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**The Prevalence and Psychological Characteristics of
Un-apprehended Deliberate Firesetters Living in the UK**

By

Emma Rebecca Barrowcliffe

Thesis submitted in accordance with the requirements of the University of Kent
for the degree of Doctor of Philosophy

January 2017

Publications

Data and literature from this thesis have been reported in the following journal articles.

Barrowcliffe, E. R., & Gannon, T. A. (2015). The Characteristics of un-apprehended firesetters living in the UK Community. *Psychology, Crime and Law*, 21(9), 836-853. doi:10.1080/1068316X.2015.1054385.

Barrowcliffe, E. R., & Gannon, T. A. (2016). Comparing the Psychological Characteristics of Un-apprehended Firesetters and Non-Firesetters Living in the UK. *Psychology, Crime and Law*, 22(4), 382-404. doi:10.1080/1068316X.2015.1111365

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Adam, mummy promises to have more time to bake cakes and build Lego with you. I'm not sure what free time is, but I'm looking forward to it! To my dad, I really wish I had started my PhD earlier as I would have loved for you to see me graduate in my floppy hat in

Canterbury Cathedral. I love and miss you! If you are still watching over me I hope you are proud xxx

In memory of my dad here is a poem he saw in a doctor's surgery, and smiling (and copious amounts of chocolate cake) is certainly what got me through my PhD.

Smiling is infectious
You catch it like the flu
When someone smiled at me today
I started smiling too
I walked around the corner
And someone saw me grin
When he smiled I realised
I had passed it on to him
I thought about the smile
And then realised its worth
A single smile like mine
Could travel round the earth
So if you feel a smile begin
Don't leave it undetected
Start an epidemic
And get the world infected!!!

Conventions Used in this Thesis

Numbering of studies

All of the studies in this thesis are numbered independently of the chapter in which they appear.

Numbering of tables

All tables are numbered in terms of the chapter in which they appear. They are numbered as table x.y., with x referring to the chapter number, and y, the order that the table is presented within that chapter.

Abbreviations and Specific Terminology

Abbreviations are described within the text. However, some of the more common abbreviations used in this thesis are described below:

A Level: Advanced Level qualifications are taken around age 18 in the UK education system

ADHD: Attention deficit hyperactivity disorder

DSM-IV-TR: The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (American Psychiatric Association, 2010)

DSM-V: The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (American Psychiatric Association, 2013)

Firesetter: An individual who has ignited a fire deliberately but has not necessarily received a criminal conviction for arson

GCSE: General Certificate of Secondary Education qualifications are taken around age 16 in the UK education system

IAT: Implicit Association Task

LDT: Lexical Decision Task

NESARC: The National Epidemiological Survey of Alcohol and Other Related Conditions

(Blanco et al., 2010; Vaughn et al., 2010)

Abstract

Deliberate firesetting has huge emotional, social, and economic impact. Traditionally, firesetting research has focussed on apprehended populations in prisons or secure psychiatric settings. In contrast, the literature relating to un-apprehended populations is extremely scarce; there has only been one study assessing un-apprehended firesetters living in the UK (Gannon & Barrowcliffe, 2012).

The purpose of this thesis is to fill the research gap, and evaluate the prevalence and psychological characteristics of un-apprehended deliberate firesetters living in the UK. Five studies were conducted: Study 1 examined the prevalence and characteristics of un-apprehended deliberate firesetters living in a high firesetting prevalent community in Kent. Study 2 specifically focussed on the psychological characteristics of un-apprehended deliberate firesetters. Studies 1 and 2 identified that firesetting tends to occur in adolescence rather than adulthood. However, the age of participants ranged from 18 to 72 years in Studies 1 and 2 and it was apparent that participants may be unable to fully recollect their adolescent behaviour. Therefore, in order to reduce recollection failures, younger participants (aged 18 to 23) were recruited for Study 3a with the aim of assessing the psychological characteristics of individuals who ignited fires in adolescence. Across Studies 1 to 3a there was an 11.5% to 25% prevalence rate of un-apprehended deliberate firesetters living in the UK and some common psychological characteristics were evident. For example, relative to non-firesetters, un-apprehended deliberate firesetters were male, exhibited higher fire interest, reported experimenting with fire before the age of 10, and having a family history of firesetting.

Study 3b compared the offence characteristics and psychological characteristics of un-apprehended firesetters (aged 18 to 23) reporting single firesetting incidences and multiple firesetting incidences. Few notable differences were found, however, relative to single

episode firesetters, recidivistic firesetters engaged in more criminal behaviour such as underage drinking and robbery. Studies 1 to 3b utilised self report measures (e.g., questionnaires) to assess psychological characteristics. In contrast, an implicit measure, a lexical decision task, was employed in Study 4 to identify the existence of any of the five implicit theories hypothesised as being relevant to deliberate firesetting (e.g., *Dangerous World*, *Normalisation of Violence*, *Fire is Fascinating or Exciting*, *Fire is a Powerful Tool*, and *Fire is Controllable*; Ó Ciardha & Gannon, 2012).

Relative to non-firesetters, un-apprehended firesetters were significantly faster at identifying letter strings as words which supported the *Dangerous World* implicit theory but slower at classifying words supporting the *Fire is Fascinating or Exciting* implicit theory. This research is the first of its kind to evaluate the psychological characteristics and implicit theories of un-apprehended deliberate firesetters. The new data associated with the studies reported in this thesis offers an insight into the psychological characteristics of un-apprehended firesetters, and details future research directions with the aim of reducing the incidences and devastating consequences of deliberate firesetting.

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Chapter 1

Deliberate Firesetting:

Introduction, Terminology, and Prevalence

Deliberately ignited fires can have devastating consequences for society. The monetisation of costs typically includes property damage, loss of business, use of emergency services, and criminal justice costs. In England, deliberately ignited fires were estimated to cost the economy approximately £2.3 billion in 2008 (Department for Local Communities and Local Government, 2011). Further, the Association of British Insurers (2009) reported that in the first half of 2009, £639 million was paid in insurance claims relating to deliberately ignited fires, equating to £3.6 million every day. However, these costs do not include loss of human life or the impacts on the wider society and wildlife.

Terminology

The terms arson, pyromania, and firesetting have historically been used interchangeably in the research literature to describe individuals who deliberately ignite fires. However, these terms are conceptually different. Internationally, arson is a restrictive legal term that predominantly refers to the unlawful and intentional destruction of property using fire (Criminal Damages Act, 1971; Kolko, 2002; Williams, 2005). In the UK, the criminal offence of arson is classified under two main headings: arson not endangering life and arson endangering life (Criminal Damages Act, 1971). The sanctions for the former depend on the severity of the crime and can result in a community order (i.e., unpaid work, a curfew) or a short custodial period in prison (i.e., 12 weeks). Arson endangering life, on the other hand, can carry a maximum sentence of life imprisonment (Sentencing Council, 2008).

The term arson can prove highly problematic for researchers in the field. The legal definition of arson centres on the intentional or reckless destruction of property by fire (Criminal Damages Act, 1971). However, if a car is stolen and later ignited, the ignition is typically reported as a continuation of the initial incident (i.e., the theft) unless there is sufficient evidence showing that the theft and the ignition were committed by different perpetrators (Home Office, 2016). Further, not all fires are set to physical property (e.g., acts of self-immolation and suicide using fire or fires set to grassland). These counting rules make arson statistics especially difficult to quantify and, as a result, such statistics do not adequately represent the true number of fires ignited deliberately.

The intentional setting of fires is also captured within the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V; American Psychiatric Association, 2013) under the disorder of pyromania as well as being included as one of 15 potential symptoms of conduct disorder. Pyromania has stringent diagnostic criteria under DSM-V. Individuals who would meet the diagnostic criteria for pyromania are considered to be those who repeatedly ignite deliberate fires as a means to relieve tension, for affective arousal, or to experience instant gratification. Individuals who meet the above criteria but who ignite fires for revenge, crime concealment, monetary gain, political protest, to change living circumstances, or those who ignite fires under the influence of delusions, hallucinations, or substances, or who have an intellectual disability or neurobiological disorder cannot be diagnosed with pyromania under the disorders exclusions criteria. Since the diagnostic criteria for pyromania are extremely strict, prevalence is rare with rates ranging from 0% (Harmon, Rosner, & Wiederlight, 1985; Koson & Dvoskin, 1982), to 3% (Lindberg, Holi, Tani, & Virkkunen, 2005), or 4% (O'Sullivan & Kelleher, 1987; Räsänen, Hakko, & Väisänen, 1995). Thus, the term pyromania, by definition, is only representative of a very

small number of individuals and has subsequently been described as an elusive concept that lacks clinical utility (Geller, McDermeit, & Brown, 1997; Gannon & Pina, 2010).

In contrast to the terms arson and pyromania, firesetting is the current preferred term in the literature. This is because it can be used to describe all acts of deliberate firesetting, regardless of motive or target, which may or may not have resulted in a formal conviction for arson (Dickens & Sugarman, 2012; Gannon & Pina, 2010). Thus, the term firesetting encompasses all individuals who have ignited a deliberate fire. This term will therefore be used throughout this thesis to describe all acts of intentional firesetting; fires ignited accidentally or as part of organised events such as bonfires are not included under this definition and will not be referred to within the context of this thesis.

Prevalence, detection, and costs of deliberate firesetting

Quantifying the number of deliberately ignited fires is highly problematic as a result of the variety of different reporting methods used (e.g., Police records versus Fire and Rescue Service records). For example, in England, in the financial year 2011 to 2012 the Fire and Rescue Services reported attending 116,000 deliberate fires. However, the number of reported arson incidents recorded by the Police was substantially lower (i.e., 27,200; Department for Local Communities and Local Government, 2012). Firesetting typically occurs in secret and therefore detection rates are low (Arson Control Forum, 2003). Thus, police figures are likely to underestimate the true extent of firesetting since they rely on a crime of arson being reported. To further complicate matters, reporting standards in some countries have changed over time (Evarts, 2012). For example, in the USA the term *suspicious* has recently been removed from the classification of fires recorded as deliberate. This means that fire personnel who suspect that a fire was ignited deliberately can no longer report it as deliberate without further investigations *proving* the intent behind ignition.

Igniting a fire is not a complicated process and does not necessarily require pre-thought or planning (Muller, Levy, & Shelef, 2011). As specific weapons are not required, deliberate firesetting is perhaps one of the easiest crimes to commit. However, the ease in which fires can be ignited makes firesetting difficult to research and prosecute (Koson & Dvoskin, 1982) as unlike other crimes, a substantial amount of investigation is required to establish that a fire was ignited deliberately (see Appendix 1; Arson Prevention Forum, 2014; Jackson, 1988). As a result, many deliberate fires may not be recorded as arson. Furthermore, relative to other crimes arson has the poorest detection rate in England and Wales (Smith, Taylor, & Elkin, 2013). For example, of the 19,306 arson offences recorded by the Police in 2013, only 2,316 (12%) perpetrators were identified by the police (Smith et al., 2013), with 1,503 individuals proceeded against in court. Further, individual firesetters may be responsible for multiple fires, so although there were 19,306 arson offences recorded by the Police in 2013 (Smith et al., 2013) it is not possible to comment on the number of perpetrators responsible for these fires. A similar picture is presented in other countries. In the USA, for example, there were 48,348 recorded arson offences in 2011 and of these only 18.8% resulted in arrest (U.S. Department of Justice, 2011). Further, data from Japan reveals that despite incidences of arson increasing, the clearance rate is decreasing (Wachi, Watanabe, Yokota, Suzuki, Hoshino, Sato, & Fujita, 2007). Thus, many perpetrators of arson appear to remain un-apprehended.

Children and adolescents have been reported to account for approximately 40% to 45% of arson offences in both the UK and USA (Arson Control Forum, 2003; Campbell, 2014). However, research suggests that approximately 5% to 10% of all children under the age of 12 have engaged in firesetting (Dadds & Fraser, 2006; Martin, Bergen, Richardson, Roegar, & Allinson, 2004); this increases to around a third for adolescents (Lambie & Randall, 2011). Further, it has been estimated that approximately 1 million adults in the USA

and approximately 200,000 adults in the UK hold a history of firesetting post 15 years of age (Dickens & Sugarman, 2012). However, only around 8% of perpetrators of deliberate fires are identified by authorities and even fewer are convicted of arson (Arson Control Forum, 2003). These figures suggest that a significant number of both adults and adolescents engage in deliberate firesetting, however, many remain undetected in the community.

Summary

Due to complex counting rules, varying reporting definitions and systems, and poor detection rates, firesetting is an incredibly complex crime to quantify and examine statistically. Despite deliberate firesetting having huge financial, social, and emotional impact it has a relatively low arrest rate and an even lower conviction rate. Subsequently the majority of perpetrators of deliberately ignited fires go undetected and therefore remain unapprehended. The subsequent introductory chapters evaluate the sociodemographic variables, psychopathology, offence characteristics, motivations, firesetting theories, and psychological vulnerabilities of both apprehended firesetters and unapprehended firesetters (i.e., those who have not come to the attention of the Police) with a view to establishing what we currently know about these two groups. The recidivism of apprehended firesetters, the current firesetting prevention initiatives, and firesetting treatments are also considered.

Chapter 2

Apprehended Firesetters: The Current Perspective

Introduction

As highlighted in Chapter 1, deliberate firesetting presents a huge problem internationally and has devastating consequences for both the economy and human life. A comprehensive understanding of those who deliberately ignite fires is integral to managing and controlling firesetting behaviour effectively (Doley, 2003). Unfortunately, compared to other types of offending, firesetting is one of the most poorly understood behaviours (Davis & Lauber, 1999; Dickens, Sugarman, & Gannon, 2012). The majority of empirical literature on adult perpetrated firesetting is severely skewed towards investigating the characteristics of apprehended populations, such as prisoners (Gannon, Ó Ciardha, Barnoux, Tyler, Mozova, & Alleyne, et al., 2013b; O'Sullivan & Kelleher, 1987; Sapsford, Banks, & Smith, 1978), and psychiatric patients (O'Sullivan & Kelleher, 1987; Räsänen et al., 1995; Tennent, McQuaid, Loughnane, & Hands, 1971; Tyler & Gannon, 2012). However, the vast majority of individuals who ignite deliberate fires are undetected and thus remain un-apprehended. To date, research with individuals in the community who have engaged in deliberate firesetting and not attracted the attention of the authorities is scarce.

In the adolescent literature, a limited number of studies pertain to adolescents convicted for firesetting (Hickle & Roe-Sepowitz, 2010; Roe-Sepowitz & Hickle, 2011; Swaffer & Hollin, 1995). However, typically research refers to adolescent firesetters arrested for firesetting who may not necessarily have received a conviction (Icove & Estepp, 1987; Saunders & Awad, 1991), firesetters identified within residential care (Kazdin & Kolko, 1986; Sakheim, Osborn, & Abrams, 1991; Shakeri, Tatari, Sadeghi, Mohamadi, & Valinia, 2007), or referrals to community fire intervention programmes (e.g., *The Arson Prevention*

Program for Children, TAPP-C; Root, MacKay, Henderson, Del Bove, & Warling, 2008).

Therefore as many adolescent firesetters have not received a conviction for firesetting, adolescent firesetters within this chapter are collectively referred to as identified firesetters rather than apprehended. As a starting point for understanding potential characteristics of unapprehended firesetters, Chapter 2 provides an overview of the existing literature pertaining to the characteristics of identified adolescent firesetters and apprehended adult firesetters; including sociodemographic and developmental variables, psychopathological features, offence characteristics, motives, theoretical explanations of firesetting, and vulnerabilities for firesetting. Where applicable comparisons between identified adolescent and apprehended adult firesetters will be made. Unless otherwise stated, the literature discussed in the following introductory chapters relates to both male and female firesetters.

Sociodemographic and developmental variables

Being male and Caucasian are common characteristics associated with both identified adolescent firesetters (Roe-Sepowitz & Hickie, 2011; Root et al., 2008) and apprehended adult firesetters (Bradford, 1982; Gannon, 2010; Koson & Dvoskin, 1982; Muller, 2008; Pettitway, 1987; Rautaheimo, 1989). Further, relative to non-firesetting offenders, apprehended adult firesetters have been found to have lower levels of intelligence (Bradford, 1982), lower levels of educational attainment (Räsänen et al., 1995), and poorer occupational outcomes (Ducat, McEwan, & Ogloff, 2013a).

Case studies and comparison studies with non-firesetting offenders reveal that identified adolescent (Macht & Mack, 1968; Saunders & Awad, 1991) and apprehended adult firesetters (Tennent et al., 1971) have disturbed childhoods, characterised by poor attachment styles. For example, compared to non-firesetting offenders, apprehended adult firesetters typically originate from broken homes (Hurley & Monahan, 1969), and are more likely to

have been taken into care at a younger age (Jackson, Hope, & Glass 1987b). Relative to non-firesetters, both identified adolescent and apprehended adult severe firesetters (i.e., ignited an average of 5.3 fires; Sakheim et al., 1991) report feelings of anger at maternal rejection and report limited parental supervision in childhood (Kolko & Kazdin, 1986; Sakheim & Osborn, 1999). Further, both identified adolescent firesetters and apprehended adult firesetters report a history of childhood physical neglect, physical abuse (Roe-Sepowitz & Hickie, 2011; Root et al., 2008), and sexual abuse (Dickens, Sugarman, Ahmad, Edgar, Hofberg, & Tewari, 2007; Jayaraman & Frazer, 2006; Noblett & Nelson, 2001; Root et al., 2008; Stewart, 1993). Root et al. (2008) conclude that maltreatment (e.g., excessive punishment) in childhood is a risk factor related to increased severity of firesetting.

Childhood adversities and poor developmental experiences are hypothesised to affect attachment and interpersonal relationships later in life (Bowlby, 2005; Rothbard, & Shaver, 1994; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000). Therefore it is not surprising that identified adolescent (Sakheim et al., 1999) and apprehended adult firesetters are noted to have poor interpersonal relationships (Ducat, McEwan, & Ogloff, 2013a; Hurley & Monahan, 1969; Lewis & Yarnell, 1951; Ó Ciardha, Alleyne, Tyler, Barnoux, Mozova, & Gannon, 2015). For example, case studies with adult firesetters in secure hospitals (Bourget & Bradford, 1989; O'Sullivan & Kelleher, 1987) and firesetters in prison (O'Sullivan & Kelleher, 1987) reveal that apprehended adult firesetters are predominantly either single or separated. Further, imprisoned firesetters have been found to report marital problems, poor social relationships with the opposite sex (Hurley & Monahan, 1969), and psychosexual problems (Hurley & Monahan, 1969; Lewis & Yarnell, 1951).

Psychopathological variables

This section of the thesis considers the most prevalent diagnoses associated with identified adolescent and apprehended adult firesetters (for a comprehensive review see Tyler & Gannon, 2012). Studies examining the mental health of identified adolescent firesetters are rare. However, rates of mental health diagnoses amongst identified adolescent firesetters are reported as being 25.8% ($n = 23$ female) and 46.7% ($n = 79$ males), with male adolescent firesetters being more likely to have multiple mental health diagnoses (Roe-Sepowitz & Hickie, 2011). Adolescent firesetters are predominantly reported to have a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD; Roe-Sepowitz & Hickie, 2011), and Conduct Disorder (Repo & Virkkunen, 1997). For example, Repo and Virkkunen, (1997) reported that almost 65% of firesetting offenders (aged 15 to 21) referred for psychiatric diagnosis had a history of Conduct Disorder with aggressive features.

Similarly, relative to non-firesetting offenders, apprehended adult firesetters report increased engagement with mental health services (Ducat, Ogloff, & McEwan, 2013b; Ó Ciardha et al., 2015a). Ducat et al. (2013b) examined the psychiatric histories of 1328 apprehended adult firesetters convicted in Australia between 2000 and 2009, and compared them to non-firesetting offenders ($n = 421$), and matched community controls ($n = 1328$). Relative to non-firesetting offenders ($n = 123$, 29.3%), and community controls ($n = 116$, 8.7%), apprehended adult firesetters were more likely to have been registered with psychiatric services ($n = 491$, 37%). In terms of psychiatric diagnoses, apprehended adult firesetters have been found to frequently report diagnoses of Depression (Ó Ciardha et al., 2015a), ADHD (Ó Ciardha et al., 2015a), Conduct Disorder with aggressive features (Repo & Virkkunen, 1997), psychosis (Lindberg et al., 2005), and Personality Disorders (Bradford, 1982; Ducat et al., 2013b; Ó Ciardha et al., 2015a; Repo, Virkkunen, Rawlings, & Linnoila, 1997). However, although a large number of firesetters are reported to have contact with

mental health services and a psychiatric diagnosis, the majority do not, and therefore it is not the case that all firesetters are mentally ill (Barker, 1994).

Deliberate firesetting offence characteristics

Firesetting committed alone or with other people

Typically, identified adolescent firesetters (Hickle & Roe-Sepowitz, 2010) and apprehended adult firesetters (Molnar, Keitner, & Harwood, 1984; O'Sullivan & Kelleher, 1987) are reported to be solo firesetters. In other words they ignite their fires alone rather than with an accomplice. For example, Hickle and Roe-Sepowitz (2010) reported that nearly two thirds of identified adolescent female firesetters ($n = 69$, 60.5%) report committing firesetting alone. Further, relative to firesetters who ignite fires in a group of two or more, identified adolescent female solo firesetters reported increased suicidal ideation, were more likely to report being in crisis at the time of the firesetting (e.g., as a result of the death of a parent, recent divorce, incidence of abuse, or pregnancy), and were more likely to be from homes characterised by increased instability (e.g., inconsistent caretakers and multiple places of residence; Hickle & Roe-Sepowitz, 2010). Relative to apprehended adult partner firesetters ($n = 71$, 31.6%), apprehended adult solo firesetters ($n = 154$, 68.4%) are reported to have lower levels of social functioning and less consistent presence of a father in the home (Molnar et al., 1984). Further, apprehended adult firesetters igniting fires with a partner are reported to be male, Caucasian, employed, and younger ($M = 25.0$, $SD = 10.25$) compared to solo firesetters ($M = 28.66$, $SD = 11.25$; Molnar et al., 1984).

Distance travelled to commit firesetting

The motives behind apprehended adult firesetting are reported to affect the distance firesetters travel to commit their offence. For example, utilising 56 solved single crime scene

cases; Fritzson (2001) revealed a relationship between the distance travelled to ignite fires, the crime scene features, and the offender's background characteristics. Typically, relative to instrumentally motivated firesetters where fire had a clear function (e.g., firesetting as a reaction to an argument with a partner, a threat, or for revenge), emotionally motivated firesetters (e.g., firesetting as a result of despair or distress) travelled shorter distances. In addition, relative to older firesetters, younger firesetters reported travelling shorter distances and igniting fires closer to home (Fritzson, 2001).

Similarly, the majority of apprehended adult firesetters are also reported to ignite fires close to home (e.g., within a mile, Bradford, 1982; Fritzson, 2001; Rautaheimo, 1989; Wachi et al., 2007), and in particular apprehended adult female firesetters are reported to predominantly target their own property (Bourget & Bradford, 1989; Harmon et al., 1985; Lewis & Yarnell, 1951; Stewart, 1993; Tennent et al., 1971; Wachi et al., 2007).

Motives

Motivations refer to the inner drive, the impulse, or the reason an individual is prompted to ignite a fire. The motivation behind the fire rather than the availability of fire paraphernalia is believed to be predictive of risk (Sakheim et al., 1991). A wide range of motives are reported to underpin firesetting behaviour. Some firesetters report only single motivations, for example, Swaffer and Hollin (1995) report that 94% ($n = 16$) of adolescents charged with a firesetting offence cited only one motivation. Alternatively, other studies reveal that identified adolescents (Kolko & Kazdin, 1991) and apprehended adult firesetters report multiple motivations (Barnoux, Gannon, & Ó Ciardha, 2015; Koson & Dvoskin, 1982). However, assessing motivations is complicated by the fact that motives are reported retrospectively of the firesetting. It is therefore unclear if the reported motivations contributed to the firesetting or are post offence justifications (Ó Ciardha & Gannon, 2012). Nevertheless,

apprehended adult firesetters report a number of common motivations which are discussed in detail below.

Revenge

Revenge is the predominant motive cited by identified adolescent male and female firesetters (Swaffer & Hollin, 1995), apprehended adult male firesetters (Bourget & Bradford, 1989; Gannon, Ó Ciardha, Doley, & Alleyne, 2012; Inciardi 1970; Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Rix, 1994), and apprehended adult female firesetters (Bourget & Bradford, 1989; Harmon et al., 1985; Icové & Estépp, 1987; Rix, 1994; Stewart, 1993, Tennent et al., 1971). For example, Inciardi (1970) reported that 58% ($n = 80$) of apprehended adult male firesetters ignited fires out of revenge such as hatred or jealousy. Using fire as a method of retaliation is reported to be increased if the perpetrator is over 18, non-Caucasian, male, and living in an area characterised by poor housing and transient populations (Pettiway, 1987).

Excitement

Both identified adolescent firesetters (Icové & Estépp, 1987) and apprehended adult firesetters (Icové & Estépp, 1987; Inciardi, 1970; Rix, 1994) are reported to ignite fires in order to create excitement. Inciardi (1970) reports that firesetters igniting fires out of excitement are 'almost always males' (p149) and younger in comparison to revenge firesetters. Similarly, using arrest files, Icové and Estépp (1987) compared the motives of identified adolescent and apprehended adult firesetters and found that creating excitement was a motive predominantly associated with identified adolescent males.

Vandalism

Like excitement motivated firesetters, apprehended firesetters motivated by vandalism are typically reported to be male and either adolescent (Icove & Estep, 1987) or young adults (Australian Government, 2005). However, a small proportion of apprehended adult firesetters in the USA ($n = 5$, 4.1%; Inciardi, 1970) and the UK ($n = 13$, 10%; Rix 1994) also report igniting fires for vandalism.

Economic gain and crime concealment

Rider (1980) speculates that firesetting for profit or material gain occurs in 20% to 30% of all firesetting cases but the number of studies reporting firesetting for profit is substantially lower. For example, studies assessing firesetters' motivations suggest that igniting a fire in order to receive economic gain (e.g., a false insurance claim) are rare (Icove & Estep, 1987; Koson & Dvoskin, 1982; O'Sullivan & Kelleher, 1987) and is a motive associated with apprehended adult firesetters (Inciardi, 1970; Molnar et al., 1984) rather than identified adolescents. Only 7% ($n = 10$) of apprehended adult firesetters in Inciardi's (1970) study reported igniting fires in order to make an insurance claim. These firesetters were male with a higher than average IQ (*Mdn* IQ 110) and experienced substance abuse issues (Inciardi, 1970). However, firesetting for profit is reported to be one of the hardest crimes to detect because these types of fires can be conducted by a 'hired torch' therefore complicating the investigation process (Arson Control Forum, 2003).

