is likely to have had an impact on the rates of detected arsons. For those sentenced in the latter half of the sample and who received a custodial sentence their period of opportunity would have been reduced.

Although this method has not been used in other firesetting studies, using ROC allows direct comparison with other similar measures, and is congruent with the violence and sexual offending risk prediction literature (Douglas, Ogloff, Nicholls, & Grant, 1999; Harris, 2007; Rice & Harris, 2005). Unfortunately, given the low base rate of firesetting recidivism it was not possible from the model to determine groupings of low, medium or high risk individuals, which would arguably be of more clinical use.

The use of data linkage methods also means that we cannot comment on crime scene actions, or the offender's mental state and motivations at the time of the firesetting; we are aware that charges for firesetting are not a proxy for fire interest. However, the purpose of this model was to develop a screening tool that could be used by clinicians. High scores would alert clinicians to individuals who may require more in-depth assessment. Finally, the data linkage process itself has some limitations, namely that the information has not always been collected for research purposes and the validity of the information can be questionable.

Future directions

The data presented in this paper provides a preliminary model of recidivistic arson based on largely historical risk factors, and represents the first step toward developing a firesetting screening tool that would be of use to investigators and forensic clinicians at the outset of an assessment. These results indicate that people with a particular set of characteristics are more likely to light fires, as evidenced by the good

AUC and moderate specificity and sensitivity of the model. However, it has little positive predictive power, suggesting that it is best suited to use as a model for assessment guidelines but cannot be used as a risk measure. Unfortunately, these results were impacted by the low base rate of firesetting recidivism which impacts upon power, thereby reducing the likelihood of detecting significant differences (Monahan, 1981). With further validation of this model using larger data sets, prospective analyses and multiple data collection methods, including interview and file review methods, the firesetting field may be on the way to developing a screening measure that would at least provide guidance around who requires further follow-up assessment, something that is sorely lacking in the current literature (Tyler & Gannon, 2012). In addition, validation of this model using non-firesetting control groups would further highlight areas of need.

Following on from this, the development of a structured professional judgement (SPJ) tool to further assess those highlighted as a potential for follow-up after screening would be of great benefit in guiding management decisions; these decisions are not currently possible with the static factors used in the screening measure. Further research is required to develop a risk assessment tool that would be applied once an individual with a firesetting history has been screened and assessed as being of concern for further firesetting. Such an assessment would need to consider the factors that may guide decisions about management of firesetting risk, as is the case with other structured professional judgement tools in other areas of risk assessment (Hart & Logan, 2011; MacKenzie et al., 2009), which is ultimately more helpful to clinicians than merely knowing someone's risk level (Mossman, 2013). Such a tool would consider crime scene actions and dynamic psychological characteristics of offenders at the time of firesetting (i.e., intoxication, acute mental illness) as well as more fire-specific risk

factors (i.e., interest in fire, early fire play, lighting multiple fires alone, target selection) (Doley & Watt, 2012; Fineman, 1995; Gannon et al., 2012; Jackson, 1994; Jackson, Glass, & Hope, 1987; Leong & Silva, 1999; Rasanen et al., 1995).

Given the number of individuals who commenced their offending career early and then went on the become recidivist firesetters, future research needs to examine the links between early antisociality and later firesetting offending. In this and other large samples the base rate for recidivism remains very low (Barnett et al., 1999; Soothill & Pope, 1987) and thus larger numbers are required, possibly through inter-jurisdictional cooperation. As it currently stands the screening tool can only provide guidance around static factors to consider in the assessment of individuals who have a history of firesetting. It cannot be used for making risk recommendations (Mossman, 2013) and thus larger numbers would allow better prediction and differentiation across the continuum of risk.

Implications and conclusions

Despite the low rate of firesetting recidivism, the rate of general recidivism was quite high. Thus, as noted by Soothill et al. (2004) and Ducat, McEwan et al. (in press), while the persistent arson offender who only sets fires is not a myth, this group represents only a small minority of the total convicted; of greater concern is the rate at which firesetters generally reoffend. These results indicate that forensic clinicians need to be as concerned about general recidivism as they are about firesetting recidivism when assessing individuals with a history of firesetting.

This study provides further evidence for the notion that firesetters are primarily rule violators whose baseline of risk is increased by the same factors that contribute to any individual's risk of offending, with a greater number of risk factors associated with greater risk of offending (Andrews & Bonta, 2010; Ducat, McEwan et al., in press;

McCarty & McMahon, 2005; Warren, MacKenzie, Mullen, & Ogloff, 2005). However, assessors also need to be cognisant of the factors that are purported to differentiate firesetters from other offenders (for a comprehensive review and explication of a guiding theory of firesetting refer to Gannon & Pina (2010) and Gannon et al. (2012)), including early firesetting, reported interest in fires, and setting fires alone. Consideration must also be given to the psychiatric history of the firesetter and their mental state at the time of offending, which may change the focus of treatment recommendations arising from any assessment of such individuals.

In this large and representative prospective study of firesetting recidivism the rate of reoffending was found to be low. The low base rate means that any tool arising from such a sample will only be able to provide clarity around the factors to consider in the assessment of firesetters. It also provides guidance as to which individuals should be prioritised for a more thorough assessment of firesetting risk. This tool is best suited to triaging cases of concern; ruling out individuals who are not of concern in terms of reoffending and to rule in individuals who need further assessment. As such, the tool screens out individuals who are not recidivists (true negatives), while being overly-inclusive of the false positives (non-recidivists identified as recidivists), allowing for more in-depth follow-up assessment. The variables used to development this measure would mostly be available to law enforcement, corrections services and forensic mental health clinicians.

High scores on this screening measure indicate that a number of risk factors for future firesetting are present and a greater level of investigation is required. This would be particularly helpful for police task forces who are deployed during high risk fire periods to monitor known arsonists (i.e., Operation Tronto in New South Wales or Operation Nomad in Adelaide, Australia). Those with lower scores are less likely to

need further assessment or intensive community follow-up. With respect to treatment, several authors have argued that treatment efficacy is enhanced by appropriate allocation of services according to risk predictions on actuarial measures (Andrews & Bonta, 2010; Andrews, Bonta, & Wormith, 2004; Harris, Rice, & Quinsey, 1993). Therefore, individuals who are assessed as being of concern for reoffending can be further assessed and allocated to treatment services accordingly.

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Table 1. Univariate comparisons between recidivist firesetters and non-recidivists

Variable	n (%) Recidivist n = 56	Non-recidivist n = 996	χ^2, p	OR (95% CI)
Offence characteristics				
Multiple arsons at index	13 (23.2)	88 (8.8)	12.63***	3.12 (1.62 – 6.02)
Offence history				
Pure arson	2 (3.6)	259 (26)	14.30***	0.11 (0.03 – 0.44)
Mixed arson	51 (91.1)	505 (50.7)	34.67***	9.92 (3.93 – 25.06)
Charges prior to index (any)	49 (87.5)	604 (60.6)	16.24***	4.54 (2.04 – 10.13)
More than two prior offences	41 (73.2)	435 (43.7)	18.67***	3.53 (1.93 – 6.46)
Prior arson	8 (14.3)	63 (6.3)	5.34*	2.47 (1.12 – 5.44)
Low criminal versatility (≤ 3 offence types)	9 (16.1)	587 (58.0)	37.85***	0.14 (0.07 – 0.29)
Moderate criminal versatility (4-5 offence types)	14 (25.0)	137 (13.8)	5.45*	2.09 (1.12 – 3.93)
High criminal versatility (> 6 offence types)	33 (58.9)	281 (28.2)	23.89***	3.65 (2.11 – 6.33)
Violent offence prior	32 (57.1)	366 (36.7)	9.38**	2.30 (1.33 – 3.96)
Non-violent offence prior	50 (89.3)	634 (63.7)	15.31***	4.76 (2.21 – 11.21)
Both prior	30 (53.6)	329 (33.0)	9.95**	2.34 (1.36 – 4.02)
Nuisance charges prior	1 (1.8)	19 (1.9)	0.00	0.94 (0.12 – 7.11)
Clinical variables				
Registered with public mental health service	41 (73.2)	372 (37.3)	28.60***	4.59 (2.50 – 8.40)
Axis I clinical diagnosis	31 (55.4)	264 (26.5)	21.87***	3.43 (1.99 – 5.93)
Serious mental illness[a]	11 (19.6)	79 (87.9)	9.30**	2.84 (1.41 – 5.70)
Psychosis	8 (14.3)	67 (6.7)	4.58*	2.31 (1.05 – 5.08)
Depression	8 (14.3)	78 (7.8)	2.94	1.96 (0.90 – 4.29)
Anxiety	8 (14.3)	73 (7.3)	3.61	2.11 (0.96 – 4.62)
Substance misuse history	18 (32.1)	152 (15.3)	11.15***	2.63 (1.46 – 4.73)
Childhood behaviour disorder	6 (10.7)	46 (4.6)	4.19*	2.48 (1.01 – 6.08)
Contact with psychiatric services as a child or adolescent	9 (16.1)	46 (4.6)	14.04***	3.96 (1.83 – 8.56)
Pyromania	1 (1.8)	1 (0.1)	7.94**	18.09 (1.12 – 293.09)
Personality diagnosis	16 (28.6)	94 (9.4)	20.73***	3.84 (2.07 – 7.12)

*$p < 0.05$ ** $p < 0.01$ *** $p < 0.001$. [a]Schizophrenia and Bipolar Affective Disorder

Table 2. Dichotomous variables used to develop improper model and Phi coefficient for each item and dichotomous recidivism

Variable	Φ, *p*
Mixed arsonist (Arson + ≥3 other offence types in Hx)	0.18***
Multiple arson charges at index	0.11***
Total number of arson offences prior to index	0.07*
Age of first arson offence	0.08*
Charge prior to index	0.12***
Total number of offences prior to index offence	0.13***
Non-violent offending prior to index	0.12***
Age of first offence (any)	0.07**
Criminal versatility (PCL-R definition > 6 offence types in history)	0.15***
Registered contact with mental health service	0.16***
Axis I clinical diagnosis	0.14***
Serious mental illness	0.09**
Personality disorder	0.14***
Substance misuse (lifetime)	0.10***
Child behaviour disorder	0.06*
Treatment in child or adolescent psychiatric services	0.17***

** $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$*

Note Full scoring criteria available from authors

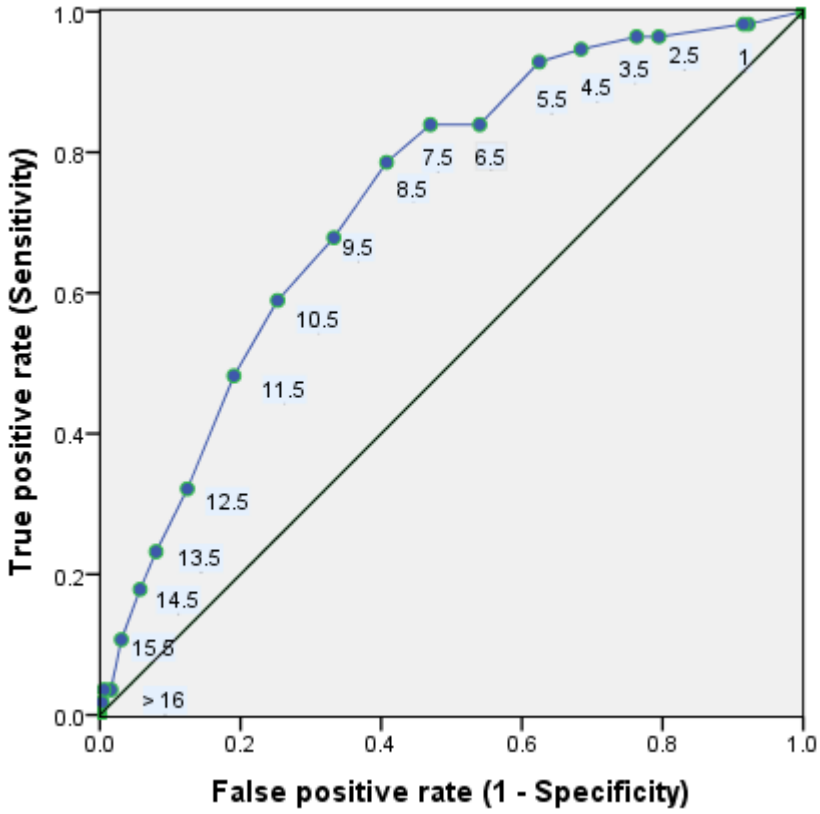

Figure 1. Receiver operating characteristic curve describing the accuracy of the arson recidivism prediction system; the coordinates along the line represent scores on the improper model.

Table 3. Indices of predictive accuracy of the improper model at various cut-off points

Cut-off	Sensitivity	Specificity	PPP	NPP
3	0.96	0.24	0.57	1
6	0.84	0.46	0.23	1
9	0.68	0.67	0.11	0.97
12	0.32	0.88	0.03	.95
15	0.11	0.97	0.01	.96

PART E: DISCUSSION

Chapter Ten: Integrated discussion

10.1 Overview of the research

The purpose of this research was to develop an understanding of the demographic, psychological, criminal history and psychiatric risk factors that are differentially associated with firesetting, to establish the rates of firesetting recidivism and to develop a predictive model of recidivistic firesetting. A robust case-linkage design and in-depth analysis of court materials was used to achieve these objectives in the three empirical studies, as summarised below.

The first objective was to characterise the offending behaviours, and psychiatric and psychological risk factors of a large sample of Australian firesetters who appeared before the Victorian courts between 2003 and 2009. Firesetters were then compared on these characteristics with a random sample of non-firesetting offenders with the aim of identifying unique risk factors for firesetting. Additionally, criminal versatility was explored within the sample and groups of firesetters were examined based upon their level of exclusivity or versatility. The basis for this analysis was evidence from past studies suggesting that firesetters are both criminally versatile and a heterogeneous group, and thus it was hypothesised that criminal versatility may be not only one of the ways in which firesetters differ from one another but also a significant risk factor for further offending (Gannon & Pina, 2010). The findings suggested that the commonalities between firesetters and other offenders are likely to be the result of the criminal versatility of firesetters. Therefore, there is a need to understand the underlying bases of all criminal behaviours (i.e., antisocial personality, attitudes supportive of

crime, criminal history, social support for crime, substance abuse, low social involvement, low work engagement and family dysfunction; Andrews & Bonta, 2010) when formulating firesetting risk, while also appreciating the unique risk factors that may impact upon an individual's firesetting risk *per se*.

The second objective was to examine psychiatric morbidity and public mental health service usage in a population of firesetters who appeared before the courts to establish prevalence rates. These were compared with offender and community controls allowing for hypotheses about the potential impact of mental disorder on firesetting. It was concluded that although a significant proportion of firesetters do experience mental illness, a large proportion do not. As such, there is a need to consider the additional factors that may contribute to an individual's risk of firesetting behaviour.

The third objective was to examine the rates of firesetting and general recidivism within this population of firesetters, and to develop a predictive model of firesetting recidivism. Recidivism amongst firesetters is a largely unaccounted for issue, with relatively little research exploring both the rates and types of recidivism amongst firesetters, or potential risk markers that could be used by assessors and investigators when assessing an individual firesetter. As such, the risk factors explored in the previous two studies were examined and comparative analyses were conducted to determine whether there was a quantifiable difference between firesetters who reoffend and those who do not. An additional aim of the paper was to develop a predictive model of recidivistic arson. Although the overall model was found to predict recidivism with moderate accuracy, the low base rate of the behaviour precluded the development of cut scores associated with different levels of reoffending. Thus, it was concluded that it is not possible to make a risk determination based upon broad-based characteristics,

although it is possible to determine the factors that are associated with firesetting recidivism. Ramifications of these findings are discussed.

10.2 Overview of Main findings

As outlined in Chapter Four, the research described in this thesis had several aims which were examined in Chapters Seven, Eight and Nine. The following section will summarise the key findings from each of these studies, as they relate to the aims. An integrated interpretation of the findings will follow, after which the implications of this research for clinicians, law enforcement and researchers will be discussed. Finally, the limitations of the research will be outlined and suggestions for future research will also be made.

10.2.1 Empirical study one: Comparing the characteristics of firesetting and non-firesetting offenders

The first study examined the criminal histories and psychological and psychiatric characteristics of firesetters before the Victorian courts and compared these with non-firesetting offenders. It also examined the issue of criminal versatility amongst firesetters, and explored whether and how firesetters with varying levels of criminal versatility differed from one another and other offenders on key variables.

Past research has frequently suggested that firesetters differ to non-firesetters in several important ways. In particular, factors such as previous firesetting history, interpersonal difficulties, early maladjustment, lower occupational and educational attainment and mental illness have all been highlighted as unique risk factors for arson (Anwar et al., 2011; Barnett & Spitzer, 1994; Bradford, 1982; Dickens et al., 2009; Hurley & Monahan, 1969; Jackson et al., 1987; Prins, 1994a,b; Rice & Harris, 1996,

2008; Ritchie & Huff, 1999; Rix, 1994; Stewart & Culver, 1982). The first study of this thesis found little evidence for some of these differences and indeed firesetters and other offenders were found to have similar criminogenic needs overall, especially when examining criminal history. The differences that did emerge suggested that firesetters tended to have more experiences with mental illness or psychological distress and social disadvantage than other offenders, consistent with findings from studies using psychiatric samples (Quinsey et al., 2006; Rasanen, Puumalainen, Janhonen, & Vaisanen, 1996; Rice & Harris, 2008; Ritchie & Huff, 1999).

Unsurprisingly, given evidence from past research (Brett, 2004; Soothill et al., 2004; Soothill & Pope, 1987 among many others), firesetters were found to be predominantly versatile offenders. While a significant proportion of the firesetters were found to be exclusive offenders (firesetting only), there was little to distinguish them from the other groups. Importantly, they were no more likely to set multiple fires, rebuffing the idea that recidivist arsonists have a specific interest in firesetting (the popular notion of the ‘fire bug’ that has been prevalent in the literature since Lewis and Yarnell coined the term in 1951). Indeed, many exclusive arsonists had no previous criminal history at all. It would seem that characterising firesetters in this way is unlikely to shed light on offenders continue to light fires until they are caught (Doley, 2003b).

In concordance with the extensive literature on the risk factors for general offending, the versatile firesetters had the greatest number of risk factors for general reoffending, even when compared with the non-firesetting control group, and firesetting recidivism. As outlined by Andrews and Bonta (2010) in their theory the Psychology of Criminal Conduct and the Problem Behaviour Model outlined in Warren and colleagues work (2005), there are a broad range of factors relevant to the assessment and treatment

of all offenders (for example, antisocial personality, attitudes supportive of crime, criminal history, social support for crime, substance abuse, low social involvement, low work engagement and family dysfunction). In addition, there are individual factors such as emotional reactivity and regulation, impulsivity, poor social skills, and other deficits that are commonly seen amongst the clientele of forensic mental health clinicians (Warren et al., 2005; McEwan et al., in press). These would often form the basis of intervention with offenders (McEwan et al., in press). As such, firesetters can be conceptualised first and foremost as rule violators whose baseline risk is increased by the same factors as non-firesetters. These factors predispose them to a variety of maladaptive and antisocial behaviours (Fineman, 1995).

A key question arising from this study is whether there are individual factors that may explain why some individuals choose fire as one part of their criminal repertoire while others do not. It is also interesting to note that the versatile firesetters exhibited many of the above general risk factors more often than the versatile offenders in the control group. Thus, it would appear that there are certain, currently unexplained, factors that may actually differentiate versatile firesetters from other offenders. This study highlighted that firesetting research needs to move beyond description of the characteristics of offenders toward a more in-depth understanding of the cognitive, affective and attitudinal individualities of firesetters, while also taking account of the oft-cited similarities in the criminogenic needs of firesetters and other offenders.

10.2.2 Service usage and psychopathology within a population of arsonists

The second empirical study sought to provide an in-depth analysis of the rates and types of mental disorder evident in a population of convicted arsonists. The study

used a case-linkage design to examine psychiatric diagnoses and public mental health service usage of 1328 arsonists convicted in the Victorian courts between 2000 and 2009, a matched sample of community controls, and an offender control group who had never been charged with arson or arson-related offences. Moving beyond description, the study compared the firesetters with the non-firesetting groups to elucidate the contributing role of psychiatric disorder in this population.