Igniting a fire in order to conceal another crime is also reported to be rare (Icove & Estep, 1987; Koson & Dvoskin, 1982; Swaffer & Hollin, 1995). For example, in a sample of identified adolescent firesetters only three (17.6%) reported igniting a fire in order to conceal another crime (Swaffer & Hollin, 1995). Similarly, none of the 26 apprehended adult firesetters in Koson and Dvoskin's (1982) study and only 3% ($n = 13$) of apprehended adult

firesetters in Icové and Estépp's (1987) study report igniting a fire as a method of crime concealment. However, as explained in Chapter 1, in the UK, if a car is stolen and subsequently ignited it is the theft which is recorded and not necessarily the ignition, this may therefore result in an underestimation of firesetting in order to conceal another crime.

Communication

It is hypothesised that firesetters ignite fires as they perceive they cannot control their environment in any other way (Ducat et al., 2013a; Jackson et al., 1987b; Vreeland & Levin, 1980). For example, firesetting can be viewed as a maladaptive coping strategy which provides perpetrators with an effective way to influence a situation (Jackson et al., 1987b), or provides a means of emotional expression in the absence of other communication skills (Ducat et al., 2013a; Vreeland & Levin, 1980). Firesetting as a form of communication is a motive particularly associated with identified adolescent firesetters who have suffered maltreatment and lack the ability to express anger or anxiety appropriately (Root et al., 2008; Sakheim et al., 1991). Apprehended adult firesetters have also been reported to ignite fires as a form of communication (Geller, 1992). For example, 21.9% of a mixed group of detained male and female mentally disordered firesetters ($n = 7$) reported igniting a fire as a 'cry for help' (Tyler, Gannon, Lockerbie, King, Dickens, & De Burca, 2014). However, firesetting for communication is predominantly associated with female firesetters (Dickens et al., 2007; Harmon et al., 1985).

Self-harm and suicide

In Iran, fire is commonly cited as a method used to commit self harm or suicide (i.e., self-immolation; Shakeri et al., 2007). However, using fire as a method of suicide is relatively rare in the Western world and accounts for approximately only 1% of completed suicides

(Squires & Busuttil, 1996). Relative to males, using fire as a form of self injury or suicide is predominantly associated with identified adolescent females and apprehended adult females (O'Sullivan & Kelleher, 1987; Shakeri et al., 2007; Swaffer & Hollin 1995).

However, typically identified adolescent firesetters (Roe-Sepowitz & Hickle, 2011) and apprehended adult firesetters (Jayaraman & Frazer, 2006; McKerracher & Dacre, 1966; Noblett & Nelson, 2001; O'Sullivan & Kelleher, 1987) have a history of self-harm and suicide ideation not encompassing fire. For example, based on pre-trial court report, 50% ($n = 17$) of apprehended adult firesetters were reported to have a general history of self harm (Jayaraman & Frazer, 2006). Furthermore, studies comparing apprehended adult firesetters and homicide offenders highlight that relative to homicide offenders, firesetters more commonly report suicidal ideation and had attempted suicide (Jackson et al., 1987b; Räsänen et al., 1995).

Although some apprehended male firesetters are reported to have suicidal thoughts and incidences of self harm, such ideations are predominantly associated with identified adolescent female firesetters (Roe-Sepowitz & Hickle, 2011) and apprehended adult female firesetters (Bourget & Bradford, 1989). Furthermore, Noblett and Nelson (2001) note that compared to apprehended adult female violent offenders ($n = 10$, 56%), apprehended adult female firesetters ($n = 17$, 85%) were more likely to report a history of self-harm.

Additional motivations

Although rare, apprehended adult male firesetters occasionally report igniting fires for sexual gratification (e.g., sexual pleasure from igniting or watching a fire; Kocsis & Cooksey, 2002; Lewis & Yarnell, 1951; Rice & Harris, 1991). Further reported inclinations by apprehended adults include political motivation (e.g., terrorist attacks and riots; Prins, 1994)

and apprehended adult mentally disordered firesetters report igniting fires as a method of self protection ($n = 2$, 8.7%; Tyler et al., 2014).

However, despite admitting guilt, some apprehended adult firesetters ($n = 6$, 11%) report no apparent reason for their firesetting (O'Sullivan & Kelleher, 1987). Inherent difficulties lie in analysing motives since they are reported retrospectively and are therefore open to misinterpretation, memory failures, or deliberate distortions (Häkkinen, Puolakka, & Santilla, 2004). Further, motives alone do not explain how a combination of developmental, distal, and proximal factors interact and culminate in an incident of firesetting. Thus, comprehensive theories that explain how a host of factors interrelate and result in firesetting are needed to understand the development of this behaviour.

Firesetting theories

There are two main types of theories specifically associated with apprehended firesetting behaviour; single factor theories and multifactor theories (Gannon & Pina, 2010). Single factor theories detail a single factor hypothesised as important in the development of firesetting. In contrast, a multifactor theory offers a more comprehensive overview of firesetting and details a combination of contributory factors.

Single factor theories

In 1932 Freud developed the first single factor theory relating to firesetting. Freud hypothesised that firesetters were sexually interested in fire and ignited fires as a result of repressed sexual urges. However, research supporting this idea is limited and only a few studies have endorsed the idea that firesetters ignite fires for sexual gratification (Kocsis & Cooksey, 2002; Lewis & Yarnell, 1951; Rice & Harris, 1991).

A second type of single factor theory is social learning theory. This theory proposes that firesetting is a 'learnt' behaviour which develops as a result of modelling peers or parents (Bandura, 1976; Macht & Mack, 1968). For example, increased exposure to fire and inappropriate learning experiences with fire are reported to be risk factors for deliberate firesetting (Gannon et al., 2012). Gannon and Pina (2010) note that fire interest, revenge, and igniting fires as a 'cry for help' all fit well with social learning theory as an individual learns that fire is a suitable method to satisfy a particular need. However, social learning theory does not consider the full suite of social, environmental, biological, or psychological influences.

Multifactor theories

Multifactor theories provide a more holistic way of looking at firesetting behaviour. Until recently only two multifactor theories had been developed to explain deliberate firesetting; *Dynamic Behaviour Theory* (Fineman, 1980; 1995) and *Functional Analysis Theory* (Jackson, 1987b). Both theories considered deliberate firesetting to result from a combination of drivers (i.e., development and background factors, ineffective social skills, intoxication) and reinforcers (i.e., peer influence, increased attention). However, both theories lack explicit information or empirical validation regarding the cognitions, and interaction of factors which facilitate or reinforce firesetting (i.e., why do firesetters explicitly choose to offend with fire? Gannon et al., 2012; Gannon & Pina, 2010). Furthermore, these theories do not adequately consider the contribution of mental health (Gannon & Pina, 2010).

More recently, the *Multi-Trajectory Theory of Adult Firesetting* was developed to address the limited explanatory depth of previous multifactor theories (*M-TTAF*; Gannon et al., 2012). The *M-TTAF* is a detailed and comprehensive multifactor theory of apprehended adult firesetting developed using the process of theory knitting (Kalmar & Sternberg, 1988). Theory knitting integrates the strongest aspects of existing theories with new aspects (i.e.,

empirical evidence and clinical expertise) to produce a comprehensive multifactor theory of firesetting. The *M-TTAF* builds on previous firesetting theories (e.g., single and multifactor firesetting theories) and hypothesises that firesetting occurs as a result of multiple factors such as developmental, biological, cultural, social learning, and contextual factors. It is this interaction of factors which lead to psychological vulnerabilities such as inappropriate interest in fire, offence supportive cognitions, emotional regulation issues, and communicative difficulties. The *M-TTAF* hypothesises that firesetters follow differing prototypical trajectories (e.g., *Antisocial*, *Grievance*, *Fire Interest*, *Emotionally Expressive and Need for Recognition*, and *Multi-faceted*), therefore acknowledging that differing combinations of factors contribute to the development and persistence of firesetting behaviour. Further, the *M-TTAF* is the first theory of its kind to consider apprehended adult firesetters in detail. The integration of current theory, typologies, and research experience has resulted in a comprehensive firesetting theory, and has highlighted that firesetters are heterogeneous with different motives and modus operandi. In addition, the *M-TTAF* acknowledges specific vulnerabilities associated with firesetting behaviour and provides five key trajectories or prototypical firesetters based on the empirical literature. Each trajectory along with relevant empirical evidence is presented in detail below.

Antisocial cognitions trajectory

The first of the *M-TTAF* trajectories, *Antisocial cognitions trajectory*, refers to apprehended adult firesetters with general antisocial cognitions, antisocial peers, and antisocial and criminal behaviour. Antisocial cognitions are likely to be generalised and not necessarily fire related, however, fire may be a convenient option at the time (Gannon et al., 2012). The *Antisocial cognitions trajectory* was developed in accordance with the identified adolescent and apprehended adult firesetting literature, which suggests an association

between firesetting and antisocial behaviour (Britt, 2011; Doley, Fineman, Fritzon, Dolan, & McEwan, 2011; Kolko, Kazdin, & Mayer, 1985; Stickle & Blechman, 2002). For example, identified firesetting children (Dadds & Fraser, 2006), identified adolescent firesetters (Dolan, McEwan, Doley, & Fritzon, 2011; Kolko, 1985; Roe-Sepowitz & Hickie, 2011), and apprehended adult firesetters (O'Sullivan & Kelleher, 1987) are reported to engage in antisocial and delinquent behaviour.

Relative to non-firesetting offenders, apprehended adult firesetters are reported to have poor impulse control (Ducat et al., 2013a; Ó Ciardha et al., 2015a; Räsänen et al., 1995). Furthermore, the difference between firesetters and non-firesetters has been hypothesised to be related to their general criminality (Gannon & Pina, 2010). For example, apprehended adult firesetters are reported to be versatile offenders with varied criminal repertoires (Alexander, Chester, Green, Gunaratna, & Hoare, 2015; Bourget & Bradford, 1989; Ducat et al., 2013a; Hagenauw, Karsten, Akkerman-Bouwsema, de Jager, & Lancel, 2015; Jayaraman & Frazer, 2006; Muller, 2008; Repo et al., 1997; Rice & Harris, 1996; Soothill, Ackerley, & Francis, 2004). Specifically, apprehended adult firesetters are reported to commit other non-violent crimes such as property offences, theft, and traffic related offences (Hollin, Davies, Duggan, Huband, McCarthy, & Clarke, 2013; Jayaraman & Frazer, 2006; Repo et al., 1997).

Antisocial behaviour may also be influenced by substance abuse. Studies assessing substance abuse problems (e.g., alcohol and/or drug abuse) are lacking in the identified adolescent population, however substance abuse is repeatedly included in the apprehended adult firesetting literature (Bradford, 1982; Jayaraman & Frazer, 2006; Molnar et al., 1984; Räsänen et al., 1995; Saunders & Awad, 1991). For example, relative to homicide offenders, firesetters referred for forensic psychiatric examination were more likely to be inebriated at the time of the offence (Räsänen et al., 1995). Similarly, Ritchie and Huff (1999) reported

that 64% ($n = 181$) of apprehended adult firesetters were abusing alcohol or drugs at the time of firesetting.

Grievance trajectory

The second *M-TTAF* trajectory, *Grievance trajectory*, refers to individuals who ignite fires out of a need to exact revenge and typically have anger and aggression issues. Such individuals are hypothesised to have communication deficits and view fire as an appropriate means to settle a grievance. Professionals report that revenge is the most commonly reported motive amongst apprehended adult firesetters, with around a third of firesetters reporting this as the motivation behind their firesetting (Smith & Short, 1995; Ritchie & Huff, 1999; Rix, 1994). Further, Gannon et al. (2013b) found that adult male imprisoned firesetters self-reported significantly higher levels of physiological and cognitive experiences of anger (e.g., rumination) as well as significantly higher levels of provocation relative to other imprisoned males. However, relative to apprehended adult violent offenders, apprehended adult firesetters are reported to be less assertive and have lower incidences of interpersonal aggression (Jackson et al., 1987b; Noblett & Nelson, 2001). In addition, apprehended adult firesetters typically avoid contact with their intended victim and thus firesetting is hypothesised to represent a suitable means to settle a grievance without directly confronting people (Kocsis & Irwin, 1997; Noblett & Nelson, 2001).

Fire interest trajectory

The third *M-TTAF* trajectory, *Fire interest trajectory*, relates to firesetters who have an interest or fascination in fire and/or fire paraphernalia. Fires may provide sensory or affective stimulation and are therefore typically ignited for pleasure or exhilaration. Furthermore, increased exposure to fire and inappropriate learning about fire are

hypothesised to be risk factors in deliberate firesetting (Gannon et al., 2012). For example, in identified and apprehended firesetting populations, fire interest and fire fascination are repeatedly correlated with firesetting in adolescence (Doley, 2009; Gallagher-Duffy, Mackay, Duffy, Sullivan-Thomas, & Peterson-Badali, 2009; Kennedy, Vale, Khan, & McAnaney, 2006; MacKay, Henderson, Del Bove, Marton, Warling, & Root, 2006; Sakheim, Osborn, & Abrams, 1999) and apprehended firesetting in adulthood (Dickens, Sugarman, Edgar, Hofberg, Tewari, & Ahmad 2009; Gannon et al., 2013b; Rautaheimo, 1989; Rice & Harris, 1991, 1996; Tyler et al., 2015).

Ó Ciardha et al. (2015c) report that four factors significantly differentiate imprisoned adult firesetters from imprisoned non-firesetting offenders. Relative to non-firesetting offenders, firesetters are more likely to identify with fire (i.e., the firesetter believes fire is part of their psychological make-up), experience serious fire interest (i.e., excitement around potentially dangerous and destructive fires), hold the belief that firesetting is normal (i.e., the belief that igniting a fire or being accused of igniting a fire is normal), and are more likely to perceive themselves as lacking fire safety knowledge.

It has been argued that a fascination with fire is universal (Jackson, 1994). However, firesetting is not simply a case of excessive fascination; if it were, firesetters might simply ignite small, non-life threatening fires. However, as Bradford (1982) notes, a large number of firesetters (80%) choose to ignite property. Property fires have increased risk of endangering life and therefore a simple love of fire cannot account for this type of behaviour.

Nevertheless, relative to identified adolescent firesetters with low levels of fire interest, firesetters with higher levels of fire interest are reported to ignite more severe fires, and appear increasingly likely to be recidivistic with fire within an 18 month follow up period (MacKay et al., 2006).

In addition to overtly reporting fire interest, apprehended adult firesetters are reported to hold implicit beliefs around fire. In other words, an individual is influenced by unconscious cognitive processes that guide or facilitate firesetting behaviour (Ward, 2000). For example, Ó Ciardha and Gannon (2012) hypothesise that apprehended adult firesetters are guided by five implicit theories; *Dangerous World*, *Normalisation of Violence*, *Fire is Fascinating or Exciting*, *Fire is a Powerful tool*, and *Fire is Controllable*. Ó Ciardha and Gannon (2012) explain that the first two implicit theories are generalised and are applicable to other types of offending (e.g., sex offending) as well as firesetting. For example, individuals holding the belief in a *Dangerous World* are hypothesised to view the world as an inherently dangerous place where it is unsafe to trust others. Individuals holding the *Normalisation of Violence* implicit theory, are hypothesised to believe that violence is a normal, suitable, and acceptable way to resolve grievances. However, the remaining three implicit theories (*Fire is Fascinating or Exciting*, *Fire is a Powerful Tool*, *Fire is Controllable*) are hypothesised to be specifically relevant to firesetters. Individuals holding these three implicit theories are hypothesised to view fire as fascinating, exciting, and powerful, and have the false understanding that fire is controllable. Firesetters may not necessarily ignite fires in order to cause damage but in order to satisfy a need, to create excitement, or to send a clear message. Apprehended adult firesetters may not hold all five implicit theories. However, it is hypothesised that recidivistic firesetters are likely to hold stronger fire related implicit beliefs. The existence of implicit theories in firesetting populations is a new avenue of research and therefore empirical evaluation is in its infancy.

Emotionally expressive and need for recognition trajectory

The fourth *M-TTAF* trajectory refers to *Emotionally expressive and need for recognition* firesetters. Both types of firesetters are hypothesised to have communication and

problems solving deficits. However, emotionally expressive firesetters are also hypothesised to be impulsive and ignite fires 'as a cry for help' (e.g., using fire as a form of self-harm). Need for recognition firesetters also use fire as a form of communication but in order to gain status. Such firesetters typically avoid being identified as the firesetter but instead may receive 'hero status' after extinguishing a fire or averting others from danger.

This trajectory was developed based on literature reporting that apprehended adult firesetters tend to have low levels of assertiveness, and poor communication and interpersonal skills (Jackson et al., 1987b; Rice & Chaplin, 1979; Rice & Harris, 1991). Further, relative to non-firesetters, both identified adolescent and apprehended adult firesetters are noted to have poor relations with others, poor social networks and experience feelings of isolation, loneliness and shyness (Leong, 1992; Hagenauw et al., 2015; Palmer & Hollin, 1999; Ritchie & Huff, 1999; Sakheim et al., 1991)

Geller (1992) suggests that firesetting is a good channel of expression for firesetters as it allows them to reduce tension and provoke change in a non-confrontational manner. Recent research provides some support for this, for example, Tyler et al. (2014) found that 30% ($n = 7$) of their sample of detained male and female mentally disordered firesetters reported setting a fire as a way to communicate a desire, wish, or need for help.

Multi-faceted trajectory

The final *M-TTAF* trajectory encompasses firesetters with at least two key clinical issues. For example, Gannon et al. (2012) hypothesise that a combination of antisocial behaviour and fire interest are risk factors for firesetting. The *Multi-faceted trajectory* was developed using the identified and apprehended firesetting literature highlighting a correlation between fire interest and antisocial behaviour (Doley et al., 2011; MacKay et al., 2006). For example, Stickle and Blechman (2002) hypothesise that identified adolescent

firesetting is a development of more serious antisocial behaviour. It is perhaps a combination of fire interest and general antisocial behaviour which leads to more extreme and recidivistic firesetting. Therefore, firesetters may require both lengthy firesetting interventions and general behaviour modification to reduce both antisocial behaviour and fire interest.

Summary

The vast majority of firesetting research has been conducted with apprehended populations. Both identified adolescent firesetters and apprehended adult firesetters are typically reported to be male and share common characteristics. For example, both identified adolescent and apprehended adult firesetters report disturbed childhoods, a background characterised by abuse (e.g., neglect, physical abuse, and/or sexual abuse), poor social relationships, and hostile and aggressive behaviour. In addition, identified adolescent firesetters specifically report limited parental supervision and low parental care. Typically both identified adolescent and apprehended adult firesetters ignite their fires alone, close to home, and cite revenge as the predominate motive behind firesetting. Additionally, identified adolescent firesetters are motivated by vandalism, whilst apprehended adult firesetters are motivated by economic gain and crime concealment. Apprehended adult firesetters also tend to have poor educational outcomes, are reported to be criminally versatile, and relative to non-firesetters, have increased engagement with mental health services, suicidal ideation, and more diagnoses of Personality Disorder and Conduct Disorder.

Whilst sociodemographic variables, psychopathology, offence characteristics, motives, psychological characteristics and vulnerabilities offer a picture of a 'typical' identified or apprehended deliberate firesetter these factors may not be representative of all firesetters. Apprehended firesetters represent only one group of firesetters, and as highlighted in Chapter 1, the majority of deliberate firesetters remain un-apprehended. Therefore, Chapter

3 considers the limited literature associated with un-apprehended firesetters who have not come to the attention of the authorities, and compares the characteristics of apprehended and un-apprehended firesetters.

Chapter 3

Un-apprehended Firesetters: The Story so Far

Introduction

The preceding chapter evaluated the sociodemographic and developmental variables, psychopathological features, motives, offence characteristics, theory, and firesetting vulnerabilities associated with identified adolescent and apprehended adult firesetters. However, as noted in Chapter 1, relatively few firesetters are formerly identified or apprehended and therefore such firesetters are by no means representative of all firesetting populations. The following chapter considers individuals who have self-reported igniting a deliberate fire but who have not been formerly convicted or identified by the authorities (e.g., Police, Fire Services, or fire related therapy services) and are referred to throughout this thesis as un-apprehended firesetters. Similarly to Chapter 2, due to the paucity of research in the area both the literature pertaining to adult and adolescent un-apprehended firesetters will be discussed.

To note, the majority of the un-apprehended adolescent firesetting research is part of larger studies measuring other constructs (e.g., aggression, conduct issues; Chen, Arria, & Anthony, 2003; Del Bove, Caprara, Pastorelli, & Paciello, 2008; Martin et al., 2004; McCarty & McMahan, 2005) and not specifically designed to evaluate firesetting behaviour. As a result, firesetting is often only assessed using a single question (e.g., *I have set fires/ I set fires*, Chen et al, 2003; Del Bove et al., 2008). A single item limits the conclusions that can be drawn about the motivations underpinning firesetting (e.g., firesetting as a result of curiosity, enjoyment, a love of fire, or retaliation). Furthermore, there is a lack of information pertaining to sociodemographic and developmental variables, psychopathology, offence

characteristics, motivations, or the psychological characteristics of un-apprehended adolescent and adult firesetters. Thus, the research is severely underdeveloped.

Prevalence

The majority of un-apprehended firesetting research centres on adolescent firesetters, with firesetting prevalence rates reported from 6.3% to 27% in this population (Chen et al., 2003; Del Bove et al., 2008; Martin et al., 2004; MacKay, Paglia-Boak, Henderson, Marton, Adlaf, 2009; McCarty & McMahon, 2005; Perrin-Wallqvist & Norlander, 2003). For example, Martin et al. (2004) investigated the relationship between firesetting and antisocial behaviour in a cross-sectional study of Australian students with an average age of 13 years ($n = 2482$). An adapted delinquency questionnaire was utilised to assess Conduct Disorder and the affirmative response to the single question, *I have set fire to things in public places just for fun*, classified individuals as firesetters. However, the research is limited due to the single item assessing firesetting which lacks clarity, and although Martin et al. intended to establish a *mischievous intent*, the question could have been misinterpreted as referring to fires ignited in public places for social events (e.g., barbeques or bonfires). Furthermore, there is a lack of information pertaining to the frequency or severity of the firesetting.

In order to elicit detailed firesetting information other researchers have included more specific questions relating to firesetting behaviour (Mackay et al., 2009; Perrin-Wallqvist & Norlander, 2003). For example, Mackay et al. (2009) elicited detailed information utilising the open-ended question, *in the last 12 months, how many times have you set something on fire that you weren't supposed to?* Furthermore, firesetters responded to the question *how old were you the first time you played with matches or lighters, or burned something that you weren't supposed to?* with either (1) *never played with matches or lighters*, (2) *5 years old or younger*, (3) *between 6 and 9 years old*, or (4) *10 years old or older*. Participants' responses

enabled Mackay et al. to establish the level of firesetting behaviour. Twenty-seven percent ($n = 1,119$) of the adolescents (aged 11 to 19 years) ignited a fire in the preceding 12 months and were further classified into low frequency firesetters (one or two firesetting episodes; $n = 575$, 20.7%) and high frequency firesetters (3 or more episodes; $n = 544$, 19.6%).

Only a relatively small amount of research has been conducted with un-apprehended adult firesetters. Like the majority of un-apprehended adolescent firesetting research, the first of these studies was part of the USA National Epidemiologic Survey on Alcohol and Related Conditions and not specifically designed to detail firesetting behaviour (*NESARC*; Blanco et al., 2010; Vaughn et al., 2010). Within this nationally representative survey - which was conducted face to face - participants who responded positively to the question *in your entire life, did you ever start a fire on purpose to destroy someone else's property or just to see it burn?* were classified as firesetters. Using this definition, the prevalence rate of deliberate firesetters living in the USA community was estimated to be 1 to 1.13% (Blanco et al., 2010; Vaughn et al., 2010) with the majority of firesetting being reported during adolescence (i.e., ≤ 15 years; Blanco et al., 2010).

Within the *NESARC* research, the single question relating to firesetting is extremely vague and could have resulted in some respondents identifying childhood experimentation with fire as meeting the criteria for starting a fire *on purpose to destroy someone else's property or just to see it burn* (Dickens & Sugarman, 2012). Furthermore, since interviews were conducted face to face, respondents may have been reluctant to answer questions truthfully for fear of reprisals (Dickens & Sugarman, 2012; Gannon & Barrowcliffe, 2012). It is also unclear from the *NESARC* data what types of fires were ignited, how severe the fires were, or whether the respondent was ever formally apprehended for their actions. In addition, variables strongly associated with apprehended firesetters (e.g., fire interest; Dickens et al., 2009; Gannon et al., 2013b) were not included.

Gannon and Barrowcliffe (2012) set out to rectify some of the limitations of the *NESARC* research through assessing the prevalence and characteristics of un-apprehended UK firesetters. They met with University and community individuals ($n = 158$; 109 female) face to face yet attempted to reduce social desirability through ensuring participants placed their responses in an unlabelled envelope to protect anonymity. The study instructions explicitly requested participants to report fires ignited to *annoy other people, to relieve boredom, to create excitement, for insurance purposes due to peer pressure, or to get rid of evidence*, and requested that certain types of fires (i.e., *fires set before the age of 10 years¹, ignited accidentally, or as part of organised events such as bonfires*) should not be reported. Participants indicating they had ignited a deliberate fire were then asked to report detailed information about the fire, (e.g., the motive behind ignition, the number of ignition points, and the firesetting paraphernalia used).

In addition, all participants completed measures designed specifically for the purpose of the study; the *Fire Setting Scale (FSS)* and the *Fire Proclivity Scale (FPS)*. The *FSS* comprises of two subscales measuring *fire interest* and *antisocial behaviour*. The *FPS* contains six hypothetical firesetting scenarios (with varying degrees of severity) designed to measure firesetting proneness or proclivity. The *FPS* requires participants to imagine themselves as the perpetrator in each of the firesetting scenarios, and rate their likelihood of *fire fascination, behavioural propensity to act similarly, arousal, and general antisocialism* in relation to each scenario. Both scales are reported in full in Appendix 2 and 3 respectively.

The prevalence rate of un-apprehended deliberate firesetters using this methodology was 11% ($n = 18$). However, the key limitation of this UK research is that participants were predominantly university students with females overrepresented, therefore limiting the

¹This study along with the studies conducted as part of this thesis consider acts of deliberate firesetting where the perpetrator possessed the capability to understand their actions. In the UK children under 10 cannot receive a criminal conviction (Gov.UK, 2015) and therefore the law assumes that such children are too young to understand that they are doing wrong.

conclusions that could be drawn regarding the characteristics of un-apprehended firesetters. As the data pertaining to un-apprehended adolescent and un-apprehended adult firesetters is limited it is not possible to comment in detail on the factors related to firesetting (i.e., psychopathological features, motives, offence characteristics) or firesetting recidivism. Nevertheless, some key characteristics relating to un-apprehended adolescent firesetters and un-apprehended adult firesetters are described in detail below.

Sociodemographic and developmental variables

Similarly to the apprehended firesetter literature explored in the preceding chapter, the majority of un-apprehended firesetters are reported to be male (Blanco et al., 2010; Chen et al., 2003; Mackay et al., 2009; Martin et al., 2004; Perrin-Wallqvist & Norlander, 2003; Vaughn et al., 2010). For example, utilising a nationally representative sample of adolescents in the USA ($n = 4595$), Chen et al. (2003) report that 8.4% of males and 4.2% of females ignited a fire with higher prevalence rates for Caucasians 6.9% versus non-Caucasians 4.8%. Similarly, in the *NESARC* study, firesetters ($n = 407$) were compared to non-firesetters ($n = 41,552$) on key socio-demographic factors. The majority of un-apprehended firesetters in the *NESARC* study were male. Specific risk factors for firesetting included: being US born and receiving a high annual income ($> \$70,000$; Blanco et al., 2010; Vaughn et al., 2010).

Intelligence and level of education were not reported in the *NESARC* study. However, in contrast to the apprehended literature stating that apprehended firesetters tend to have low IQ and poor educational status (Bradford, 1982; Harmon et al., 1985; Lewis & Yarnell, 1951; Rautaheimo, 1989) all of the un-apprehended UK firesetters were educated to at least GCSE level (Gannon & Barrowcliffe, 2012), therefore suggesting that un-apprehended firesetters possess sufficient levels of intelligence to evade detection.

Both identified adolescent firesetters (Root et al., 2008) and un-apprehended adolescent firesetters report low parental care and physical abuse (Martin et al., 2004).

Similarly, both identified adolescent firesetters (Kolko & Kazdin, 1986) and un-apprehended adolescent firesetters (McCarty & McMahon, 2005) report limited parental supervision. The preceding chapter also highlighted that both identified adolescent and apprehended adult firesetters (Bourget & Bradford, 1989; Ducat et al., 2013a; Hurley & Monahan, 1969; Lewis & Yarnell, 1951; Ó Ciardha et al., 2015a; Räsänen et al., 1995; Sakheim et al., 1991) have issues with social competency and relationship issues. The *NESARC* study also reports that being unmarried is a risk factors for un-apprehended firesetting (Blanco et al., 2010; Vaughn et al., 2010).

In the UK, a comparison of un-apprehended firesetters and non-firesetters on sociodemographic and historical variables (e.g., age, number of siblings, from single parent households) elicited few notable differences (Gannon & Barrowcliffe, 2012). However, social learning theory (Bandura, 1976; Macht & Mack, 1968) hypothesises that firesetting is a learnt behaviour, and is therefore influenced by being exposed to a fire related learning experience (Gannon et al., 2012; Kolko & Kazdin, 1986), such as knowing someone who has ignited a fire, recently watching a film, reading a book about fire (Stewart, 1993), or having a father employed in a fire related job (Macht & Mack 1986). Similarly, over half (56%, $n = 10$) of UK un-apprehended firesetters reported awareness that a family member had also deliberately ignited a fire (Gannon & Barrowcliffe, 2012). However, this figure is likely to be an underrepresentation as individuals are unlikely to be privy to the full extent of their parent's behaviour.

Psychopathological variables

Both identified adolescent firesetters (Roe-Sepowitz & Hickie, 2011) and apprehended adult firesetters are reported to exhibit a high prevalence of mental health issues (Ducat et al., 2013b; Räsänen et al., 1995; Ó Ciardha et al., 2015a; Tyler & Gannon, 2012). Similarly, un-apprehended adolescent firesetters are most often reported to have Conduct Disorder (Martin et al., 2004). Blanco et al. (2010) report that relative to non-firesetters ($n = 41,552$), un-apprehended firesetters ($n = 407$) are more likely to report engagement with mental health services and DSM-IV diagnoses of Antisocial Personality Disorder (ASPD; 3.2% and 51.5% respectively). Bipolar disorder ($n = 94$, 23.0%) and pathological gambling ($n = 11$, 2.7%) were also strongly associated with firesetting following statistical adjustments for sociodemographic factors (Blanco et al., 2010). However, in Gannon and Barrowcliffe's (2012) self-report study, non-firesetters and UK un-apprehended firesetters could not be significantly differentiated in terms of psychiatric illness but relative to non-firesetters ($n = 2$, 1.4%), significantly more firesetters ($n = 2$, 11.1%) reported a behavioural problem diagnosis. However, to date there is a general dearth in the research literature pertaining to the psychopathology of un-apprehended firesetters.

Deliberate firesetting offence characteristics

Due to the lack of research pertaining to un-apprehended firesetters the data is restricted and therefore full comparisons between un-apprehended firesetters and their apprehended counterparts cannot be made. Nevertheless, in Gannon and Barrowcliffe's (2012) UK study, un-apprehended firesetters were requested to disclose detailed offence characteristics. The majority of firesetters reported igniting their fires using only one ignition point ($n = 9$, 81.8%). In addition, the majority of firesetters ignited *countryside, grass, leaves, or shrubbery* ($n = 6$, 33.3%), or *ignited empty or derelict buildings* (e.g., *a garage, shed, or*

beach hut, $n = 5$, 27.8%). Similarly, un-apprehended adolescent firesetters in Sweden typically self-report igniting grass (Perrin-Wallqvist & Norlander, 2003).

Firesetting committed alone or with other people

Identified adolescent firesetters (Hickle & Roe-Sepowitz, 2010) and apprehended adult males (Molnar et al., 1984; O'Sullivan & Kelleher, 1987) are most often reported to conduct their firesetting alone. However in contrast, the majority of UK un-apprehended firesetters reported igniting their fire(s) with other people ($n = 12$, 92.3%; Gannon & Barrowcliffe, 2012). It is unclear why this is the case and this could be related to the motives behind firesetting. For example, apprehended firesetters are predominantly reported to ignite fires for revenge (Gannon et al., 2012; Koson & Dvoskin, 1982; Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Rix, 1994; Swaffer & Hollin, 1995) which is perhaps a solo activity. In comparison, none of the UK un-apprehended firesetters reported igniting fires for revenge but were instead motivated by boredom, excitement, peer pressure, rebellion, and for a joke (Gannon & Barrowcliffe, 2012) which are perhaps more group orientated motivations.

Distance travelled to commit firesetting

Detailed offence characteristics have not been included in the majority of un-apprehended firesetting studies. However, in line with the literature associated with apprehended firesetters (Bradford, 1982; Fritzson, 2001; Rautaheimo, 1989; Wachi et al., 2007), un-apprehended firesetters in Gannon and Barrowcliffe's (2012) UK study reported igniting fires within walking distance (i.e. less than a mile away) from their home ($n = 7$, 63.6%).

Motives

Many of the studies concerned with un-apprehended firesetters only included a single question to ascertain firesetting (Chen et al., 2003, Del Bove et al., 2008; Martin et al., 2004) and further studies (e.g., the *NESARC* study) did not request firesetters to comment on their motivations, and therefore the information pertaining to motives is limited. However, in Gannon and Barrowcliffe's (2012) UK research the majority of un-apprehended firesetters ($n = 16$, 89%) indicated they had ignited fire(s) during adolescence (10 to 19 years) due to boredom, peer pressure, to express feelings, or for excitement. Unlike the literature associated with identified adolescent firesetters (Swaffer & Hollin, 1995), and apprehended adult firesetters (Gannon et al., 2012; Koson & Dvoskin, 1982; Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Rix, 1994; Swaffer & Hollin, 1995) none of the UK un-apprehended firesetters indicated that revenge was a motive for firesetting (Gannon & Barrowcliffe, 2012).

Igniting fires in order to create excitement or for vandalism are motivations predominantly associated with younger apprehended male firesetters (Icove & Estep, 1987; Inciardi, 1970). Although Gannon and Barrowcliffe (2012) did not report the gender breakdown in relation to igniting fires for excitement, 44.4% ($n = 8$) of un-apprehended firesetters ignited a fire as a result of boredom and two firesetters (11.1%) ignited a fire to create excitement. Further motivations included, curiosity ($n = 1$, 11.1%), igniting a fire for a joke ($n = 1$, 11.1%), and firesetting in order to rebel ($n = 1$, 11.1%; Gannon & Barrowcliffe, 2012). Similarly, Perrin-Wallqvist and Norlander (2003) report that un-apprehended adolescent firesetters self report being predominantly motivated by curiosity and distraction.

Igniting fires as a result of peer pressure appears to be relatively rare in the apprehended adult literature and is a motivation most often associated with younger apprehended firesetters (Molnar et al., 1984; Swaffer & Hollin, 1995). Gannon and Barrowcliffe (2012) report that only 11.1% ($n = 2$) of un-apprehended UK firesetters reported

igniting a fire as a result of peer pressure. Furthermore, as explained in Chapter 2 it is rare for apprehended firesetters to officially report motivations relating to economic gain (e.g., a false insurance claim; Icové & Estépp, 1987; Koson & Dvoskin, 1982; O'Sullivan & Kelleher, 1987), or concealment of crime (Icové & Estépp, 1987; Koson & Dvoskin, 1982). Similarly, none of the un-apprehended firesetters reported igniting a fire in order to gain financially, and just one un-apprehended firesetter (5.6%) reported igniting a fire in order to destroy evidence (Gannon & Barrowcliffe, 2012).

Self-harm and suicide

Typically, apprehended adult firesetters are reported to have a history of self harm or suicidal ideation (Jayaraman & Frazer, 2006; McKerracher & Dacre, 1966; Noblett & Nelson, 2001; O'Sullivan & Kelleher, 1987). Similarly, firesetting is associated with suicidal thoughts and suicidal plans for both male and female un-apprehended Australian adolescents ($n = 2596$, $M = 13$ years; Martin et al., 2004). For example, Martin et al. (2004) report that un-apprehended adolescent male firesetters ($n = 153$) were more likely to have suicidal thoughts ($n = 61$, 40%) and suicidal plans ($n = 41$, 27%) compared to adolescent male non-firesetters ($n = 183$, 15%; $n = 73$, 6% respectively). Similarly, un-apprehended adolescent female firesetters ($n = 35$) were also more likely to have suicidal thoughts ($n = 25$, 70%) and suicidal plans ($n = 12$, 35%) compared to adolescent female non-firesetters ($n = 73$, 6%; $n = 150$, 14% respectively; Martin et al., 2004). However, in the UK, non-firesetters ($n = 9$, 6.4%), and un-apprehended firesetters ($n = 2$, 11.1%) were statistically similar in their reports of suicide attempts (Gannon & Barrowcliffe, 2012).

Additional motivations

The association of sexual motivations and firesetting are rare within the apprehended firesetter literature (Kocsis & Cooksey, 2002; Lewis & Yarnell, 1951; Rice & Harris, 1991). Similarly, none of the UK un-apprehended firesetters reported being sexually motivated to ignite fires (Gannon & Barrowcliffe, 2012).

The research pertaining to apprehended firesetters, highlights that despite admitting guilt some firesetters do not provide reasons for firesetting ($n = 6$, 11%; O'Sullivan & Kelleher, 1987). Similarly, two un-apprehended firesetters (11.1%) did not provide motivations for their firesetting (Gannon & Barrowcliffe, 2012).

Firesetting theories

The firesetting theories discussed in the previous chapter were developed utilising information from identified and apprehended firesetters. As explained in the previous chapter, Gannon et al. (2012) hypothesise that firesetters follow typical trajectories (*M-TTAF*; e.g., *Antisocial cognitions trajectory*, *Grievance trajectory*, *Fire interest trajectory*, *Emotionally expressive and need for recognition trajectory*, or the *Multi-faceted trajectory*). However, these trajectories have not been explicitly applied to un-apprehended firesetters. Nevertheless, the *M-TTAF* offers a basis to also explain the key vulnerabilities associated with un-apprehended firesetting populations which are detailed below.

Antisocial cognitions trajectory

Like their apprehended counterparts (Dolan et al., 2011; Kolko et al., 1985) un-apprehended firesetters are reported to be generally antisocial (Blanco et al., 2010; Del Bove et al., 2008; Gannon & Barrowcliffe, 2012; Martin et al., 2004). Antisocial behaviour is associated with general criminality. For example, apprehended firesetters are reported to have

varied criminal repertoires (Alexander et al., 2015; Bourget & Bradford, 1989; Ducat et al., 2013a; Hagenauw et al., 2015; Jayaraman & Frazer, 2006; Muller, 2008; Repo et al., 1997; Rice & Harris, 1996; Soothill et al., 2004). Similarly, relative to non-firesetters, un-apprehended firesetters are also more likely to participate in a variety of criminal behaviours such as robbery, mugging or purse-snatching, harassing, threatening, and blackmail (Blanco et al., 2010). Although, relative to non-firesetters ($n = 2$, 1.4%), UK un-apprehended firesetters ($n = 1$, 5.6%) could not be differentiated in terms of convictions for violent offences, un-apprehended firesetters had significantly more vandalism related convictions ($n = 2$, 11.1%) compared to non-firesetters ($n = 2$, 1.4%; Gannon & Barrowcliffe, 2012).

In the previous chapter antisocial behaviour was hypothesised to be associated with substance abuse (Bradford, 1982; Harmon et al., 1985; Jayaraman & Frazer, 2006; Räsänen et al., 1995; Ritchie & Huff 1999; Saunders & Awad, 1991). Similarly, firesetting in un-apprehended populations has been associated with both alcohol abuse (Blanco et al., 2010) and drug abuse (Blanco et al., 2010; Mackay et al., 2009; Martin et al., 2004). Blanco et al. (2010) report that of their 407 un-apprehended firesetters, 80.4% had a substance use disorder; 27.4% had a history of alcohol abuse, 44.3% were alcohol dependent, 26.3% abused drugs, and 22.2% reported being drug dependent. These figures were significantly higher compared to the 41,552 non-firesetting members of the general population (38.2% had a substance use disorder; 17.8% had a history of alcohol abuse, 12.2% alcohol dependent, 7.6% abused drugs, and 2.4% reported being drug dependent). It is possible that firesetters who are under the influence are less able to evade detection and this offers an explanation as to why none of the un-apprehended UK firesetters reported being under the influence of alcohol or drugs during ignition (Gannon & Barrowcliffe, 2012).

Grievance trajectory

As explained in the motives section of this chapter only a limited number of studies have reported the motivations of un-apprehended firesetters. Unlike the apprehended literature, un-apprehended firesetters do not report being motivated by revenge or retaliation (Gannon & Barrowcliffe, 2012). However, relative to non-firesetters, identified adolescent firesetters (Sakheim et al., 1991) and apprehended adult firesetters are found to have high levels of aggression (Hagenauw et al., 2015). Similarly, relative to non-firesetting adolescents ($n = 4,207$), un-apprehended adolescent firesetters ($n = 284$) are also reported to have higher levels of aggression (Chen et al., 2003). Un-apprehended adolescents with a combination of moderate-to-high levels of aggression, shyness, and feelings of peer rejection are estimated to be 13.1 times more likely to be firesetters (Chen et al., 2003).

Furthermore, both apprehended adult firesetters (Ducat et al., 2013; Ó Ciardha et al., 2015a; Räsänen et al., 1995) and un-apprehended firesetters are reported to have issues with impulse control (Blanco et al., 2010). For example, relative to non-firesetters, firesetters in the *NESARC* study were reported to have disorders typically associated with deficits in impulse control (e.g., drug dependence and pathological gambling; Blanco et al., 2010).

Fire interest trajectory

Fire interest was highlighted in Chapter 2 as a factor associated with both identified and apprehended firesetting in adolescence (Doley, 2009; Gallagher-Duffy et al., 2009; Kennedy et al., 2006; MacKay et al., 2006; Sakheim et al., 1991) and adulthood (Dickens et al., 2009; Gannon et al., 2013b; Rautaheimo, 1989; Rice & Harris, 1991, 1996; Tyler et al., 2015). In terms of UK un-apprehended firesetters, Gannon and Barrowcliffe (2012) report that on the newly developed *Fire Setting Scale*, firesetters and non-firesetters could not be differentiated in terms of fire interest. However, on the *Fire Proclivity Scale*, relative to non-

firesetters, firesetters self-reported significantly higher levels of *fire fascination*, and *behavioural propensity* to act in a similar manner to the firesetting perpetrator depicted in the vignettes. In addition, the *behavioural propensity* subscale of the *Fire Proclivity Scale* entered the final discriminant function analysis equation successfully classifying firesetters at a rate of 91% overall, highlighting that individuals with higher levels of fire related behaviour propensity are more likely to be classified as un-apprehended firesetters.

Emotionally expressive and need for recognition trajectory

Firesetting is hypothesised to be a maladaptive coping strategy which provides perpetrators with an effective way to influence a situation (Jackson et al., 1987b). For example, apprehended adult firesetters report igniting fires as a form of communication (Ducat et al., 2013a; Geller, 1992) such as a 'cry for help' (Dickens et al., 2007; Harmon et al., 1985; Tyler et al., 2014). However, in the UK just two un-apprehended firesetters (11.1%) reported igniting fires in order to express their feelings, and none of the firesetters reported igniting a fire in order to gain attention (Gannon & Barrowcliffe, 2012). Similarly, Perrin-Wallqvist and Norlander (2003) also found a lack of evidence to suggest that un-apprehended adolescent firesetters ignite fires for attention.

Multi-faceted trajectory

The final *M-TTAF* trajectory, the *Multi-faceted trajectory*, hypothesises that firesetting results from a combination of two vulnerabilities. For example, fire interest and antisocial behaviour have been found to interact in the identified adolescent and apprehended adult firesetting literature (Doley et al., 2011; MacKay et al., 2006). However, due to limited research pertaining to un-apprehended firesetters this interaction has not been evaluated in the un-apprehended firesetting literature.

Summary

The literature associated with un-apprehended deliberate firesetters is scarce. As a result there is a distinct lack of data pertaining to un-apprehended firesetters. However, what has emerged from Chapters 2 and 3 is that whilst apprehended and un-apprehended firesetters are reported to share some common characteristics and similar offence characteristics (e.g., predominantly male, single, and ignite fires close to home), there are some stark differences. For example, in terms of motivations, apprehended firesetters tend to be motivated by revenge, but this is not the case with UK un-apprehended firesetters. In addition, in contrast to the apprehended firesetter literature, UK un-apprehended firesetters also appear to be well-educated.

Deliberate firesetting has huge economic and social impact both in the UK and internationally. The previous chapters have evaluated the characteristics of apprehended and un-apprehended deliberate firesetters; in contrast, Chapter 4 focuses on recidivism, the current prevention and education programmes available to deter firesetting, and the treatment programmes currently available for apprehended firesetters.

Chapter 4

Recidivism, Risk Factors, Prevention, and Treatment

Introduction

It is clear from Chapter 1 that deliberate firesetting has huge societal impact, from the monetary consequences to the loss of human life. Due to complex counting rules, varying reporting definitions and systems, and poor detection rates deliberate firesetting is an incredibly complex crime to quantify. As highlighted in previous chapters, compared to other areas of offending, the clinical knowledge and practice relating to deliberate firesetting is extremely underdeveloped (Gannon & Pina, 2010). Therefore it is unsurprising that there is very little research which has investigated reoffending in deliberate firesetters and risk factors associated with this. As highlighted in preceding chapters, the majority of individuals who ignite fires remain undetected and are consequently un-apprehended. It is therefore important to develop both preventive measures as well as interventions to reduce the incidence and devastating consequences of deliberate firesetting. This chapter considers the existing knowledge base relating to the recidivism of deliberate firesetters (both for firesetting and general offending) as well as existing prevention strategies, and intervention initiatives aimed at reducing incidents of deliberate firesetting.

Recidivism

There is a lack of information pertaining to the firesetting recidivism of identified adolescent firesetters. However, rates of recidivism for firesetting amongst apprehended adult firesetters have been reported to range quite wildly, with reoffending rates reported from 4% to 61% (Bourget & Bradford, 1989; Dickens et al., 2009; Ducat et al., 2014; Koson & Dvoskin, 1982; O'Sullivan & Kelleher, 1987; Rice & Harris, 1996; Soothill & Pope, 1973;

Tennent et al., 1971). As highlighted in Chapter 1, complex reporting standards and processes make deliberate firesetting difficult to quantify and therefore accurate reoffending rates are difficult to establish. To date, the majority of research examining firesetting recidivism has involved retrospective examination of official records of firesetting (e.g., police records, court records) (Barnett, Richter, Sigmund, & Spitzer, 1997; Lindberg et al., 2005; Soothill et al., 2004). For example, Soothill et al. (2004) utilised court records in England and Wales to retrospectively establish firesetting recidivism in apprehended adults over a period of 20 years. In 1951, only three men (4.5%; Soothill & Pope, 1973) were classified as recidivistic with fire, however, this rate more than doubled to 10.7% between 1980 and 1981 (Soothill et al., 2004).

Rice and Harris (1996) prospectively followed up 243 adult male firesetters released from a maximum security hospital in Canada over a 7.8 year period. Police and institutional records were examined and any convictions for further offences or incidents of behaviour that would have otherwise resulted in criminal charges during this period were recorded. Rice and Harris (1996) found that 66% of their sample showed some sort of recidivism during the follow up period. More specifically, 16% ignited another fire, 31% committed a violent offence and 57% committed a non-violent offence within the follow up period. More recently, Edwards and Grace (2014) examined the police records of 1250 adults convicted of firesetting in New Zealand and followed them up over a 10 year period. Edwards and Grace found that 6.2% of their sample of firesetters were convicted of a further firesetting offence during this period, 48.5% were convicted of a violent offence, and 79.3% were convicted of a general offence. Hollin et al. (2013) also report similar findings for their sample of 115 adult firesetters discharged from a medium secure hospital in the UK (males = 81, females = 34) with over half of firesetters (males $n = 41$, 50.6%, and females $n = 19$, 55.9%) being reconvicted of a non-fire related crime (e.g., criminal damage, robbery, Grievous Bodily

Harm) and 9.5% (males $n = 8$, 9.9%, and females $n = 3$, 8.8%) reconvicted of a further firesetting offence over a 10 year follow up period. Together these findings suggest that apprehended adult firesetters are more likely to be reconvicted of a non-firesetting related offence rather than found to have ignited another fire. However, as discussed previously, the majority of firesetters are not apprehended, and it is therefore likely that these studies relating to apprehended firesetters are not an accurate reflection of the true extent of firesetting recidivism.

Estimates and correlates of firesetting recidivism in community samples are rare and therefore it is not possible to fully comment on the level of recidivism of un-apprehended firesetters (MacKay, Feldberg, Ward, & Marton, 2012). However, in Gannon and Barrowcliffe's (2012) study, 83.3% ($n = 15$) of UK un-apprehended firesetters reported igniting multiple fires (two fires [$n = 4$, 22.2%], three fires [$n = 3$, 16.7%], four or more fires [$n = 8$, 44.4%]). This rate is significantly higher than those reported in studies with apprehended firesetters.

Risk Factors

As previously highlighted, there has been little research examining the risk factors for deliberate firesetting. However, there have been some attempts in the identified adolescent and apprehended adult literature to assess risk factors associated with repeat firesetting.

Research suggests that recidivistic firesetters share some common characteristics. For example, relative to non-recidivists, apprehended adult recidivistic firesetters are younger at the time of igniting their first fire (Dickens et al., 2009; Rice & Harris, 1996), male (Ducat et al., 2014), have low levels of intelligence (Rice & Harris, 1996), and a history of relationship difficulties (Dickens et al., 2009; Rice & Harris, 1996). In addition, apprehended adults who engage in repeat firesetting are also reported to misuse substances (Ducat et al., 2014; Koson

& Dvoskin, 1982; Lindberg et al., 2005; Repo et al., 1997; Repo & Virkkunen, 1997), display covert antisocial behaviour (Rice & Harris, 1996), and have varied criminal repertoires (Bourget & Bradford, 1989; Ducat et al., 2014; Jayaraman & Frazer, 2006; Muller, 2008; Soothill et al., 2004). Furthermore, identified adolescent repeat firesetters are reported to have high levels of family dysfunction (Kennedy et al., 2006; Sakheim et al., 1991), poor social skills (Kennedy et al., 2006), and more frequently report feelings of isolation and loneliness compared to one-time firesetters (Sakheim et al., 1991).

Increased fire interest has also been found to be positively associated with both identified adolescent and apprehended adult repeat firesetting (Doley, 2009; Kennedy et al., 2006; MacKay et al., 2006; Rice & Harris, 1991, 1996; Tyler et al., 2015). For example, Tyler et al. (2015) found that an expressed interest in fire/explosives uniquely predicted repeat firesetting in male and female mentally disordered offenders. Further, Tyler et al. (2015) found that individuals who held an expressed interest in fire/explosives were 15 times more likely to be a repeat firesetter than a one-time firesetter. Ó Ciardha et al. (2015b) also found that relative to single episode firesetters ($n = 74$), recidivistic firesetters ($n = 41$) self reported higher levels of identification with fire. Together these findings suggest that fire interest and identification with fire are potentially important risk factors to consider for firesetting recidivism.

Firesetting prevention

Given that there has been little research into risk factors for deliberate firesetting it is unsurprising that there is a distinct lack of research examining effective prevention and intervention strategies with deliberate firesetters. Deliberate firesetting prevention and intervention strategies appear to adopt two main approaches; fire safety education directed at individuals regardless of any firesetting behaviour (e.g., fire safety education in schools), and

behavioural, social, or psychological interventions directed at individuals who have ignited a deliberate fire (Muller & Stebbins, 2007; Palmer, Caulfield, & Hollin, 2005, 2007).