The results of study two support past research, which tends to report elevated rates of mental disorders amongst firesetters, although usually in selective samples (Anwar et al., 2011; Barnett et al., 1997; Devapriam et al., 2007; Geller, Fisher, & Moynihan, 1992; Lindberg et al., 2005; Vinkers et al., 2011; Wallace et al., 1998). Firesetters had higher rates of all disorders when compared with community members, which is to be expected given the literature that exists on the elevation of mental disorder amongst offenders generally (Stevens et al., 2012) and firesetters in particular (Blanco, Alegria, & Petry, 2010; Gannon & Barrowcliffe, 2012). Consistent with the few studies that have compared firesetters with other offenders, the firesetters in this study experienced higher levels of pathology than the offender control group, with two important exceptions: psychotic disorders and bipolar affective disorder. However, the rates found in the current study were significantly lower than those reported in other studies, where serious or recurring mental illness is cited as being present in as much as 30 - 60% of firesetting samples (Devapriam et al., 2007; Leong & Silva, 1999; Lindberg et al., 2005; Puri, Baxter, & Cordess, 1995; Stewart, 1993; Tennent et al., 1971). The findings of study two provide evidence that the link between firesetting as a behaviour and psychiatric disorder, while clearly present, is confounded by the types of samples studied in past research.

Although rarely based on comparison with other offenders (exceptions being Jackson et al., 1987; McKerracher & Dacre, 1966; Rasanen, Hakko, & Vaisanen, 1995) past studies imply that firesetting is inherently related to psychopathology. This link has a long history in the psychiatric literature and is also supported by current sentencing practice in the United Kingdom and some countries in Europe (Boden, Fergusson, & Horwood, 2013; Tyler & Gannon, 2012). While the current study did show elevated prevalence of most disorders compared with either control group, it does not show that all, or even the majority, of firesetters experience mental illness or come into contact with public mental health services. Indeed less than one third of firesetters received any clinical Axis I diagnosis in their lifetime and only one in ten were diagnosed with a personality disorder. The findings suggest that even if an individual firesetter had a history of contact with psychiatric services they very often were not in contact with those services in the days leading up to the offending. Based on this, it is reasonable to suggest that acuity of mental illness does not necessarily play a role in the commission of most firesetting offences, even if the more chronic impacts of such illness are relevant. As Prins (1994a) noted several decades ago it may be a mistake to medicalise criminal behaviour, thereby turning attention away from the various other factors that are likely to contribute to firesetting (e.g., biological factors, developmental experiences, culture, social learning and psychological vulnerabilities such as inappropriate fire interest and offence-supportive cognitions ;Gannon et al., 2012; Tyler and Gannon, 2012).

10.2.3 Empirical study three: Examination of recidivism rates and the development of a model to predict recidivism by firesetters

The third and final study in the thesis aimed to establish the rates of firesetting recidivism in a representative sample of firesetters who appeared before the courts over a 10 year period. Each firesetter was followed to March 2012 allowing a minimum of two and half years of follow-up and extending up to 11 years in the earlier cases. Upon establishing the rate of reoffending, the criminal histories and psychiatric characteristics of recidivists were compared with non-recidivists and significant predictors were combined to develop a model to predict firesetting recidivism.

Rates of recidivism by firesetters have been found to vary widely. On the one hand, studies relying on psychiatric samples report rates of firesetting recidivism in the region of 20-40% (Dickens et al., 2009; Lindberg et al., 2005; Rice & Harris, 1996), while more representative criminal justice samples report rates as low as 4% - 10% (Barnett et al., 1999; Muller, 2008; Soothill et al., 2004; Soothill & Pope, 1973). Despite the latter findings, firesetting is frequently described as a recidivistic crime (Brett, 2004). The findings in study three are largely consistent with the similar criminal justice samples described above, suggesting that arsonists as a whole are not inherently recidivistic. Unsurprisingly, and consistent with study one, the mixed (criminally versatile) firesetters were most likely to be recidivists. The rates of subsequent general offending by arsonists were very high, also consistent with several other studies (Barnett & Spitzer, 1994; Doley, 2009; Ritchie & Huff, 1999), suggesting that targeting general risk of offending may produce the largest impact on recidivism in this sample (Gannon & Pina, 2010).

Importantly, there were a number of factors that were found to distinguish between recidivist firesetters and non-recidivist firesetters, and these were combined to develop a model that was able to predict firesetting recidivism with a moderate degree of accuracy. However, given the low base rate of this type of reoffending, it was not possible to differentiate between levels of risk associated with different rates of reoffending. Thus the model is best used as guidance tool for the clinical assessment of firesetters, and should not be used as a risk prediction measure. At best, it could be used as an initial screen to identify individuals who might be appropriate for a more thorough assessment (although even this assessment would rely more on the wider offending literature than specific on knowledge about firesetting risk). As expected, factors such as general criminality, criminal versatility, and early age at onset of offending were able to predict firesetting reoffending (Phillips et al., 2005). Similarly, the clinical factors of a history of contact with psychiatric services, especially from an early age, and serious mental illness (i.e., psychotic disorders or bipolar affective disorder) also predicted firesetting recidivism. However, factors related to firesetting behaviour added significantly to the accuracy of the model beyond these general criminogenic factors. In particular, number of firesetting incidents and age at onset of firesetting history distinguished those who set further fires from those who did not. These findings are consistent with the significant body of literature in the risk assessment field, where offence-specific factors are reported to add predictive utility above the baseline of general criminogenic need (Harris, Rice, & Quinsey, 1993; Hilton et al., 2004).

The screening tool developed in this study highlights the impact of low base rates on the ability to develop clinically meaningful risk assessment measures. It also highlights that while broad-based risk factors may have some ability to discriminate between recidivists and non-recidivists, the more in-depth and offence-specific factors

used in structured professional judgement tools in other areas of forensic psychology (i.e., the Historical-Clinical-Risk-managment-20 (Webster et al., 1997), the Stalking Risk Profile (MacKenzie et al., 2009), the Spousal Assault Risk Assessment (Kropp, Hart, Webster, & Eaves, 1995) and the Risk for Sexual Violence Protocol (Hart et al., 2003) are likely to increase predictive validity. The current combination of factors moves the firesetting literature toward the development of a triage tool that could be useful for clinicians and law enforcers in the early stages of assessment in identifying the group of individuals from which recidivists are likely to be drawn, although that group will also include a significant number of non-recidivists. However, the model requires further validation, and until further large-scale studies are conducted, firesetting recidivism may remain a poorly understood behaviour.

10.3 Integrated interpretation of findings

The following section will present an integrated interpretation of the findings, focusing on the main themes that became evident over the course of the studies. Taken together, the results of the three empirical studies confirm that there are number of factors that underpin firesetting behaviours, many of which are related to an individual's general risk of offending. Perhaps as a direct result, this population of firesetters tended to exhibit high levels of criminal versatility and extremely high rates of general recidivism. However, there are important differences between firesetters and non-firesetters, and between those who recidivate and those who do not, which warrant attention and full exploration.

The findings also raise the question of the pathways that result in an individual deliberately setting fires, especially repeatedly. The Multi-Trajectory Theory of Adult Firesetting (M-TTAF) proposes a number of trajectories associated with different

aetiological underpinnings and maintaining factors, and possibly different expressions of the behaviour. For example, the current findings show that there is a core of individuals who engage in a wide variety of antisocial behaviour, and these individuals are likely to have happened upon fire in their extensive criminal experience. For these individuals fire may simply be a means to an end, and reinforcement and lack of negative consequences is likely to play a large part in determining whether an individual repeats the behaviour. These individuals will likely have a quite different clinical presentation to the individual who learnt from an early age that fire is a powerful tool for achieving one's goals in relationships with others, a tool which can be applied with relative ease for maximum impact. Although the latter individual is likely to be grouped with the antisocial people in the current sample because they actually have a range of antisocial behaviours, they are likely to be distinguishable by their fire interest. In each of these cases, and others highlighted by the M-TTAF the underlying attitudes, cognitions and thus treatment targets are likely to be quite different. While the current studies did not examine the in-depth psychological factors required to examine the utility of this theory, the M-TTAF does provide a useful framework for considering the applicability of the current findings, which will be discussed now.

10.3.1 Underlying similarities with other offenders

While it is clear that there are a number of similarities between firesetters and other offenders, there are also important differences that point to areas for intervention. Knowledge of the known risk factors for and the characteristics of detected firesetters is crucial for clinicians, as such knowledge provides guidance for assessment and points toward particular interventions that take account of the individual needs of the firesetter (Gannon & Pina, 2010). The current studies showed that although there were some

important differences between firesetters and non-firesetting offenders, particularly in terms of psychiatric disturbance, there were a number of underlying similarities. Often these similarities are ignored in the research literature despite several studies failing to differentiate firesetters from non-firesetters on many characteristics (Doley, 2009). Such similarities have important implications for both the assessment and treatment of firesetters, while divergences indicate particular offence-specific needs that may form specific targets in interventions.

While firesetters have traditionally been viewed as a particularly dangerous sub-group of offenders (Hurley & Monahan, 1969; Lewis & Yarnell, 1951), the findings in study one suggest that firesetters have similar criminogenic needs when compared with non-firesetters; they were no more likely to have a history of offending and engaged in both violent and non-violent offending at similar rates to non-firesetters. This indicates that firesetting is not a unique type of offending but one form of criminal behaviour that is underpinned by a baseline of factors thought to be instrumental in the development of all offending behaviours. Andrews and Bonta's (2010) theory of the 'Psychology of Criminal Conduct' suggests that there are a constellation of risk factors they term the 'Central Eight' that underpin criminal behaviour: antisocial personality, attitudes supportive of crime, criminal history, social support for crime, substance abuse, low social involvement, low work engagement and family dysfunction. Individuals who have this combination of characteristics tend to engage in a variety of persistent antisocial behaviours (Andrews & Bonta, 2010; Bonta, Law, & Hanson, 1998; Gendreau, Little, & Goggin, 1996; Phillips et al., 2005). Generally speaking, the more of these baseline factors present, the more likely the person is to offend, and to be criminally versatile. Within the juvenile firesetting literature McCarty and McMahon (2005) found evidence of this, reporting that juveniles from a community sample who

had a greater number of risk factors (i.e., poorer grades, oppositional or aggressive behaviour, inappropriate or harsh parenting, substance abuse) were more likely than those who did not to have set fires and to have become firesetting recidivists.

Implicit in the current findings is that the basic principles of risk assessment and treatment of all offending behaviours are likely to apply on some level to firesetting behaviours. One model to take such an approach is the Problem Behaviour Model in operation at the Community Forensic Mental Health Service, Forensicare, in Victoria, Australia. This model refers to 'problem behaviours' rather than specific offending behaviours. These are more broadly defined as repeated patterns of behaviour that intentionally or recklessly cause harm to others, and to the perpetrator (see McEwan, MacKenzie, & McCarthy (In press) or Warren et al. (2005) for full description of the model). This model, which draws on the theory of the Psychology of Criminal Conduct, assumes that problem behaviours are underpinned by a number of common factors, including situational variables (antisocial peers, unemployment, relationship conflict), individual traits such as personality features (antisocial attitudes, beliefs and cognitions, and values), interpersonal and other skills deficits (emotion- and self-regulation, problem-solving, communication skills), and, where applicable, psychopathology. These contributory factors are likely to interact with the specific context in which the problem behaviour occurs (McEwan et al., In press). The type of problem behaviour engaged in in a particular context is reliant on the presence of offence-specific cognitive factors that are active in that context (for example, attitudes regarding entitlement to sexual gratification in sexual offending, aggression scripts in response to perceived hostility in violent offending). The current findings suggest that such an approach would be of use for addressing firesetting behaviour given the baseline of criminogenic need found in the histories of firesetters.

While the Central Eight factors are associated with general offending, they cannot account for some of the important differences that were highlighted in the current studies. In addition, they do not explain why the individual's underlying level of criminogenic need would manifest in firesetting behaviour. Firesetting theorists along with others in forensic psychology generally, suggest that it is the offence-specific factors that may account for some of those differences (Ciardha & Gannon, 2012; Doley et al., 2011; Gilbert & Daffern, 2011; Hanson & Bussiere, 1998; Hanson & Morton-Bourgon, 2005; Kocsis & Cooksey, 2002). In the case of fire-setting, such offence-specific factors are likely to include early fire interest, characterized by false alarm or bomb hoaxes, coming to police notice for fire lighting or fire play, fire-related cognitions and behaviours related to type of firesetting, such as lighting a number of small fires in remote areas (Ciardha & Gannon, 2012; Fineman, 1995; Jackson, 1994; McEwan, Doley, & Dolan, 2012).

These factors were not specifically explored in the current research, although factors such as number of past fires and age at onset of firesetting behaviour were found to distinguish recidivist from non-recidivist firesetters, suggesting that these may be proxy measures for the underlying attitudes, behavioural scripts and offence-supportive cognitions specific to firesetting. The findings in the current studies highlight that both the broad underpinning and offence-specific factors form an integral part of the assessment of firesetters by forensic mental health clinicians. How this translates into the formulation and treatment of such individuals will be discussed in section 10.6.1 below.

10.3.2 Criminal versatility and the exclusive firesetter: Common myths and misconceptions

Given the low rates of firesetting by exclusive firesetters, and the low rate of firesetting recidivism in general (most of which was committed by versatile offenders), these findings raise an important question about why there is a persistent search in the research literature and the media for the pyromaniac firesetter. The notion of the fire-bug was coined by Lewis and Yarnell in 1951 to describe individuals who set fires alone for no practical reasons. It has remained prominent in lay descriptions of firesetters, suggesting that firesetters are unusual individuals driven by an irresistible impulse to set fires. This is based on earlier assumptions arising from psychoanalytic thinking that firesetting was related to sexual urges, and more recently to its classification in current nosology as an impulse control disorder (Bradford, 1982; Eigen, 1995; Geller et al., 1986). However, the current studies, based on the broad risk factors available, did not identify many individuals who could be classified as the 'typical' fire bug in this mould.

It is interesting to reflect momentarily on how the public, and indeed much of the research literature in the twentieth century, became focused on 'finding pyromania' (Lindberg et al., 2005), even though much of the emerging evidence is at odds with this search. The explanation for this phenomenon may lie in cognitive psychology and criminological theories about heuristics (mental shortcuts) and 'othering' (Slovic, 2000; Surette, 1994; Tulloch, 1999; Tversky & Kahneman, 1974). Humans attend to information that is salient, and will attempt to fit new information into pre-existing schemas, which is evidenced in the literature of the implicit assumptions of offenders (Ciardha & Gannon, 2012; Molden, Plaks, & Dweck, 2006). Evidence from the sexual

and violent offending literature has recently showed that events that bring particular types of offending into the public consciousness, such as changes to legislation or proposals to monitor offenders via public registers, spark increased reporting and thus public interest in the issue (Ducat, Thomas, & Blood, 2009; Peelo, Francis, Soothill, Pearson, & Ackerley, 2004). The recent reporting of high profile arson cases in Australia, with particular emphasis on the unusual aspects of the offender (see for example, Deery, 2013), highlights this. In addition, there is the usual reporting of the imminent high fire danger associated with certain hazardous weather conditions during summer. These two elements increase the saliency of the event and reinforce the public perception that firesetters are particularly disordered individuals who are active at the most high risk times. Evidence suggests that this is likely to increase public awareness of and impact on their perception of the offence and the perpetrators, and impacts not just lay people but politicians and law enforcement alike. Geller (1997) studied local law enforcement officers' knowledge of arsonists and found that law enforcement personnel were impacted by the stigma and media perceptions of the offenders they were profiling. Similarly, Kocsis (2004) reported that police and the community members relied on social stereotypes to profile arsonists, which has significant impacts upon both public perceptions of risk, and who would be considered suspicious, and law enforcement officers' ability to accurately identify individuals who are most likely to have engaged in firesetting recidivism.

Despite the overwhelming public perception of firesetters as a special case, the current research was congruent with the firesetting literature and research of other offending behaviours, and did not support the assumptions commonly reported in the media; firesetters were more likely to be criminally versatile, and criminal versatility was significantly related to firesetting recidivism. (Brett, 2004; Broadhurst & Maller,

1992; Hanson & Morton-Bourgon, 2005; Harris, Knight, Smallbone, & Dennison, 2011; Quinsey et al., 2006; Smallbone & Wortley, 2004; Ventura & Davis, 2004). Unsurprisingly, criminally versatile firesetters had a greater preponderance of risk factors across the demographic, clinical and criminogenic domains than the non-criminally versatile firesetters (Dickens et al., 2009; Repo & Virkkunen, 1997; Rice & Harris, 1996).

While these findings are generally supported in the literature, it raises questions about the individual trajectories of these offenders. Criminally versatile firesetters had higher rates of Cluster B personality disorders, substance misuse and poorer social outcomes than the exclusive firesetters. Given these characteristics, the multi-faceted trajectory of the M-TTAF may explicate the potential pathways to offending for the versatile firesetters. Individuals fitting within the multi-faceted trajectory are likely to have general antisocial attitudes, have been exposed to psychosocial disadvantage, antisocial environments and pro-criminal peer groups. As such, these individual are likely to have had early experiences not only with fire but with criminality in general, and are likely to have commenced their offending careers at an early age. Early offending and firesetting was characteristic of the versatile firesetters in the current studies, thus contributing to an entrenched and reinforced pattern of firesetting behaviour that meets many needs, including peer acceptance, stimulation, emotion regulation, crime concealment, aggression, and intimidation. As noted by the M-TTAF, individuals following the multi-faceted trajectory will have fire interest but very often it will be in the service of antisocial cognitions and goals (Gannon et al., 2012). Such information provides guidance around the factors to consider when assessing versatile firesetters, and when considering their potential risk of setting further fires.

On the other spectrum of firesetting behaviour characterised in the current studies were the exclusive firesetters. The findings support Soothill and Pope (1973) and Doley's (2003b) assertion that while there is a small group of offenders who only light fires, they are less distinctive than is commonly thought, and are responsible for fewer fires than the more versatile offenders. However, there were some interesting distinguishing features of this group which warrant investigation. For example, the exclusive firesetters had a lower prevalence of personality or substance misuse disorders, fewer past convictions, and the index offence was the first convicted offence of any kind for many in the group. Therefore, they do form a distinct group in terms of their risk trajectory and potentially the presence of underlying fire-related cognitions, although the differences are somewhat at odds with those in other studies examining exclusivity (Barnett et al., 1999; Lindberg et al., 2005). The general pattern suggests that exclusive firesetters may not hold the general antisocial attitudes that the more versatile firesetters do but may have more of the fire-specific vulnerabilities. According to the M-TTAF, these characteristics would fit within the fire interest, emotionally expressive or grievance trajectories, suggesting that firesetting is likely to be fulfilling very specific emotional needs that may arise in particular contexts.

Findings from the current studies suggest that while there are some important differences in the presentation of firesetters, they do not stand as far apart from the typical offender, at least on broad criminogenic, social and clinical variables, as is commonly thought. Those who exclusively light fires are even less distinctive than popularly thought and reported in the small amount of literature that looks at the issue (see for example Barnett et al., 1999; Lindberg et al., 2005). Where they do differ, it tends to be in ways that are associated with less, rather than more, recidivism. The narrow focus on exclusive firesetting in both the research literature and the media has

the result of taking attention away from the important similarities between offenders and may lead to stigmatising of firesetters, further compounding any pre-existing vulnerabilities and hampering efforts at developing clinically relevant risk assessment tools.

10.3.3 The first step toward a model for understanding firesetting recidivism: pathways to offending and reoffending

This thesis is part of a limited literature in which an attempt has been made to develop a predictive model of arson. Despite the large and representative sample size, the low base rate of firesetting recidivism meant that it was not possible to develop a tool with sufficient predictive power to enable its use as a screening tool to identify individuals who are varying levels of risk. At best, the model suggests that there are a number of factors, which when combined, are associated with recidivistic arson. Essentially, the same factors that distinguished between firesetters and non-firesetters were found to distinguish between recidivists and non-recidivists. Although Rice and Harris (1996) concluded that developing an actuarial risk tool for predicting firesetting recidivism was possible, no such tool has been developed in the intervening decades. This research shows that using the broad-based factors available to mental health clinicians and investigators, such a tool may not hold much predictive utility. Each of the elements of the model will be discussed in the following sections, with an indication of the additional factors that would be of assistance to investigators and clinicians in predicting firesetting recidivism.