The most common preventative approaches focus on providing fire safety education aimed at children and adolescents in the community and are typically delivered by Fire Safety Officers (Canter & Almond, 2001; Cheshire Fire and Rescue Service, 2016; Essex County Fire and Rescue Service, 2016; Kent Fire and Rescue Service, 2016a; London Fire Brigade, 2016a; Muller & Stebbins, 2007; New Zealand Fire Service, 2016a; Schwartzman, Stambaugh, & Kimball, 1998; Toronto Fire Services, 2016). Educating children about the dangers of fire has been shown to have a positive impact on firesetting behaviour (Kolko, 1985; 2001). For example, Kolko, Watson and Faust (1991) conducted a study involving 24 identified firesetting children in a psychiatric facility in the USA. Children were randomly assigned to one of two conditions; a Fire Safety/Prevention Skills Training group ($n = 12$), where children learnt and practiced fire safety concepts through instruction, modelling, and role-play, or the Fire Assessment/Awareness condition ($n = 12$), where firesetting behaviour was simply assessed on a one to one basis by a staff nurse. Relative to the Fire Assessment/Awareness Group, children taking part in the Fire Safety/Prevention Skills Training were reported to have significantly less contact with fire-related toys and matches, had increased fire safety knowledge, and parental reports indicated they had less involvement with fire at a six month follow up. However, although in terms of reducing fire involvement parental reports show promising results, the children were not directly asked about their firesetting. Thus, it is not possible to be confident that parental reports are an accurate reflection of participants' actual firesetting.

In the USA (Suffolk County Government, 2016), Canada (Toronto Fire Services, 2016), Australia (Fire and Rescue NSW, 2014), New Zealand (New Zealand Fire Service, 2016a), and the UK (London Fire Brigade, 2016a) there are several well established fire

safety education programmes targeted at children and adolescents. The majority of these school based programmes focus on either teachers or fire personnel educating young people about the effects of fire. For example, in the UK approximately 100,000 children a year receive fire safety education through free interactive fire safety educational workshops delivered in both primary and secondary schools in London (London Fire Brigade, 2016a). Primary school workshops last approximately an hour and involve audience participation and group work. In secondary schools, workshops are tailored to class sessions or assemblies and young people are encouraged to participate in educational games and activities on the London Fire Brigade's website.

In Australia and New Zealand fire safety education is specifically tailored to children at various stages in education (Fire and Rescue NSW, 2014; New Zealand Fire Service, 2016a). For example, in New Zealand, the *Get Out! Stay Out!* programme for early childhood, *Get Firewise!* for children aged 5 to 7 years, and *Be Firewise* for older children aged 11 to 13 years can be delivered by teachers or fire personnel (New Zealand Fire Service, 2016a). Similarly, in New York (Suffolk County Government, 2016) pupils learn the importance of fire safety, with an additional emphasis on parental responsibility such as controlling access to fire related paraphernalia and setting a good example. Unfortunately, none of these fire safety education programmes have been rigorously evaluated and therefore it is difficult to conclude whether these programmes are an effective strategy for reducing children and adolescents' engagement in deliberate firesetting.

In addition to face-to-face fire safety education initiatives with children and adolescents, some fire services are also utilising online resources and national media as a preventative measure. For example, in Canada, parents can learn about fire safety practices online and via leaflets, and are encouraged to pass on fire safety messages to their children (Toronto Fire Services, 2016). Further, in New Zealand the Fire Service recently educated the

general public in the dangers of fire through a national media campaign (Our Day of Influence, 2016). Ink for a two-page newspaper spread was embedded with the ash from the remains of real house fires. The article describes the story of a real family from the local area who lost everything in the fire, focuses on the dangers of fire, and encourages the reader to purchase, install, or check smoke alarms. Unfortunately, it does not appear that the effectiveness of such campaigns have been investigated and therefore it is unclear if they are successful in reducing the number of fires attended by the Fire Service.

Although the majority of preventative work is targeted at children and adolescents, some Fire and Rescue Services in the UK also report engaging in fire prevention work with both adolescents and adults identified as having ignited deliberate fires, and also adolescents and adults considered at risk of accidental firesetting (e.g., vulnerable populations). Individuals are usually referred from other agencies (e.g., mental health services, prisons, probation service, multi-agency public protection arrangements [MAPPAs]) and are generally provided with individual sessions relating to the effects of fire and fire safety awareness (personal correspondence Kent Fire & Rescue Service, London Fire Brigade, 2016). However, the effectiveness of these fire safety sessions in reducing incidents of firesetting has not been examined. Thus, the effectiveness of these sessions as a preventative strategy is unclear.

Empirically evaluated treatment programmes

Approximately 10 years ago the UK government commissioned a large scale evaluation of the interventions for both identified adolescent and apprehended adult firesetters (see Palmer et al., 2005). The report highlighted a distinct lack of interventions for adult firesetters across mental health services, HM Prison Service, and the community. The evaluation also found that the majority of interventions are delivered by Fire and Rescue

Services and predominantly target identified children and adolescents; focussing on informing these individuals about the dangers of fire and teaching fire safety skills (e.g., dangers and consequences of fire, and victim awareness). Although such interventions were identified as being valuable, Palmer et al. (2005, 2007) highlighted that due to a lack of monitoring, evaluation, and follow up studies the effectiveness of such programmes had not been established.

As discussed in the previous section, although internationally there are many prevention programmes (e.g., fire safety education) offered by Fire Services for children and adolescents regardless of firesetting history, very few have been evaluated. However, Fire and Rescue Services also offer intervention programmes for identified individuals who have ignited a fire or who hold increased interest and fascination with fire. For example, the *Fire Awareness and Intervention Programme* delivered in the New Zealand (*FAIP*; Lambie, Randell, Ioane, Seymour, & Inger, 2009) receives approximately 500 referrals a year, is suitable for young people (aged 5 to 17 years), and is typically delivered in the firesetter's home (New Zealand Fire Service, 2016b). The programme is individually tailored and varies according to the age and maturity of the young person and aims to educate young people about the dangers of fire and develop behaviour modification. Participants, parents, and professionals have reported finding the programme helpful for explaining the dangers and consequences of firesetting. Although a 10-year follow-up of criminal records of 200 *FAIP* participants revealed a high rate of general reoffending, only 2% of participants ($n = 4$) were recorded to have ignited a subsequent fire.

Further support for implementing firesetting intervention programmes with identified adolescent firesetters can be found in the study conducted by Kolko (2001). In the USA, Kolko (2001) compared the efficacy of eight sessions of cognitive behavioural therapy, eight sessions of fire safety education, and the shorter intervention of two home visits from fire

fighters. The fire involvement of children (aged 5 to 13 years) was measured pre-treatment and a year later. When measured post treatment all three methods reduced attraction to fire, fire interest, and fire involvement, but participants in the cognitive behavioural sessions and fire education classes were recorded to have the greatest improvements.

In the UK, Fire and Rescue Services offer free educational intervention programmes for adolescent firesetters. For example, the London Fire Brigade (2016b) deliver the *Juvenile Firesetters Intervention Scheme* to young people referred by a professional or parents for a fascination in fire. Each programme is delivered on a one to one basis and tailored to suit the needs of individual firesetters. The initial session takes place at the firesetter's home but the number of subsequent visits depends on the needs of the child. The London Fire Brigade report having received 3,500 referrals for this service and report that the programme helps to reduce fires across the London boroughs. However, like the majority of the preceding programmes there is a lack of statistical data detailing recidivism rates and therefore the successful of the programme is unclear.

Studies reviewing the effectiveness of apprehended adult firesetter treatment programmes are also rare (Hagenauw, et al., 2015; MacKay et al, 2012). Typically treatment programmes for apprehended adult firesetters have been developed within forensic mental health services on a clinical need basis with very few published evaluations. The majority of published interventions encompass cognitive behavioural therapy (Clare, Murphy, Cox, & Chaplin, 1992; Gannon & Lockerbie, 2011; Taylor, Robertson, Thorne, Belshaw, & Watson, 2006; Taylor, Thorne, Robertson, & Avery, 2002; Swaffer, Haggett, & Oxley, 2001). For example, in the UK, Clare et al. (1992) report using cognitive behavioural therapy (e.g., social skill training, assertiveness training, and alternative coping strategies) with a 23 year old male convicted of firesetting and with an IQ of 65. At a 48 month follow up firesetting recidivism was not evident. Although this study shows promise for the effectiveness of

cognitive behavioural therapy, it consisted of a single case study and is therefore limited in its applicability to wider populations.

Other UK based researchers have implemented group based interventions for detained mentally disordered firesetters. For example, Swaffer et al. (2001) implemented a 62 session, group programme covering fire education, coping skills, reflective insight, self esteem, and relapse prevention. However, although Swaffer et al. provide detailed mid-treatment case studies for the patients in the programme there is a lack of information pertaining to clinical outcomes or change. Similarly, 14 firesetters from low secure psychiatric facilities in the UK took part in 40 group sessions covering fire education, analysis of offending, coping skills, family issues, and relapse management (Taylor et al., 2002). Based on pre and post treatment assessments utilising the *Fire Attitude Scale* (Muckley, 1997) and the *Fire Interest Rating Scale* (Murphy & Clare, 1996) participants reportedly made significant improvements on their attitudes towards fire (Taylor et al., 2002). Furthermore, anger cognitions as measured by the *Novaco Anger Scale and Provocation Inventory* (Novaco, 1994) were reported to decline. However, the study lacked a control group and furthermore it is unclear if the improvements were clinically significant.

In a recent development, the *Australian Centre for Arson Research and Treatment* (ACART; Fritzon, Doley, Davey, & McEwan, 2013) have developed a specialist intervention programme for identified adolescent and apprehended adult firesetters for use in both community and correctional settings in Australia. Treatment targets within the ACART are underpinned by the *Multi-Trajectory Theory of Adult Firesetting* (Gannon et al., 2012; see chapter 2 for a detailed description of the *M-TTAF*) and focus on *values and goals, fire safety awareness, fire interest, mood and coping, thinking patterns, communication and relationships, and understanding my offending* (Fritzon et al., 2013). Each session within the programme is individually tailored and delivered to individuals over the age of 14 in both

Australia and the USA. Although the *ACART* Programme represents a promising development in the treatment of deliberate firesetting, it is still in its infancy and to date only 12 individuals have completed the programme and therefore its effectiveness is yet to be reported (K. Fritzon, personal correspondence, 8th August 2016).

Most recently, in the UK, Gannon and colleagues developed and systematically evaluated two firesetting treatment programmes for apprehended adult firesetters; *The Firesetting Intervention Programme for Prisoners*, (*FIPP*; Gannon et al., 2015), and *The Firesetting Intervention Programme for Mentally Disordered Firesetters* (*FIP-MO*; Gannon & Lockerbie, 2011). Both programmes are grounded in empirical research (e.g., Dickens et al., 2012; Fritzon, Doley, & Clark, 2013; Gannon et al., 2013b; Gannon, Lockerbie, & Tyler, 2013a; Gannon et al., 2012; Gannon & Pina, 2010) and underpinned by the latest theoretical developments in offender rehabilitation (e.g., *Good Lives Model*, Ward & Stewart, 2003; *Risk-Need-Responsivity Model*, Andrews & Bonta, 2010) and deliberate firesetting (*M-TTAF*; Gannon et al., 2012). The *FIPP* and the *FIP-MO* are predominantly cognitive behavioural programmes combining group therapy and individually tailored sessions specifically targeting *fire interest and fire safety knowledge*, *offensive supportive attitudes* (i.e., general criminal cognitions), *social competence* (i.e., social skills, assertiveness, self-esteem), *self management*, *coping skills*, and *alternative pro-social replacement skills* to reduce the risk of future firesetting (i.e., problem solving and communication; Gannon et al., 2013a).

Following the development of the *FIPP* and *FIP-MO*, Gannon and colleagues rolled out both programmes across multiple sites as part of evaluative research projects. In the *FIPP* evaluation, Gannon et al. (2015) compared problematic fire interest pre treatment, immediately post treatment, and three months post treatment for those who completed the *FIPP* to that of a treatment as usual comparison group. Relative to the comparison group ($n = 45$), prisoners enrolled on the *FIPP* ($n = 54$) significantly improved in terms of problematic

fire interest and associations of fire (measured using the *Fire Interest Rating Scale*, Murphy & Clare, 1996; *Fire Attitude Scale*, Muckley, 1997; *Identification with Fire Questionnaire*, Gannon, Ó Ciardha, & Barnoux, 2011), and also made significant improvements on some secondary outcomes (e.g., attitudes towards violence and aggressive attitudes). The biggest improvements were noted in firesetters with the most serious firesetting behaviour, and all improvements were maintained at a three month follow up. As a result, Gannon et al. (2015) concluded that specialist cognitive behavioural therapy should be directed at individuals with the most serious firesetting history.

The *FIP-MO* evaluation followed a similar design to that of its sister programme (the *FIPP*), comparing treatment participants pre and post treatment questionnaire results to that of a treatment as usual comparison group. Preliminary analysis of the first 34 treatment and 24 comparison participants indicate that, relative to the comparison group, patients who completed the *FIP-MO* made positive improvements post treatment in the areas of *serious fire interest, fire safety awareness, general self-esteem* and *anger expression*; however, analysis of the full data set (treatment = 52, comparison = 40) is still ongoing (N. Tyler, personal correspondence 19th September 2016).

The findings of both the *FIPP* and *FIP-MO* provide promising evidence that specialist treatment is effective in reducing psychological factors associated with apprehended adult deliberate firesetting when compared to treatment as usual. This highlights the need for specialist interventions for apprehended adult deliberate firesetters to help manage and reduce the risk of deliberate firesetting.

Summary

To date there have been very few attempts to establish base rates for reoffending for apprehended firesetters. In addition, there has been little focus on establishing risk factors for

deliberate firesetting. Consequently there are few evidence based prevention and intervention strategies available for this population. Community prevention appears to be the most common strategy used to manage deliberate firesetting. The majority of prevention programmes involve teachers and Fire and Rescue Services educating children and adolescents in fire safety with the aim of preventing the development of firesetting behaviour. However, there are very few fire safety education programmes specifically aimed at adults. Typically prevention programmes lack clarity and vary in terms of content, delivery, and length (i.e., number of sessions). For example, UK based programmes are school based and typically focus on educating children and young people about the dangers of fire. However, programmes in the USA and Australia stress the importance of parental contribution to firesetting (e.g., increased parental supervision). Further, whilst such programmes have been reported to be valuable, they lack systematic evaluation or statistical data detailing a reduction in deliberate firesetting.

It is apparent that firesetting is a complex and multifaceted phenomenon which requires a diverse approach to treatment (Uhnoo, Persson, Ekbrand, & Lindgren, 2015). Typically treatment programmes contain cognitive behavioural elements combining individual and group therapy sessions addressing offence supportive attitudes, fire interest, social competence, self management, coping skills and pro-social replacement skills. Although a number of programmes have recently emerged for apprehended adult firesetters which show promise in reducing psychological factors associated with deliberate firesetting (e.g., *FIPP* and *FIP-MO*) further evaluation regarding their effectiveness is required.

There is a clear lack of understanding of the psychological vulnerabilities and treatment needs of un-apprehended firesetters. Therefore the following chapters describe novel research examining the sociodemographic variables, psychopathology, offence characteristics, motivations, psychological characteristics and vulnerabilities associated with

un-apprehended deliberate firesetters. This new information will be useful in forming an overview of a 'typical' un-apprehended firesetter, and essential if researchers are to identify and target specific risk factors in future prevention and treatment interventions.

Rationale and Research Agenda

Deliberate firesetting has devastating and life changing consequence, from high economic costs to the loss of human life. It is clear from the arrest figures detailed in Chapter 1 that the vast majority of firesetters remain un-apprehended. The detailed information exploring the sociodemographic and developmental variables, psychopathology, offence characteristics, motives and psychological characteristics of apprehended firesetters (Chapter 2) is typically based on data from arrest files and interviews with apprehended firesetters incarcerated in prisons or mental health settings. However, it is clear from Chapter 3 that there is a distinct lack of research pertaining to un-apprehended firesetters and therefore identified adolescent and apprehended adult firesetters may not represent all firesetting populations. As the research assessing un-apprehended deliberate firesetters is scarce this thesis offers a comprehensive explanation of the sociodemographic and developmental variables, psychopathology, offence characteristics, motives, and psychological characteristics associated with un-apprehended firesetters. Furthermore, comparisons will be made between these un-apprehended firesetters and their apprehended counterparts.

The first study in this thesis (Chapter 5) assesses the prevalence of self-reported un-apprehended deliberate firesetters in the UK. Study 1 also provides the opportunity to examine both the characteristics of un-apprehended firesetters and their offence characteristics. Study 2 (Chapter 6) builds upon Study 1 and explores the demographic, psychological, and offence characteristics of un-apprehended deliberate firesetters as well as their attitudes towards fire. To reduce effects of memory recall, Studies 3a and 3b (Chapter 7 and Chapter 8) specifically focus on the psychological characteristics of adolescent firesetters with participants aged 18 to 23 years self-reporting their firesetting behaviour between the ages of 10 and 18 years. Further, Study 3b (Chapter 8) compares the shared and unique

correlates (e.g., sociodemographic variables, firesetting offence characteristics, and motives) of un-apprehended firesetters igniting one deliberate fire (single episode firesetters) and recidivistic firesetters.

Studies 1 to 3b rely upon self report measures (e.g., questionnaires) to assess and compare the psychological characteristics of self reported un-apprehended deliberate firesetters. However, implicit beliefs are hypothesised to facilitate offending (e.g., *Dangerous World, Normalisation of Violence, Fire is Fascinating or Exciting, Fire is a Powerful Tool, and Fire is Controllable*; Ó Ciardha & Gannon, 2012) but to date these implicit theories have not been empirically evaluated and are therefore explored in the final empirical chapter, Study 4 (Chapter 9). Here, an implicit lexical decision task (LDT) is used to examine whether un-apprehended deliberate firesetters hold any of the implicit theories hypothesised as being applicable to apprehended firesetters. In addition, the utility of this implicit measure of fire interest (e.g., a Lexical Decision task measuring the *Fire is Fascinating or Exciting* implicit theory) is compared to an explicit measure of fire interest (i.e., the *Fire Interest subscale* of the *Fire Setting Scale*, Gannon & Barrowcliffe, 2012). It is anticipated that the new information pertaining to un-apprehended firesetters will show promise in identifying community individuals who require fire education and preventative work.

Chapter 5

Study 1: The Prevalence and Characteristics of Un-apprehended Firesetters Living in the UK Community²

Introduction

As explained in Chapter 1, igniting a deliberate fire can have devastating consequences. However, despite such high economic costs and the loss of human life, relative to other crimes, firesetting has the poorest detection rate in England and Wales (Smith et al., 2013). Previous research pertaining to deliberate firesetting has concentrated almost exclusively on the characteristics of identified and apprehended firesetters. However, given that the majority of perpetrators of deliberately ignited fires go undetected research with apprehended firesetters may only be reflective of a relatively small group of individuals who have come to the attention of authorities. In order to develop effective community fire prevention and management strategies it is critical for us to develop a comprehensive understanding of those who deliberately ignite fires (Doley, 2003). Thus, a greater understanding of the prevalence and characteristics of un-apprehended firesetters is required.

Research with apprehended adult firesetters has highlighted that deliberate firesetters share some common characteristics such as being male (Bradford, 1982; Muller, 2008; Pettiway, 1987; Räsänen et al., 1995; Rautaheimo, 1989), Caucasian (Gannon, 2010; Koson & Dvoskin, 1982), having poor developmental experiences such as victimisation or abuse during childhood (Gannon, 2010; Noblett & Nelson, 2001; Saunders & Awad, 1991), separation from parents (Macht & Mack, 1968; Saunders & Awad, 1991; Tennent et al., 1971), and low IQ and poor education (Bradford, 1982; Harmon et al., 1985; Lewis & Yarnell, 1951; Rautaheimo, 1989). Identified adolescent and apprehended adult firesetters

² The content of this chapter has been published: Barrowcliffe, E. R., & Gannon, T. A. (2015). The characteristics of un-apprehended firesetters living in the UK community. *Psychology, Crime and Law*, 21(9) 836-853. doi: 0.1080/1068316X.2015.1054385

also appear to hold a wide range of motivations underpinning their deliberate firesetting. For example, vandalism and excitement (Gannon & Pina, 2010; Icove & Estepp, 1987; Inciardi, 1970), peer pressure (Molnar et al., 1984; Swaffer & Hollin, 1995), crime concealment (Denet, 1980), self protection (Tyler et al., 2014), political motivation (e.g., terrorist attacks and riots; Prins, 1994), communication (Geller, 1992), and self injury and suicide (Jayaraman & Frazer, 2006; McKerracher & Dacre, 1966; Noblett & Nelson, 2001; O'Sullivan & Kelleher, 1987; Swaffer & Hollin, 1995). However, research suggests that revenge is the most commonly reported motive associated with deliberate firesetting (Gannon et al., 2012; Koson & Dvoskin, 1982; Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Rix, 1994; Swaffer & Hollin, 1995).

Only a relatively small amount of research has been conducted with un-apprehended firesetters. The first of these studies (described in Chapter 3) utilised data from the USA National Epidemiologic Survey on Alcohol and Related Conditions (*NESARC*; Blanco et al., 2010; Vaughn et al., 2010). The prevalence rate of deliberate firesetters living in the USA community was estimated to be 1 to 1.13% (Blanco et al., 2010; Vaughn et al., 2010). However, respondents were only asked one question relating to firesetting (e.g., *in your entire life, did you ever start a fire on purpose to destroy someone else's property or just to see it burn?*). Firesetting predominantly took place during adolescence (i.e., ≤ 15 years) and relative to non-firesetters, firesetters were predominantly male, and never married (Blanco et al., 2010). Furthermore, firesetters were more likely to report engaging in antisocial behaviours (e.g., destroying property).

In the *NESARC* study, the single question relating to firesetting is extremely vague. It is possible that individuals could have misidentified experimentation with fire as a criteria for firesetting (Dickens & Sugarman, 2012). A further limitation is that the respondents were questioned face to face and may therefore have been reluctant to answer the firesetting

question truthfully for fear of reprisals (Dickens & Sugarman, 2012; Gannon & Barrowcliffe, 2012). The *NESARC* study also lacked detailed offence characteristics such as the types, severity, or number of fires ignited. Furthermore, identified adolescent and apprehended adult firesetters are reported to have an interest in fire (Doley, 2009; Kennedy et al., 2006; MacKay et al., 2006; Rice & Harris, 1991; Rice & Harris, 1996), but fire interest and the motivations behind the firesetting behaviour were not explored in the *NESARC* study.

Gannon and Barrowcliffe (2012) set out to rectify some of the limitations of the *NESARC* research through assessing the prevalence and characteristics of un-apprehended UK firesetters. They met with University and community individuals ($n = 168$; 109 female) face to face yet attempted to reduce social desirability through ensuring participants placed their responses in an unlabelled envelope to protect anonymity. The study instructions explicitly requested participants to think about the types of fire that they had set and requested that certain types of fires (i.e., fires set before the age of 10 years, ignited accidentally, or as part of organised events such as bonfires) should not be reported. Participants who had ignited a fire which matched the criteria were also requested to report detailed information about the fires that they had set (e.g., motives) and to complete measures designed specifically for the purpose of the study. All participants completed the rest of the questionnaire which included the *Fire Setting Scale (FSS)*, comprising of two subscales measuring fire interest and anti-social behaviour and the *Fire Proclivity Scale (FPS)* comprising of six hypothetical firesetting scenarios designed to measure firesetting proneness or proclivity. Using this measure, participants were asked to imagine themselves perpetrating each of the firesetting scenarios and then to rate their likelihood of fire fascination, behavioural propensity to act similarly, arousal, and general anti-socialism in relation to each scenario. The prevalence rate of deliberate firesetters using this methodology was 11% ($n = 18$); with the majority of respondents (89%, $n = 16$) indicating that they had ignited their

fire(s) during adolescence due to boredom, peer pressure, to express feelings, or for excitement. None of the firesetters reported ever having been apprehended for their fires.

A comparison of firesetters and non-firesetters on socio-demographic and historical variables elicited few notable differences. However, firesetters were significantly more likely to report having been diagnosed with behavioural problems or a conviction for a vandalism-related offence(s). On the newly developed Fire Setting Scale, relative to non-firesetters, firesetters self-reported significantly higher levels of anti-social behaviour but not fire interest. On the Fire Proclivity Scale, relative to non-firesetters, firesetters self-reported significantly higher levels of fire fascination, behavioural propensity, and arousal. Of these factors, only the behavioural propensity subscale of the Fire Proclivity Scale entered the final discriminant function analysis equation successfully classifying firesetters at a rate of 91% overall.

Previous research has concentrated almost exclusively upon the prevalence of un-apprehended firesetters with little consideration of the characteristics of this population. In Gannon and Barrowcliffe's (2012) study (the only paper that has focused on the characteristics of un-apprehended firesetters), the population was predominantly female and University based therefore limiting the conclusions that could be drawn regarding the characteristics of un-apprehended firesetters. Furthermore, Gannon and Barrowcliffe (2012) did not include measures examining identification with fire or attitudes towards fire. Therefore, the aims of Study 1 reported within this thesis rectify existing knowledge gaps regarding the characteristics of un-apprehended firesetters and report the characteristics of a sample of un-apprehended deliberate firesetters randomly selected from a high firesetting prevalence community within Kent, UK. The predictive ability of basic demographics and the use of a combination of measures examining fire interest and identification with fire, anti-social behaviour, and firesetting proclivity are included with the aim of predicting and

discriminating between un-apprehended deliberate firesetters and non-firesetters. However, specific hypotheses are not reported as this study is exploratory in nature.

Method

Design

To ensure an adequate sample size of un-apprehended firesetters, data collected from UK Kent Fire and Rescue Services (Incident Response System, 2012) were examined. As a result a district was chosen within the county (i.e., Thanet) that was both geographically convenient to travel to and held the third highest prevalence of deliberate fires in Kent (1615 fires between April 2009 and March 2012). Following this, ten percent of households ($n = 5,568$) were randomly selected using the website Dougal.co.uk and invited to partake in an online survey examining firesetting. To maintain even distribution, the survey invitation letters were delivered—by hand—to 10% of households within each of the 23 Wards officially documented within the district of Thanet.

Participants

Two hundred and fifty six individuals accessed the online questionnaire survey. Of these, 158 answered the question relating to deliberate firesetting. One participant was excluded as they self-reported a conviction for arson. Twenty-four individuals left parts of the survey incomplete, resulting in only 133 individuals fully completing the survey (i.e., a 2.8% partial and 2.4% complete response rate respectively). Of the participants who answered the deliberate firesetting question, 78 reported themselves as male and 79 female; the majority identified themselves as White British ($n = 153, 97.5\%$)³. The majority of participants indicated that their highest level of education was GCSE or A Levels ($n = 71$;

³ Due to a programming error non-firesetters were not asked their age. Current age of the firesetter group ranged from 23 to 72 years old (*Mdn* 45 years).

45.2%), and 40.1% ($n = 63$) held a degree or higher degree, indicating a preponderance towards highly educated participants. Key demographics are outlined in Table 5.1.

Participants did not receive remuneration for their participation.

Table 5.1. Comparison of demographics and historical characteristics of self-reported firesetters and non-firesetters.

Variable	Firesetters (<i>n</i> = 18)		Non-firesetters (<i>n</i> = 139)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Demographics				
Siblings (number)	2.6	(.85)	2.8	(1.35)
	Percentage yes (<i>n</i>)		Percentage yes (<i>n</i>)	
Males	61.1	(11)	48.2	(67)
Females	38.9	(7)	51.8	(72)
Formal qualifications	100	(18)	93.5	(130)
History of enuresis	5.6	(1)	1.4	(2)
Psychiatric illness diagnosis	22.2	(4)	18.5	(25)
Physical disability diagnosis	5.6	(1)	5.2	(7)
Expulsion from school	0	(0)	2.2	(3)
History of suicide	22.2	(4)	7.2	(10)
History of self-harm	27.8	(5)*	4.3	(6)
Criminal convictions	16.7	(3)	7.9	(11)
Experimented with fire before age 10 years	0**		23.0	(32)
Family Background				
Lack of money (i.e., sometimes not enough money for food)	38.9	(7)	20.9	(29)
Witnessed domestic violence	27.8	(5)	15.8	(22)
Mother diagnosed with a psychiatric illness	11.8	(2)	11.7	(15)
Father diagnosed with a psychiatric illness	21.4	(3)*	4.8	(6)
A family member also ignited a deliberate fire	38.9	(7)*	3.6	(5)

χ^2 with 95% confidence * $p \leq .05$; ** $p \leq .03$

The Measures

Participants were requested to complete an online questionnaire broadened from the one used by Gannon and Barrowcliffe (2012; see Appendix 4) which comprised a *demographic and historical background* section (e.g., questions relating to gender, number of siblings, family background, psychiatric history and education level) and a *firesetting disclosure* section. Within the firesetting disclosure section, similarly to Gannon and Barrowcliffe's (2012) protocol, participants were asked to indicate whether they had ever deliberately ignited a fire or fires to *annoy other people, to relieve boredom, to create excitement, for insurance purposes due to peer pressure or to get rid of evidence*. Participants were requested to exclude any fires they had set before the age of 10 years, fires started accidentally, or fires started for organised events such as bonfires. Participants who answered affirmatively to this item were then requested to disclose specific information relating to the offence via a series of forced choice questions examining; number of deliberate fires set, age at first and last firesetting incident, formal apprehension or therapy relating to their firesetting, factors precipitating the firesetting (i.e., intoxication, planning), modus operandi (i.e., use of accelerants, ignition points, distance of fire from home), motives and targets for the deliberate firesetting, and response to the firesetting (i.e., attempts to extinguish the fire). Participants were also asked to indicate—to the best of their knowledge—whether anyone in their family had ever deliberately set a fire.

The final part of the questionnaire comprised five measures; the *Fire Setting Scale*, the *Fire Proclivity Scale*, the *BIDR-IM* (version 6; Paulhus, 1984, 1988), the *Identification with Fire Scale* (Gannon et al., 2011), and the *Fire Attitude Scale* (Muckley, 1997). The internal reliability alphas are reported in accordance with George and Mallery's (2003) criteria: $\geq .90$ excellent, $\geq .80$ good, $\geq .70$ acceptable, and $\geq .60$ questionable.

The Fire Setting Scale. The 20 item *Fire Setting Scale (FSS)* was specifically developed by Gannon and Barrowcliffe (2012) from empirical literature reviews examining the factors associated with identified adolescent and apprehended adult firesetters. The *FSS* contains two subscales each containing 10 items measuring *Antisocial Behaviour* (e.g., *I like to engage in acts that are exciting* and *I am a rule breaker*) and *Fire Interest* (e.g., *I am attracted to fire* and *I get excited thinking about fire*). The items are rated using a 7-point Likert scale (1 = *not at all like me*, 7 = *very strongly like me*). Gannon and Barrowcliffe (2012) reported that the *Fire Setting Scale* had good internal consistency (overall $\alpha = .86$, *Antisocial Behaviour* $\alpha = .80$, *Fire Interest* $\alpha = .85$) in their UK community sample. In the present study the internal consistency ranged from acceptable to excellent (overall $\alpha = .90$, *Antisocial Behaviour* $\alpha = .72$, *Fire Interest* $\alpha = .92$).

The Fire Proclivity Scale. The *Fire Proclivity Scale (FPS)* was specifically developed by Gannon and Barrowcliffe (2012) and provides an indication of an individual's propensity to engage in firesetting using a combination of a Rape Proclivity Scale (Bohner, Reinhard, Rutz, Sturm, Kerschbaum, & Effler, 1998), and the firesetting research literature. Participants read six hypothetical vignettes describing firesetting situations of varying degrees of severity, are asked to imagine themselves as the firesetting protagonist, and are then requested to respond to four questions using a 5-point Likert scale assessing: (1) *fascination* with the fire described in the scenario (1 *not at all fascinated* to 5 *very strongly fascinated*), (2) *behavioural propensity* to act similarly (1 *would definitely not have done the same* to 5 *would definitely have done the same*), (3) *general arousal* to the fire described in the scenario (1 *would not enjoy [watching it] at all* to 5 *would greatly enjoy [watching] it*), and (4) *general antisocialism* (1 *would not enjoy [watching others' reaction] at all* to 5 *would greatly enjoy [watching others' reaction]*). Gannon and Barrowcliffe (2012) reported that the overall *FPS*

had good internal consistency ($\alpha = .82$). In addition, the subscales were reported as holding internal consistency that ranged from questionable to good (i.e., *fire fascination* $\alpha = .82$, *behavioural propensity* $\alpha = .68$, *fire arousal* $\alpha = .83$, and *general antisocialism* $\alpha = .78$). In the present study, there were similar levels of internal consistency (overall $\alpha = .93$, *fire fascination* $\alpha = .86$, *behavioural propensity* $\alpha = .66$, *fire arousal* $\alpha = .80$, and *general antisocialism* $\alpha = .76$).

The Identification with Fire Scale. The *Identification with Fire Scale* was developed by Gannon et al., (2011; see Appendix 5) to measure a participant's level of identification with fire (e.g., *fire is almost part of my personality*). It contains 10 items rated on a 5-point Likert scale (1 = *strong disagreement*, 5 = *strong agreement*). The psychometric properties of the *Identification with Fire Scale* have not been formally reported. In the present study, however, the internal consistency was acceptable ($\alpha = .71$).

The Fire Attitude Scale. The *Fire Attitude Scale* (FAS; Muckley, 1997; see Appendix 6) is a 20 item measure rated on a 5-point Likert scale (1 = *strong disagreement*, 5 = *strong agreement*) and was originally designed for use within Fire and Rescue Services. The FAS items assess attitudes and beliefs about firesetting (e.g., *the best thing about fire is watching it spread*). To date, the psychometric properties of the FAS have not been formally reported however in the present study the internal consistency was questionable ($\alpha = .63$). Deleting items did not improve the internal consistency of the FAS.

Balanced Inventory of Desirable Responding. Paulhus' *Balanced Inventory of Desirable Responding* (BIDR: 1984, 1988; see Appendix 7) is a 40 item scale rated on a 5-point Likert scale (1 = *not true*, 5 = *very true*). Only the *Impression Management* (IM) aspect

of the scale was analysed; 20 items relating to intentional self-misrepresentation (e.g., *I never swear*). The *BIDR-IM* scale has established psychometric properties with acceptable to good internal consistency (α ranging from .75 to .86; Paulhus, 1988). In the present study, similar levels of internal consistency were noted $\alpha = .83$.

Procedure

The study was ethically approved by the University of Kent's Research Ethics Committee (Ref 20122520). Households were randomly selected through postcode information and received a hand-delivered letter inviting participation in an online firesetting questionnaire. Participants provided informed consent online and were assured of anonymity. To ensure that the researcher was not obliged to inform the authorities regarding undisclosed firesetting, participants were requested to refrain from disclosing identifiable information about either themselves, or any fires that they had ignited. A written debrief reiterating that participants would not be personally identified appeared on screen after questionnaire completion. In addition, participants were thanked for their participation and provided with contact numbers for organisations (e.g., the Samaritans) which could help should they wish to talk about any potential issues raised by the research.

Results

Firesetting Prevalence and Features

Eighteen participants (11.5%) reported igniting a deliberate fire in the community. All of the firesetters reported themselves to be White British and as holding qualifications (i.e., GCSE or above). Just under two thirds of self-reported firesetters identified themselves as male ($n = 11$; 61.1%). Firesetters reported igniting their deliberate fires between the ages of

10 to 51 years of age. Firesetting began between the ages of 10 to 35 years (*Mdn* age⁴ 11.5 years) and the most recent fire was ignited between the ages of 11 to 51 years (*Mdn* age 15 years). Only two firesetters (11.1%) reported igniting their first deliberate fire as adults and a total of seven firesetters (38.9%) ignited their most recent fire in adulthood.

Firesetters stated that they ignited either one fire ($n = 3$, 16.7%), two fires ($n = 4$, 22.2%), three fires ($n = 3$, 16.7%), or four or more fires ($n = 8$, 44.4%). None of the firesetters reported being apprehended for their fires nor had they ever received therapy for firesetting. However, three firesetters reported a general criminal conviction (e.g., vandalism, possession of drugs, shoplifting). The majority of firesetters reported being single at the time of their fire(s) ($n = 8$, 72.7%), and igniting fires within walking distance (i.e., less than a mile away) from their home ($n = 7$, 63.6%). None of the firesetters reported having been influenced by alcohol or drugs whilst igniting their fire(s). The majority of firesetters reported igniting their fire with other people ($n = 12$, 92.3%). Table 5.2 contains further offence characteristics.

⁴ Due to outliers skewing the data the Median age rather than Mean age is reported throughout Study 1.

Table 5.2. Deliberate firesetting offence characteristics.

Offence Characteristics	<i>Percentage yes (n)</i>
Ignition point and target	
One ignition point	81.8 (9)
Multiple ignition points	18.2 (2)
Ignited countryside e.g. grass/ shrubbery	33.3 (6)
Ignited empty/ derelict garage/ shed /beach hut	27.8 (5)
Ignited flammable liquid/items	16.7 (3)
Ignited clothes	5.6 (1)
Ignited an unoccupied car	5.6 (1)
Ignited a rubbish bin outside	5.6 (1)
Ignited evidence relating to another crime	5.6 (1)
Fires ignited alone or with accomplices	
Ignited fire alone	7.7 (1)
Ignited fire with 1 other person	38.5 (5)
Ignited fire with 2 other people	15.4 (2)
Ignited fire with 3 ⁺ people	38.5 (5)

Note: Figures may not add up to 100% due to missing data

In terms of motivations, participants predominantly reported having ignited fire(s) due to *curiosity and experimentation* ($n = 9, 81.8\%$) and to *create fun/ excitement or alleviate*

boredom ($n = 6, 54.5\%$). None of the firesetters indicated that revenge was a motive and three firesetters (27.3%) stated they experienced *a love of fire*. Table 5.3 contains a detailed breakdown of motivations.

Table 5.3. The motivations behind deliberate firesetting.

Motivation	Percentage yes (n)
Curiosity or experimenting with fire	81.8 (9)
To create fun/excitement or alleviate boredom	54.5 (6)
Love fire	27.3 (3)
Problems at home or school	18.2 (2)
Dared or pranked	18.2 (2)
Vandalism	9.1 (1)
Covering a crime/destroying documents or evidence	9.1 (1)
For financial gain	9.1 (1)

Note: Motivations do not add up to the number of firesetters due to multiple motives and only 11 firesetters indicated their motives.

Although the majority of firesetters ($n = 5, 63.6\%$) attempted to extinguish their fires, two firesetters stated that the fire brigade had extinguished their fires (18.2%). Firesetters indicated that increased fire safety knowledge ($n = 2, 18.2\%$) and increased confidence to stand up to peers ($n = 2, 18.2\%$) would have prevented them igniting fires, see Table 5.4.

Table 5.4. Factors firesetters believe would have prevented them from firesetting.

Preventative Measures	Percentage yes (<i>n</i>)
Increased fire safety knowledge	18.2 (2)
Increased confidence to stand up to peers	18.2 (2)
Other not specified	45.5 (5)
Nothing	36.4 (4)
Being less bored	9.1 (1)
More parental supervision	0
Increased anger control	0
Increased impulse control	0

Note: Only 11 firesetters completed the preventative measures question and firesetters were able to select multiple options therefore preventative measures may not add up to 100.

Comparison of Firesetter and Non-firesetter Characteristics

Demographic and historical variables. Univariate comparisons of firesetters and non-firesetters were conducted on basic demographics and historical variables (see Table 1). A-priori power analysis using G Power 3 (Faul et al., 2007) computed the statistical power of the analyses. According to Cohen's (1988) guidelines in order to detect a medium sized effect 88 participants were required for the Chi-square analyses and 82 participants required for the t-test analyses, given that the analyses were conducted with larger participant samples medium effects are likely to be detected. However the analyses for both Chi-square analyses and t-tests are unlikely to be able to detect smaller more subtle effects as they required 785 and 779 participants respectively.

Firesetters could not be significantly differentiated from non-firesetters on number of siblings, formal qualifications, history of enuresis, psychiatric illness, physical disability, expulsion from school, history of suicide attempts, criminal convictions, family finances, witnessing domestic violence in childhood, or mother being diagnosed with a psychiatric illness. However, relative to non-firesetters, firesetters were more likely to report a history of self-harm, $\chi^2(1, n = 157) = 10.10, p < .01, \phi = .29$, had a father who had been diagnosed with a psychiatric illness, $\chi^2(1, n = 140) = 3.38, p < .05, \phi = .20$, and a family member who had ignited a deliberate fire $\chi^2(1, n = 149) = 23.81, p < .01, \phi = .44$. Interestingly, significantly more non-firesetters ($n = 32, 23.0\%$), reported experimenting with fire prior to the age of 10 years compared to none of the firesetters $\chi^2(1, n = 157) = 3.88, p < .03, \phi = -.18$.

Questionnaire measures. Overall, the *Fire Setting Scale* and the *Fire Proclivity Scale* were negatively correlated with the *BIDR-IM* ($r = -.36; p < .01$ and $r = -.27; p < .01$ respectively). Similarly, the *Identification with Fire Scale* and the *Fire Attitude Scale* were also negatively correlated with the *BIDR-IM* ($r = -.18; p < .05$ and $r = -.33; p < .01$ respectively). However, when these correlations were computed for firesetters and non-firesetters separately, the *Fire Setting Scale* was negatively correlated with the *BIDR-IM* ($r = -.31, p < .01$) and the *Fire Attitude Scale* ($r = -.30, p < .01$) for the non-firesetters only. Nevertheless, firesetters scored significantly higher on the *BIDR-IM* compared to the non-firesetters, $t(131) = -3.02, p < .01, d = -.053$.

Mean scores for firesetters and non-firesetters on the *Fire Setting Scale*, the *Fire Proclivity Scale*, the *Identification with Fire Scale*, *Fire Attitude Scale* and the *BIDR-IM* were calculated, see Table 5.5.

Table 5.5. The scores and reliability of the scales and subscales for self-reported deliberate firesetters and non-firesetters.

Scale	Cronbach Alpha	Firesetters		Non-Firesetters		Scale range
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Fire Setting Scale	0.90	63.27*	(25.86)	39.19	(14.99)	20-140
Behavioural items	0.72	27.00***	(7.92)	17.77	(6.19)	10-70
Fire Interest items	0.93	36.27*	(19.09)	21.43	(11.19)	10-70
Fire Proclivity Scale	0.93	55.18*	(19.42)	34.51	(10.61)	24-120
Fire Fascination	0.86	15.55*	(6.52)	9.32	(3.95)	6-30
Behavioural Propensity	0.66	13.09*	(4.93)	8.51	(2.42)	6-30
Fire Arousal	0.81	15.64*	(6.34)	9.24	(3.38)	6-30
Antisociality	0.76	10.91*	(4.13)	7.43	(2.03)	6-30
Identification with Fire						
Scale	0.71	19.18*	(6.85)	13.85	(3.44)	10-50
Fire Attitude Scale	0.64	52.55***	(8.15)	42.60	(6.28)	20-100
BIDR						
Impression Management	0.83	54.55	(11.60)	65.61	(11.61)*	20-100

* $p \leq .05$; *** $p \leq .001$, independent t-tests

Two separate one-way between-groups multivariate analysis of variance (MANOVA) were conducted to establish any differences between firesetters and non-firesetters on the subscales of the *Fire Setting Scale* and *Fire Proclivity Scale*.² Assumption testing for the *Fire Setting Scale* showed no serious violations of normality, linearity, outliers, multicollinearity, or homogeneity of variance-covariance. A-priori power analysis of MANOVA using G Power 3 (Faul et al., 2007) computed the statistical power of the analyses and indicated that 128 participants were required to detect a medium sized effect according to Cohen's (1988) guidelines and 52 participants were required to detect a large effect with a power of .80. Therefore, with 138 participants it is likely that the analyses are able to detect medium to large effects but not small effects (787 participants required). Relative to non-firesetters, firesetters scored significantly higher on the total *Fire Setting Scale* $F(2,137) = 12.53, p < .01$; Wilks' $\Lambda = .84$; $\eta_p^2 = .16$; $d = 1.14$, and its subscales; the *Behavioural subscale*, $F(1,138) = 21.54, p < .01$; $\eta_p^2 = .14$; $d = 1.30$, and the *Fire Interest* subscale $F(1,138) = 15.68, p < .01$; $\eta_p^2 = .10$; $d = .95$,

The MANOVA examining the combined subscale indices of the *Fire Proclivity Scale* also revealed that firesetters scored significantly higher than non-firesetters, $F(4, 133) = 9.16, p < .01$; Pillais = .78; $\eta_p^2 = .22$; $d = 1.32$. Firesetters scored significantly higher compared to non-firesetters on all subscales of *Fire Fascination*, $F(1,136) = 22.34, p < .01$; $\eta_p^2 = .14$; $d = 1.16$, *Behavioural Propensity* $F(1,136) = 29.50, p < .01$; $\eta_p^2 = .18$; $d = 1.18$, *Arousal Index* $F(1,136) = 30.48, p < .01$; $\eta_p^2 = .18$; $d = 1.26$, and the *Antisocial Index* $F(1,136) = 24.29, p < .01$; $\eta_p^2 = .15$; $d = 1.07$.

An independent samples t-test revealed that firesetters scored significantly higher compared to non-firesetters on the *Identification with Fire Scale*, $t(10.45) = 2.55, p < .05$ (two-tailed). The magnitude of the difference in the means (mean difference = 5.33, 95% CI:

² MANCOVA analyses were also conducted but the effect of adding the *BIDR IM* scores as a covariate did not significantly alter the results.

0.71, 9.96) was large ($d = 1.26$). Firesetters also scored significantly higher compared to non-firesetters on the *Fire Attitude Scale*, $t(135) = 4.92, p < .01$ (two tailed). The magnitude of the difference in the means was 9.95 (95% CI: 5.95, 13.95) indicating a large effect ($d = .85$).

Classifying Firesetters and Non-firesetters

Ideally a Logistic Regression would be conducted using all of the eight predictor variables which significantly differentiated firesetters and non-firesetters (e.g., history of self-harm, having a father diagnosed with a psychiatric illness, experimentation with fire under 10 years of age, history of family firesetting, the *Fire Setting Scale*^{total score}, the *Fire Proclivity Scale*^{total score}, the *Identification with Fire Scale* and the *Fire Attitude Scale*). However, due to limited cases in each category Logistic Regression analysis is not appropriate for the static variables (e.g., father diagnosed with a psychiatric illness $n = 3$). However a Logistic Regression analysis was conducted with the *Fire Setting Scale*^{total score}³, the *Fire Proclivity Scale*^{total score}³, the *Identification with Fire Scale* and the *Fire Attitude Scale*. The full model was significant $\chi^2(4, n = 137) = 26.53, p < .01$, and therefore able to distinguish between self-reported firesetters and non-firesetters. The model as a whole explained between 17.6% (Cox and Snell R Square) and 41.1% (Nagelkerke R squared) of the variance in firesetting status, and correctly classified 95.6% of cases overall, 45.5% of firesetters, and 100% of the non-firesetters but none of the independent variables were statistically significant contributors to the model in their own right, See Table 5.6.

³ Logistic Regression using the subscales of the *FSS* and *FPS* was also conducted, but none of the individual subscales were significant contributors to the model in their own right.

Table 5.6. Logistic Regression predicting the likelihood of being a firesetter.

	β	S.E.	Wald	<i>df</i>	<i>P</i>	Odds	95% C.I. For	
						Ratio	Odds Ratio	
							Lower	Upper
Fire Setting Scale	0.02	0.03	0.49	1	0.49	1.02	0.97	1.07
Fire Proclivity Scale	0.05	0.03	2.51	1	0.11	1.05	0.99	1.12
Identification with Fire								
Scale	0.03	0.11	0.06	1	0.81	1.03	0.83	1.26
Fire Attitude Scale	0.13	0.07	3.17	1	0.08	1.13	0.99	1.30
Constant	-11.78	2.99	15.48	1	0.00	.000		

Discussion

An area in Kent was identified as having a high incidence of deliberate fires and provided an opportunity to assess the characteristics of un-apprehended deliberate firesetters living in the community. A random sample of households revealed an 11.5% prevalence rate of deliberate firesetting (i.e., 18 un-apprehended community firesetters). This prevalence rate is substantially higher than the *NESARC* prevalence rate of 1% to 1.13% in the USA (Blanco et al., 2010; Vaughn et al., 2010) yet similar to the 11% prevalence rate reported by Gannon and Barrowcliffe (2012) in their research conducted with Kent University students who were predominantly female. It is likely that the difference in prevalence rate reported in the current study, relative to the *NESARC* study, relates to differing assurances of anonymity. In the current study, similarly to that of Gannon and Barrowcliffe (2012), participants were assured that their responses would not be incriminating. However, the researchers associated with the *NESARC* study did not make such assurances. Failing to provide assurances of anonymity is

likely to seriously reduce participant's likelihood of reporting firesetting behaviour. Perhaps more surprising is the fact that Study 1 targeted a particularly fire prone area in Kent, and yet the prevalence rates were still similar to that reported by Gannon and Barrowcliffe (2012). It is unclear why this was the case. However, the sample was relatively well educated suggesting that a firesetting prevalence rate of 11% may be generally accurate for members of the educated Kent, UK community. Furthermore, this study and that of Gannon and Barrowcliffe (2012) both pinpointed the majority of firesetting activity to have occurred during adolescence. These findings suggest that many adults have ignited deliberate fires during adolescence and supports work suggesting that adolescent firesetting is a relatively common (Mackay et al., 2009) yet undetected criminal activity.

In terms of basic demographics, firesetters and non-firesetters were similar on a number of variables (e.g., formal education). Firesetters and non-firesetters also exhibited similar historical characteristics (e.g., psychiatric diagnosis, previous convictions). However, relative to non-firesetters, significantly more firesetters reported having; engaged in self-harming behaviour, a father diagnosed with a psychiatric illness, and a family history of firesetting. These findings support research that has been conducted with apprehended firesetters showing the relationship between male and female firesetting and self-harm (Coid, 1999, Miller & Fritzon, 2007; Noblett & Nelson, 2001).

To date there is a lack of research assessing the relationship between firesetting and family psychiatric illness. Furthermore, the finding that firesetters tended to self report having a family history of firesetting appears to support theoretical models of firesetting which suggest that social learning is important in promoting the sequence of firesetting behaviour (see Gannon et al., 2012; Jackson et al., 1987a). What is less clear, however, is why more *non-firesetters* reported experimenting with fire prior to reaching 10 years of age. In line with Gannon et al.'s (2012) theory of firesetting it is possible that firesetters hold

restricted experiences in manipulating fire as children which feeds into their motivation to misuse fire later on. Clearly, it would be beneficial for future research to be conducted with larger samples to truly assess the effects of family background and childhood fire experiences on subsequent firesetting behaviour.

Other comparisons can also be made between the findings with un-apprehended firesetters and the literature on apprehended firesetters. For example, professionals have suggested that apprehended adult firesetters tend to ignite their fires close to home (Bradford, 1982; Rautaheimo, 1989). Similarly, in the present study the majority of un-apprehended deliberate firesetters living in the general community also indicated that they ignited fires close to home (e.g. within one mile). In addition the research associated with identified adolescent and apprehended adult firesetters highlights that the majority of firesetters tend to be male (Bradford, 1982; Muller, 2008; Pettway, 1987; Räsänen et al., 1995; Rautaheimo, 1989) and although the current data converges well, there is a notable percentage (38.9%) of female firesetters. It is unclear why there is a high percentage of un-apprehended female firesetters; perhaps females felt more comfortable disclosing their firesetting behaviour due to the stringent assurances of anonymity. It is also unclear why those who participated in the research chose to do so. However, research into participation reports that relative to males, females are more likely to participate in research (Sax, Gilmartin, Lee & Hagedorn, 2008) and particularly research with a lack of remuneration (Sax, Gilmartin, Bryant 2003). Nevertheless, the participation rate of males and females was similar and therefore perhaps a reasonable explanation for the higher than usual rate of female firesetters is that females are more willing to answer personal and potentially incriminating questions. In addition, perhaps females were additionally reassured by the guarantee of anonymity.

There are some noticeable differences between un-apprehended and formally identified firesetters. Apprehended adult firesetters have been noted to be unskilled and have

low IQ (Bradford, 1982; Harmon et al., 1985; Lewis & Yarnell, 1951; Rautaheimo, 1989). In contrast, all of the un-apprehended firesetters in the current study were educated and reported holding formal qualifications. Perhaps identified or apprehended firesetters are the least successful at covering their tracks, which could be indicative of low intelligence and/or poor problem solving skills. Numerous researchers have highlighted findings to suggest that apprehended adult firesetters hold poor problem solving skills (Jackson et al., 1987b; Tyler et al., 2014) which could, in part, explain this difference.