10.3.3.1 Demographic characteristics of repeat firesetters

Although general disadvantage is thought to be related to many forms of offending, the findings from these studies suggest that firesetters are a particularly disadvantaged group, even when compared to other offenders of similar criminal versatility. Congruent with the literature, firesetters in the current research were single (Quinsey et al., 2006), unemployed or employed in less skilled positions and had less schooling (Doley, 2009; Enayati et al., 2008; Rice & Harris, 2008; Vaughn et al., 2010). They were younger at the age of their first offences (Dickens et al., 2009; Sapsford et al., 1978; Soothill & Pope, 1973). These findings suggest that firesetters may come from impoverished backgrounds, which may impact upon their capacity to develop appropriate social skills and affect-regulatory behaviour (Gannon & Pina, 2010; Hanson, Mackay-Soroka, Stanley, & Poulton, 1994; Mackay et al., 2006; Stanley, 2002). Authors have suggested that, given the deprived learning environment associated with such developmental experiences, firesetters are likely to have a number of characteristics that may inhibit appropriate responses to situations and further impede social achievement in adulthood, including impulsivity (Rasanen et al., 1996), poor assertiveness and communication skills (Quinsey et al., 2006; Rice & Chaplin, 1979), and low self-esteem (Swaffer et al., 2001). Some firesetters therefore use firesetting as a way of managing and expressing emotions (Canter & Fritzon, 1998; Geller, 1992b). While the current studies did not examine the psychological aspects of the firesetters, the overall picture suggests that some of these factors may impact upon the initiation of firesetting behaviour; there are likely to be a range of other factors that will maintain it over time, as will be discussed in the coming sections.

10.3.3.2 Psychopathology

The findings in these studies support existing research suggesting that that there is a higher prevalence of psychopathology amongst firesetters (for a full review refer to Tyler and Gannon, 2012). However, while contact with psychiatric services and diagnosis of mental disorder features in the histories of many of the firesetters often from an early age, the majority are not unwell, especially not at the time of the index offending. This suggests, as other authors have stated, that mental illness is unlikely to have a causal role in firesetting in the majority of cases, unless there are specific command hallucinations and delusions present (for example, see Gannon et al., 2012; Geller, 1992c).

Geller (1987) proposed that firesetting is a symptom of many psychiatric disorders; however, he went on to note that it is not sufficient to attribute firesetting to a disorder without fully explicating the origins of the behaviour and the specific link between the behaviour and the illness. Current thinking, based upon these earlier proposed notions, suggests that personality factors (including cognitive and affective responses) are influenced by social learning, culture, developmental experiences with fire and specific skills deficits that are likely to be further impacted by mental illness, which acts as both a distal and proximal antecedent to firesetting (Fineman, 1995; Gannon et al., 2012; Jackson et al., 1987). Thus, firesetting may be thought of as an operant behaviour that is intended (consciously or unconsciously) to produce a reaction from others, irrespective of the mental state of the firesetter (Geller & Bertsch, 1985; Sturmey, 2010). There is significant evidence in the literature supporting this view, with many authors suggesting that firesetting is a useful tool for communicating distress, frustration, anger, anxiety or excitement by mentally disordered firesetters in that it has

an immediate impact and is likely to bring about rapid environmental change (Geller, 1992b; Murphy & Clare, 1996; Read & Read, 2008).

In comparing firesetters and other offenders or community members this research shows that firesetters are more likely to experience suicidal ideation and have made more attempts at suicide. Indeed, the motivation for firesetting was recorded as suicide in a small number of the court files analysed in Study One. Other researchers have also reported that self-injurious behaviour and admissions to psychiatric units differentiate between firesetters and non-firesetting community members or psychiatric patients (Geller, Fisher, & Moynihan, 1992; Vaughn et al., 2010). This may be indicative that firesetting is used by individuals who have impairments in the experience and expression of affective states. Such individuals are likely to have had certain developmental experiences with fire that have been reinforced; if an individual has had the experience of reduced emotional arousal after setting fires, this behaviour is likely to be internally reinforcing, as is the avoidance of future negative states (Fineman, 1995; Gannon et al., 2012; Jackson et al., 1987). Certainly the current research shows that firesetters generally, and repeat firesetters especially, are more likely to have had behavioural diagnoses as children and to have been registered with child and adolescent psychiatric services. This suggests that such individuals may have had a number of pre-existing vulnerabilities that have been reinforced over time, and firesetting may simply have been one form of disordered behaviour (Del Bove & Mackay, 2011; Mackay et al., 2006; Stanley, 2002).

Although the validity and clinical utility of pyromania as a diagnostic category has been questioned, it continues to appear in the research literature and folk lore as a potential explanatory factor for recidivistic arson. The current studies suggest that pyromania is very rare. By definition, an individual who is diagnosed with pyromania

will have set and is likely to set multiple fires. However, it is not the case that pyromania is meaningfully or statistically associated with repeat firesetting, at least in criminal justice samples where intent to damage property is what defines firesetting. In examining the clinical characteristics of individuals with pyromania, Grant and Kim (2007) found that much of the firesetting did not meet the legal criteria for arson, and the majority of their firesetters set fires that they considered to be controlled, or were in empty buildings or fields. However, they did exclude individuals with comorbid serious mental illnesses, despite examining comorbidities in the sample. Criminal justice samples, such as the one used in the current studies, may therefore be less likely to pick up individuals who set fires for pathological reasons (i.e., tension reduction) (Grant & Kim, 2007).

Several specific disorders have been found in the literature to be associated with arson, including schizophrenia, alcohol use and personality disorders. These disorders also impact upon an individual's ability to inhibit responses, and are therefore associated with impulsivity (Anwar et al., 2011; Boden et al., 2013; Vinkers et al., 2011; Wallace et al., 2004). These findings are supported by the current studies, indicating that it may not be psychopathology *per se* that is associated with firesetting but the associated sequelae. High levels of hyperactivity and early conduct disorder in children who light fires suggest that neurobiological deficits associated with impulse control may predispose individuals to offending generally (Del Bove & Mackay, 2011), and may be underpinned by several neurobiological disorders that predispose an individual to impulse-control disorders (Bosshart & Capek, 2011; Dolan & McEwan, 2012; Dolan, Millington, & Park, 2002; Virkkunen, Kallio, & Rawlings, 1994; Virkkunen, Nuutila, Goodwin, & Linnoila, 1987). Evidence of this was found in Grant and Kim's (2007) sample of individuals with pyromania from community psychiatric

services. They found that a number of the individuals who no longer met criteria for pyromania did meet criteria for other impulse-control and addictive disorders, pointing toward a potential underlying deficit in the reward pathways for such individuals. This research is all speculative, and given that the link between impulsivity and firesetting is not clearly established in the literature, caution when drawing links between these findings and firesetting behaviour is warranted. However, they do provide for an interesting area for future consideration.

10.3.3.3 Antisociality

The current studies showed that general antisociality, as evidenced by the number and array of offending behaviours and formal diagnoses of antisocial personality disorder, was the best predictor of firesetting recidivism. Studies one and three demonstrated that individuals who were 'mixed' firesetters (had firesetting in addition to at least 3 other offence types) were more likely to repeat the behaviour. Such findings are well-reported in the research literature, including the general offending literature (Bonta et al., 1998; Phillips et al., 2005). In the juvenile firesetting literature Martin, Bergen, Richardson, Roeger and Allison (2004) conclude that firesetting is an expression of general antisociality in adolescents, with juveniles reporting firesetting behaviour also exhibiting a number of other extreme antisocial behaviours, drug use, suicidal ideation and school failure. In a longitudinal study of children who set fires, Kolko, Day, Bridge and Kazdin (2001) found that covert antisocial behaviour predicted firesetting recidivism at a 12-month follow up. Interestingly, youth with fire involvement had the greatest number of risk indicators for poor mental health, substance misuse and delinquency when compared with juveniles not reporting firesetting, signifying that firesetting in this group may simply be a proxy for general antisociality.

Other geographical analyses of firesetting behaviour suggest that reported firesetting is most likely to occur on the urban-rural fringe, in lower socio-economic regions that have higher unemployment and crime rates (Bryant, 2008; Muller, 2009; Muller & Bryant, 2009). In speaking to the Bushfire Arson Symposium in Melbourne, Australia, in 2010, Dr Tomison, Director of the Australian Institute of Criminology, reported that bushfire arson occurs in areas where there is a high crime rate generally (Advancing bushfire arson prevention in Australia: Report, 2010). While this does not speak specifically to an individual's risk of firesetting it does suggest that firesetters may be more likely to come from environments that have a higher preponderance of anti-social individuals, or at the least, environments that are conducive to crime generally, exposing children in such environments to social models, early learning experiences about the use of fire to achieve goals and opportunity to commit firesetting offences. As Gannon and colleagues (2012) note in the development of the M-TTAF, cultural forces, the socially constructed views about fire and its uses, are also likely to impact upon the development of particular attitudes towards its use. Anti-social sub-cultures may have more implicit and explicit antisocial attitudes, which may interact with the individual's psychological vulnerabilities (i.e., inappropriate fire interest, offence-supportive attitudes, self-emotional regulation issues and communication problems, as outlined by Gannon et al., 2012) to increase an individual's risk of firesetting. Peer pressure and firesetting in groups is a particular feature of the firesetting behaviour of the more conduct disordered juveniles (Martin et al., 2004; McCarty & McMahon, 2005), suggesting that culture and social learning may play some role in the development of firesetting for the more generally antisocial firesetters.

10.3.3.4 Firesetting history

While general criminality and antisocial attitudes may provide some clarity about the high rates of general offending by and criminal versatility of firesetters, it may be that these factors are indicators of a general proclivity for risk-taking behaviour but not firesetting per se (Hanson et al., 1994). Martin and colleagues (2004) reported that use of at least three illicit drugs and frequent engagement in risk-taking or dangerous behaviour was related to firesetting in a community sample of adolescents, suggesting that firesetting may simply be one expression of delinquency for young firesetters (Ritchie & Huff, 1999; Stanley, 2002). It may be that general antisociality distinguishes between firesetting and non-firesetting offenders, but is less useful in predicting those who go on to repeatedly set fires as distinct from those who do not, as evidenced in the current studies (Mackay et al., 2006). It is likely to be fire-specific factors such as those discussed in section 10.3.3.2 that predict who will go on to become repeat firesetters, as opposed to general antisocial traits or criminality. Mackay and colleagues (2006) report that fire interest predicted firesetting in adolescents over and above general antisociality, concluding that fire interest accounted for past firesetting behaviour. In the absence of a measure of fire interest in the current studies, it is feasible, then, to consider past firesetting behaviour as a proxy for measuring fire interest in those who repeatedly set fires.

Past behaviour is the best predictor of future behaviour, which is certainly the case for firesetting (Harris, et al., 1993; Quinsey et al., 2006; Rice & Harris, 1996). As evidenced by the current studies, recidivist firesetters were more likely to have committed past acts of deliberate firesetting than non-recidivists and non-firesetters (Canter & Fritzon, 1998; Dickens et al., 2009; Doley, 2009; Soothill et al., 2004; Soothill & Pope, 1973). Others have reported that firesetters are likely to have indicated

fire interest through false alarm or bomb hoaxes, coming to police notice for fire lighting or fire play, or lighting a number of small fires in remote areas (Doley et al., 2011; McEwan et al., 2012). One explanation for this comes from the social-learning and functional analytic understandings of behaviour. Behaviours that are reinforced internally (i.e., reduced tension, affect regulation) or externally (i.e., attention from caregivers) in the absence of negative consequences (i.e., removal of privileges or criminal justice sanctions) are more likely to be repeated. Different levels of fire involvement will hold varying levels of intrinsic and extrinsic reinforcement for different individuals and these will transact with biological predispositions to determine whether an individual will persist with or desist from the behaviour (Fineman, 1995; Jackson, 1994; Jackson et al., 1987).

As suggested by several authors in the sexual offending, violence and firesetting literatures (Ciardha & Gannon, 2012; Gilbert & Daffern, 2011; Polaschek, Calvert, & Gannon, 2009; Polaschek & Ward, 2002), it is likely that fire interest/scripts, and particular offence-supportive attitudes related to fire provides explanation of the aetiology and maintenance of the behaviour; for some individuals these may operate in addition to general antisocial attitudes and early conduct disorder (Gannon et al., 2012).

10.4 Tying it all together

Taken together, these findings have a number of important implications for the assessment of and intervention with firesetters (these will be explored in more detail in coming sections). It is clear that firesetters are usually individuals with extensive offending histories, both violent and non-violent, which means that they share a number of characteristics with other offenders. However, they do exhibit higher rates of psychopathology, social disadvantage and therefore, potentially, psychological

vulnerabilities. The greater the number of these underlying risks and vulnerabilities the more likely an individual is to exhibit a number of antisocial behaviours (Andrews & Bonta, 2010; MacKay et al., 2009). In addition, firesetters also present with more extensive firesetting histories than non-firesetters, and number of past fires is associated with risk of future firesetting (Dickens et al., 2009; Quinsey et al., 2006), indicating that additional factors, such as interest in fire or inappropriate scripts about the use of fires, are likely to act as both proximal and distal risk factors for arson (Ciardha & Gannon, 2012; Gannon et al., 2012). As outlined in the M-TTAF, the different combinations of vulnerabilities and risk factors are likely to result in different trajectories into firesetting.

10.5 Limitations of the research

The limitations of the empirical studies in this thesis have been discussed in detail in Chapters Seven to Nine, and so will only be considered briefly in this section. The most significant limitation of the present research, particularly studies two and three, relates to the case-linkage design used. In particular, case-linkage procedures are reliant upon the quality and type of data available in the source databases, potentially limiting the precision and accuracy of the information extracted. While this research provided an overview of the broad criminogenic and mental health factors associated with firesetting in a population of convicted firesetters, it was unable to provide an in-depth analysis of some factors reported to be of relevance in the literature, such as early fire interest or play, psychological characteristics such as impulsivity or poor problem-solving skills, family and childhood experiences, social relationships or cognitions and attitudes of firesetters. Moreover, neither the criminal records (LEAP) nor the psychiatric (VCPR) databases were designed as research tools, further limiting the information that can be extracted. For example, only limited information was available for offence details,

which precluded in-depth temporal analysis of offending or examination of offence characteristics.

The accuracy of the linkage procedures also provides a possible source of error. Unlike some European nations (for example, Sweden), Australia does not currently have a unique personal identifier for each citizen to allow for easy linkage of government databases. As a result, the present linkage procedure may incur a degree of error due to inaccurate or incomplete matching across databases. In addition, there is no method for identifying when individuals have changed names or provided aliases that have not been merged with other known features, thus potentially reducing the ability to match every case. Error may also arise due to mistakes incurred when information was first entered into the source databases. This sort of error is inevitable in all case-linkage research, but is moderated here by the use of a large sample size. As such, the relative influence of such errors remains insignificant.

Although the robust case-linkage design allows for the examination of a large sample of individuals, in this case the entire population of convicted firesetters in the selected time period, and allows for follow-up of individuals over many years, one limitation of this design was that we were unable to make adjustment for periods of time when opportunities for criminality were reduced (for example during incarceration or hospitalisation). However, this would impact on both the recidivist and non-firesetting-recidivist groups equally and thus the risk factors are likely to remain fairly stable despite the absence of such data.

In terms of the first study (Chapter Seven) the data collection protocol was based upon a thorough literature review of the factors likely to be of interest when considering firesetting behaviour. Particular attention was paid to those variables that have been reported in the literature to have been relevant to the courts in making sentencing

decisions and thus readily available in court files. As with the case-linkage design, the use of previously collected data limited the depth of information obtained and the types of variables available for analysis; there was also considerable variation across files in the level of information available. In addition, scoring by multiple raters was not practicable and thus there is no measure of reliability for the coding of the court data. However, the coding protocol closely mirrored Canter and Fritzon's (1998) coding protocol of firesetting actions and characteristics while incorporating other variables reported in the research literature. Detailed definitions of the variables were developed and all data were coded dichotomously as either present or absent thereby reducing the subjectivity of scoring. Similar approaches have been utilised by several past researchers where reliable results have been produced despite reliance on potentially unreliable data (Canter & Fritzon, 1998; Canter & Heritage, 1990; Fritzon, et al., 2001).

As highlighted in Chapter Three, intellectual disability has been associated with greater risk of arson, although this assumption is often questioned. Given the controversy, one of the initial aims of this thesis was to examine this issue using a data linkage approach bedded in to the approach used for empirical studies two and three. Unfortunately, this was not achieved as access to the database in which information about intellectual disability is stored was not granted by the governing body. As such, there remains a significant gap in the literature regarding firesetting and intellectual disability that requires exploration.

A significant strength of all three studies is the use of control samples; an offender sample was used in studies one and two and a community sample in the second study, which few studies have previously achieved. While the community sample in study two was matched to the firesetters on age and gender it was not possible to match the offender samples in studies one or two to the firesetters. It would have been

extremely difficult to obtain control samples large enough to achieve this. However, it is broadly recognised that the use of random samples in epidemiological methods is a sound approach to reducing potential biases (Farmer, Miller, & Lawrenson, 1996). As a result it is not anticipated that that the use of a randomly selected but unmatched control sample will limit the generalisability of the results.

10.6 Implications of this research

Taking the aforementioned limitations of this research into account, the following section will explore some relevant implications of this research. Throughout this thesis, a number of potential implications of the research have been raised. These will now be discussed in detail, focusing on the implications for the forensic mental health system, forensic clinicians, and the criminal justice system and policy development.

10.6.1 Implications for clinicians and the mental health system

Understanding the risk factors associated with firesetting, and the mental health and psychological characteristics of firesetters, is essential for clinicians operating in the mental health and forensic systems. This research suggests that firesetters are more likely to come into contact with psychiatric services, while other researchers have found that psychiatric patients are at greater risk of setting fires, especially in the institution's in which they are held (Geller, 1987; Geller, Fisher, & Moynihan, 1992). This indicates that whether clinicians have specific training in forensic issues, they will most likely come into contact with individuals who present with an elevated risk of firesetting and other offending behaviours.

More than one third of the firesetters in study two were known to public mental health services prior to the commission of their index offending. This provides enormous opportunities to treat and assess firesetting risk when individuals become known to services. Given the elevated rate of psychiatric hospitalisation reported in this thesis and other studies (Anwar et al., 2011), and the reported rate of firesetting amongst psychiatric inpatients (Geller, Fisher, & Moynihan, 1992), all psychiatric assessments, especially those of psychotic patients should include at least some assessment of past or present firesetting, especially if other risk factors are present. Where a history of firesetting is discovered, clinicians need to give consideration to the contexts in which this occurred, which is relevant to the individual's risk of setting fires while institutionalised. However, given that firesetters, and most other offenders, may be more likely to present in the courts rather than mental health settings, greater attention needs to be paid to assessment of firesetters' mental state when they present at court. This would provide opportunity for assessment and referral to specialist mental health services where required, as is the case with other offending behaviours, such as stalking (McEwan, Pathe, & Ogloff, 2011). This may have a greater impact on the rates of reoffending by providing diversionary pathways for mentally ill offenders.

On the other hand, all firesetters should be assessed for presence of any psychiatric illness, not just severe or chronic disorder. As Anwar and colleagues (2011) note, there is a strong imperative to assess comorbidities, especially substance misuse and personality disorders. However, clinicians assessing firesetters, especially for pre-sentence reports or for treatment suitability, need to be mindful that while there is a strong concordance between mental disorder and firesetting, mental illness is not present in the majority of cases and is not routinely associated with acute symptomatology. Therefore formulations of firesetting risk need to consider the chronic

impacts of mental disorder on executive functioning, impulsivity and inhibitive processes, in addition to acute symptoms (for further discussion of the hypothesised impacts refer to Appendix J).

For clinicians conducting forensic assessments, certain factors should be considered in addition to mental disorder. Given the lack of validated risk assessment tools, and the difficulty in predicting risk of firesetting recidivism as evidenced in the current study, clinicians conducting assessments of firesetting risk need to be well-versed in the characteristics and associated risks of firesetters. The tool presented in study three, although of little utility as a risk assessment measure, does show that certain characteristics are more often associated with repeat firesetting. The current research shows that general criminality, criminal versatility, poor employment and educational attainment, and psychological disturbance are all related to firesetting, and can be used to distinguish firesetters from other offenders, and repeat from non-repeat firesetters. As with risk assessments of all offenders, exploration of current ideation around firesetting, intent and planning, access to firesetting materials and a functional analysis of similar past behaviour to determine presence or absence of relevant precipitants will be necessary (Andrews et al., 2004; Burton, McNeil, & Binder, 2012; Doley & Watt, 2012; Gannon et al., 2012; McEwan, et al., 2011). In addition to mental state at the time of the offence and at time of assessment, substance use, and in particular alcohol intoxication, needs to be assessed (Burton et al., 2012). The current studies show that substance use disorders are prevalent amongst firesetters and it is likely that substance intoxication plays a significant role in the firesetting of some individuals, as has been shown in past research (Jayaraman & Frazer, 2006; Koson & Dvoskin, 1982; Rasanen et al., 1995).

Although intent to harm another person is not necessary for the prosecution of an arson offence, it does form a crucial component of the forensic assessment of firesetters, in the same way that motivation can inform formulation and treatment recommendations (Burton et al., 2012). It follows logically that an individual whose intent is to harm another is more likely to set fires that are more dangerous, and these will be underpinned by a range of antisocial attitudes and attitudes supportive of violence generally (Dickens et al., 2009; Sugarman & Dickens, 2009).

From the assessment of firesetters comes the formulation of the behaviour; hypotheses that meaningfully explicate the link between various predisposing, precipitating and maintaining factors for the firesetting behaviour (Fineman, 1995; Hart, Sturmey, Logan, & McMurran, 2011). When only examining the broad-based risk factors examined in this thesis, the empirical studies suggest that mental disorder, in addition to psychosocial disadvantage may form one element of the formulation of firesetting behaviour. While some authors have made arguments that purely treating mental illness will treat firesetting behaviour in some cases (Bradford, 1982), contemporary thinking takes account of the other relevant mediating factors and recognises that mental illness likely moderates firesetting behaviour rather than being directly causal (Gannon et al., 2012). As Vinkers and colleagues (2011) note, it is of little use to determine that the prevalence of mental illness is higher amongst firesetters unless there is an understanding of the relationship; that is, whether there is a direct causal association, only an indirect association or a common antecedent. Geller (1987) provides a number of case studies that explicate this point. While each of the individuals presented had a mental illness, and some committed arson while acutely unwell, their motivations for doing so were reflective of the underlying function of the behaviour. For example, he reports the case of a female with a chronic history of schizophrenia

who set fires in order to prolong her hospitalisation. When she was released from the facility she set a further fire resulting in significant damage and was subsequently hospitalised for a much longer period, essentially providing significant reinforcement of her firesetting behaviour.

Several authors have suggested that case formulation is likely to be of the greatest utility to understanding an individual's risks and associated behaviours where the behaviour is not well understood (Drake & Ward, 2003; Hart & Logan, 2011; Sturmey, 2010). The research presented in this thesis suggests that even when mental illness is present there will be a range of other factors that may mediate and/or moderate the relationship between disorder and firesetting, including social disadvantage and anti-sociality. Therefore, there is a need to formulate the specific impact of the mental disorder on the firesetting behaviour, the function of the behaviour, as well as the cognitive and affective aspects, including attitudes, appraisals, social learning and affective states of the firesetter preceding, during and after the firesetting event. While the M-TTAF has developed a model to understand these factors, their exact relationship with firesetting is yet to be tested in the literature. Other approaches suggest that observing the behaviour of the offender in institutions or long-term therapeutic relationships may also provide guidance as to the factors to target in treatment. This approach is based on an understanding of offence-paralleling behaviours (OPB). OPB are defined by Daffern and colleagues (2007) as a "behavioural sequence incorporating overt behaviours… appraisals, expectations, beliefs, affects, goals and behavioural scripts…that is functionally similar to behavioural sequences involved in previous criminal acts." (p. 267). Such a model provides the framework for assessing the function of the behaviour and highlights skills deficits that may form targets for intervention (Jones, 2004). These have been incorporated into some treatment

approaches for juvenile firesetters (Palmer, Caulfield, & Hollin, 2005), and thus careful assessment and observation of these behaviours is also likely to illuminate treatment targets. In addition to examining and formulating the function of the fire, attention should be set to the targets and location of fires and the methods used to light them. These may differ for mentally ill and non-mentally ill offenders and may provide clues as to the offence chain and areas for intervention.

The findings in this thesis suggest that although mental illness may form one treatment target for a proportion of firesetters, there are other areas of disadvantage that also require targeting in interventions to reduce firesetting behaviour. Study one provided evidence for the social disadvantage of firesetters when compared with other offenders, while studies one and three showed that general criminality and criminal versatility was associated with firesetting and those who would repeat the behaviour. Some of these factors suggest that interventions targeting general antisocial attitudes, social skills deficits, vocational skills, problem-solving, emotion regulation and impulsivity are likely to impact upon offending behaviour, as they are with many problem behaviours (McEwan, et al., In press). Factors more specific to firesetting risk, such as interest in fire, fire-related scripts and offence-supportive attitudes, in addition to educational components highlighting the risks and consequences associated with fire will form additional targets (Ciardha & Gannon, 2012; Gannon et al., 2012; Geller, Fisher, & Moynihan, 1992; Palmer et al., 2005). Further examination of these factors and how they are targeted in the few treatment programs available is required.

10.6.2 Implications for policing and community safety

Studying the risk factors for firesetting clearly has important implications for policing and community safety. Victoria Police, along with many State police services

across Australia, already engage in preventative operations to reduce the risk of arson during high risk periods (i.e., during extreme heat and/or wind). These operations are thought to be successful in reducing the number of deliberately-lit fires (2009 Bushfire Royal Commission, 2010). In order to do this effectively, police agencies require knowledge about the characteristics, behaviours and motivations of firesetters generally, before that knowledge can be applied to individual cases (2009 Bushfire Royal Commission, 2010). Currently, these operations gather intelligence from police units in high risk areas and deploy personnel to gather intelligence, deter offending, monitor individuals and communities, and respond rapidly to fire events (McMahon, 2010; 2009 Bushfire Royal Commission, 2010). This involves a higher police presence in communities, including community education about what factors to look for, and individual monitoring of offenders through door-knocking and both covert and overt surveillance. Police therefore require both intelligence about suspected arsonists and research on which to develop knowledge of the patterns of offending and reoffending in firesetters and their associated characteristics (McMahon, 2010).

Essentially, these operations rely on having a suspect for an arson event, very often a person with a known history of such offending. When this does not occur it can take years before patterns of behaviour are established and an individual is apprehended. Examination of the procedures for identifying ‘persons of interest’ in arson investigations reveal a distinct focus on history for firesetting offences. In many tools used by police forces across Australia, individuals who have no criminal history pertaining to firesetting but do have a general criminal history are considered to be low risk. Narrowly focusing on past firesetting may have the result of limiting the scope of investigations which can have dire impacts on subsequent firesetting event. An example was provided in the Advancing bushfire arson prevention in Australia report (2010), of

a 42 year old woman in South Australia who lit 47 fires over a period of three fire seasons before being caught. She had no previous firesetting history and thus was not flagged as a suspect until after she had lit many potentially devastating fires. Similarly, in New South Wales, Australia in 2002 a serial arsonist was eventually caught when he caused a major bushfire in the Blue Mountains. This man was reported to be an upstanding citizen with no known criminal history and thus it was only after his behaviour became very patterned over a number of years and across several jurisdictions that authorities eventually identified and apprehended him (Power, 2009). Such cases highlight that profiling error, based on common misconceptions of firesetting (Kocsis, 2004), can have very real consequences. This thesis shows that such a narrow focus, while borne of economic imperative, is likely to miss very many offenders who are at risk of setting fires. It also does not take account of the low apprehension rate of firesetters, nor the fact that very few go on to commit further arson offences, and thus valuable resources may be wasted. Therefore, consideration needs to be given to factors above and beyond offending history. Indeed, very few of the small proportion of individuals who were identified in this thesis as exclusive firesetters had any criminal history, which is likely to significantly hamper police investigations.

In addition to identifying and investigating offenders, police are increasingly recognised as the ‘gatekeepers’ of the criminal justice and mental health systems, and are skilled at recognising individuals who are in need of specialist mental health care (Godfredson, Thomas, Ogloff, & Luebbers, 2011; Ogloff, et al., 2013). Given that arsonists have been found to have higher rates of psychiatric disturbance than other offenders, and firesetters with psychiatric disturbance are more likely to be recidivists, this issue is highly relevant to their management. Therefore, police need to be aware that many firesetters will have acute mental health needs, may present as substance

affected and are also likely to have personality disorders or traits (i.e., impulsivity, thrill-seeking, lack of regard for others) that may have them coming into contact with police more frequently. Having information about the risk of firesetting amongst mentally ill offenders has the potential to facilitate a more effective police response, improving outcomes for police, the offenders and the broader community.

Encouragingly, the protocols used by police to assess firesetting risk amongst suspects incorporate rating of mental disorder, including personality disorder, intellectual disability or individuals who have been dealt with under the Mental Health Act[6], and these all serve to increase a person of interest's risk rating. However, once such individuals are identified, it is unclear whether there are protocols established as to appropriate procedures for management or intervention. In these cases a systems approach, including collaboration with health services, the offender and family, would be more beneficial than mere monitoring, and may reduce long-term risk of firesetting. This approach has been incorporated into policy development of policing of the mentally ill in several jurisdictions (for example, the Memphis model which was introduced in 1988 in Memphis, Tennessee or the PACER initiative that was trialled in Victoria, Australia; Victoria Police, 2010; The Allen Consulting Group, 2012). The essential tenet of these models is to divert people with mental illnesses away from the criminal justice system, by using specialised police units in crisis situations. Positive outcomes have been reported, highlighting the need for a working partnership between police and mental health services (Godfredson et al., 2011).

While increased monitoring by police may reduce the occurrence of firesetting for some individuals, for others, especially those with mental disorders, such monitoring may simply serve to exacerbate the underlying mechanisms that are related to an

[6] Individuals who are suspected of having a mental illness can be apprehended under the Mental Health Act and transported to hospital for a mental health assessment.

individual's risk of firesetting (Jackson et al., 1987). As proposed in the M-TTAF, monitoring resulting in either a punitive response or restricted opportunities with fire may increase the chances that the individual will seek out the positively reinforcing aspects of setting fires (i.e. tension reduction, stimulation, communication of frustration), thereby reinforcing fire interest (Jackson et al., 1987). As Godfredson and colleagues (2011) point out, management of mentally ill offenders must go beyond identification of the signs of mental illness, toward a better understanding of how to approach and engage an individual with mental disorder. In the case of firesetters, this may be about engaging families of offenders, case managers and others involved with the individual to develop behaviour management plans that would outline clearly the role for police and others involved. This may include suggestions as simple as working with support services to remove the individual from fire prone areas and engaging them in structured activity during times of high fire danger (related to either the individual's circumstances or the environment). This would likely have a greater impact on firesetting rates and be more cost-effective for police than maintaining a vigil on a single offender, and may assist in developing long-term behavioural change.

Where psychiatric illness is found to be associated with an individual's firesetting behaviour police and mental health services need to have the capacity to share information and plan for ways of managing the individual and intervening. Alternatively, mental health services need to have clear protocols in place with police in terms of reporting significant concerns about an individual's risk of firesetting. Where specialist forensic mental health assessment is required, protocols could be established between health services and police to open referral pathways for such an assessment.

10.6.3 Implications for policy development and criminal justice management of firesetters

Arson poses a significant issue for psychiatry (Sugarman & Dickens, 2009), policing (2009 Bushfire Royal Commission, 2010), and the development of policy for the effective criminal justice management of offenders (National work plan to reduce bushfire arson in Australia, 2009). Currently there is little coordination across jurisdictions or services, allowing serial and problematic firesetters to continue offending for many years before they are caught (as evidenced by the cases described above; Power, 2009). The current research suggests that the rate of firesetting and firesetting recidivism is very low. However, in addition to the low detection rate and the even lower conviction rate for firesetting (Bryant, 2008; Muller, 2008; Victoria Police 2009), this research found significant omissions in the recording of firesetting offences in the police database, impacting upon the rates reported. Such omissions not only pose significant issues for research but for the criminal justice system's capacity to identify at-risk individuals. As noted by several organisations and summarised by the final report from the Bushfire Royal Commission 2009, there is a distinct need for agencies to communicate and to accurately record what is known about firesetting and the firesetters they come into contact with. Without an integrated approach, the considerable expertise held by individual agencies may become marginalised and their effectiveness in impacting on rates of firesetting recidivism reduced.

One strategy for managing firesetting risk that has gained some ground over the past year in Australia and the United States (Anderson & Landsell, 2010; California Penal Code 451) is the development of an arson register, similar to those currently in use for sexual offenders (which, in Australia, are not publically available). In Australia,

such a register was developed in 2010 and became operational in late 2011. This register centralised information from State police forces, creating a central repository for the names of all convicted arsonists across Australia. This information is available to law enforcement officers in the course of conducting investigations into deliberate firesetting (Crimtrac, 2010). While this information will assist in the investigation of fire-related offences, there is potential to capture a vast number of individuals who do not necessarily pose a further risk of firesetting (i.e., the 94% who do not reoffend).

Given the prevalence of psychiatric and personality disorder, and likely intellectual disability, amongst firesetters the use of any such register needs to be carefully governed. Research into similar registration schemes used for sex offenders, especially when made public, suggest that they may have a counter-productive impact upon recidivism rates (Doyle & Ogloff, 2009). For those with mental illness, such monitoring, if not conducted judiciously, is likely to have adverse impacts on the mental health of the offender, potentially increasing the individual's risk of firesetting. As California is the only jurisdiction to have post-detention registration and monitoring, there is yet no evidence that it assists in reducing firesetting recidivism.

Others have even gone so far as to suggest the monitoring of known arsonists through GPS tracking devices would be of assistance in reducing the incidence of the offence (Ministerial Media Statement, 20 January 2013; Murphy, 2011). The targeting of arsonists in this way assumes that firesetters are inherently recidivistic. However, the current research does not support such an assumption and shows that any such tracking would be very inefficient due to the small number of firesetters who are identified as repeat offenders. In the sexual offending field, where monitoring of offenders has been occurring since 2003 in Australia and since the late 1990s in the US and UK (Doyle & Ogloff, 2009), McGuire (2002) reports that electronic monitoring has been found to be

ineffective in reducing subsequent general offending once the monitoring ceases and may even impede rehabilitation. In addition, as discussed earlier, firesetters are popularly viewed as a dangerous and odd type of offender, who are somehow akin to sexual offenders in that they have uncontrolled urges to set fires, are specialists, and persist with particular behavioural patterns over time (Doyle & Ogloff, 2009; Geller, et al., 1986). A move to track firesetters in the same way that sex offenders are tracked will only serve to augment these views and take the focus off potentially more effective preventative interventions. It is much more likely that engaging an offender in rehabilitation and treatment services will have a greater impact on long-term rates of firesetting recidivism than monitoring and further punishment (Palmer et al., 2005).

In addition to the implications discussed above, there is the significant issue of how 'dangerous' or repeat offenders will be identified and assessed to obtain their risk rating. There are no known, validated risk assessment or screening tools for use with arsonists and the issue of who to target is greatly affected by the base rate of the behaviour. The current research attempted to develop a screening tool to highlight individuals that may be at risk of setting further fires, but due to the low base rate of firesetting recidivism, the tool was only useful for identifying characteristics of offenders who have reoffended, but had no positive predictive power. Thus, consistent with the risk assessment literature, the very low base rate of firesetting in the population studied in this thesis meant that accurate prediction of its reoccurrence was precluded (Ogloff & Davis, 2005). Thus, it remains that any monitoring, which is underpinned by assumptions about the risk of the individual, is unlikely to be based on validated assessments protocols, because as yet, there are none. Public policies about firesetting need to be careful not to repeat the same errors that policy regarding child safety did in the 1980s and 1990s, where 'stranger danger' was emphasised, taking the focus away

from the real dangers of sexual abuse committed by close family members (Hanson & Morton-Bourgon, 2005). Such 'othering' may have a dangerous impact on community safety with firesetting, and impede efforts to develop well-validated and research-oriented tools that could be used for profiling offenders (Kocsis, 2004).

Moving away from discussion of the monitoring of firesetters, this research has highlighted a need to accurately identify mental illness in firesetters involved in the criminal justice system. As mentioned above, firesetters are more likely to have a mental disorder; many firesetters in study one were identified during assessments for court as suffering some type of mental illness. In examination of the judges' sentencing remarks, many identified mental illness as being at least correlated with offending behaviour and at the very least, impacting upon the offender's judgement. In the UK, judges frequently cite *R. v Calladine* 1975 in which Justice Boreham expounded on the needs for all firesetters to be psychiatrically assessed prior to sentencing, reflecting the view that psychopathology is related to firesetting. This has resulted in a number of individuals being recognised as mentally ill (approximately 10% of arrested arsonists) and receiving hospital orders and psychiatric treatment rather than prison sentences (Tyler & Gannon, 2012). France also has a requirement that all convicted arsonists undergo psychiatric assessment, approximately 54% of whom have been found to have a diagnosable mental illness (Yesavage, Benezech, Ceccaldi, Bourgeois, & Addad, 1983). Sentencing provides a significant opportunity for judges to make orders for assessment of firesetters identified as mentally ill and to request recommendations for treatment where appropriate. In the first instance, all firesetters could be referred for a screening assessment via a Court Liaison Service. This service is currently in existence in Victoria and serves to provide brief mental state assessments by trained specialists, usually mental health nurses, of offenders as they attend court (Victorian Institute of

Forensic Mental Health, retrieved 4 May 2013). In the case of firesetting assessments, if indicators of mental illness were identified during such a screen, further recommendations regarding referral for assessment could be made (Anwar et al., 2011). Usually this would occur through the state-wide Community Forensic Mental Health Service (Forensicare), which specialises in the assessment and treatment of problem behaviours (i.e. firesetting, sexual offending, violence, stalking, threats). The service is responsible for conducting court-ordered psychological assessments or assessment for suitability for treatment at the service's Problem Behaviour Program (PBP). At present, firesetters are one of the least referred groups to the clinic. Since the PBP commenced in 2004, firesetting has accounted for only 6% of referrals (McEwan, et al., In press). Unfortunately, such low referral rates mean that individuals who are suffering from some form of mental illness and who also lights fires may not be adequately treated, or are treated in the public mental health service without targeting their specific offending risks. Thus, their risk of firesetting may remain static.

While it was beyond the scope of this thesis to examine the offenders' motivations for firesetting, McEwan and Freckelton (2011) have suggested that for offenders for whom firesetting serves a psychological function, and who did not intend to harm others through their firesetting, psychological intervention is likely to be more effective than punitive measures. Identification and demarcation of these offenders from the more anti-social firesetters (whose intent is to harm, threaten or frighten another) would only be achieved through court-mandated referral for specialist psychological and/or psychiatric assessment.

10.7 Future Directions

The previous sections discussed the findings, the significance of those findings and the potential implications for various stakeholders. The following discussion will turn toward areas for further exploration in future research and clinical work with firesetters.

This research showed that there were a small number of individuals who came to police notice for firesetting as juveniles. These individuals had a higher rate of contact with psychiatric services and also had higher rates of recidivism than individuals who were not identified until adulthood. Prospective analyses are sorely lacking in the firesetting literature and thus there is a distinct chasm between the juvenile and adult firesetting bodies of literature. It would be both interesting and informative to conduct large-scale prospective analyses of juvenile offenders by examining their trajectories at various time-points into adulthood. This would not only provide evidence for the early risk markers associated with firesetting but would also allow for a concerted examination of the factors that may predict or be associated with desistance from firesetting and other offending. Unfortunately, the exploration of desistance is practically non-existent in the firesetting literature and such an examination would have important implications for intervention with firesetters, which may ultimately reduce the overall rate of firesetting.

The impact of intellectual disability on firesetting also needs to be examined in a similar way. It has been contended elsewhere (see Appendix J) that firesetting by individuals with intellectual disability is likely to be underpinned by some of the same psychological impairments that underpin firesetting by offenders with mental illness, and probably also a portion of other firesetters. It may be that underlying deficits in

emotional regulation, problem solving, social skills, impulsivity and disinhibition, and lack of consequential thinking provide some common mechanisms for this behaviour in this other heterogeneous population. However, without prospective studies, such assertions remain assumptions. Initially, the rate of firesetting and recidivism in this population needs to be established to determine if there is indeed a preponderance of firesetting in this population. Careful thought would need to be given to the multi-modal design as pure data linkage is likely to be limited by a significant under-reporting of firesetting, especially when it occurs and is managed within residential settings. After establishing the rates of firesetting, a more in-depth analysis of the demographic, social, psychological (including knowledge structures, experience with and attitudes toward offending and fire), psychiatric and criminogenic factors associated with risk of firesetting in this population would be examined. While part of this work (data linkage) is likely to be underway in the near future, the more in-depth analysis requires careful planning and forethought, and thus remains a way off.