The research literature examining apprehended adult firesetters also indicates that they tend to have issues with alcohol (Bourget & Bradford, 1989; Rautaheimo, 1989). However, in the current study, none of the un-apprehended firesetters indicated that alcohol or drugs played a role in deliberate firesetting. A key possibility is that alcohol and drug issues are likely to be over represented in the apprehended adult firesetting population. For example, relative to the un-apprehended firesetters, apprehended adult firesetters under the influence of alcohol or drugs may lack the cognitive capacity to cover their tracks and evade detection. In light of this stark contrast between apprehended adult and un-apprehended firesetters it would be beneficial to further research the influence of drugs and alcohol.

The predominant motivations behind deliberate firesetting in the current un-apprehended population were curiosity and experimentation ($n = 9$, 81.8%). However, in previous research Gannon and Barrowcliffe (2012) found only one community firesetter (5.6%) who reported igniting a fire as a result of curiosity. Both in the current research ($n = 6$, 54.5%) and Gannon and Barrowcliffe's (2012) original un-apprehended research ($n = 8$, 44.4%) a high proportion of firesetters reported igniting fire(s) to *create fun or alleviate boredom*. The literature associated with apprehended adult firesetters highlights revenge as the predominant motive behind deliberate firesetting (Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Swaffer & Hollin, 1995). However, none of the community firesetters in this

research or in the research by Gannon and Barrowcliffe (2012) acknowledged revenge as a motive. This further highlights the need for additional research examining the motivations of un-apprehended firesetters.

In this first study each of the dynamic factors which significantly differentiated firesetters and non-firesetters were entered into a Logistic Regression to assess if they were able to predict firesetting status (i.e. the total scores of the *Fire Setting Scale*, the *Fire Proclivity Scale*, the *Identification with Fire Scale*, and the *Fire Attitude Scale*). Although the model as a whole was able to predict firesetting status the variables were not significant in their own right. Unfortunately due to limited participants it was not possible to assess the predictive ability of the static variables (i.e. a history of self-harm, having a father diagnosed with a psychiatric illness, experimentation with fire under the age of 10, and history of firesetting in the family). It is worth noting that static variables such as having a father diagnosed with a psychiatric illness or growing up in an environment with a family history of firesetting may play a significant role in why firesetters choose fire as a non-confrontational form of communication. However, although such results allow speculation about firesetters' home environment (e.g., chaotic, unstable) it is unclear at what point in time an individual may be aware of their fathers' psychiatric disturbance or family firesetting history, if such factors affected the household environment, or if the issues and diagnosis occurred in later life.

It is acknowledged that the current study is not nationally representative, and there are limitations associated with relying on self-reports. It is possible that the traits and characteristics of people who voluntarily disclose personal information differ from those who do not comment on their behaviour. Additionally, relative to non-firesetters, firesetters scored significantly higher on the *BIDR-IM* scale potentially implying that firesetters were less likely to impression manage. However, it is perhaps more likely that relative to non-

firesetters, firesetters are more antisocial. For example, relative to non-firesetters, firesetters scored significantly higher on the antisocial items contained within the *FSS* and *FPS*.

Similarly, as the *BIDR-IM* scale includes items related to antisocial behaviour (e.g., when I was young I sometimes stole things, I have some pretty awful habits), firesetters may simply be indicating they are more antisocial compared to non-firesetters rather than managing impressions. There are also issues associated with fear of reprisals. Despite the participants being assured of anonymity and confidentiality it is possible that some members of the public were reluctant to disclose potentially incriminating information 'online'. In addition although a representative sample of the Thanet population were invited to participate in the research, the low participation rate is a research limitation. It is unclear why the participation rate is so low, however, the participants do appear to be representative of the local population. For example, the general Thanet population are predominantly White British (90.4%; ONS 2011) and similarly 97.5 % of the participants indicated they were White British. The gender division of the participants (49.7% male, 50.3% female) was also similar to the gender split of the general Thanet population between the ages of 20 to 70 years (48.0% male, 52.0% female, ONS 2011).

It is interesting that two of the un-apprehended deliberate firesetters (18.8%) believed that if they had been more aware of the dangers associated with fire they would not have ignited their fires. Therefore, for these firesetters, education programmes which focus on fire safety would help to reduce the incidences and severity of deliberate fires.

Only a small number of firesetters are apprehended and prosecuted (Rider, 1980). Despite this, the vast majority of research is centred on firesetters who are the least successful at evading apprehension and are therefore by no means representative of all firesetters. The literature relating to both adolescent and adult undetected firesetters is sparse, thus one hypothesis is unable to encompass all firesetters. It is advisable and advantageous to develop

a comprehensive understanding of the firesetters who manage to evade detection. To my knowledge no other scale exists requesting participants to imagine themselves as the fire protagonist. Physically carrying out behaviours and imagining those behaviours is believed to result in the same brain activation (see Jeannerod & Frak, 1999). Therefore asking un-apprehended firesetters to imagine themselves in firesetting scenarios may be a powerful form of self-reflection.

Additional research will aid a wider understanding of community individuals who have a proneness to engage in illegal firesetting behaviour. By understanding different types of deliberate firesetters, professionals could predict, discriminate, and direct appropriate education and treatment programmes to prevent those at risk of this type of behaviour.

Summary

Study 1 assessed the prevalence and psychological characteristics of un-apprehended deliberate firesetters living in a high firesetting prevalent community in the UK. Relative to non-firesetters, deliberate firesetters were found to have higher levels of fire interest and fascination as measured using the *Fire Setting Scale*, *Fire Proclivity Scale*, *Identification with Fire* and *Fire Attitude Scale*. In addition, significantly more firesetters self reported having a father with a psychiatric illness, a family history of deliberate firesetting, a history of self harm, and reported experimenting with fire before the age of 10. Although basic psychological characteristics were considered as part of Study 1, information relating to personality characteristics were not captured (e.g., experiences relating to anger, boredom proneness, and assertiveness), something which has been highlighted in the literature as differentiating between apprehended adult firesetters and non-firesetters (Gannon et al., 2013). Thus, Study 2 builds upon Study 1 by further exploring the psychological characteristics of un-apprehended deliberate firesetters in a larger community sample.

Chapter 6

Study 2: Comparing the Psychological Characteristics of Un-apprehended Firesetters and Non-Firesetters Living in the UK⁵

Introduction

Study 1 examined similarities and differences in the characteristics of un-apprehended firesetters and non-firesetters in the UK. The results of Study 1 highlighted that un-apprehended firesetters were similar to non-firesetters on a number of basic demographic (e.g., formal education) and historical characteristics (e.g., psychiatric diagnosis, previous convictions). However, relative to non-firesetters, significantly more un-apprehended firesetters reported having; engaged in self-harming behaviour, a father diagnosed with a psychiatric illness, and a family history of firesetting. Although identifying characteristics which differentiate un-apprehended firesetters from non-firesetters is important to developing our understanding of this population, for effective prevention and intervention strategies to be developed it is critical to develop an understanding of the *psychological* characteristics of un-apprehended firesetters.

Research with apprehended adult firesetters has highlighted that firesetters appear to be a unique population who psychologically differ from non-firesetters. For example, Gannon et al. (2013b) found that male apprehended adult firesetters could be differentiated from other offenders on fire related factors (i.e., more identification with fire, interest in everyday and serious fires, attitudes aimed at legitimising firesetting as 'normal', and less perceived fire safety knowledge), emotional/self regulation factors (i.e., firesetters reported significantly more anger related cognitions, physiological arousal to anger, and susceptibility to provocation), and self concept factors (i.e., firesetters hold lower levels of self esteem).

⁵ The content of this chapter has been published: Barrowcliffe, E. R., & Gannon, T. A. (2016). Comparing the psychological characteristics of un-apprehended firesetters and non-firesetters living in the UK. *Psychology, Crime and Law*, 22(4), 382-404. doi: 10.1080/1068316X.2015.1111365

Gannon et al. (2013b) concluded that relative to non-firesetting offenders, adult male firesetters incarcerated in prisons are a special group of offenders who hold unique psychological characteristics.

Although research with apprehended firesetters may provide an indication of psychological factors which may be important for understanding deliberate firesetting, it is inappropriate to generalise the literature associated with apprehended firesetters to all firesetting populations. For example, there are only a few studies concerned with un-apprehended firesetters (described in detail in Chapter 3) and therefore relatively little is known about firesetters who manage to evade detection.

Study 2 aims to extend the findings of Study 1 to include an examination of the psychological characteristics of un-apprehended firesetters in comparison to non-firesetters. The format of the current study is similar to that of Study 1 (Chapter 5; Barrowcliffe & Gannon, 2015). Participants completed an online questionnaire relating to firesetting. Fascination with fire (Barrowcliffe & Gannon, 2015; Gannon & Barrowcliffe, 2012; Rautaheimo, 1989), antisocial behaviour (Barrowcliffe & Gannon, 2015; Gannon & Barrowcliffe, 2012; Dolan et al., 2011), and fire interest have been found to play a role in both adult (Barrowcliffe & Gannon, 2015; Barnoux et al., 2015; Ó Ciardha & Gannon, 2012), and identified and un-apprehended adolescent firesetting (MacKay et al., 2006; Watt, Geritz, Hasan, Harden, & Doley, 2015), and therefore, like Study 1, scales measuring these characteristics are included in Study 2. However, the literature associated with apprehended adult firesetters has also highlighted that other psychological characteristics may be linked with firesetting behaviour such as anger (Gannon et al., 2013; Rix, 1994), a lack of assertiveness, loneliness, social isolation (Hurley & Monahan, 1969; Inciardi, 1970; Jackson et al., 1987b; Noblett & Nelson, 2001; Rice & Chaplin, 1979), and boredom (Perrin-Wallqvist et al., 2004; Sapp, Huff, Gary, & Icove, 1999). These characteristics have not

previously been assessed in un-apprehended firesetting populations. Thus, demographic information in combination with measures examining the aforementioned psychological characteristics are examined in Study 2, with the aim of discriminating between un-apprehended deliberate firesetters and non-firesetters. Based on the apprehended literature, it is predicted that relative to non-firesetters, un-apprehended firesetters will report increased fire interest, antisocial behaviour, anger, loneliness, and boredom, and report significantly lower assertiveness.

Method

Participants

Participants were recruited through social media and snow balling techniques. Two hundred and thirty two people accessed an online questionnaire relating to firesetting. Of these, 204 completed the questionnaire in full (87.9% completion rate). Two hundred and twenty five people (37 males, 188 females) answered the question relating to deliberate firesetting with an average age of 25 years (range 18 to 69 years). The majority of these participants indicated they were White ($n = 175$, 77.8%), of these 75.4% ($n = 132$) identified themselves as White British, and 24.6% ($n = 43$) White other. The majority of the participants were educated, only 3.1% ($n = 7$) indicated they held no qualifications. The majority of participants had gained A level qualifications (or foreign equivalent; $n = 172$; 76.4%), or a degree or higher ($n = 30$; 13.3%). Participants' email addresses were entered into a prize draw to win Amazon vouchers.

The Measures

Like Study 1, the online questionnaire had three main sections: a *demographic and background section* containing questions relating to gender, number of siblings, family

background, psychiatric history, education level, and family background (e.g., parental psychiatric history, witnessing domestic violence, family finances, and family history of firesetting), a *firesetting disclosure section* where participants indicated whether they had ever ignited a fire to *annoy other people, to relieve boredom, to create excitement, for insurance purposes, as a result of peer pressure, or to get rid of evidence*. Fires set before the age of 10, ignited accidentally, or set as part of an organized event (i.e. a bonfire) were excluded. Participants who indicated they had ignited a deliberate fire answered additional questions (e.g., forced choice questions) examining number of deliberate fires ignited, age at first and most recent firesetting incident, formal apprehension or therapy relating to their firesetting, factors precipitating the firesetting (i.e., intoxication, planning), modus operandi (i.e., the use of accelerants, ignition points, distance of the fire from home), motivations, targets of the deliberate firesetting, and response to the firesetting (i.e., attempts to extinguish the fire).

The final section of the questionnaire included various scales assessing fire interest and behaviour (e.g., antisocial behaviour, boredom proneness, assertiveness, and anger) which are presented in detail below and can be seen in full in the Appendices. The scales were presented in a randomized order. In line with Study 1 the internal reliability alphas are reported in accordance with George and Mallery's (2003) criteria: $\geq .90$ excellent, $\geq .80$ good, $\geq .70$ acceptable, and $\geq .60$ questionable.

The fire related scales.

There were five fire related scales; the *Fire Setting Scale* and the *Fire Proclivity Scale* (Gannon & Barrowcliffe, 2012), the *Identification with Fire Questionnaire* (Gannon, et al., 2011), the *Fire Attitude Scale* (Muckley, 1997), and the *Fire Interest Rating Scale* (Murphy & Clare, 1996).

The Fire Setting Scale (FSS). The 20 item *FSS* is described in full in the Method section of Chapter 5 (p 65). In the current study the internal consistency ranged from good to excellent (overall $\alpha = .91$, Antisocial Behaviour $\alpha = .85$, Fire Interest $\alpha = .92$).

The Fire Proclivity Scale (FPS). The *FPS* is detailed in full in the Method section of Chapter 5 (p 65) The internal consistency of the *FPS* in the current study ranged from acceptable to excellent (overall $\alpha = .82$, fire fascination $\alpha = .71$, behavioural propensity $\alpha = .81$, fire arousal $\alpha = .81$, and general antisocialism $\alpha = .93$).

The Identification with Fire Scale. The *Identification with Fire Scale* is described in full in the Method section of Chapter 5 (p 66). The internal consistency was found to be questionable in the current study ($\alpha = .66$).

The Fire Attitude Scale (FAS). The *FAS* is described in full in the Method section of Chapter 5 (p 66) and was found to have acceptable internal consistency ($\alpha = .71$) in the current study.

The Fire Interest Rating Scale. The *Fire Interest Rating Scale* (Murphy & Clare, 1996; see Appendix 8) measures fire interest and contains 14 statements (e.g., *striking a match to set fire to a building*) rated on a 7 point Likert scale (1 = *extremely upsetting or frightening*, 4 = *OK and it doesn't bother you*, 7 = *exciting, fun or lovely*). Alpha information from previous research is not available for the *Fire Interest Rating Scale* but the internal consistency was noted to be $\alpha = .82$ in the current study.

Personality related scales.

The Novaco Anger Scale and Provocation Inventory (NAS-PI). The *NAS-PI* (Novaco, 2003) contains 60 items assessing four separate aspects of how anger is experienced; anger cognitions (*COG*: e.g., *once something makes me angry, I keep thinking about it*)⁶, arousal (*ARO*: e.g., *when I get angry I stay angry for hours*), behavioural elements of anger (*BEH*: e.g., *my temper is quick and hot*), and Anger Regulation (*REG*: e.g., *if I feel myself getting angry, I can calm myself down*). Items are rated on a three point Likert scale (*never, sometimes, always*). The *Provocation Inventory* aspect of the *NAS-PI* contains 25 items associated with an individual's ability to tolerate provocation. Items (e.g., *someone else gets credit for work that you did, and people who think they are better than you*) are responded to using a four point Likert scale (1 = *not at all angry*, 4 = *very angry*).

The total scale, and subscales have previously been found to have acceptable to excellent internal consistency when tested with a community sample, (*overall* $\alpha = .92$, *COG* $\alpha = .78$, *ARO* $\alpha = .82$, *BEH* $\alpha = .82$, *PI* $\alpha = .92$; Jones, Thomas-Peter, & Trout, 1999) and *REG* appears to exhibit acceptable reliability ($\alpha = .74$) with a standardised sample (Novaco, 2003). In the current study the *NAS-PI* scale demonstrated slightly higher internal consistency ranging from good to excellent (*overall* $\alpha = .92$, *COG* $\alpha = .81$, *ARO* $\alpha = .87$, *BEH* $\alpha = .90$, *REG* $\alpha = .95$, and *PI* $\alpha = .95$).

The Revised UCLA Loneliness Scale. The *UCLA* (Russell, Peplau, & Cutrona, 1980; see Appendix 9) is a short, 20-item self-report measure designed to measure loneliness. Items (e.g., *I lack companionship*) are responded to using a four point Likert scale (1 = *never*, 4 = *often*). A reliability generalisation study reported the mean internal reliability to be, $\alpha = .87$

⁶ Sample items from the Novaco Anger Scale and Provocation Inventory (NAS-PI) copyright © 2003 by Western Psychological Services. Reprinted by E. Barrowcliffe, University of Kent, for scholarly display purposes by permission of the publisher, WPS, 625 Alaska Avenue, Torrance, California 90503, U.S.A. Not to be reprinted in whole or in part for any additional purpose without the expressed written permission of the publisher (rights@wpspublish.com). All rights reserved.

(Vassar & Crosby, 2008). Similar psychometric properties were noted in the current study, $\alpha = .93$.

The Simple Rathus Assertiveness Schedule—Short Form. The *Simple Rathus Assertiveness Schedule—Short Form* (Jenerette & Dixon, 2010; see Appendix 10) consists of 19 items (e.g., *I am quick to say what I think*) rated on a 6 point Likert scale (1 = *very much unlike me*, 6 = *very much like me*). Jenerette and Dixon (2010) reported that their scale had good reliability ($\alpha = .81$), this was also evident in the current study ($\alpha = .82$).

Nowicki Strickland Locus of Control. The *Nowicki Strickland Locus of Control* scale (Nowicki 1976; see Appendix 11) measures how much an individual feels they are in control of the events around them. The 40 items in the scale (e.g., *are some people just born lucky?*) are responded to with either a *yes* or *no* answer. The scale has been noted to have levels of internal consistency ranging between $\alpha = .66$ and $\alpha = .75$ (Duke & Nowicki, 1973), and similarly the internal consistency in the current study ($\alpha = .69$) falls within this range.

Boredom Proneness Scale - short form. The *Boredom Proneness Scale - Short Form* (Vodanovich et al., 2005; see Appendix 12) contains 12 items measuring *internal* (e.g., *I find it easy to entertain myself*), and *external* (e.g., *It seems that the same things are on television or the movies all the time; it's getting old*) factors relating to boredom. The items are measured using a 7 point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). The short form has been noted to have acceptable reliability ($\alpha = .70$; Hopley & Nicki, 2010), and $\alpha = .73$ in the current study.

Measure of Criminal Attitudes and Associates - Part B (M-CAA). The *M-CAA-Part B* (Mills & Kroner, 1999) is a 46 item scale (*agree/disagree*) which measures attitudes towards *violence* (e.g., *sometimes you have to fight to keep your self-respect*), *entitlement* (e.g., *It is wrong for a lack of money to stop you from getting things*), *antisocial intent* (e.g., *rules will not stop me from doing what I want*), and *associates* (e.g., *I have committed a crime with friends*; see Appendix 13). The psychometric properties of the *M-CAA-Part B* have previously been reported to range between acceptable and good (Part B *total* $\alpha = .75$, *violence* $\alpha = .80$, *antisocial index* $\alpha = .72$, and *associates* $\alpha = .82$) with the exception of *entitlement* ($\alpha = .63$; Mills, Kroner, & Forth, 2002). In the current study the reliability alpha was $\alpha = .86$ for the complete *M-CAA-Part B* (*violence* $\alpha = .68$, *entitlement* $\alpha = .72$, *antisocial index* $\alpha = .72$, and *antisocial associates* $\alpha = .77$).

Impression Management

Balanced Inventory of Desirable Responding (BIDR). The *BIDR-IM* is described in full in the Method section of Chapter 5 (p 66) and had acceptable internal consistency ($\alpha = .72$) in the current community sample.

Procedure

The research was ethically approved by the University of Kent's Research Ethics Committee (Ref 20142842). Participants completed the online questionnaire in their own time. To encourage participation, participants' email addresses were entered into a prize draw to win Amazon vouchers. Participants viewed an information sheet online before the start of the study, and were informed that continuing with the study indicated consent. Participants were requested not to disclose any personally identifying information about themselves or any fires they may have ignited. In order to ensure anonymity IP addresses were not

recorded. At the end of the questionnaire participants were thanked and a written debrief appeared explaining the purpose of the research, and reiterated that the information provided would remain anonymous.

Results

Firesetting Prevalence and Features

Forty participants (17.8%) indicated that they had ignited a deliberate fire but had not been formally apprehended for their actions. The majority of firesetters reported that they were White British ($n = 26$, 65.0%), and all held a formal qualification (e.g., A levels or higher). Overall the majority of the firesetters were female ($n = 25$, 62.5%). Of the 37 males and 188 females who participated 40.54% ($n = 15$) of the males and 13.31% ($n = 25$) of the females were classified as firesetters. Key demographics can be found in Table 6.1.

Table 6.1. Firesetters and non-firesetters historical characteristics and demographics.

Variable	Firesetters (<i>n</i> = 40)	Non-firesetters (<i>n</i> = 185)
	<i>M</i> <i>SD</i>	<i>M</i> <i>SD</i>
Demographics		
Age	24.0 (9.00)	25.5 (12.73)
Siblings (number)	2.5 (1.20)	2.6 (1.12)
	Percentage yes (<i>n</i>)	Percentage yes (<i>n</i>)
Males	37.5 (15)	11.9 (22)
Females	62.5 (25)	88.1 (163)
White British	65.0 (26)	57.3 (106)
White Other	20.0 (8)	18.9 (35)
Formal qualifications	100 (40)	96.2 (178)
History of enuresis	7.5 (3)	4.3 (8)
Psychiatric illness diagnosis	32.5 (13)**	14.1 (26)
Physical disability diagnosis	5.0 (2)	1.6 (3)
Behavioural problem diagnosis	12.5 (5)**	0 (0)
Suspension from school	32.5 (13)**	4.3 (8)
Expulsion from school	10.0 (4)	3.2 (6)
History of suicide	17.5 (7)*	6.5 (12)
History of self-harm	35.0 (14)	21.6 (40)
Criminal convictions	7.5 (3)	1.1 (2)
Experimented with fire before the age of 10	57.5 (23)**	24.3 (45)
Family Background		
Lack of money (i.e., sometimes not enough money for food)	25.0 (10)	14.6 (27)
Witnessed domestic violence	25.0 (10)	25.9 (48)
Mother diagnosed with a psychiatric illness	30.0 (12)	17.8 (33)
Father diagnosed with a psychiatric illness	12.5 (5)	10.3 (19)
A family member also ignited a deliberate fire	15.0 (6)**	3.2 (6)

χ^2 with 95% confidence ** $p \leq .01$, * $p \leq .05$

Firesetters self-reported igniting their most recent fire between the ages of 10 and 37 years (*Mdn* 16 years). The majority ($n = 34$, 85%) of firesetters reported igniting their most

recent fire between 10 and 18 years of age, and only 15% ($n = 6$) ignited fires during adulthood (range 20 to 37 years). Only one firesetter (2.5%) ignited their first fire in adulthood.

Fifteen firesetters ignited only one deliberate fire (37.5%). However the majority of firesetters ignited multiple fires. None of the firesetters reported holding any convictions for arson, but three firesetters reported holding convictions for either a violent crime, antisocial behaviour, or theft. None of the firesetters reported having received therapy for their firesetting behaviour. The majority of firesetters ($n = 28$, 70%) reported igniting a fire within one mile of their home (e.g., walking distance). One firesetter (2.5%) reported being under the influence of drugs, and five firesetters (12.5%) claimed to be under the influence of alcohol during ignition. The majority of firesetters ignited their fires with other people ($n = 29$, 72.5%). Just under a third of firesetters ignited *grass, shrubbery or dry leaves* ($n = 11$, 27.5%) and 10 firesetters (25%) ignited *paper, books, or newspapers*. Igniting *waste paper baskets and bins inside* ($n = 5$, 12.5%), and *bins outside* ($n = 9$, 22.5%) were also common targets. Table 6.2 contains further offence characteristics.

Table 6.2. Deliberate firesetting offence characteristics.

Offence Characteristics	Firesetters (<i>n</i> = 40) <i>Percentage yes (n)</i>
Number of deliberate fires ignited	
One	37.5 (15)
Two	27.5 (11)
Three	17.5 (7)
Four or more	17.5 (7)
Ignition point and target	
One ignition point	67.5 (27)
Multiple ignition points	32.5 (13)
Ignited countryside (e.g., grass/ shrubbery)	27.5 (11)
Paper, books, or newspapers	25.0 (10)
Ignited a bin outside	22.5 (9)
Ignited a wastepaper bin or bin inside	12.5 (5)
Ignited clothing	12.5 (5)
Ignited a toilet roll dispenser	12.5 (5)
General rubbish	7.5 (3)
Furniture	5.0 (2)
Ignited an unoccupied car	2.5 (1)
Ignited an animal which was alive	2.5 (1)
Ignited a house knowing it was occupied	2.5 (1)
Fires ignited alone or with accomplices	
Ignited fire alone	27.5 (11)
Ignited fire with 1 other person	12.5 (5)
Ignited fire with 2 other people	20.0 (8)
Ignited fire with 3 ⁺ people	40.0 (16)

Note: Ignition targets do not add up to 100% due to multiple targets

Participants were requested to list the motivations behind their firesetting (see Table 6.3). The majority of firesetters ($n = 28$, 70%) reported multiple motivations. The predominant motivations behind firesetting were to *create fun/ excitement or alleviate boredom* ($n = 27$, 67.5%) and *curiosity or experimentation* ($n = 26$, 65%). Nine firesetters (22.5%) stated they experienced *a love of fire* and none of the firesetters were motivated by revenge.

Table 6.3. The motivations behind deliberate firesetting.

Motivation	Firesetters ($n = 40$) Percentage yes (n)
To create fun/excitement or alleviate boredom	67.5 (27)
Curiosity or experimenting with fire	65.0 (26)
Love fire	22.5 (9)
Dared or pranked	20.0 (8)
Vandalism	10.0 (4)
Other not specified	10.0 (4)
Going along with friends	5.0 (2)
Stressed or frustrated	5.0 (2)
Problems at home or school	2.5 (1)
Protecting themselves	2.5 (1)
Revenge	0
Insurance payout or financial gain	0
Covering up another crime/ destroying evidence	0

Note: Motivations do not add up to the number of firesetters as 28 firesetters (70%) indicated multiple motives.