While this study provides an examination of the underlying broad-based demographic, clinical and criminogenic characteristics of firesetters and the factors that predict firesetting recidivism, further testing of the cognitive and affective aspects and individual deficits of firesetters is required. Consideration should be given to how these factors may differ between the exclusive and mixed firesetters. There is now a good baseline of theory upon which to base tests of these factors.

This thesis is the first known work in the firesetting literature to develop a predictive model of recidivistic arson based on broad-based risk factors from information available to the police and mental health clinicians. As such, further investigation of this model is required. Given the very low base rate of recidivism found in this and other studies, any such work would need to include a large prospective

sample. In addition, several factors have been identified in the literature and proposed in the development of a number of theories (i.e., Fineman's (1995) dynamic-behavioural model of recidivistic firesetting, Jackson's (1987) Functional Analytic Model of Firesetting, and Gannon and colleagues (2012) M-TTAF), to be of importance in formulating individual risk of firesetting. As such, further research is required that would move beyond a screening tool such as that developed in this research toward a structured professional judgement (SPJ) tool that would canvas the full array of risk factors that contribute to an individual's risk of future firesetting, and guide appropriate management and intervention strategies.

An SPJ tool would consider crime scene actions and the psychological characteristics of the firesetter at the time of the firesetting (i.e., intoxication, acute mental illness) and fire-specific risk factors (i.e., interest in fire, early fire play, lighting multiple fires alone, target selection) (Doley & Watt, 2012; Fineman, 1995; Gannon et al., 2012; Jackson 1994; Jackson et al., 1987; Leong & Silva, 1999; Rasanen et al., 1995). In order to achieve this, a multi-modal approach should be used, developing data files that incorporate interview material, court file review, examination of mental health files, and data-linkage methods.

Finally, one of the major themes identified in the conceptualisation of this thesis was the lack of knowledge about deliberate bushfire-setters. This issue came to the fore after the 2009 Black Saturday bushfires in Victoria, Australia. A Royal Commission was held into these fires, and it was quickly identified that there was little research to assist investigators or the courts in understanding, preventing or intervening in this behaviour (2009 Bushfire Royal Commission, 2010). Bushfire arson is perhaps a misnomer, because it is typically an urban phenomenon occurring on the fringes of the urban-rural interface (Bryant, 2008; Muller & Bryant, 2009; Willis, 2004). As a result,

the potential for loss of life and damage to property is immense. Developing a profile of such offenders was therefore a top priority for this thesis. However, it soon became clear that due to the legislative framework and sentencing hierarchy within Victoria, and police data collection methods, very few cases were identifiable as bushfire cases because very often they were subsumed under other arson charges. There is considerable confusion in the legislative framework relating to bushfire arson. Australia-wide, there are over 60 laws covering bushfire arson and attempts at creating a common legislative framework have failed (Lansdell, Anderson, & King, 2011). All of the cases examined in study one were reviewed for their relevance to bushfire-setting, but only two cases were identified in addition to the four cases identified by the appropriate statutory reference. Short of examining the court files for offence details for every single case in the larger sample, many of which would not have sufficient information about the offence details (i.e., cases heard at the Magistrates' Court), there was no way of determining which cases would be of relevance. As such, it remains unclear if and how bushfire-setters differ from structural arsonists. Prospective studies may be able to nationally identify those cases that are related to bushfire-setting and compare these to samples of other arsonists in the same time period.

10.8 Conclusions

The findings in this thesis emphasise that while firesetters have a similar level of overall criminogenic need to other offenders they do present with particular vulnerabilities that are likely to be related to both the aetiology of firesetting behaviour and clinical presentations that could be targeted in treatment. It can now be said with confidence that firesetters do present with some unique risk factors, and that recidivist firesetters are more likely than non-recidivists to have such characteristics. These

include poorer life outcomes in terms of education and employment, early commencement of offending, diverse offending histories and psychopathology.

Despite these differences, this research confirms that firesetters are versatile offenders who do share a number of underlying baseline risk factors with other offenders. Criminal versatility was related to an increase in the number of fire-specific risk factors present in the histories of firesetters, suggesting that general criminality may be a significant predictor of firesetting behaviour. On the other hand, the notion of the highly recidivistic fire bug who only sets fires was not supported by these studies, which found that exclusive firesetters had fewer risk factors for reoffending and less offending overall than the more versatile offenders.

Psychopathology was found to be a significant risk factor for firesetting behaviour in each of the three empirical studies, indicating that a proportion of firesetters will present with the vulnerabilities that are associated with the sequelae of mental illness and are likely relevant to the aetiology and maintenance of firesetting behaviour. However, it is clear that while a significant proportion of firesetters have had contact with psychiatric services or received a diagnosis at some point in their lifetime, the majority do not, and thus clinicians, in formulating risk of firesetting, need to consider the additional risk factors highlighted in these and other studies.

The implications of this research extend beyond the academic literature to the criminal justice system, the mental health system, policy development and the community at large. For police it is important to be cognisant of the fact that firesetters at increased risk of recidivism are likely to present with many more risk factors than an official history of firesetting behaviour. In addition, police members need to be aware of the potential mental health issues of firesetters, with a view towards better detecting and managing the needs of this sub-population of offenders. Collaborative protocols

between police and the mental health services may allow better identification of and intervention with individuals who are at ongoing risk of firesetting and who also present with mental illness. Similarly, clinicians need to be aware that firesetters will present with a number of needs beyond their mental health. While formulation of general criminogenic need will be helpful to assessing baseline risk, additional factors relevant to firesetting specifically also need to be considered. Furthermore, mental health clinicians need to be mindful of the relationship between psychopathology and firesetting behaviour, and thus firesetters who appear before the courts should be screened for the presence of psychiatric disorder. Where potential disorder is identified, referral to appropriate services could be made. Finally, for policy development and the broader community, it is important that policy is based on sound empirical evidence about the nature of firesetting so as not to perpetuate the common misconceptions of the behaviour. Such misconceptions only serve to take the focus off the actual risks of firesetting and may result in the community being placed at further risk of harm by large-scale fire events, such as those witnessed during the Black Saturday bushfires in Victoria in 2009.

DESCRIPTION OF APPENDICES

APPENDIX A: Coding manual used in Study One

APPENDIX B: Coding of offences using the Cormier-Lang system

APPENDIX C: Coding of diagnostic categories

APPENDIX D: Letter of approval from Department of Justice Human Research Ethics Committee

APPENDIX E: Letter of approval from Department of Justice Human Research Ethics Committee for amendment to include coronial data

APPENDIX F: Letter of approval from Monash University Human Research Ethics Committee

APPENDIX G: Letter of support from the Victorian Department of Human Services

APPENDIX H: Letter of support from the Chief Magistrate

APPENDIX I: Letter of support from Chief Judge of the County Court

APPENDIX J: Book chapter written during candidature 'The role of mental illness in firesetting behaviour'

APPENDIX A: CODING MANUAL

Note. The manual presented includes all of the variables collected during data collection. A vast number were not included in the analyses reported in this thesis but will be analysed at a later date. For the purposes of transparency the whole manual is included.

Variable classification	Variable label	Variable codes	Comments and definitions
Demographics			
	Court where case heard	0 = County Court 1 = Supreme Court	
	Age at offence		
	Arsonist's gender	0 = male 1= female	
	Country of birth	111 - Australia, 112 - New Zealand, 113 - Melanesia, 114 - Micronesia, 115 - Polynesia (excluding Hawaii) 221 - UK, 222 - Ireland, 223 - Western Europe, 224 - Northern Europe, 331 - Southern Europe, 332 - South Eastern Europe, 333 - Eastern Europe 441 - North Africa, 442 - Middle East 551 - Mainland Sth-East Asia 552 - Maritime Sth-East Asia 661 - Chinese Asia, 662 - Japan & Korea 771 - Southern Asia, 772 - Central Asia 881 - Northern America,	Countries are classified using SACC codes from the Australian Bureau of Statistics.

	882 - South America, 883 - Central America, 884 - Caribbean 991 - Central and West Africa 992 - Southern and East Africa	
Relationship status at time of offence	0 = single 1 = boyfriend/girlfriend 2 = defacto/married 3 = separated/divorced	
Highest level of education completed	0 = primary school 1 = secondary school 2 = tertiary education	
Years of education		Total years completed including prep.
Employment status at time of offence	0 = unemployed 1 = employed	Employed includes income from full time and part time work, pension or funded retiree, or the individual is a student
Type of employment at time of offence	0 = unskilled 1 = trade 2 = professional 3 = student	Unskilled includes jobs requiring little training and can be performed without a trade certificate or other qualification, including factory work, cleaning, labouring; trade includes jobs requiring some sort of training (on the job and TAFE) and trades membership such as an electrician, plumber, builder, glazier, mechanic, welder; professional includes jobs requiring formal training beyond a trades certificate or individuals who work within a professional office environment where training may have been on the job, for example, health professionals, dental technician, legal secretary, clerk, academic; student includes offenders who were at school or university at the time of the offence and this is their primary employment

Current circumstances of the offender			
	Current living arrangements	0 = unknown 1 = NFPA 2 = alone 3 = with parents 4 = with other family 5 = with friends 6 = institution	Where the offender lived for the most amount of time (at time of PPO): 1 = No fixed place of abode 2 = Offender lives alone 3 = Offender lives with one or both parents 4 = Offender lives with other family member 5 = Offender lives with a friend or other non-related person 6 = Offender lives in an institution such as a hospital; disability residential unit; juvenile detention centre; prison (not an exhaustive list)
	Own child	0 = no 1 = yes 2 = unknown	Offender is a parent; does not have to be in regular contact with the child
	Recently separated/divorced	0 = no 1 = yes 2 = unknown	Separation occurred not more than 6 months prior to current PPO
Current offence			
	Type of structure in which the fire was lit	0 = Residential 1 = Business 2 = School 3 = Public building 4 = Hospital/institution 5 = Car/vehicle 6 = Misc./uninhabited/ derelict property 7 = Self 8 = Own home 9 = Bushland/grassland /forest	Residential = a property that at the time of the fire was used for residential purposes (legally or illegally). Uninhabited or derelict properties not coded as residential unless the property was part of a block of flats/apartments where some of the other apartments/flats in the block were inhabited Business = Property currently in use for business purposes, inc. shopping centres School = Fire set in/on any area of an educational establishment Public building = Any type of building to which the public have access i.e. toilet, law courts, library, town hall, police stations, church Hospital/institution = any area of a hospital/institution, care faciltity, residential care unit, psychiatric care unit Car/vehicle = anything used

		as a means of transporting goods or people, inc. bicycle, boat, train, van, motorcycle, car Misc./uninhabited/derelict = misc. applies to items set alight that were not inside a property i.e. a park bench or rubbish bin. If it is inside a property it is coded as that property e.g. a school; uninhabited/derelict buildings can be either commercial or residential but are currently not in use Self = when an individual lights a fire in their own home, other property, including a car, and then makes no attempt to leave or alert anyone, or other situation in which it is clear that the person lighting the fire had intent to harm themselves with the fire. This would be coded over the residential and own home codes where applicable Own home = offender sets fire to property in which he/she is currently residing as the owner, renter, boarder, squatter, or in some other capacity. This code, where applicable, would be coded over the residential code. Bushland/grassland/forest = any area that is predominantly flora and is lightly inhabited. If this was the main target, this code overrides any others that may have been burnt as a result of the fire spreading. If the fire ends up burning bushland but it was not the target then apply the most relevant target using one of the code's above
Targeted property	0 = no 1 = yes 2 = unknown	Evidence suggests that the property set alight was specifically targeted by the offender
Geographical location in which fire was lit	0 = Metropolitan 1 = Rural 2 = Remote	see for definitions of these http://www.abs.gov.au/ausstats/abs@.nsf/7d12b0f6763c78caca257061001cc588/a30c81b7fbcf02aeca2570ec000e215b!OpenDocument

	Offence was planned	0 = no 1 = yes 2 = unknown	Direct and clear evidence that the offence was planned, for example if materials were brought to the scene, i.e. matches or petrol, then premeditation is evident; evidence that individual made an effort to avoid detection e.g. by wearing gloves
	Relationship to victim	0 = none/cannot be determined 1 = colleague 2 = acquaintance 3 = partner 4 = ex-partner 5 = friend/family 6 = organisation 7 = Casual contact	This is the victim intended by the offender as the target.
	Prior violence/argument with victim	0= No 1 = Yes 2 = Not applicable	Any dispute, especially heated disputes, occurring not more than a month before the arson. Violence can be actual physical violence toward the victim, sexual violence, harming of victim's belongings/pets
	Prior threats toward victim	0= No 1 = Yes 2 = Not applicable	Statements, gestures, and acts, overt or implicit. Statements made verbally or in writing (including SMS, fax & graffiti) of intent to harm or kill the victim or others. Includes veiled threats such as 'I know where you live', 'you'll be sorry', 'I know where your children go to school' in addition to behaviours such as sending surveillance or damaged photographs of the victim's loved ones, or leaving materials such as dead animals or posting an obituary; or gestures such as drawing one's hand across one’s neck in a threatening way.
	Prior threats of arson	0= No 1 = Yes 2 = Not applicable	The offender has made threatening remarks with reference to fires, either explicitly or in an abstract sense, such as "I once knew someone whose house burned down", or "be careful you don't leave matches lying around; someone might get hold of them". (Canter & Fritzon, 1998)

	Number of targets that actually ended up in the fire		The number of targets that actually ended up damaged in the fire. For example, in a bushfire several houses and cars may have been burned. The number recorded would be the number of houses and cars burned.
	Multiple seats of fire	0 = no 1 = yes	The number of initial ignition points, includes lighting of fire or setting an incendiary device in different rooms of a house, multiple areas on a bush track etc.
	Accelerant used	0 = no 1 = yes	Was there evidence that a flammable liquid or material was used to accelerate the rate of the fire spreading or to maximise the damage caused by the fire.
	Material brought	0 = no 1 = yes	Material specifically brought for purpose of lighting fire. This should be something that the offender would not normally carry. If a smoker uses a cigarette lighter to light the fire this variable would not be coded as it cannot be inferred that the offender deliberately brought the lighter for the express purpose of lighting the fire
	Lives endangered deliberately	0 = no 1 = yes	Offender knew the property was occupied at the time of the fire but did not attempt to alert the occupants
	Lives endangered by location	0 = no 1 = yes	Any area in which it could be reasonably foreseeable for lives to be endangered by fire, including fires lit in bush/grass areas that are on the urban-rural interface, or it is clear that there is a house nearby (either signposted, letterbox, or in plain view)
	Voiced intent to harm another person through the fire	0 = no 1 = yes	The offender made explicit threats to harm another person through this particular fire. These may be verbal threats such as "I am going to burn your house down while you are asleep", gestures such as sending a picture of the victim at home while his property burned

	Offender alerted authorities/other person of fire	0 = no 1 = yes	The offender made attempts at alerting the authorities or raising the alarm for other residents/passersby to call the authorities
	Remained at the scene	0 = no 1 = yes 2 = unknown	Offender remained at the scene, returned to the scene while the fire was still burning, or returned to the scene to light another fire
	Suicide note	0 = no 1 = yes 2 = not applicable	A suicide note was left by offender and discovered by authorities at the scene. The individual does not necessarily have to have died in the fire
	Alcohol use	0 = no 1 = yes 2 = unknown	Alcohol use at time of the offence or immediately prior such that the offender was intoxicated at the time of the offence
	Drug use	0 = no 1 = yes 2 = unknown	Drug use at time of offence or immediately prior such that the offender was intoxicated at the time of the offence
	Spree	0 = no 1 = yes 2 = unknown	More than one fire with a gap of no more than 24 hours; must be separate fire events
	Spree number		If offence was part of a spree, how many individual fires were lit during the spree
	Serial	0 = no 1 = yes 2 = unknown	The offender has lit a number of fires with a gap of more than 24 hours. The gaps should be no longer than 1 month. If multiple sprees occur in the period of one month these would be coded as serial
	Serial number		If the offence was in the context of serial offending, how many other offences were committed in the serial period
	Day of the week	0 = unknown 1 = Sunday 2 = Monday 3 = Tuesday 4 = Wednesday 5 = Thursday 6 = Friday 7 = Saturday	Day of the week the offence was committed on
	Time of day	0 = Morning 1 = Afternoon 2 = Evening 3 = Night	Morning is counted from 6am to 11.59am; Afternoon 12.00pm to 6pm; Evening 6pm to 11.59pm; Night

		12.00am to 5.59am
Distance travelled to light fire	0 = 0km 1 = 1 - 5km 2= 5 - 10 km 3 = Greater than 10 km	Distance the offender travelled to light the fire either from where offender lives or where based immediately before firesetting. For example, if the fire was set on the way home from work or school (where the offender had been most of the day) then school or workplace would be the reference point
Forced/illegal entry	0 = no 1 = yes 2 = unknown	The offender was trespassing in order to set the fire or was required to force entry into the premises (for example, using cutters to get through a fence, breaking a window to get inside the property) in order to set the fire.
Other crime committed at same time as PPO (for which the offender was charged)	0 = no 1 = yes 2 = unknown	The offender committed and was charged for another crime at the property and the time of the arson e.g., theft of belongings while in the victim's home
Sexual crime committed at same time as PPO	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a sexual crime (as defined by the Crimes Act 1958).
Violent offence charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a violent offence (as defined by the offence hierarchy).
Kidnapping charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a kidnapping offence (as defined by the offence hierarchy).
Weapons charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a weapons offence (as defined by the offence hierarchy).
Threat charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a threat

		offence (as defined by the offence hierarchy).
Property damage charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a property damage offence (as defined by the offence hierarchy).
Stalking charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a stalking offence (as defined by the offence hierarchy).
Drug charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a drug offence (as defined by the offence hierarchy).
Deception charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a deception offence (as defined by the offence hierarchy).
Theft charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a theft offence (as defined by the offence hierarchy).
Charge for breaching order	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a breaching an order offence (as defined by the offence hierarchy).
Public behaviour offence charge	0 = no 1 = yes	If the offender committed, and was charged for, an additional crime to the arson offence, was it a public behaviour offence (as defined by the offence hierarchy).
Theft from premises	0 = no 1 = yes 2 = unknown	There was evidence that the offender removed items from the scene of the crime that belonged to the victim
Number of offenders		How many offenders were involved in the firesetting incident, including the offender
Delayed incendiary device used	0 = no 1 = yes 2 = unknown	Evidence at the scene that the offender used some form of incendiary device to light the

		fire that would put some distance between the time of the offender setting the fire and when it actually took light. For example, throwing a petrol bomb through a window, using a timed device, a mosquito coil in bushland.
Witness to the firesetting	0 = no 1 = yes 2 = unknown	Offender lit the fire in front of another person who was not a willing participant (e.g. does not condone the act implicitly or explicitly)
Public view	0 = no 1 = yes 2 = unknown	The fire was lit in a time and place where others may have witnessed the offender lighting the fire. This includes directly lighting the fire in the above mentioned places, as well as lighting them in an area with clearly signposted or would usually have CCTV, on a street
Trigger specific to victim	0 = no 1 = yes 2 = unknown	Firesetting was targeted at a specific person or property, and occurred immediately following an argument(or other emotional trigger) with the specific person
Non-specific trigger	0 = no 1 = yes 2 = unknown	Firesetting occurred immediately following an argument (or other emotional trigger) with another person but there is no obvious targeting of a specific person or property
Insertion into investigation	0 = no 1 = yes 2 = unknown	Firesetter either 'discovers' the fire or attempts to assist the investigative team to 'solve' the crime
Fire fighter	0 = no 1 = yes 2 = unknown	Firesetter is currently, or has previously been, trained and/or employed by CFA or MFB as a professional fire fighter
Fire fighter: volunteer	0 = no 1 = yes 2 = unknown	Firesetter is currently, or has previously been, trained and/or employed by CFA or MFB as a volunteer fire fighter.
Fire fighter: rejected	0 = no 1 = yes 2 = unknown	Offender is known to have applied to be a member of an organisation involved with fire fighting or providing assistance at the scene of

			fires, but was rejected.
	Motive	0 = unknown (no known info to indicate offender has this particular attribute) 1 = none 2 = political reasons 3 = financial 4 = crime concealment 5 = Revenge 6 = Excitement/stimulation/boredom relief 7 = vandalism 8 = self- immolation 9 = peer support 10 = 'hero' recognition 11= mental illness/intellectual disability 12 = mixed	2. Political = firesetting to make a political statement (inc. acts of terrorism). For e.g. setting fire to land requisitioned by the government 3. Financial = firesetting for perceived financial gain (monetary or gain). For e.g. insurance fraud or a person living in Department of Housing wishing to be moved. Includes fire fighter setting fire in order to receive overtime or other payments, or to ensure the fire station remains operational 4. Crime concealment = the fire is lit to conceal another crime; usually the firesetting itself is not the primary motive. For e.g. setting light to a stolen car to prevent identification 5. Revenge = Fire is lit to redress some real or imagined wrong that indirectly or directly affects the offender. If the perceived wrong was committed by a member of parliament or other governing body then this variable would not be coded and the code of 'political reasons' would apply. 6. Excitement/stimulation/boredom relief = the fire is lit purely for the reason of providing relief from boredom or something to do, or enjoys the thrill of watching the fire burn 7. Vandalism = the sole purpose of lighting the fire was to damage property 8. Self-immolation = offender attempted to commit suicide by setting him/herself alight 9. Peer support = fire set in an actual or vicarious peer environment (i.e. peers may or may not have been present at the firesetting) where the offender was encouraged to set the fire; did so in the presence of others; or was

			forced to light the fire. May have been pressured to light the fire or acted voluntarily in order to gain recognition among peers 10. Hero recognition = the offender set the fire to either call it in or attempt to put it out in order to receive public accolades and community recognition. May be a fire fighter 11. Mental illness/intellectual disability = the fire was set by the offender in the context of a diagnosed mental illness/ID and there appears to be no other rational motives 12. Mixed = a number of motives are relevant
Past offence history			
	Prior convictions	0 = none 1 = 1-3 convictions 2 = 4+ convictions	Number of past criminal convictions, regardless of whether it was arson-related or not
	Prior sexual offence convictions	0 = no 1 = yes	All offences involving unwanted sexual contact, or contact prohibited by law, including possession of child pornography or sex with a minor even if the offender was a minor at the time
	Violent offence charge	0 = no 1 = yes	Murder, manslaughter, culpable driving resulting in death, arson causing death; attempt murder, assault, recklessly or intentionally cause injury, reckless conduct resulting in injury, armed robber, aggravated burglary, hit and run; do not include cruelty to animals as this is coded separately
	Kidnapping charge	0 = no 1 = yes	As per offence hierarchy
	Weapons charge	0 = no 1 = yes	As per offence hierarchy
	Threat charge	0 = no 1 = yes	As per offence hierarchy

	Property damage charge	0 = no 1 = yes	As per offence hierarchy
	Stalking charge	0 = no 1 = yes	As per offence hierarchy
	Drug charge	0 = no 1 = yes	As per offence hierarchy
	Deception charge	0 = no 1 = yes	As per offence hierarchy
	Theft charge	0 = no 1 = yes	As per offence hierarchy
	Charge for breaching order	0 = no 1 = yes	As per offence hierarchy
	Public behaviour offence charge	0 = no 1 = yes	As per offence hierarchy
	Prior arson convictions	0 = no 1 = yes	Prior to current PPO
	Prior cruelty to animals	0 = no 1 = yes	
	Number of prior arson convictions		Number of convictions for arson prior to the current PPO
	Police notice (formal)	0 = no 1 = yes	Offender has no criminal history relating to fire offences, but has previously come to notice as a suspect and formal action/legal action has included Caution, Warning, Infringement, Youth Conference for this type of offence
	Police notice (no formal action)	0 = no 1 = yes	Offender has no criminal history relating to fire offences, but has previously come to notice for fire incident/s as a suspect but No Formal Action was taken in relation to these matters
Fire history			
	False alarm calls	0 = no 1 = yes 2 = unknown	Offender has made false alarm calls to emergency services (police, fire, ambulance) without an actual offence occurring, or without having witnessed the said offence.

	Early fascination with fire	0 = no 1 = yes 2 = unknown	Offender has displayed an early fascination with fire including fire 'play', has come to the attention of police, school, fire services or social services as a result of firesetting as a juvenile
	Age at onset of firesetting behaviour		Self-report or official (whichever earlier)
	Early onset of firesetting	0 = no 1 = yes 2 = unknown	Early firesetting is characterised as lighting fires from ages 5-12 (Stanley, 2002)
	Number of previous fires		Number of fire set by the offender prior to the current PPO. Do not necessarily have to have been charged or convicted for these offences, this is more a subjective measure based on the offender's admissions
Clinical variables			
	Primary diagnosis	0 = none 1 = schizophrenia/other psychosis 2 = bipolar affective 3 = depressive disorders 4 = anxiety disorders 5 = eating disorders 6 = autism spectrum disorders 7 = Impulse control disorders NOS 8 = childhood disorders	Code as per 'diagnostic codes.doc'
	Secondary diagnosis	0 = none 1 = schizophrenia/other psychosis 2 = bipolar affective 3 = depressive disorders 4 = anxiety disorders 5 = eating disorders 6 = autism spectrum disorders 7 = Impulse control disorders NOS 8 = childhood disorders	Code as per 'diagnostic codes.doc'

Intellectually disabled	0 = no 1 = yes	Individual has received a formal diagnosis of intellectual disability
Pyromania	0 = no 1 = yes	Is there an established diagnosis of pyromania (not required to be the primary diagnosis)
Level of intellectual disability	0 = none 1 = mild 2 = moderate 3 = severe	If an ID is present, what is the level of impairment
Personality disorder diagnosis	0 = none 1 = paranoid 2 = schizoid 3 = schizotypal 4 = antisocial 5 = borderline 6 = histrionic 7 = narcissistic 8 = avoidant 9 = dependent 10 = obsess-compulsive 11 = NOS	Established diagnosis reported, or diagnosed by clinician writing a psychological or psychiatric report.
Personality disorder/traits cluster	0 = none 1 = Cluster A 2 = Cluster B 3 = Cluster C	
Delusional beliefs present at time of PPO commission	0 = no 1 = yes	Was the offender experiencing delusions at the time of the index offending
Nature of delusional beliefs	0 = none 1 = grandiose 2 = persecutory 3 = erotomanic 4 = morbid jealousy 5 = rambling/incoherent	If delusional beliefs were prominent, what was the nature of those beliefs
Thought disorder	0 = no 1 = yes	Evidence of thought disorder at the time of the assessment or by corroborated evidence from the crime scene i.e., individual was taken from the scene of the crime to be assessed by a mental health professional, who deemed the individual to be thought disordered
Suicidal ideation at time of PPO commission	0 = no 1 = yes	Was the offender experiencing suicidal ideation at the time of the index offence; does not have to have culminated in an attempted act of suicide
Past suicidal ideation	0 = no 1 = yes	Has the offender had suicidal ideation prior to the index offending

	Past suicidal acts	0 = no 1 = yes	Has the offender made suicidal attempts prior to the index offending
	Past self-harming acts	0 = no 1 = yes	Self-harming acts are any acts where the intent was to cause some harm to self but necessarily with the intention of committing suicide
	Substance abuse or dependence disorder	0 = no 1 = yes	Offender has a diagnosed substance misuse disorder
	Drug of choice	0 = none 1 = cannabis 2 = amphetamines (speed) 3 = amphetamines (ice) 4 = heroin 5 = party drugs 6 = polysubstance 7 = prescription medication	polysubstance = regular use of more than one type of drug. If the individual mostly uses cannabis daily and ice once every 6 weeks, record as a cannabis user.
	Alcohol is drug of choice	0 = no 1 = yes	
	Past psychiatric hospitalisations	0 = no 1 = yes	Public or private
	Release from psychiatric hospital in week prior to PPO	0 = no 1 = yes	Was the offender a patient of a psychiatric institution but released in the week prior to the index offence
	Other psychiatric treatment in past	0 = no 1 = yes	Including medications; ECT; counselling, psychological treatment
Social/childhood factors			
	Social services	0 = no 1 = yes 2 = unknown	Offender has come to the attention of the social services in the past or currently i.e., family or offender assessed by the Department of Human Services due to questions about the safety of the home environment
	Lived with parents	0 = no 1 = yes 2 = unknown	Offender lived with own parents for most of childhood.
	Lived with other family members	0 = no 1 = yes 2 = unknown	Offender lived with other family members for most of his/her childhood
	Lived in other care situations	0 = no 1 = yes 2 = unknown	As a child, offender lived with non-family members who were either ordered to care

		for offender i.e. foster home, institution, or who voluntarily cared for the offender but were not related to him/her e.g. friend
Behavioural/academic problems at school	0 = no 1 = yes 2 = unknown	Offender has a history of behavioural problems and/or academic problems at school, including wagging, verbal or physical abuse of authority figures, fighting, extreme inattention requiring intervention, poor grades
Behavioural problems at home	0 = no 1 = yes 2 = unknown	Offender exhibited behavioural problems at home as a child, including unwillingness to follow directions, abuse toward family members, parental reports that child is “out of control”
Past victim of physical abuse at home	0 = no 1 = yes 2 = unknown	Offender was subjected to physical abuse in the home either recently or in the past, including any acts that caused or had the potential to cause physical harm to the individual. This may or may not be related to contact with the social services
Past victim of sexual abuse at home	0 = no 1 = yes 2 = unknown	Offender was subjected to sexual abuse in the home either recently or in the past. This may or may not be related to contact with the social services. The perpetrator does not necessarily have to be a family member. Any history of sexual abuse should be coded as 'yes'. This includes any unwanted sexual contact, sexual contact or coercion between family members, being forced to commit sexual acts on an unwilling party
Past victim of neglect at home	0 = no 1 = yes 2 = unknown	Offender was subjected to neglect from primary caregiver either recently or in the past. This may or may not be related to contact with the social services. The offender's perception of neglect is also relevant i.e. do they report that their physical or emotional needs were taken care of by those caring for

		them
Parents divorced	0 = no 1 = yes 2 = unknown	Offender's parents are divorced/separated
Parental conflict	0 = no 1 = yes 2 = unknown	Offender has noted parental conflict. This can simply be that the offender believes his parents were often in conflict.
Parent-child conflict	0 = no 1 = yes 2 = unknown	Offender has noted conflict between self and parents. This can be the subjective experience of the offender
Father absent	0 = no 1 = yes 2 = unknown	Offender or public records (as they are recorded in the court file) state that the offender's father was absent for a good portion of the offender's upbringing. A 'good portion' can be subjective and is at the coder's discretion but should be enough time for the offender or the files to note the absence, and/or for it to be a source of distress for the offender either in the past or currently
Family criminal history	0 = no 1 = yes 2 = unknown	Other members of the offender's family have a criminal record, or have engaged in criminal activity which may/may not been the subject of investigation.
Family history of firesetting	0 = no 1 = yes 2 = unknown	Other members of the offender's family have engaged in firesetting behaviours that may or may not have come to the attention of the emergency services. Does not include lighting campfires in a controlled environment
Family fire interest	0 = no 1 = yes 2 = unknown	Offender has noted that there was a significant interest within the family, or amongst certain members of the family, in fire and firesetting, or fire-related paraphrenalia
Family fire fighter	0 = no 1 = yes 2 = unknown	A member of the offender's family was either employed , volunteered as or attempted to join a professional or volunteer fire fighting organisation such as the MFB or CFA

APPENDIX B: CODING OF OFFENCES USING THE CORMIER-LANG SYSTEM

Note. The coding system is based on the Cormier-Lang system used by Quinsey, Harris, Rice and Cormier (2006). It has been adapted to allow for the coding of offences specific to Victorian Crimes Act 1958 and the offences coded in the LEAP database.

Hierarchy	*Offence name*	*Example of offences (note. These are not exhaustive)*	*Violent or non-violent offence*
1	Homicide	Murder, manslaughter, culpable driving resulting in death, arson causing death	Violent
2	Sexual assault	All sexual offences against adults or children	Violent
3	Violence	Attempt murder, assault, recklessly or intentionally causing injury, reckless conduct resulting in injury, armed robbery, aggravated burglary, hit and run, cruelty to animals, assault with a weapon	Violent
4	Kidnap	Kidnapping/false imprisonment/abduction	Violent
5	Weapons offences	Possess/carry controlled weapons (without causing injury or using a weapon to cause injury to another), discharging missiles, explosives offences, all firearms/ammunitions offences	Non-violent
6	Threats of violence	All threat offences, blackmail, extortion with threats, use of threatening words in a public place	Non-violent
7	Arson	All arson or arson-related offences as defined in methodology.	Non-violent (unless the offence was arson causing death in which case it is coded as homicide)
7	Property damage	Criminal damage, wilful damage, vandalism	

Hierarchy	*Offence name*	*Example of offences (note. These are not exhaustive)*	*Violent or non-violent offence*
8	Stalking	Breaching IVO, stalking, harassment, use telecommunications service to harass	Non-violent
9	Drug offences	Use/possess/traffic/cultivate, forge or alter prescriptions, driving over .05 (the legal blood alcohol limit) or while intoxicated, underage drinking	Non-violent
10	Deception offences	Obtain property by deception, handle/receive stolen goods, deal proceeds from crime, stating false name/address, make/use false documents, make false report to police, use false registration plates on car, make a false alarm call, bomb hoax	Non-violent
11	Theft offences	Burglary, robbery (without arms), theft, theft of/from car, shopsteal, go equipped to steal, loiter, possess house breaking implements, trespass with intent	Non-Violent
12	Breach a legal order	Fail to answer bail, escaping from lawful custody, breach conditions of any community disposition, bad behaviour in custody, unpaid parking fines, resist police, resist arrest, contravene instruction of police/law enforcement	Non-violent
13	Bad public behaviour	Public nuisance, affray, drunk in public, offensive public behaviour, use offensive language, smoking on trains, no public transport ticket, bad driving behaviour not resulting in death or injury to another person (speeding, failing to stop at traffic lights, unlicensed driving), trespass (enter w/o excuse), begs alms	Non-violent

APPENDIX C: CODING OF DIAGNOSTIC CATEGORIES

Axis I

Description	*ICD-9*	*ICD-10*	*DSM-IV*
Schizophrenia and other psychosis	295; 297	F20 (all); F21 (all); F22 (all); F24 (all); F25 (all); F28 (all); F29 (all)	295 (all); 297.1; 297.3; 298.8; 298.9
Bipolar affective disorder	296; 296.0; 296.1; 296.4-.8	F30 (all); F31 (all); F34.0	296.4-.9; 301.13
Depressive disorders	296.2; 296.3; 300.4	F32 (all); F33 (all); F34.1; F53.0	296.2-.3; 300.4; 311
Anxiety disorders	300.0; 300.2; 300.3; 300.8; 308; 309.0-.81	F40 (all); F41 (all); F42 (all); F43 (all); F44 (all)	300.00-.3; 309.81; 308.3
Eating disorders	307.1; 307.5	F50 (all)	307.1; 307.51; 307.50
Substance disorders	291; 292; 303; 303.9; 304; 305	F10-F16 (all); F18-F19 (all)	303.90; 304 (all); 305 (all – except 305.90, 305.1); 291.0-.9; 292.0-.9
Impulse control disorders	312.3	F63 (all)	312.30-4; 312.39
Childhood disruptive behaviour disorder	312; 314	F90 (all); F91 (all); F92 (all)	312-314.9
Autism spectrum disorders	299	F84; F84.4; F84.5	299.00; 299.80
Other PDD		F84.2	299.10; 299.80 (Rett's)

Axis II

Description	*ICD-9*	*ICD-10*	*DSM-IV*
Mental retardation	317-319	F70-F73; F78-F79	317-319
Personality disorder	301.1-.9	F60 (all); F61	301.0-.9

APPENDIX D: LETTER OF APPROVAL FROM DEPARTMENT OF JUSTICE HUMAN RESEARCH ETHICS COMMITTEE

Department of Justice

Human Research Ethics Committee

18 February 2011

Reference: CF/10/25047

Professor James Ogloff
Monash University

Re: Understanding the psychology of firesetters

Dear Professor James Ogloff,

I am happy to inform you that the Department of Justice Human Research Ethics Committee (JHREC) considered your response to the issues raised in relation to the project *Understanding the psychology of firesetters* and granted **full approval** for the duration of the investigation. The Department of Justice reference number for this project is CF/10/25047. Please note the following requirements:

- To confirm JHREC approval sign the Undertaking form attached and provide both an electronic and hardcopy version within ten business days.
- The JHREC is to be notified immediately of any matter that arises that may affect the conduct or continuation of the approved project.
- You are required to provide an Annual Report every 12 months (if applicable) and to provide a completion report at the end of the project (see the Department of Justice Website for the forms).
- Note that for long term/ongoing projects approval is only granted for three years, after which time a completion report is to be submitted and the project renewed with a new application.
- The Department of Justice would also appreciate receiving copies of any relevant publications, papers, theses, conferences presentations or audiovisual materials that result from this research.
- All future correspondence regarding this project must be sent electronically to ethics@justice.vic.gov.au and include the reference number and the project title. Hard copies of signed documents or original correspondence are to be sent to The Secretary, JHREC, Level 21, 121 Exhibition St, Melbourne, VIC 3000.

If you have any queries regarding this application you are welcome to contact me on (03) 8684 1514 or email: ethics@justice.vic.gov.au.

Yours sincerely,

[redacted]

Dr Yasmine Fauzee
Secretary,
Department of Justice Human Research Ethics Committee

Victoria
The Place To Be

APPENDIX E: LETTER OF APPROVAL FROM DEPARTMENT OF JUSTICE HUMAN RESEARCH ETHICS COMMITTEE FOR AMENDMENT TO INCLUDE CORONIAL DATA

Department of Justice

Justice Human Research Ethics Committee

Innovation and Strategy Unit
Level 21
121 Exhibition Street
Melbourne, Victoria 3000
GPO Box 123A
Melbourne, Victoria 3001
Telephone: (03) 8684 1514
Facsimile: (03) 8684 1525
DX 210077

06 September 2012

Reference: CF/10/25047

Professor James Ogloff
Monash University

Re: Understanding the psychology of firesetters

Dear Professor Ogloff,

The Department of Justice Human Research Ethics Committee (JHREC) considered your request for amendment to the project *Understanding the psychology of firesetters* at its meeting on 28 August 2012 and granted **full approval for the amendment** for the duration of the investigation. The Department of Justice (DOJ) reference number for this project is CF/10/25047.

Please ensure that the JHREC is notified immediately of any matter that arises that may affect the conduct or continuation of the project. To enable the JHREC to fulfil its reporting obligations you are asked to provide an Annual Report every 12 months (if applicable) and to report on the completion of your project. Annual Report and Completion of Research forms are available on the Justice Human Research Ethics website.

All future correspondence regarding this project must be sent electronically to ethics@justice.vic.gov.au and include the DOJ reference number and the project title. Hard copies of signed documents or original correspondence may be sent to The Secretary, JHREC at: GPO Box 4356, Melbourne, VIC 3001.

If you have any queries regarding this application, you are welcome to contact me on (03) 8684 1514 or email: ethics@justice.vic.gov.au.