Although the majority of firesetters ($n = 30$, 75%) took part in extinguishing the fire, four firesetters (10%) indicated that the Fire Service extinguished their fires. In terms of preventative measure, 45% ($n = 18$) indicated that nothing would have prevented their firesetting. However, 35% of firesetters ($n = 14$) indicated that having better fire safety knowledge (e.g., *being aware of the dangers*, and *increased knowledge of how fire develops*)

would have prevented them from firesetting, see Table 6.4. Of the participants who indicated that having better fire safety knowledge would have prevented them from firesetting, seven ignited just one fire, but the remaining seven firesetters ignited multiple fires (two fires [$n = 3$], three fires [$n = 2$], or four or more fires [$n = 2$]).

Table 6.4. Factors firesetters believe would have prevented them from firesetting.

Preventative Measures	Firesetters ($n = 40$) Percentage yes (n)
Nothing	45.0 (18)
Increased fire safety knowledge	35.0 (14)
Increased confidence to stand up to peers	12.5 (5)
More parental supervision	12.5 (5)
Other not specified	12.5 (5)
Being less bored	5.0 (2)
Increased anger control	0
Increased impulse control	0

Note: Firesetters were able to select multiple options therefore preventative measures may not add up to 100.

Comparison of firesetter and non-firesetter characteristics

Demographic and historical variables.

Univariate comparisons (see Table 6.1) revealed that firesetters and non-firesetters could not be significantly differentiated on the majority of demographic, or historical variables (e.g., age, number of siblings, history of enuresis, formal qualifications, physical disability, history of self-harm, criminal convictions, witnessing domestic violence, or parental psychiatric history). A-priori power analysis using G Power 3 (Faul et al., 2007) computed the statistical power of the analyses. According to Cohen's (1988) guidelines in order to detect a medium sized effect 88 participants were required for the Chi-square

analyses and 82 participants required for the t-test analyses. Therefore as the analyses were conducted with data from over 200 participants the analyses are likely to detect medium to large effects. However the analyses for both Chi-square analyses and t-tests are unlikely to be able to detect smaller and more subtle effects as they required 785 and 779 participants respectively.

Relative to non-firesetters, firesetters were more likely to report a diagnosis of a psychiatric illness⁷, $\chi^2(1, n = 225) = 6.58, p \leq .01, \phi = .19$, and a diagnosis of a behavioural disorder (e.g., ADHD), $\chi^2(1, n = 225) = 18.25, p < .01, \phi = .32$. All of the firesetters with a behavioural disorder began firesetting in childhood and adolescence (10 to 15 years of age) and ignited more than one fire (two fires [$n = 3$], three fires [$n = 1$], five or more fires [$n = 1$]). Firesetters were also more likely to have been suspended from school $\chi^2(1, n = 225) = 27.61, p < .01, \phi = .37$, engaged in more suicide attempts $\chi^2(1, n = 225) = 3.83, p \leq .05, \phi = .15$, and experimented with fire before the age of 10 years $\chi^2(1, n = 225) = 15.63, p < .01, \phi = .28$. In addition relative to non-firesetters, firesetters reported having a family member who had also ignited a deliberate fire $\chi^2(1, n = 201) = 9.60, p < .01, \phi = .25$.

Questionnaire measures.

The *Impression Management (BIDR-IM)* subscale of the *BIDR* significantly correlated with the *Fire Setting Scale* ($r = -.31$), *Fire Proclivity Scale* ($r = -.31$), the *Fire Attitude Scale* ($r = -.21$), the *Novaco Anger Scale and Provocation Inventory* ($r = -.40$), the *Revised UCLA Loneliness Scale* ($r = -.35$), and the *Measure of Criminal Attitudes and Associates Part B* ($r = .30$). However, for all of these scales, when computed separately for the firesetters and non-firesetters the scale scores did not significantly correlate with the *BIDR-IM*.

⁷ Psychiatric disorder included Depression, Schizophrenia, Obsessive Compulsive Disorder, eating disorders and anxiety disorders.

Mean scale scores were calculated separately for the firesetters, and non-firesetters (See Table 6.5). Separate one-way between-groups multivariate analysis of variance (MANOVA) were conducted to establish any differences between firesetters, and non-firesetters on the *Fire Setting Scale*, *Fire Proclivity Scale*, the *Novaco Anger Scale and Provocation Inventory*, and the *Measure of Criminal Attitudes and Associates*. A-priori power analyses of the MANOVA was computed using G Power 3 (Faul et al., 2007) and indicated that 128 participants were required to detect a medium effect with a power of .80 and therefore the sample size is suitable for detecting medium to large effects. However the analyses are unlikely to detect smaller more subtle effects as 787 participants are required. After checking assumptions for normality, linearity, outliers, multicollinearity, and homogeneity of variance-covariance the separate MANOVA analyses confirmed that firesetters scored significantly higher compared to non-firesetters on the combined *Fire Setting Scale* $F(2,216) = 16.27, p < .01$; Wilks' $\Lambda = .87$; $\eta_p^2 = .13$; $d = .90$. When the results of the dependent variables were considered separately, both of the subscales were also significant, (*Behavioural subscale* $F(1,217) = 26.79, p < .01$; $\eta_p^2 = .11$; $d = .83$, *Fire Interest subscale* $F(1,217) = 17.56, p < .01$; $\eta_p^2 = .08$; $d = .71$). Similarly, the firesetters also scored significantly higher compared to the non-firesetters on the combined *Fire Proclivity Scale* $F(4,215) = 10.24, p < .01$; Wilks' $\Lambda = .84$; $\eta_p^2 = .16$; $d = .73$ and all of the subscales (*Fascination* $F(1,218) = 16.06, p < .01$; $\eta_p^2 = .07$; $d = .63$, *Behavioural Propensity* $F(1,218) = 35.78, p < .01$; $\eta_p^2 = .14$; $d = .90$, *Arousal Index* $F(1,218) = 17.98, p < .01$; $\eta_p^2 = .08$; $d = .67$, and *Antisocial Index* $F(1,218) = 4.10, p < .05$; $\eta_p^2 = .02$; $d = .35$).

Table 6.5. Reliability and scale scores for self-reported deliberate firesetters and non-firesetters.

Scale	Cronbach Alpha	Firesetters (<i>n</i> = 40)		Non- Firesetters (<i>n</i> = 185)		Scale range
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Fire Setting Scale	0.91	68.40***	(21.87)	50.70	(17.38)	20-140
Behavioural items	0.85	33.10***	(11.43)	24.59	(8.89)	10-70
Fire Interest items	0.92	35.30***	(13.76)	26.11	(12.25)	10-70
Fire Proclivity Scale	0.82	56.43***	(18.49)	44.81	(13.03)	24-120
Fire Fascination	0.71	16.55***	(6.16)	13.13	(4.56)	6-30
Behavioural Propensity	0.81	13.85***	(4.87)	10.17	(3.15)	6-30
Fire Arousal	0.81	16.00***	(5.73)	12.63	(4.25)	6-30
Antisociality	0.93	10.03*	(3.49)	8.88	(3.16)	6-30
Identification with Fire Scale	0.66	19.74	(5.73)	18.08	(4.23)	10-50
Fire Attitude Scale	0.71	53.28	(11.46)	52.00	(7.11)	20-100
The Fire Interest Rating Scale	0.82	45.97**	(10.53)	40.59	(7.84)	14-98
The Novaco Anger Scale and Provocation Inventory T scores	0.92	115.49***	(13.17)	105.84	(14.36)	
Cognition (COG)	0.81	31.95***	(4.58)	28.67	(4.62)	20-80
Arousal (ARO)	0.87	30.38**	(5.42)	27.52	(5.64)	21-80
Behavioural (BEH)	0.90	28.13***	(6.25)	24.18	(5.80)	29-80
Regulation (REG)	0.95	25.03	(3.87)	25.46	(3.52)	20-80
Provocation Inventory (PI)	0.95	68.37*	(12.72)	62.71	(14.59)	20-79
The Revised UCLA Loneliness Scale	0.93	42.06	(13.39)	37.51	(9.75)	20-80
The Simple Rathus Assertiveness Schedule—Short Form	0.82	69.51	(14.06)	66.35	(12.22)	19-114
Nowicki Strickland Locus of Control	0.69	14.74	(5.99)	13.34	(5.77)	0-40
Boredom Proneness Scale - short form	0.73	44.42*	(10.02)	40.59	(7.51)	12-84
Measure of Criminal Attitudes and Associates	0.81	19.95***	(7.21)	15.07	(5.41)	0-46
Violence	0.76	4.72**	(3.32)	2.93	(2.20)	0-12
Entitlement	0.72	5.72**	(3.16)	4.43	(2.61)	0-12
Antisocial	0.41	5.51***	(1.73)	4.18	(1.71)	0-12
Associates	0.01	4.00*	(1.50)	3.53	(1.23)	0-10
BIDR - Impression Management	0.66	54.21	(7.11)	59.85	(9.37)	20-100

* $p \leq .05$, ** $p < .01$, *** $p \leq .001$

A separate MANOVA also showed that firesetters scored significantly higher on the combined *Novaco Anger Scale and Provocation Inventory*⁸ $F(5,195) = 3.53, p < .01$; Wilks' $\Lambda = .92$; $\eta_p^2 = .08$; $d = .70$, and the majority of its subscales (*COG* $F(1,199) = 15.26, p < .01$; $\eta_p^2 = .07$; $d = 1.15$, *ARO* $F(1,199) = 9.33, p < .01$; $\eta_p^2 = .05$; $d = .52$, *BEH* $F(1,199) = 12.72, p < .01$; $\eta_p^2 = .06$; $d = .67$, and *PI* $F(1,199) = 5.61, p < .05$; $\eta_p^2 = .03$; $d = .41$). The subscale relating to the regulation of anger (*REG*) was not significant.

The MANOVA for the *M-CAA-Part B* revealed that relative to non-firesetters, firesetters scored significantly higher on the combined subscales of the *M-CAA-Part B*, $F(4,198) = 6.81, p < .01$; Pillais = .13; $\eta_p^2 = .13$; $d = .89$, and also scored significantly higher on the majority of its subscales (*Violence* $F(1,201) = 10.82, p < .01$; $\eta_p^2 = .05$; $d = .58$, *Antisocial Index* $F(1,201) = 25.57, p < .01$; $\eta_p^2 = .11$; $d = .89$, and *Associates* $F(1,201) = 10.97, p < .01$; $\eta_p^2 = .11$; $d = .69$). Firesetters and non-firesetters did not statistically differ on the subscale scores relating to *Entitlement*.

Independent samples t-tests confirmed that firesetters scored significantly higher compared to non-firesetters on the *Fire Interest Rating Scale* $t(47.71) = 3.02, p < .01, d = .87$ (two-tailed, mean difference = 5.39, 95% CI: 1.79, 8.98). Firesetters also scored significantly higher on the *Boredom Proneness Scale* $t(46.96) = 2.22, p < .05, d = .65$ (two-tailed, mean difference = 3.83, 95% CI: 0.36, 7.30). There were no significant differences between the scores of firesetters and non-firesetters on the *Identification with Fire Scale*, the *Fire Attitude Scale*, the *Revised UCLA Loneliness Rating Scale*, the *Simple Rathus Assertiveness Scale-Short Form*, or the *Nowicki Strickland Locus of Control Scale*.

⁸ Novaco t-score conversions were used in the analysis.

Classifying Firesetters and Non-firesetters

A total of twelve variables significantly differentiated the deliberate firesetters and the non-firesetters. Due to small sample sizes two separate Logistic Regressions were conducted, one to assess the static variables, and one relating to the dynamic variables. There were six static variables; a diagnoses of a psychiatric illness, a diagnosis of a behavioural problem, suspension from school, history of suicide attempts, experimentation with fire before the age of 10 years, and having a family history of firesetting. However, due to a small number of participants ($n = 5$) reporting a behavioural problem diagnosis this variable was omitted from the analysis. The complete model was significant $\chi^2(5, n = 201) = 41.81, p < .01$, and therefore able to distinguish between the self-reported firesetters and non-firesetters. As a whole the model explained between 18.8% (Cox and Snell R Square), and 33.0% (Nagelkerke R squared) of the variance in firesetting status, and correctly classified 87.1% of cases overall. The sensitivity of the model to correctly classify the firesetters was 33.3% and specificity of the model to correctly predict non-firesetting status was 96.5%.

Three independent variables, having been suspended from school, experimenting with fire before the age of 10 years, and having a family history of firesetting were statistically significant contributors to the model with odds ratios of .10, .32, and .23 respectively; thus meaning that participants who had been suspended from school, experimented with fire before age 10, or had a family member with a history of deliberate firesetting were more likely to be classified as deliberate firesetters, see Table 6.6.

Table 6.6. Logistic Regression predicting firesetter status based on static variables

	β	S.E.	Wald	df	P	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Diagnosis of a psychiatric illness	-0.58	.59	.96	1	.33	.56	.18	1.78
Suspension from school	-2.35	.58	16.40	1	< .01	.10	.03	0.30
History of suicide attempts	-0.66	.74	.81	1	.37	.52	.12	2.18
Experimented with fire before age 10	-1.15	.47	5.93	1	.02	.32	.13	0.80
Family history of deliberate firesetting	-1.46	.73	3.98	1	<.05	.23	.06	0.98
Constant	3.24	1.03	10.05	1	< .01	25.8		

In terms of the dynamic variables, firesetters and non-firesetters scored significantly differently on six scale measures; the *Fire Setting Scale*, the *Fire Proclivity Scale*, the *Fire Interest Rating Scale*, the *Novaco Anger Scale and Provocation Inventory*, the *Boredom Proneness Scale*, and the *Measure of Criminal Attitudes and Associates*. The complete model was significant $\chi^2(6, n = 203) = 33.85, p < .01$, and therefore able to distinguish between self-reported firesetters and non-firesetters. As a whole the model explained between 15.4% (Cox and Snell R Square), and 24.8% (Nagelkerke R squared) of the variance in firesetting status, and correctly classified 83.3% of cases overall, 23.7% of the firesetters, and 97.0% of the non-firesetters. However none of the variables were individually statistically significant contributors to the model overall, see Table 6.7.

Table 6.7. Logistic Regression predicting firesetter status based on dynamic variables.

	β	S.E.	Wald	<i>df</i>	<i>P</i>	Odds Ratio	95% C.I. For	
							Lower	Upper
Fire Setting Scale	.03	.02	2.99	1	.09	1.03	1.00	1.06
Fire Proclivity Scale	.01	.02	.14	1	.71	1.01	.97	1.05
Fire Interest Rating Scale	.01	.03	.01	1	.96	1.00	.95	1.06
The Novaco Anger Scale and Provocation Inventory (T scores)	.04	.04	1.46	1	.23	1.04	.097	1.12
Boredom Proneness Scale	-.01	.03	.01	1	.97	1.00	.95	1.06
Measure of Criminal Attitudes and Associates	.06	.04	2.82	1	.09	1.06	.99	1.14
Constant	-7.44	2.44	9.29	1	.00	.00		

Discussion

The current study extends the firesetting literature by examining the behaviour and personality characteristics of un-apprehended firesetters. A total of 17.8% of the participants were classified as deliberate firesetters. This prevalence rate is considerably higher than the prevalence rate of 1% to 1.13% in the USA study (Blanco et al., 2010; Vaughn et al., 2010), and 11% to 11.5% prevalence rates in UK community studies (e.g., Study 1, Barrowcliffe & Gannon, 2015; Gannon & Barrowcliffe, 2012). One explanation for the increase in prevalence rate is as a result of the way in which participants were recruited. For example, participants did not meet the researchers face to face but were instead recruited online.

Igniting fires close to home is a feature associated with identified or apprehended adult firesetters (Bradford, 1982; Rautaheimo, 1989; Wachi et al., 2007), and community firesetters in both this study, and Study 1. Identified adolescent and apprehended adult

firesetting populations and the un-apprehended firesetters in this current study also share some similar characteristics. For example, identified adolescent and apprehended adult firesetters tend to have a history of self harm and suicide (Jayaraman & Frazer, 2006; McKerracher & Dacre, 1966; Noblett & Nelson, 2001; O'Sullivan & Kelleher, 1987; Swaffer & Hollin, 1995). Similarly, the community firesetters were also noted to have significantly more suicide attempts compared to the non-firesetters. In addition, relative to non-firesetters, community firesetters reported significantly more diagnoses of psychiatric illness. However, it is unclear when the diagnosis took place (e.g., before or after the firesetting), or if the firesetters were having symptoms at the time of ignition.

Firesetting offenders, relative to non-firesetting offenders, have been found to be distinguishable based on fire related factors such as fire interest, increased anger cognitions, and susceptibility to anger provocation (Gannon et al., 2013b). Fire interest has been found to increase the likelihood of firesetting in both apprehended adults (Barnoux et al., 2012), and identified adolescents (MacKay et al., 2006; Watt et al., 2015). Similarly, fascination with fire (Rautaheimo, 1989), and antisocial behaviour (Dolan et al., 2011) are also linked to firesetting behaviour. Although the current study with un-apprehended firesetters is not nationally representative, and is relatively small scale it offers an insight into the relevance of fire interest and fascination, anger cognitions, and antisocial behaviour as these factors significantly differentiated un-apprehended firesetters and non-firesetters. In addition, un-apprehended firesetters in the current study held more positive attitudes towards fires (e.g., interest around fire), which is consistent with the apprehended adult firesetting literature relating to the implicit theories associated with adult firesetters (Ó Ciardha & Gannon, 2012).

Apprehended adult firesetters are noted to be unskilled, and have low IQ (Bradford, 1982; Harmon et al., 1985; Lewis & Yarnell, 1951; Rautaheimo, 1989). In contrast to the apprehended firesetting literature, but in line with the research associated with un-

apprehended firesetters in Study 1, all of the un-apprehended firesetters in the current study were educated, and held at least A-level (Advanced level) UK qualifications.

The majority of the firesetters (85%, $n = 34$) in this community study reported igniting fires between the ages of 10 and 18 years. Similarly the majority of firesetters in the *NESARC* study (Blanco et al., 2010, Vaughn et al., 2010) and both the studies with UK un-apprehended firesetters (Study 1, Barrowcliffe & Gannon, 2015; Gannon & Barrowcliffe, 2012) ignited fires during adolescence. However, in contrast to the literature associated with identified adolescent and apprehended adult firesetters (Bradford, 1982; Muller, 2008; Pettiway, 1987; Räsänen et al., 1995; Rautaheimo, 1989) the majority of the firesetters in the current study were female ($n = 25$, 62.5%). Yet this is not surprising as relative to males ($n = 37$, 16.4%) significantly more females participated in the research ($n = 188$, 83.6%). It is worth noting that 40.5% ($n = 15$) of the male participants and 13.3% ($n = 25$) of female participants indicated that they had ignited a fire which matched the criteria for deliberate firesetting.

Both male and female offenders in general (Andrews & Bonta, 2010a, 2010b; Andrews, Guzzo, Raynor, Rowe, Rettinger, Brews, & Wormith, 2012) and apprehended adult firesetters are noted to have substance abuse issues (Jayaraman & Frazer, 2006), and/or issues with alcohol (Bourget & Bradford, 1989; Rautaheimo, 1989). However, none of the un-apprehended firesetters in Study 1 cited that alcohol or drugs played a role in their firesetting. Similarly, in the current study just one firesetter (2.5%) self-reported being under the influence of substances at the time of ignition, and only five firesetters (12.5%) indicated they were slightly to moderately intoxicated at the time of ignition. As individuals under the influence are likely to lack the cognitive capacity to evade detection, it is likely that alcohol and drug issues are over represented in the apprehended adult firesetting population.

The apprehended firesetting literature cites revenge as the predominant motivation behind firesetting (Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Swaffer & Hollin, 1995). However, revenge was not cited as a motivation in this study, nor in previous research with un-apprehended firesetters (Study 1, Barrowcliffe & Gannon, 2015; Gannon & Barrowcliffe, 2012). Revenge fires are likely to target an individual or their property. It is therefore feasible to assume that they are larger more destructive fires which have increased likelihood of coming to the attention of the authorities and leading to apprehension. Instead curiosity, excitement, and alleviating boredom were the most common motivations cited by un-apprehended firesetters in the current study, in Study 1, and in previous un-apprehended firesetting research (Gannon & Barrowcliffe, 2012). Interestingly, in the current study, boredom was a motivation associated only with adolescent firesetters. For this reason, encouraging adolescents to attend youth engagement programmes (e.g., after school activities and youth clubs) may help to alleviate boredom and prevent these individuals from deliberately igniting fires.

Attention Deficit Hyperactivity Disorder (ADHD) has also been cited as a factor relating to firesetting, but the data is limited (see Dolan et al., 2011). For example, McCardle, Lambie, and Barker-Collo (2004) found that just over half (53%) of their identified adolescent male firesetters in New Zealand had a diagnosis of ADHD. However, this information was obtained from parent/caregivers rather than relying on medical records. In contrast, none of the un-apprehended firesetters in Study 1 self-reported a behavioural disorder diagnosis. In the current community research, five (12.5%) firesetters self-reported a behavioural disorder and firesetting was predominantly associated with younger firesetters. For example, the majority of firesetters who reported a diagnosis of a behavioural disorder ignited their first and most recent fire in childhood or adolescence (10 to 18 years of age), with just one firesetter igniting a fire at 20 years old. Interestingly firesetters diagnosed with a

behavioural disorder ignited multiple fires which supports the idea that firesetting may be an advanced level of antisocial behaviour (Forehand, Wierson, Frame, Kempton, & Armistead, 1991) that warrants further research.

When comparing un-apprehended firesetters and non-firesetters, Study 1 found that relative to non-firesetters, firesetters were significantly less likely to have experimented with fire before the age of 10. It was suggested that firesetters may hold restricted experiences in manipulating fire as children which feeds into their motivation to misuse fire later on. However, in contrast the current community firesetters were significantly more likely to have experimented with fire before 10 years of age. It is hypothesised that fire interest is common in childhood but by the age of 10 the majority of children have a reasonable understanding of fire safety (Dolan et al., 2011). However, early firesetting in childhood is hypothesised to be a significant predictor of subsequent fire involvement for both patients and non-patients (Kolko, 2001). Dolan et al. (2011) suggests that firesetting develops into a problematic issue for children who lack adequate supervision. The participants in the current study were not asked to comment on the supervision they received as a child but this may offer an explanation as to how their firesetting remained un-noticed. In line with Study 1 the current community firesetters were also more likely to have a family history of firesetting. These findings further support theoretical models of firesetting suggesting that there is a social learning aspect associated with firesetting behaviour (see Gannon et al., 2012; Jackson et al., 1987a). Clearly, it would be beneficial for future research to be conducted with larger samples to truly assess the effects of family background and childhood fire experiences on subsequent firesetting behaviour.

It is concerning that a reasonable percentage of the firesetters ignited fires inside buildings ($n = 5$, 12.5%). Similarly concerning, is that although the majority of firesetters ($n = 30$, 75%) extinguished their fires, four firesetters (10%) indicated that the Fire Service

intervened. Presumably the fires extinguished by the Fire Service were larger, and more destructive in nature. Worryingly, 45% ($n = 18$) of firesetters indicated that nothing would have prevented them from deliberately igniting a fire. However, some comfort can be found in the fact that 35% of firesetters ($n = 14$), indicated that having better fire safety knowledge, such as being aware of the dangers of fire, and increased knowledge of how a fire develops would have prevented them from firesetting. Therefore it would be advisable to implement additional fire safety education.

As this research was conducted via social media the recruitment rate cannot be determined and therefore it is not possible to comment on any sample selection biases. However, it is acknowledged that the gender participation bias (high female to male participation rate) is a research limitation. Other researchers have also found that relative to males, high female participation rates are a common research problem (Sax et al., 2008; Underwood, Kim & Matier, 2000). In addition, the findings of the current study are limited by self report measures. However, the *BIDR-IM* was included to measure attempts at impression management and revealed that firesetters and non-firesetters were statistically similar in their *BIDR-IM* scores. Further, some of the measures included were relatively long (e.g., *NAS-PI* containing 85 items and *M-CAA-Part B* containing 46 items) which may have resulted in respondent fatigue and therefore non-completion of the study for some. It is likely that shorter studies would encourage questionnaire completion. It is also acknowledged that unintentional memory recollection failures may have occurred as the majority of un-apprehended firesetters (85%) were retrospectively commenting on their firesetting behaviour in adolescence. Therefore, future research concerned with un-apprehended firesetting should perhaps aim to recruit younger participants.

The factors which significantly differentiated firesetters and non-firesetters were entered into a Logistic Regression to gauge their ability to predict firesetting status. Two

separate Logistic Regressions were conducted to assess the predictive ability of five static variables (i.e., a diagnoses of a psychiatric illness, suspension from school, history of suicide attempts, experimentation with fire before the age of 10 years old, and having a family history of firesetting), and six dynamic variables, (i.e., the *Fire Setting Scale*, the *Fire Proclivity Scale*, the *Fire Interest Rating Scale*, the *Novaco Anger Scale and Provocation Inventory*, the *Boredom Proneness Scale*, and the *Measure of Criminal Attitudes and Associates*). Only three static variables successfully predicted firesetting status (suspension from school, experimentation with fire before the age of 10 years old, and having a family history of firesetting). The current research warrants further investigation, but supports the findings that previous firesetting incidences are the best predictors of future firesetting in both children, identified adolescent and apprehended adult firesetters (Edwards & Grace, 2014; Kennedy et al., 2006; Kolko, 2001).

The literature associated with un-apprehended UK firesetters is limited. Relative to their apprehended counterparts, un-apprehended firesetters appear to be highly educated, and possess the ability to evade detection. Therefore, it is inappropriate to apply all of the research associated with apprehended firesetters to un-apprehended firesetters; instead it would be beneficial to conduct further research in this area. In particular it is interesting to note that some un-apprehended firesetters highlighted factors which they believe would have prevented them from firesetting (e.g., better fire education). Incorporating such programmes into educational curriculums is a step closer to reducing the incidences, injuries, and fatalities caused as a result of deliberate firesetting.

Summary

Study 2 extended previous research by examining the psychological characteristics of un-apprehended deliberate firesetters. Similar to Study 1, relative to non-firesetters, un-

apprehended firesetters had higher levels of fire interest and fascination with fire, and held a family history of deliberate firesetting. In addition, un-apprehended firesetters were more likely to have been diagnosed with a psychiatric illness, diagnosed with a behavioural problem disorder, suspended from school, have a history of suicide, and scored higher on measures examining experiences of anger, boredom proneness, and criminal attitudes. Despite these findings, it was apparent from Studies 1 and 2 that the majority of firesetters ignited deliberate fires during adolescence and were commenting on their firesetting behaviour many years afterwards. To address issues related to memory recollection failures, Study 3a focuses on further examining the characteristics of un-apprehended firesetters with a younger sample of participants.