Yours sincerely,

[redacted]

Mr Jonathan Clark
Secretary,
Department of Justice Human Research Ethics Committee

APPENDIX F: LETTER OF APPROVAL FROM MONASH UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE

MONASH University

Monash University Human Research Ethics Committee (MUHREC)
Research Office

Human Ethics Certificate of Approval

Date:	**28 March 2011**
Project Number:	**CF11/0681 - 2011000329**
Project Title:	**Understanding the psychology of firesetters**
Chief Investigator:	**Prof James Ogloff**
Approved:	**From: 28 March 2011 to 28 March 2016**

Terms of approval

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, and a copy forwarded to MUHREC before any data collection can occur at the specified organisation. **Failure to provide permission letters to MUHREC before data collection commences is in breach of the National Statement on Ethical Conduct in Human Research and the Australian Code for the Responsible Conduct of Research**.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. **Complaints:** The researchers are required to inform MUHREC promptly of any complaints made about the project, whether the complaint was made directly to a member of the research team or to the primary HREC.
6. **Amendments to the approved project (including changes in personnel):** Requires the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

[redacted]

Professor Ben Canny
Chair, MUHREC

cc: Dr Troy McEwan; Ms Lauren Ducat

Postal – Monash University, Vic 3800, Australia
Building 3E, Room 111, Clayton Campus, Wellington Road, Clayton
Telephone +61 3 9905 5490 Facsimile +61 3 9905 3831
Email muhrec@adm.monash.edu.au www.monash.edu/research/ethics/human/index/html
ABN 12 377 614 012 CRICOS Provider #00008C

APPENDIX G: LETTER OF SUPPORT FROM THE VICTORIAN DEPARTMENT OF HUMAN SERVICES

Department of Health

Incorporating: Health, Mental Health and Senior Victorians

50 Lonsdale St
GPO Box 4541
Melbourne Victoria 3001
DX 210311
www.health.vic.gov.au
Telephone: 1300 253 942
Facsimile: 1300 253 964

OUR REF:
ADD/10/34052

YOUR REF:

12 AUG 2010

Professor James Ogloff
Centre for Forensic Behavioural Science
Monash University
505 Hoddle Street
CLIFTON HILL VIC 3068

Dear Professor Ogloff

Thank you for your letter about your research project, investigating recidivism and the assessment and treatment of individuals convicted of arson.

I would like to convey the support of the Mental Health, Drugs and Regions Division for your research into arson behaviour.

The support is conditional on approval given by a Human Research Ethics Committee (HREC) which is constituted in accordance with the National Statement on Ethical Conduct in Human Research (2007). Before any information can be released you will need to sign a deed of release. This document governs issues such as confidentiality, copyright and liability in relation to the data.

Please contact Tracey Burgess, Manager of Information, Analysis and Reporting on 9096 6112, to discuss the scope and nature of the project and the timelines within which we can provide the information.

Yours sincerely

Dr Karleen Edwards
Executive Director
Mental Health, Drugs and Regions Division

State Government Victoria

APPENDIX H: LETTER OF SUPPORT FROM THE CHIEF MAGISTRATE

Telephone: (03) 9628 7792
Facsimile: (03) 9628 7793

Magistrates' Court
Victoria

Chief Magistrate's Chambers
Melbourne Magistrates' Court
233 William Street
Melbourne, Vic 3000

GPO Box 882G
Melbourne, Vic 3001
(Ausdoc 350080)

13 August 2010

Professor James Ogloff
Centre for Forensic Behavioural Science
Monash University
505 Hoddle Street
Clifton Hill VIC 3068

Dear Professor Ogloff,

Permission to access offender names for research into arson

I refer to your letter dated 14 June 2010 and apologise sincerely in the long delay in replying to you. I am happy to give you my permission to access the data you seek.

I note the undertakings relating to the protection of the privacy and that no individual identifiable information will be reported or published as a result of the research.

I will copy your letter and my reply to the CEO of the Court whose staff will be responsible for assisting yourselves and the Sentencing Advisory Council to access the relevant data.

Yours sincerely

IAN L GRAY
Chief Magistrate

CC: Mr Rudy Monichetone, Acting CEO, Magistrates' Court of Victoria

APPENDIX I: LETTER OF SUPPORT FROM CHIEF JUDGE OF THE COUNTY COURT

Phone: (03) 8636 6698
Fax: (03) 9640 0119
Email: andrea.david@countycourt.vic.gov.au

CHIEF JUDGE'S CHAMBERS
COUNTY COURT
250 WILLIAM ST, MELBOURNE

22 September 2010

Professor James Ogloff
Director
Centre for Forensic Behavioural Science
505 Hoddle Street
Clifton Hill VIC 3068

Dear Professor Ogloff

Re: Permission to access court files for research into arson

The Chief Judge has asked that I respond to your letter of 16 September 2010 requesting permission to access individual case information for arson offences in the years 2000/1 and 2008/09.

This request is approved. Further, you are also authorised to access the same information from an equal number of cases not relating to arson to allow for statistical comparison.

Accordingly, as per your previous request, you may contact the Sentencing Advisory Council and advise that it is authorised to provide you with the information described above.

Yours sincerely,

[redacted]

Andrea David
Strategic Advisor to Chief Judge Rozenes
County Court of Victoria

APPENDIX J: BOOK CHAPTER WRITTEN DURING CANDIDATURE

Preamble to chapter in submission: "The role of mental illness in firesetting behaviour"

The chapter presented in Appendix J of this thesis examines the prevalence, nature and diagnoses of firesetters with a view to providing an overview of the potential relevance of mental disorder to firesetting behaviour. It explores the possible underlying cognitive and affective deficits associated with particular disorders and how these may relate to firesetting behaviour.

The following chapter has been prepared for consideration of inclusion in an edited book for publication in 2014, '*Practical guide to the psychology of firesetting: Understanding, managing and treating adult deliberate firesetters'* R. Doley, G. Dickens, & T. Gannon (Eds), Abingdon, UK: Psychology Press.

Declaration of Thesis Appendix J

Monash University
Declaration by candidate for thesis Appendix J

In the case of Appendix J, the nature and extent of contributions to the work are as follows:

Name	Nature of contribution	Extent of contribution
Dr Troy E. McEwan	Conceptualisation of chapter, reviewed literature, prepared and revised manuscript	50%
Ms Lauren Ducat	Reviewed literature, prepared and revised manuscript	50%

Candidate's Signature:		Date:

Declaration by co-authors

The undersigned hereby certify that:

g) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.

h) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

i) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

j) there are no other authors of the publication according to these criteria;

k) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

l) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s):	Centre for Forensic Behavioural Science, School of Psychology & Psychiatry, Monash University 505 Hoddle Street, Clifton Hill Victoria, Australia

Dr Troy E. McEwan		Date:

The role of mental illness in firesetting behaviour

Troy E. McEwan and Lauren Ducat

Centre for Forensic Behavioural Science, Monash University and the Victorian Institute of Forensic Mental Health (Forensicare)

Key Points

- Mental disorder is common, but not ubiquitous, amongst firesetters. Mood disorders, alcohol and substance use disorders, intellectual disability, personality disorder and psychosis are all moderately to highly prevalent. However, the mechanisms by which these mental disorders are associated with firesetting behaviour are poorly understood.
- This chapter proposes that the cognitive and affective deficits associated with mental disorders may explain the over-representation of psychopathology in firesetting populations. These deficits influence individuals' ability to regulate emotions, identify alternative behaviours, and implement more prosocial strategies, potentially exacerbating existing vulnerabilities related to firesetting and making firesetting more likely to occur in particular contexts.
- Clinicians assessing or treating firesetters should be cognisant of the indirect relationship between most mental disorders and firesetting, and consider the multiple ways in which mental disorders may impact the decision to engage in deliberate firesetting.

Introduction

Research on the psychiatric characteristics of deliberate firesetters suggests that mental disorder is common in this population, though not ubiquitous. Studies have identified moderate to high prevalence of mood disorders (Blanco et al., 2010; Grant & Kim, 2007; Ritchie & Huff, 1999) , alcohol and substance use disorders (Ritchie &

Huff, 1999; Vinkers, De Buers, Barendregt, Rinne, & Hoek, 2011), intellectual disability (Devapriam, Raju, Singh, Collacott, & Bhaumik, 2007; Enayati, Grann, Lubbe, & Fazel, 2008), personality disorders (Barnett, Richter, Sigmund, & Spitzer, 1997; Soothill & Pope, 1973; Wallace et al., 1998) and psychosis (Anwar, Langstrom, Grann, & Fazel, 2011; Lindberg, Holi, Tani, & Virkkunen, 2005). The reasons that such a wide variety of psychopathologies are associated with this problematic behaviour are unclear.

The purpose of this chapter is to provide a brief and easily accessible overview of the potential relevance of various mental disorders to deliberate firesetting behaviour. Section 1 discusses the prevalence of mental disorder among firesetters, Section 2 briefly examines the relevance of pyromania as a diagnostic category. Section 3 examines the underlying cognitive and affective deficits associated with various disorders, and Section 4 hypothesises about how these deficits may relate to firesetting. Section 5 discusses some of the clinical implications of the findings of this review. Our aim is to provide clinicians with a resource for understanding firesetting in the context of mental disorder so as to enable more informed assessment, formulation and treatment.

1. Prevalence of mental disorder amongst deliberate firesetters

Conclusions about the prevalence of mental disorder among firesetters have been complicated by the use of samples drawn from psychiatric populations without appropriate control groups (Tyler & Gannon, 2012). However, recent results from epidemiological research suggest that deliberate firesetters do suffer from increased rates of mental disorder. Ducat, Ogloff & McEwan (in press) compared the mental health records of the entire population of 1328 firesetters convicted between 2000 and 2009 in Victoria, Australia, with those of 1328 matched community controls and 421

non-firesetting offenders. Individuals convicted of an arson or fire-related offence recorded significantly higher rates of depressive disorders (8.2% of firesetters; 4.8% of non-firesetting offenders; 1.7% of community members), schizophrenia (6.7%; 2.4%; 0.6%), substance misuse (15.5%; 9.5%; 1.2%), childhood (4.7%; 0.5%; 0.2%), and personality disorders (10.2%; 2.9%; 0.5%; antisocial and borderline types most common). A similar study by Anwar, Långström, Grann & Fazel (2011) of 1689 Swedish convicted arsonists and 40 560 community controls found signficantly higher rates of schizophrenia (5.3% of firesetters vs 0.3% of community controls) and other psychoses (3.5% vs 0.3%) in firesetters. Bipolar affective disorder did not differentiate between groups in either study.

Similar results were obtained in the United States by Blanco and colleagues (2010), who identified firesetting in 1% (407) of 43,093 respondents to a national mental health survey. Firesetters reported higher rates of mood disorders (40.3% vs. 18.5%), substance abuse (80.4% vs. 38.2%) and personality disorders (68.9% vs. 14.5%), particularly antisocial (51.5% vs. 3.2%). These three methodologically strong studies show that many types of psychopathology are not only common amongst firesetters, they are more prevalent than in other offenders and the non-offending community.

While acknowledging that correlation is not evidence of causation, these findings do raise the possibility that mental disorder plays some causal role in the development and maintenance of some firesetting behaviour (Ducat, Ogloff, et al., in press; Gannon & Pina, 2010; Tyler & Gannon, 2012). Assuming some level of causality, there are two possible explanations for the over-representation of psychopathology among firesetters. The presence of mental disorder either fully explains firesetting behaviour, or the disorder plays some indirect role, interacting with other factors to make fire setting

more likely (Gannon, Ciardha, Doley, & Alleyne, 2012; Geller, 1987; Geller, 1992b). In their integrative theory, Gannon and colleagues suggest that the latter explanation is more likely, with psychopathology exerting its influence through the moderation of pre-existing vulnerabilities. This is consistent with the wider research literature on mental illness and offending behaviour (Phillips et al., 2005; Sirotich, 2008) and has considerable face validity, but the mechanisms of any moderation remain unclear. When considering these mechanisms for clinical or research purposes, it may be useful to examine the psychological deficits associated with various mental disorders rather than the diagnostic categories themselves. Understanding the functional impacts of a particular disorder on cognition, affect and behaviour can inform hypotheses about the association between that disorder and firesetting. Such information can both inform clinical formulations of individual firesetters' behaviour and guide future research.

2. Pyromania

Once central to conceptualisations of deliberate firesetting, pyromania as it is defined in the current *Diagnostic and Statistical Manual* (DSM-IV-TR; American Psychiatric Association, 2000) is no longer considered to have much explanatory depth or empirical adequacy (Burton, McNeil, & Binder, 2012). Pyromania offers a circular explanation for ongoing firesetting behaviour, asserting that those with pyromania set fires because they have set fires in the past and appear to be unable to resist doing so (Ducat, McEwan, & Ogloff, in press; Lindberg, et al., 2005). Pyromania is also problematic because it attributes the behaviour to an internal psychological flaw (originally mania, then sexual deviance and, more recently, deficits in impulse control), entirely ignoring contemporary psychological theories of offending behaviour. Finally, the clinical utility of the construct is questionable, with criteria so stringent that few firesetters would reach the diagnostic threshold (Davis & Lauber, 1999; Lindberg, et al.,

2005; Ritchie & Huff, 1999). These problems raise serious questions about whether pyromania has any place in modern conceptualisations of deliberate firesetting.

3. The psychological impacts of mental disorders common among firesetters

Putting pyromania aside, this section reviews research on the cognitive and affective deficits associated with the specific psychiatric diagnoses most commonly identified in firesetters: depressive disorders, schizophrenia, personality disorders, autism spectrum disorders, intellectual disability, and substance use disorders.

3.1 Depressive disorders

Depressive disorders have a range of impacts on mood, emotional experience and regulation, motivation, and stress responses, which have been associated with specific cognitive and affective impairments. Individuals experiencing a Major Depressive Disorder (MDD) exhibit a general mood-congruent processing bias in attention, memory and interpretation that interferes with their ability to successfully up-regulate emotions (Mathews & MacLeod, 2005; Mogg, Bradbury, & Bradley, 2006; Peckham, McHugh, & Otto, 2010; Price & Drevets, 2012). They are more likely to attend to negative stimuli and, once attending, appraise these stimuli in more self-relevant and negative ways, leading to increased sadness, guilt, anger and other forms of negative affect (Gould, Ball, & Kaspi, 1996; Murrough, Lacoviello, Neumeister, Charney, & OIosifescu, 2011; Posternak & Zimmerman, 2002). The negative bias present during a depressive episode may interact with pre-existing maladaptive emotion regulation strategies, such as rumination, cognitive avoidance of emotions and unhelpful reappraisals. Such strategies develop in the absence of a strong problem solving orientation, increasing the experience of negative emotion and creating vulnerability to depressed mood (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

Emotional reactivity and memory may also be affected by this negative bias, although may also be uniquely impaired by MDD. Lack of emotional reaction to reward leads to the absence of a response bias towards emotionally positive events. Depressed individuals are also less able to recall specific positive autobiographical memories in response to emotionally positive cues, and have fewer recent memories than individuals without MDD (Price & Drevets, 2012). Whether this is a problem associated with social withdrawal related to depression (resulting in fewer life experiences), an encoding problem (due to lack of attentional or executive resources during MDD) or a retrieval problem (due to attentional bias away from positive events) is unclear (Young et al., 2012). There is some evidence that residual deficits exist in these domains even when MDD has remitted (Hasselbalch, Knorr, & Kessing, 2011).

Executive functioning (EF) (which governs the ability to synthesise information for planning, problem solving and making decisions) may also be impaired in depression. A recent meta-analysis concluded that MDD is associated with broad deficits in EF, beyond the impact of the slowed processing speed that also occurs in depression (Snyder, 2013). Participants with MDD showed significant impairment in response inhibition, response shifting, and all aspects of working memory, while the effect of MDD on planning and verbal fluency was less clear. Those taking anti-depressant medications were more impaired than participants who were not.

3.2 Schizophrenia

Although much of the clinical and research attention in schizophrenia has been on the impact of core positive symptoms, a large body of research now exists showing that schizophrenia is also associated with cognitive impairments that are present throughout the course of the illness, including during the prodromal period and possibly before (Comparelli et al., 2013). Neurocognitive deficits affect emotional experience and

recognition, working and episodic memory, attention, and executive function, while deficits in social cognition impair theory of mind, social attribution and social problem solving.

Executive dysfunction is recognised as a core symptom of the illness that is present throughout its course. Deficits are present across a range of executive functions, including planning, response shifting, verbal fluency and goal-directed cognition (Barch & Ceaser, 2012; Liu et al., 2011). There is also strong evidence of memory impairment in people with schizophrenia, with deficits in learning new information, recognition, and free recall across a range of modalities (visuo-spatial, list learning, narrative) (Cirillo & Seidman, 2003). Working memory in particular seems to be impaired, beyond what would be expected based on impaired control of attention, with deficits in both storage and manipulation of information (Barch & Ceaser, 2012). Episodic memory – memory of life events – is also clearly impaired, with evidence of particular deficits in relational memory, the memory for associations between items (Achim & Lepage, 2003; Ranganath, Minzenberg, & Ragland, 2008).

Social cognition deficits are also marked in schizophrenia. Social cognition refers to the cognitive capacity to process social information, typically including emotion perception, social perception and reasoning, theory of mind and attributional style (Bell, 2013; Couture, Penn, & Roberts, 2006; Green et al., 2012). People with schizophrenia have difficulties identifying and differentiating emotions in others' facial expressions, body motion and complex social stimuli (Bigelow et al., 2006; Kohler, Walker, Martin, Healey, & Moberg, 2010). There is evidence that recognition of anger, sadness and possibly disgust is particularly impaired (Bigelow, et al., 2006; Malone, Carroll, & Murphy, 2012). Recent research has suggested that impairments in each of these

domains partially mediate the impact of neurocognitive deficits on rehabilitative outcomes (Bell, Tsang, Greig, & Bryson, 2009).

Couture and colleagues (2006) suggest that these deficits lead to socially inappropriate behaviour because people with schizophrenia draw faulty conclusions about others' emotions (e.g., the presence of anger) based on inaccurate interpretations of facial expressions and social context. The perceived emotions are then explained in a biased way because of a personalising attributional style (e.g., 'they're angry at me') leading to negative emotions relating to the other person, social discomfort, and a subsequent behavioural response that is socially inappropriate (i.e., withdrawal or confrontation). Malone et al. (2012) suggest that this pattern may particularly relate to aggression by individuals with psychosis, whose impaired perception of facial affect may then be interpreted with a hostile attribution bias, leading to anger and subsequent interpersonal aggression in apparently benign situations.

Schizophrenia also impairs 'theory of mind' (ToM) – the ability to infer one's own and others' mental states (Sprong, Schothorst, Vos, Hox, & Van Engeland, 2007). Deficits are most apparent in people affected by negative symptoms of schizophrenia (avolition, social withdrawal) and those with thought and language disorganisation, however impairments remain even when acute symptoms have remitted (Brüne, 2005; Sprong, et al., 2007). It is possible that ToM deficits interact with broader social cognition and neurocognitive deficits. For example, impaired emotion perception may make immediate decoding of others' mental state based on facial expression more difficult, and interpreting social cues may be impaired by poor memory for social events (Bora, Eryavuz, Kayahan, Sungu, & Veznedaroglu, 2006).

Beyond its cognitive impacts, schizophrenia also impairs the experience and regulation of emotion. Self-reported anhedonia (the inability to experience pleasant

emotions) is a core symptom, although research reveals no differences in experienced emotion in response to laboratory-based induction. Cohen, Najolia, Brown and Minor (2011) suggest a number of possible explanations for this difference in reported emotional experience. People with schizophrenia may lack the ability to forecast positive emotional experience even while 'in-the-moment' pleasurable feelings remain intact. Alternatively, there may be a specific impairment in the ability to up-regulate negative emotional states, contaminating positive experiences; or deficits in encoding and retrieval making it difficult for people to access positive emotional experiences in memory. These various explanations are not mutually exclusive and each attempts to address the fact that schizophrenia leads to an overall perception of the environment as non-rewarding.

3.3 Intellectual disability

Intellectual disability (ID) is a syndrome related to a range of clinical disorders with genetic, infectious, metabolic or neurotoxic origins. Regardless of aetiology, intellectual disability is marked by impairment across a range of neurocognitive domains. Memory systems, particularly working and associative memory, appear to be particularly impaired, decreasing the ability to learn broader cognitive skills and resulting in lower IQ (Alloway, 2010; Edgin, Pennington, & Mervis, 2010). Executive function is delayed, with people with ID seeming to function at a level consistent with their developmental age (Danielsson, Henry, Rönnberg, & Nilsson, 2010). It is possible that ID may be associated with deficits in particular domains of executive function, with evidence that verbal fluency and possibly set shifting in particular contexts may be impaired (Danielsson et al., 2010).

Although the neurocognitive effects of ID are under-researched, its functional outcomes on problem-solving and decision-making are well recognised. Intellectual disability is associated with rigid thinking, poor abstract and critical reasoning, and difficulties organising and generalising knowledge (Baurain & Nader-Grosbois, 2012). These deficits may in turn lead to the development of rigid and dysfunctional behavioural scripts and coping styles, resulting in poor decision-making, partly due to a lack of available alternatives (Jankowska, Bogdanowicz, & Shaw, 2012).

Social skills deficits are also apparent in individuals with ID (van Nieuwenhuijzen & Vriens, 2012), and there is some evidence of impairment in social information processing and emotion recognition difficulties, as well as theory of mind deficits. As with executive functioning, research has pointed to these skills being at a developmentally appropriate level in those with intellectual disability. Nonetheless, if these skills are at a lower than expected level for actual age, problems with interpreting and responding to social situations appropriately may lead to age-inappropriate social behaviour (Baurain & Nader-Grosbois, 2012).

One consequence of social skills deficits is poor social integration, with flow-on effects for employment opportunities, socio-economic status and general life satisfaction (Rantanen, 1994). Accordingly, individuals with such deficits are more likely to be disadvantaged, may experience bullying and other forms of negative responses from others and thus may develop hostile attribution biases which have been found to be related to both aggressive behaviour and acquiescence (Asscher, van der Put, & Stams, 2012; Dekker, Koot, Van der Ende, & Verhulst, 2002). Indeed, Emerson and Halpin (2013) found that when they controlled for social deprivation intellectual disability was actually associated with lower levels of antisocial behaviour in adolescents.

Affective regulation also appears to be effected by ID, with increased irritability and physical arousal reported (Asscher, et al., 2012; Lindsay et al., 2013). Poor emotional-regulation skills may also contribute to socially inappropriate behaviour, including aggressive behaviour to self or others (Asscher, et al., 2012; Davies & Oliver, 2013; Novaco & Taylor, 2008).

3.4 Autism spectrum disorders

The combination of problems seen in Autism Spectrum Disorders can be conceptualised as an overall problem with social cognition in addition to separate strengths and weaknesses in non-social information processing. There is high comorbidity with intellectual disability, with overall IQ being the greatest predictor of functional outcome in those with ASD (Bhattacharya & Klann, 2012; Charman et al., 2011; Kanne et al., 2011). Most research into social cognition impairments in ASD has focussed on theory of mind deficits, although there is also evidence of problems with emotion and social perception (Baron-Cohen, 2004). These deficits can lead to socially inappropriate behaviours, which may in part contribute to the social disadvantage observed among adults with ASD (Brugha et al., 2011).

Beyond social cognition, there is strong evidence of abnormalities in the executive functions of set shifting, planning, response inhibition, working memory, and different forms of attention in ASD (Sanders, Johnson, Garavan, Gill & Gallagner, 2008). These abnormalities have a range of impacts, including difficulty disengaging visually from objects or activities, and being able to sustain attention for extremely long periods of time on items or topics that are of particular interest. Problems with response inhibition and set shifting are hypothesised to underlie repetitive behaviours seen in ASD, locking individuals into patterns of behaviour due to the inability to generate new solutions (see Sanders et al., 2008 for review). Some have questioned the role of

executive function in these problems and there is evidence that language and attention deficits may also explain these findings (Baron-Cohen, 2004; Sanders et al., 2008).

A third body of research has examined the issue of weak central coherence as an explanatory mechanism for the non-social strengths and weaknesses observed in ASD. Weak central coherence refers to a perceptual processing bias or cognitive style that privileges details over processing of global characteristics of stimuli. This can be problematic for individuals with ASD when it leads to distress in response to small changes in the environment (Happé & Frith, 2006). It may also contribute to difficulties generalising skills across contexts if experiences are encoded in details (‘this situation’) rather than as global prototypes (‘situations like this’). While weak central coherence was originally proposed as the central causative factor in ASD, more recent conceptualisations view it as sitting alongside impairments in social cognition and executive dysfunction.

3.5 Personality disorder

Examining the cognitive and affective impacts of personality disorder (PD) is made difficult by the ongoing confusion in the literature about the best way to describe such disorder (Livesley, 2012). Moreover, disorders of personality have historically been considered characterological, with behavioural sequelae explained by the presence of abnormal personality traits (Monarch, Saykin, & Flashman, 2004). It is only in the last two decades that cognitive and social psychology and cognitive neuroscience have brought a different focus to PD, with research identifying neurocognitive abnormalities in some forms of personality disorder. Most research has focussed on borderline and antisocial PD (and the related construct of psychopathy), which are prevalent amongst firesetters. A more detailed understanding of the cognitive and neurological

underpinnings of these forms of PD may lead to more effective understanding of how they exert influence on behaviour.

There is evidence of global neurocognitive deficits in borderline personality disorder (BPD), affecting attention, executive functions (decision making, cognitive flexibility, planning, working memory), learning and memory, processing speed, and visuospatial abilities (Monarch, et al., 2004; Ruocco, 2005; Schuermann, Kathmann, Stiglmayr, Renneberg, & Endrass, 2011). Neurocognitive deficits have been shown to contribute to disturbance of adult attachment in BPD, both independent of and interacting with abuse history (Minzenberg, Poole, & Vinogradov, 2008). Executive function deficits have been linked to impulsivity in both borderline and antisocial PD, with deficits in the latter group identified in planning, aspects of set shifting and behavioural inhibition (Dolan, 2012; Dolan, Millington, & Park, 2002). These deficits have not been observed in individuals with the more restrictive diagnosis of a psychopathic personality disorder (Blair et al., 2006; Dolan, 2012; Fullam & Dolan, 2006).

Borderline and psychopathic PDs have also been associated with deficits in social cognition, although there is conflicting evidence of facial affect recognition deficits in both disorders (Bagley, Abramowitz, & Kosson, 2009; Hagenhoff et al., 2013; Wilson, Juodis, & Porter, 2011). Perhaps the most promising area of social cognition research is into the cognitive structures and processes that underpin various types of PD. There is a growing body of research highlighting attributional biases as core components of abnormal personality function, and investigating the knowledge structures (beliefs, attitudes, schemas) and affective arousal patterns that inform the behaviours characteristic of personality disorders. This research suggests that aggression-related knowledge structures may be common amongst those with borderline, antisocial and

paranoid personality disorders. There is preliminary evidence that individuals with these disorders more often endorse normative beliefs accepting of violence, have aggressive behavioural scripts, and have hostile and suspicious attribution biases (Gilbert & Daffern, 2011). Recent research by Sieswerda and colleagues (2013) has linked the maladaptive schemas observed in borderline PD to negativistic interpersonal evaluations, suggesting another pathway for some of the socially inappropriate behaviours that are observed in BPD.

Personality disorder also clearly effects emotional experience and regulation, which are core components of the Cluster B PDs, psychopathy, and paranoid PD. Anger and other negative affective states appear to occur more frequently, more intensely and for longer in those with Cluster B PDs, although most of the research in this area has focussed on borderline PD (Howells, 2009). It is unclear whether negative affectivity has a causal or dependent role in Cluster B personality disorders. As in depression, negative affective states in borderline PD are clearly linked to the use of maladaptive emotional regulation strategies such as rumination and thought suppression, and there is also evidence of similar memory and attribution biases as exist in depression (Baer, Peters, Eisenlohr-Moul, Geiger, & Sauer, 2012). It is unclear whether similar processes are present in other types of Cluster B personality disorder. It has also been suggested that there is an underlying biological disposition to increased emotional reactivity in borderline PD, and there is evidence of neurobiological changes in brain areas associated with automatic emotion regulation responses, although whether this pre-exists the development of abnormal personality is unclear (Puntam & Silk, 2005). It is clear that once negative emotions are aroused, they bias subsequent cognitive processes

towards that emotional state, prolonging the emotional experience in the absence of alternative emotional regulation strategies (Howells, 2009).

3.6 Substance use disorders

Substance use disorders are highly comorbid with other forms of psychopathology (Tiet & Mausbach, 2007), making it difficult to separate the neuropsychological effects of mental illness from those of chronic substance misuse. It does seem, however, that chronic abuse of any psychoactive substance impacts on cognitive functioning in the areas of memory, emotion and executive function (Fernandez-Serrano, Perez-Garcia, & Verdejo-Garcia, 2011; Yücel & Lubman, 2007). Alcohol and methamphetamine abuse have also been linked to changes in social cognitive functioning (Uekermann & Daum, 2008), however this area research is not well-developed as yet. Changes to goal-directed cognitive control and memory systems have been implicated in the development of drug addiction (Torregrossa, Corlett, & Taylor, 2011), and there is evidence supporting episodic memory impairments during the period of abuse of cannabis, alcohol, psychostimulants and opioids, with most of these impairments resolving once substance abuse had ceased (Fernandez-Serrano et al., 2011).

3.7 Summary of the core deficits common across disorders

There are some clear similarities in the cognitive and affective impacts of the different mental disorders that are common among firesetters. Executive functioning, specific memory systems (working, associative and episodic memory), emotion experience and regulation, and social cognition are all affected by each of these disorders, although with some more fine-grained differences (particularly in the types of executive and memory dysfunction that are implicated in different disorders). This transdiagnostic similarity at the cognitive level is reflected in neurobiological research into these disorders, which tends to implicate volume or activation changes in areas of

the prefrontal cortex, amygdala and hippocampus in many disorders. Further discussion of some of the potential neurobiological influences on firesetting can be found in Dolan and McEwan (2012).

4. Relevance of neuropsychological deficits in mental disorder to firesetting behaviour

In their Multi-Trajectory Theory of Firesetting Behaviour (M-TTAF), Gannon and colleagues (2012) suggest that psychopathology acts as a moderator, affecting the expression and functioning of the four key psychological vulnerabilities that they hypothesise are related to firesetting: inappropriate fire interest/scripts, offence supportive cognition, self/emotional regulation issues and communication problems. However; the mechanisms by which this moderation occurs have not yet been elaborated upon or linked with the different firesetting trajectories that have been described. The findings of the above review suggest some possible avenues of moderation that could be clinically relevant and subject to further investigation.

4.1 Neurocognitive deficits

Several of the mental disorders described above impact upon the ability to maintain goal-directed cognitive control, to generate solutions, to plan behaviour and to make considered decisions. Using a phenomenological approach, these characteristics may be described as problems with the broader construct of impulsivity, which has historically been associated with firesetting (Labree, Nijman, Van Marle, & Rasin, 2010). It may be that these underlying executive function deficits effect mentally disordered firesetters' ability to respond appropriately when faced with triggering fire-related contexts. In the context of the M-TTAF, executive dysfunction would be implicated in the 'self/emotional regulation' area of psychological vulnerability and 'critical risk factors' that occur proximal to the firesetting behaviour. It may be that while all firesetters have some difficulty with impulsivity, mentally disordered

firesetters have additional difficulties that are secondary to executive dysfunction related to their psychopathology. In these cases, firesetting behaviour may be precipitated by cognitive impairments that make it more difficult for the mentally disordered firesetter to identify and generate alternative behaviours when faced with a triggering context. Specific types of executive dysfunction such as cognitive inflexibility may also maintain firesetting behaviour. For mentally disordered offenders with these deficits, difficulties identifying and shifting to alternative strategies could lead to repetitive use of firesetting, even when the behaviour has become maladaptive.

Memory impairment may also maintain firesetting by limiting the data base of available alternatives (impaired episodic memory limiting experiential learning) and making it difficult to hold and manipulate competing information in working memory through the process of problem-solving. Firesetters with mental disorder are more likely than those without to have previous convictions for firesetting, offering some indirect support for the idea that neurocognitive impairments may contribute to repetitive firesetting, but further research in this area is clearly necessary (Jayaraman & Frazer, 2006; Koson & Dvoskin, 1982).

4.2 Emotion regulation

The emotion experience and regulation deficits associated with psychopathology would also likely impact on firesetting trajectories via interaction with the psychological vulnerability of self/emotion regulation outlined in the M-TTAF. Consistent with self-regulation theories of other offending behaviours (e.g., sexual offending – Ward, Hudson & Keenon, 1998) it has been hypothesised that firesetting is used to up-regulate negative emotional states in the absence of more socially appropriate and psychologically effective strategies (Gannon et al., 2012). There is only circumstantial evidence of such a relationship between firesetting and emotional regulation in the

research to date, with evidence of emotion dysregulation being extrapolated from heightened rates of suicide and self-harm (Ducat, Ogloff, et al., in press; Geller, 1992a; Tyler & Gannon, 2012)) and inferred from apparent motivation (e.g., Canter & Fritzon, 1998). Nonetheless, if this hypothesised relationship does exist, the affect regulation deficits associated with mental disorders may mean that individuals with a mental illness experience intense negative emotion more frequently and/or are more impaired in their capacity to regulate their emotional experience, exposing them to more situations in which firesetting behaviour may occur. Further research investigating the temporal relationship between negative emotional states and urges to set fires in mentally disordered and non-mentally disordered firesetters is required to test this hypothesis.

4.3 Social cognition deficits

There is substantial evidence of psychosocial disadvantage among firesetters (Doley, Fineman, Fritzon, Dolan, & McEwan, 2011), some of which may be associated with the disadvantage experienced by many with mental illness. The impacts of various types of psychopathology on social cognition are only beginning to be understood, however the schizophrenia literature suggests that these deficits are a primary cause of poor psychosocial outcomes (Green, 1996). Using the M-TTAF structure, deficits in social and emotion perception may be implicated in firesetting both distally, by contributing to socially inappropriate behaviour that leads to social exclusion, and proximally, by leading to flawed interpretations of social cues and others' affect that are then the source of negative attributions and emotional arousal (Couture, et al., 2006). It is possible that these distal and proximal factors influence one another, with pre-existing social disadvantage reducing the opportunity to identify or implement alternative problem-solving strategies when faced with a triggering context, and contributing to

negative, hostile or personalising attributions of others' actions. Fire becomes a way of communicating in this socially impoverished environment, but it increases social disadvantage in the long term, which in turn reinforces fire as the only seemingly effective way of communicating dissatisfaction (Jackson, Glass & Hope, 1987). Theory of mind deficits may not only contribute to flawed perceptions of social cues, but also impair an individual's ability to perceive some of the negative consequences of their behaviour for others, reducing their ability to learn and adapt their behaviour over time. Difficulties mentalising about victims' emotions might be exacerbated in the case of firesetting because of the physical distance between the offender and many victims.

Attribution style may be a particularly important component of social cognition in firesetting. While this is the least studied of the various aspects of social cognition and psychopathology, it may be that negativistic, personalising, hostile and suspicious processing biases that are associated with various forms of psychopathology may be particularly important proximal factors for firesetting. At present, the M-TTAF does not propose a specific mechanism by which a context that activates critical risk factors actually produces firesetting behaviour. It may be that some firesetting is triggered by attributions about the psychological or social context the firesetter is in. These attributions then lead to emotional arousal and/or activation of firesetting behavioural scripts and offence-supportive cognitions.

It may be that attributional styles associated with psychopathology do not cause firesetting *per se*, but make those who have them more vulnerable to experiencing negative reactions in social interactions, which they then respond to with firesetting. For instance, someone with an antisocial personality disorder may have an attribution bias that leads them to more frequently attribute hostile intent to others actions and to respond with aggression. Where this tendency exists in combination with other

cognitive structures such as fire-related behavioural scripts and normative beliefs supportive of antisocial behaviour, deliberate firesetting may be the result. Conversely, a depressed person who tends to appraise events in a self-relevant negativistic way may more often respond to social interactions with withdrawal and hopelessness. Where this tendency exists in combination with knowledge structures that identify firesetting as an effective emotion regulation strategy, deliberate firesetting may be the result. Given that there is very little research about cognitive structures and processes in firesetters, investigating attributional style may offer one avenue for explaining why some contexts operate as triggers for firesetting while others do not.

5. Clinical implications

At present, given the lack of research into the mechanisms by which mental disorder may influence firesetting behaviour, clinicians must rely on the application of research from other domains when working with firesetting clients. Based on the research literatures regarding the psychological impacts of various mental disorders, it seems likely that a significant proportion of firesetters will have deficits in emotion experience and regulation, executive function, aspects of memory, and social cognition. This strongly suggests that neuropsychological screening should be undertaken as part of a detailed assessment of any mentally disordered firesetter, particularly when the assessment is linked to treatment recommendations. A tool such as the D-KEFS (Delis, Kaplan, & Kramer, 2001) may be appropriate for this purpose as it can measure a wide array of executive functions, although memory assessment may also be necessary. Recognising and adapting to the presence of neurocognitive dysfunction in firesetters is consistent with the Risk Needs and Responsivity principles of offender treatment (Andrews & Bonta, 2010). It may even be appropriate in some cases to deliver offence-related treatment in conjunction with cognitive remediation techniques that have been

shown to be effective in producing neurocognitive improvement in those with severe mental illness (Wykes, Huddy, Cellard, McGurk, & Czobor, 2011).

When undertaking a formulation of firesetting behaviour, the focus should be on explaining the behaviour itself rather any psychopathology that is present. Nonetheless, as this review makes clear, psychopathology may have direct or indirect relevance to firesetting behaviour. Considering the role of specific symptoms such as hallucinations or delusions should only be the first step in such a process. Underlying cognitive and affective deficits associated with the disorder may predispose an individual to firesetting in particular contexts as well as precipitating specific acts of firesetting and perpetuating the pattern of behaviour over time. Considering the relevance of active symptoms and underlying cognitive impairments in conjunction with deficits in more complex psychological skills such as problem solving or communication, and how these individual factors interact with the context in which the firesetting occurs, is essential when attempting to explain an individual's firesetting behaviour.

This review suggests that when implementing psychological interventions for firesetting, it may be helpful to examine client's attributions and appraisals of the triggering contexts related to the firesetting behaviour. This could form part of the process of developing an offence cycle with a client. While various forms of psychopathology have been associated with particular attributional styles (e.g., paranoid schizophrenia with a personalising style), it may be that such attributions are only made in particular environmental and psychological contexts rather than being cross-situationally consistent (Mischel, 2004). As such, attempting to undertake a detailed functional analysis of the firesetting behaviour with the client will be central to developing some sense of the thoughts and emotional arousal patterns that precede

firesetting (based on the principles proposed by Jackson and colleagues [1987], but not necessarily adhering to all aspects of their model).

6. Conclusion

The over-representation of psychopathology amongst firesetters suggests the possibility of a causal relationship between mental disorder and firesetting. However, the wide variety of illnesses observed in firesetting samples makes it difficult to conclude that there are direct relationships between symptoms specific to various disorders and firesetting. With the exception of people who set fires in response to command hallucinations or in the context of delusions, it seems likely that most forms of mental illness have an indirect relationship with firesetting; influencing the operation of other factors to make firesetting more likely in particular contexts. Based on a review of relevant literature, we suggest that cognitive and affective dysfunction common to many different types of mental disorder may be the mechanism by which most mental illnesses moderate firesetting behaviour. If this relationship is borne out in research, it has important implications for treatment, highlighting the need to attend to both active symptoms *and* underlying deficits, in addition to the wider range of criminogenic and offence-specific needs that are present.

As highlighted by several authors in the firesetting field (Doley, 2009; Fineman, 1995; Gannon, et al., 2012) and the broader offending literature (Andrews & Bonta, 2010; Warren, MacKenzie, Mullen, & Ogloff, 2005), many of the psychological deficits associated with mental illness impact upon an already vulnerable population of individuals who are likely to have pre-morbid deficits in social skills, problem-solving abilities, emotion regulation and arousal, and impulsivity. It may be that the neuropsychological deficits discussed in this chapter are present in some firesetters who are not mentally disordered, although with different aetiology. Further research into the

cognitive and affective processes related to various mental illnesses and firesetting is required to clarify the role of these factors and to inform future assessment and treatment practices with this population.

Summary of practice implications

- A significant number of firesetters experience mental illness, making it necessary to always assess for and consider the role of specific symptoms in firesetting behaviour.
- While overt symptoms such as delusions and hallucinations may directly contribute to some firesetting behaviour, in the majority of cases the relationship between mental disorder and behaviour is likely to be more indirect.
- The mechanisms by which mental disorder contributes to firesetting behaviour have not yet been fully established. It is possible that mental disorder impacts on firesetters' ability and motivation to identify alternative, socially appropriate, behaviours. This may be due to the negative impact of mental disorder on neurocognition (executive functioning, memory, attention), affect (experience and regulation) and social cognition (emotion perception, theory of mind). Deficits in these areas are likely influence firesetters' decisions to light fires and their ability to engage in and respond to treatment.
- Further research into the underlying mechanisms by which mental disorder, and associated neurocognitive, emotion regulation and social cognitive deficits affect firesetting to fully inform clinical practice and future research efforts in this area.

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