Chapter 7

Study 3a: Narrowing the Focus: Prevalence and Psychological Characteristics of Un-apprehended Firesetter and Non-Firesetters as Reported by 18 to 23 Year Olds in the UK

Introduction

Studies 1 and 2 highlighted the prevalence of un-apprehended deliberate firesetters in the UK and focussed on examining the psychological characteristics of adults recalling their previous firesetting. However, it was apparent that the majority of firesetters began igniting fires in adolescence, only 11.1% ($n = 2$) of firesetters in Study 1 and 2.5% ($n = 1$) of firesetters in Study 2 reported igniting their first fire as adults. Since the majority of un-apprehended firesetters in Studies 1 and 2 were retrospectively commenting on their firesetting behaviour in adolescence (approximately 85%) it is possible that unintentional memory recollection failures may have occurred. Thus, although Study 3a also requests participants to retrospectively comment on their firesetting behaviour, to help reduce recollection issues, the study focuses on younger participants aged between 18 and 23 years old.

Relative to adults, adolescent firesetters commit a disproportionate amount of firesetting (Watt et al., 2015). Data from the FBI highlights that over half of those arrested for arson in 2009 were under the age of 21 (U.S. Department of Justice, 2011). As explained in Chapter 2, typically adolescent firesetters do not receive a conviction for firesetting; often their firesetting has been identified whilst in residential care (Kazdin & Kolko, 1986; Sakheim et al., 1991; Shakeri et al., 2007) or they are referred to a community firesetting intervention programme (Root et al., 2008). Thus, rather than being referred to as apprehended firesetters,

adolescent firesetters are collectively referred to as identified adolescent firesetters (i.e., they have been identified as firesetters by a service or authorities).

Adolescent firesetters are also referred to in the literature as self-reported or un-apprehended firesetters. For example, like Studies 1 and 2, a number of studies have been conducted with community samples of adolescents who self-report having engaged in deliberate firesetting. Although typically the literature associated with self-reported community adolescent firesetters is limited, studies have been conducted in Australia (Martin et al., 2004), Canada (MacKay et al., 2009), USA (Chen, 2003; McCarty & McMahon, 2005), and Europe (Del Bove et al., 2008; Perrin-Wallqvist & Norlander, 2003). However, to date no such studies have been conducted in the UK. Furthermore, typically the international research is not specifically designed to evaluate firesetting behaviour in detail and often includes only single item questions (e.g., *I set fires*; Chen et al., 2003; Del Bove et al., 2008; Martin et al., 2004). Consequently, such studies lack detail relating to personality and offence characteristics. Study 3a is the first study exploring the prevalence and psychological characteristics of UK adolescent firesetters who self-report firesetting but have not been formally identified or apprehended for firesetting (i.e., un-apprehended adolescent firesetters). Although the format of Study 3a is similar to Studies 1 and 2, Study 3a specifically aims to reduce memory bias by recruiting younger participants (aged 18 to 23 years).

To address this gap in the literature, Study 3a specifically focuses on aspects not previously assessed with un-apprehended adolescent firesetters in the UK, but have been found to be relevant in the identified adolescent and apprehended adult firesetting literature. For example, identified adolescent firesetters are reported to have attachment issues such as limited parental supervision and ineffectual discipline (Kolko & Kazdin, 1986; McCarty & McMahon, 2005), parental distance (e.g., un-involvement and parental pathology; Kolko &

Kazdin, 1986), separation from parents (Macht & Mack, 1968), and an absent father (Root et al., 2008). Further, identified adolescent firesetters are reported to have experienced disturbed childhoods (Root et al., 2008) with a history of physical neglect (Root et al., 2008), physical abuse (Root et al., 2008), and sexual abuse (Dickens et al., 2007; Noblett & Nelson, 2001; Root et al., 2008; Stewart, 1993). In addition, adolescents living with domestic violence have been found to have an increased risk of developing behavioural problems (Holt, Buckley, & Whelan, 2008).

Identified and self-reported adolescent firesetters are reported in the literature to be aggressive (Chen et al., 2003; Kolko et al., 1985; McCarty & McMahon, 2005) and shy (Chen et al., 2003). Furthermore, like apprehended adult firesetters (Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Rix, 1994) identified and un-apprehended adolescent firesetters commonly report revenge as a motivator for their deliberate firesetting (Swaffer & Hollin, 1995) and are reported to engage in a variety of antisocial and delinquent behaviours (Dadds & Fraser, 2006; Del Bove et al., 2008; Dolan et al., 2011; Kolko et al., 1985; Lambie, Ioane, Randell, & Seymour, 2013; Martin et al., 2004), such as serious drug use (Martin et al., 2004). However, as conviction rates are not necessarily good indicators of criminal activity Study 3a requests participants to comment on their antisocial behaviour which may or may not have resulted in conviction.

Hyperactivity, impulsivity, and attention issues are also commonly reported behavioural issues associated with identified and un-apprehended child and adolescent firesetters (Dadds & Fraser, 2006; Del Bove et al., 2008; Hoerold & Tranah, 2014; Howell Bowling, Lambie, Ioane, Randell, & Seymour, 2013; Kolko et al., 1985; Martin et al., 2004; McCarty & McMahon, 2005). In addition, an interest or fascination with fire has been found to increase the likelihood of firesetting in both apprehended adults (Barnoux et al., 2015; Gannon et al., 2013; Ó Ciardha & Gannon, 2012), and identified adolescents (MacKay et al., 2006; Watt et

al., 2015). Furthermore, Rice and Harris (1991) report that unusual childhood fire interest is a discriminating factor between apprehended adult firesetting offenders and non-firesetting offenders. Therefore it is expected that relative to non-firesetters, un-apprehended firesetters will score significantly higher on items assessing impulsivity, fire interest and fire fascination.

Firesetting prevalence rates amongst self-reported un-apprehended community samples of adolescents range from 7.2% to 37.5% (Del Bove et al., 2008; Martin et al., 2004; Tanner, Hasking, & Martin, 2014; Watt et al., 2015), and therefore, like Studies 1 and 2, it is expected that a reasonable percentage of participants will hold a history of firesetting. Study 3a further seeks to build upon Studies 1 and 2 by replicating some aspects of the previous studies (e.g., measures of psychological characteristics, antisocial behaviour, and fire fascination) as well as exploring factors found to be related to deliberate firesetting in un-apprehended adolescents (e.g., childhood disturbances, attachment style, parental supervision, emotional loneliness, and adolescent antisocial behaviour). However, it is acknowledged that some of the measures included in Study 2 were relatively long (e.g., *NAS-PI* containing 85 items and *M-CAA-Part B* containing 46 items) which may have resulted in respondent fatigue and non-completion of the study for some. Therefore a reduced battery of personality questions are included in Study 3a with the aim of encouraging high quality study completion.

Method

Participants

Participants were recruited using the crowd sourcing website, Prolific Academic (www.prolific.ac). This recruitment method enabled the study to be advertised to a wider community. Two hundred and seventy six participants accessed the online questionnaire and 270 completed the questionnaire resulting in a 97.8% completion rate. However 30

participants failed at least two of the three attention check questions and therefore their data was disregarded leaving 240 participants. Data analysis was conducted on self reports from 119 (49.6%) males and 121 (50.4%) females with an age range of 18 to 23 years ($M = 19.98$, $SD = 1.41$). The majority of the participants indicated they were White ($n = 197$, 82.1%), of these 74.6% ($n = 179$) identified themselves as White British, and 7.5% ($n = 18$) White other. The majority of participants were educated with 215 (89.5%) holding five top grade GCSEs (e.g., A* to C) and 150 participants (62.5%) holding three A level qualifications grades A* to C. Participants were paid £1.50 in return for their participation.

The Measures

Participants completed an online battery of questionnaires examining a range of demographic and psychological factors. The internal reliability alphas for each of the measures are reported in accordance with George and Mallery's (2003) criteria: $\geq .90$ excellent, $\geq .80$ good, $\geq .70$ acceptable, and $\geq .60$ questionable. Similarly to Studies 1 and 2 the online questionnaire consisted of three main sections (e.g., demographic and background questions, firesetting disclosure items, and personality measures). The *demographic and background section* replicated that of Studies 1 and 2. However, in order to increase the likelihood of completion the self-reported inventories were designed to be brief. Therefore the scales in the *firesetting disclosure* section and various scales assessing general *personality and behaviour* were reduced to single items measured using a 7 point Likert Scale (1 = *not at all like me*, 7 = *very strongly like me*). For example, the NAS-PI contains 60 items assessing how anger is experienced (i.e., anger cognitions, arousal, behaviour, and regulation), and 25 items relating to provocation. To reduce the length of the questionnaire these aspects were reduced to three items (e.g., *I consider myself to be an angry person*, *I often get mad*, *I have a*

fiery temper) and combined to produce a single score of how anger is experienced. The resulting scale had a good level of reliability ($\alpha = .85$).

The UCLA is a 20 item scale concerned with loneliness and this was reduced to two items assessing loneliness and friendship (e.g., *I consider myself to be a lonely person*, and *I wish I had more friends*). The two single items relating to loneliness were combined in the subsequent analyses and had an acceptable level of reliability ($\alpha = .72$). The 19 item *Simple Rathus Assertiveness Scale-Short Form* was reduced to a single item (e.g., *I am an assertive person*). The 12 item *Boredom Proneness Scale* was reduced to a single item assessing boredom (e.g., *I get bored easily*). The *M-CAA-Part B* contains 46 items measuring criminal attitudes and associates but to reduce the length of time to complete the study only a single item relating to criminal associates was included in the current study (e.g., *I have friends who are criminals*).

The Fire Related Scales. *The Fire Setting Scale (FSS)* and *Fire Proclivity Scale (FPS)* are both described in detail in the Method section of Chapter 5 (p 65). In the current study (Study 3a) the reliability of the *FSS* was noted to range from good to excellent (overall $\alpha = .90$, *Antisocial Behaviour* $\alpha = .81$, *Fire Interest* $\alpha = .94$). Similarly, the internal consistency of the *FPS* was excellent (overall $\alpha = .90$). However, although the reliability of the *fire fascination*, *fire arousal*, and general *antisocialism* subscales were acceptable ($\alpha = .78$, $\alpha = .75$, $\alpha = .74$ respectively), the *behavioural propensity* subscale alpha was questionable ($\alpha = .62$).

The Relationship Questionnaire (RQ) *The Relationship Questionnaire (RQ)* designed by Bartholomew and Horowitz (1991; see Appendix 14) is an extension of the measure developed by Hazan and Shaver (1987) assessing the attachment style of adults across different relationship domains. The *RQ* requires participants to read four short paragraphs

referring to attachment styles (e.g., *secure, preoccupied, fearful, and dismissing*) and indicate which style is most applicable to them. In addition, Likert scale responses provide a continuous rating of individuals' attachment pattern (1 = *it does not describe me at all*, 7 = *it very much describes me*). Although reliability statistics are not reported, categorical measures of attachment are generally only included as a descriptive measure of attachment. However, Scharfe and Bartholomew (1994) argue that continuous, rather than categorical measures of attachment offer a more stable measure of attachment and therefore it is the continuous aspect of the *RQ* which is analysed in the results.

The Parental Bonding Instrument (PBI) The *PBI* designed by Parker et al. (1979; see Appendix 15) measures the perception of being parented up to age 16. Using 25 items, participants retrospectively comment on their perceptions of parental care (12 items relating to care, e.g., *my mother/father was affectionate to me*) and overprotection (13 items associated with overprotection, e.g., *my mother/father tried to control everything I did*) for their mother and father separately. Parental styles are rated using the headings (*very like, moderately like, moderately unlike and very unlike*) with higher scores indicating more parental care or over protectiveness. In community samples, the *PBI* has been shown to have good reliability and stability over time (see Wilhelm, Niven, Parker, & Hadzi-Pavlovic, 2004; Wilhelm & Parker, 1990). In addition, alpha coefficients of all four subscales have been found to be acceptable to good (*maternal care* $\alpha = 0.75$, *maternal control* $\alpha = 0.82$, *paternal care* $\alpha = 0.80$, and *paternal control* $\alpha = 0.83$; Canetti, Bachar, Galili-Weisstub, De-Nour, & Shalev, 1997). In the current study, the alpha coefficients ranged from good to excellent (*maternal care* $\alpha = 0.93$, *maternal over protection* $\alpha = 0.90$, *paternal care* $\alpha = 0.94$, *paternal over protection* $\alpha = 0.87$, *parental care* $\alpha = 0.95$, and *parental over protection* $\alpha = 0.90$).

Impression Management

Balanced Inventory of Desirable Responding (BIDR) The *BIDR* is described in full in the Method section of Chapter 5 (p 66). The internal consistency in the current study was found to be acceptable $\alpha = .75$.

Procedure

The research was ethically approved by the University of Kent's Research Ethics Committee (Reference: 20153388). Participants were members of Prolific Academic and the study was advertised to participants meeting the necessary requirements (e.g., aged 18 to 23 years and living in the UK). An information sheet appeared online before the start of the questionnaire and participants were informed that continuing with the study indicated consent. Participants were requested not to disclose any personally identifying information about themselves or any firms they may have ignited, informed that their responses were anonymous and that IP addresses would not be recorded. Participants were informed that the questionnaire would take approximately 15 to 20 minutes to complete and had a maximum of 50 minutes to complete the study. Participants were paid £1.50 for their time. Three attention check questions were included in the questionnaire to ensure that participants were paying attention (e.g., prompting participants to select a particular response). Participants were informed that they needed to successfully answer the attention check questions in order to receive payment. On completion of the study a written debrief appeared on screen explaining the purpose of the research, and reiterated that the information provided would remain anonymous.

Results

Firesetting Prevalence and Features

Twenty five percent of participants ($n = 60$) indicated they had ignited a deliberate fire. Firesetters were predominantly White British ($n = 45, 75.0\%$). Firesetters and non-firesetters were similar in their level of qualifications with 90% ($n = 54$) of firesetters holding five top grade GCSE qualifications (A* to C) and 55% ($n = 33$) holding three A Level qualifications graded A* to C. The majority of firesetters were male ($n = 43, 71.7\%$). Key demographics can be found in Table 7.1.

Table 7.1. Firesetters and non-firesetters historical characteristics and demographics.

Variable	Firesetters	Non-firesetters
	(<i>n</i> = 60) <i>M</i> (<i>SD</i>)	(<i>n</i> = 180) <i>M</i> (<i>SD</i>)
Demographics		
Age	20.1 (1.5)	19.9 (1.4)
Siblings (number)	2.5 (1.1)	2.3 (.9)
	Percentage yes (<i>n</i>)	Percentage yes (<i>n</i>)
Males	71.7 (43)	42.2 (76)
Females	28.3 (17)	57.8 (104)
White British	75.0 (45)	74.4 (134)
White Other	5.0 (3)	8.3 (15)
Formal qualifications 5 GCSE A* to C	90.0 (54)	89.4 (161)
Formal qualifications 3 A Levels A* to C	55.0 (33)	65.0 (117)
History of enuresis	11.7 (7)	8.3 (15)
Psychiatric illness diagnosis	18.3 (11)	20.0 (36)
Physical disability diagnosis	0 (0)	1.61 (2)
Behavioural problem diagnosis	3.3 (2)	2.8 (5)
As a teenager had easy access to fire paraphernalia	95.0 (57)**	74.4 (134)
Suspension from school	10.0 (6)	6.7 (12)
Expulsion from school	3.3 (2)	2.8 (5)
Deliberately skipped class more than once a week	28.3 (17)**	11.1 (20)
History of suicide	13.3 (8)	7.2 (13)
History of self-harm	35.0 (21)	31.1 (56)
Exerted power over a partner	10.0 (6)	2.8 (5)
Taken drugs e.g., Dope/Cannabis	68.3 (41)***	43.9 (79)
Taken drugs e.g., Cocaine, Ecstasy or Heroin	35.0 (21)**	17.2 (31)
Taken any drugs	70.0 (42)***	43.9 (79)
Criminal convictions	5.0 (3)	0.1 (1)
Assault	18.3 (11)***	3.9 (7)
Sexual assault	0	0
Robbery	11.7 (7)*	3.3 (6)
Shop theft	38.3 (23)***	16.7 (30)
Vandalism	21.7 (13)**	7.2 (13)
Burglary	1.7 (1)	0
Fraud	6.7 (4)	2.2 (4)
Threatened someone with a weapon	0	0
Car theft	0	0
Underage drinking	70.0 (42)	57.8 (104)
Smoking	63.3 (38)	51.7 (93)
Experimented with fire before the age of 10	50.0 (30)**	28.3 (51)
Family Background		
Lack of money (i.e., sometimes not enough money for food)	20.0 (12)	16.7 (30)
Witnessed domestic violence	28.3 (17)**	10.0 (18)
Mother diagnosed with a psychiatric illness	21.7 (13)	20.0 (36)
Father diagnosed with a psychiatric illness	20.0 (12)	9.4 (17)
Mother smoked	21.7 (13)	22.2 (40)
Father smoked	28.3 (17)	25.0 (45)
As a child had easy access to fire paraphernalia	46.7 (28)	37.8 (68)
A family member also ignited a deliberate fire	32.6 (15)***	7.0 (11)

χ^2 with 95% confidence * $p < .05$, ** $p < .01$, *** $p < .001$.

On average, firesetters reported igniting their most recent fires during adolescence ($M = 16$ years, $SD = 3.09$). Twenty one firesetters (35%) continued to ignite fires in adulthood (18 to 22 years) and one firesetter ignited their first fire in adulthood (age 19). Just over half of firesetters ignited multiple fires 55% ($n = 33$), with 45% ($n = 27$) igniting one fire. Seventeen firesetters (28.3%) were prolific firesetters and self-reported igniting five or more fires. The predominant firesetting targets were paper products ($n = 15$, 25%; e.g., *paper and books*) followed by igniting *grass, shrubbery, or dry leaves* ($n = 14$, 23.3%). Common targets also included igniting *bins outside* ($n = 9$, 15.0%), and *toilet roll dispensers* ($n = 8$, 13.3%; see Table 7.2).

The majority of firesetters ($n = 38$, 65%) reported igniting a fire within one mile of their home (e.g., walking distance). Ten firesetters (16.7%) reported copying a fire they had seen in the media. The majority of firesetters ignited their fires with other people ($n = 39$, 65.0%) and reported being predominantly sober at the time of ignition ($n = 51$, 85%), but two firesetters (3.3%) reported being under the influence of drugs. Table 7.2 contains further offence characteristics.

Table 7.2. Deliberate firesetting offence characteristics.

Offence Characteristics	Firesetters (<i>n</i> = 60) <i>Percentage yes (n)</i>
Number of deliberate fires ignited	
One	45.0 (27)
Two	16.7 (10)
Three	8.3 (5)
Four or more	30.0 (18)
Ignition point and target	
One ignition point	63.3 (38)
Multiple ignition points	36.7 (22)
Paper, books or newspapers	25.0 (15)
Ignited countryside (e.g., grass/ shrubbery)	23.3 (14)
Ignited a bin outside	15.0 (9)
Ignited a toilet roll dispenser	13.3 (8)
Ignited clothing	10.0 (6)
Ignited a bin inside	8.3 (5)
Ignited an animal which was alive	3.3 (2)
Mattress or bedding	1.7 (1)
Ignited fire within a mile of home	63.3 (38)
Copied a fire seen in the media	16.7 (10)
Fires ignited alone or with accomplices	
Ignited fire alone	35.0 (21)
Ignited fire with 1 other person	23.3 (14)
Ignited fire with 2 other people	16.7 (10)
Ignited fire with 3 ⁺ people	25.0 (15)
State of mind	
Firesetter believed they were in control of the fire	93.3 (56)
Sober at time of ignition	85.0 (51)
Planned the fire	31.7 (19)
Under the influence of drugs at time of ignition	3.3 (2)
Extinguishing the fire	
Firesetter took part in extinguishing the fire	81.7 (49)
Firesetter left the fire to burn itself out	18.3 (11)
The Fire Service extinguished the fire	0

Note: Ignition targets do not add up to 100% due to multiple targets

Participants identified the motivations behind their firesetting behaviour (see Table 7.3) with the majority of firesetters ($n = 46$, 76.7%) reporting multiple motivations. The most frequently reported motives were *curiosity and experimenting with fire* ($n = 48$, 80%), and *to create fun/excitement or alleviate boredom* ($n = 47$, 78.3%). Eighteen firesetters (30%) reported they were motivated by *a love of fire* and none of the firesetters reported being motivated by revenge.

Table 7.3. The motivations behind deliberate firesetting.

Motivation	Firesetters ($n = 60$) Percentage yes (n)
Curiosity or experimenting with fire	80.0 (48)
To create fun/excitement or alleviate boredom	78.3 (47)
Love fire	30.0 (18)
Dared or pranked	8.3 (5)
Stressed or frustrated	8.3 (5)
Protecting themselves	5.0 (3)
Other not specified	5.0 (3)
Problems at home or school	3.3 (2)
Vandalism	3.3 (2)
Covering up another crime/ destroying evidence	1.7 (1)
Revenge	0
Insurance payout or financial gain	0

Note: Motivations do not add up to the number of firesetters as many firesetters ($n = 46$, 76.7%) indicated multiple motives.

Three firesetters reported holding criminal convictions; one firesetter reported being convicted for vandalism, one firesetter for antisocial behaviour, and one firesetter for antisocial behaviour and a violent crime. None of the firesetters reported an arson conviction or having received any therapy for their firesetting behaviour. The majority of firesetters ($n =$

49, 81.7%) reported extinguishing their fires and none of the firesetters reported the fire service extinguished their fires. The remaining firesetters ($n = 11$, 16.7%) reported *leaving the fire to burn itself out*. Twenty one (35.0%) firesetters reported that *increased impulse control* would have prevented them from firesetting. However, 20 firesetters (33.3%) reported that *nothing* would have prevented them from firesetting. In terms of fire education programmes, eight firesetters (13.3%) indicated that having *increased fire safety knowledge* would have prevented them from firesetting, see Table 7.4.

Table 7.4. Factors firesetters believe would have prevented them from firesetting.

Preventative Measures	Firesetters ($n = 60$) Percentage yes (n)
Increased impulse control	35.0 (21)
Nothing	33.3 (20)
Other not specified	15.0 (9)
Increased fire safety knowledge	13.3 (8)
Increased confidence to stand up to peers	10.0 (6)
More parental supervision	10.0 (6)
Increased anger control	5.0 (3)
Being less bored	3.3 (2)
Future Preventative Measures	
Nothing	60.0 (36)
Common sense/ growing up	11.7 (7)

Note: Firesetters were able to select multiple options therefore preventative measures may not add up to 100%. In terms of future preventative measures 17 firesetters (28.3%) did not comment.

When asked to indicate any measures which would prevent firesetters engaging in future firesetting, the majority ($n = 36$, 60%) reported that *nothing* would prevent them from

firesetting. However, seven (11.7%) reported that *common sense/ growing up* is a preventative measure.

Comparison of firesetter and non-firesetter characteristics

Demographic and historical variables

A-priori power analysis using G Power 3 (Faul et al., 2007) was computed. According to Cohen's (1988) guidelines, in order to detect a medium sized effect 88 participants were required for the Chi-square analyses and 82 participants required for the t-test analyses. Therefore as the analyses were conducted with data from 240 participants it is likely that medium effects are detected. However the analyses for both Chi-square analyses and t-tests are unlikely to be able to detect smaller and more subtle effects as they required 785 and 779 participants respectively.

Firesetters and non-firesetters could not be significantly differentiated on the majority of demographic or historical factors (e.g., age, number of siblings, history of enuresis, formal qualifications, physical disability, diagnoses of psychiatric illness, suspension or expulsion from school, having easy access to fire paraphernalia as a child, history of self harm or suicide, running away from home, number of sexual partners, criminal convictions, parental smoking, parental psychiatric history). Relative to non-firesetters, firesetters were more likely to report witnessing domestic violence $\chi^2 (1, n = 240) = 10.72, p \leq .01, \phi = .23$. Firesetters also reported having easier access to fire paraphernalia as teenagers $\chi^2 (1, n = 240) = 10.47, p \leq .01, \phi = .22$, and deliberately skipping classes more than once a week $\chi^2 (1, n = 240) = 8.96, p \leq .01, \phi = .21$. In addition, relative to non-firesetters, firesetters reported experimenting with fire before age 10 $\chi^2 (1, n = 240) = 8.50, p \leq .01, \phi = .20$, and having a family history of firesetting $\chi^2 (1, n = 204) = 18.83, p \leq .01, \phi = .32$.

Although firesetters and non-firesetters did not significantly differ in self-reported criminal convictions there were some significant differences in terms of engagement in illegal behaviour. For example, relative to non-firesetters, firesetters self-reported engaging in significantly more robbery $\chi^2(1, n = 240) = 4.58, p \leq .03, \phi = .16$, assault $\chi^2(2, n = 240) = 11.53, p \leq .01, \phi = .24$, reported having taken cannabis or dope $\chi^2(1, n = 240) = 11.25, p \leq .01, \phi = .23$, as well as taking 'harder' drugs such as Cocaine, Ecstasy or Heroin $\chi^2(1, n = 240) = 7.37, p \leq .01, \phi = .19$. Relative to non-firesetters, firesetters reported engaging in more shop thefts $\chi^2(1, n = 240) = 11.05, p \leq .01, \phi = .27$, and property vandalism $\chi^2(1, n = 240) = 8.28, p \leq .01, \phi = .20$. There were no differences in engagement in sexual assault, threatening someone with a weapon, burglary, fraud, car thefts, or underage drinking without parental consent, see Table 7.1.

Independent samples t-tests confirmed that relative to non-firesetters, firesetters scored significantly higher on the single items relating to having criminal friends $t(81.53) = 3.45, p < .01$ (two-tailed). The difference in the means (mean difference = .97, 95% CI: .41, 1.52), was of medium magnitude $d = .55$. Firesetters also reported increased levels of impulsivity $t(238) = 3.77, p < .01$ (two tailed). The difference in the means (mean difference = .85, 95% CI: .41, 1.29) was also of medium magnitude, $d = .57$. In addition, relative to non-firesetters, firesetters reported less supervision as teenagers $t(87.72) = -2.47, p < .02$ (two-tailed). The magnitude of the difference in the means (mean difference = -.522, 95% CI: -.94, .10) was small, $d = -.39$. On the combined items assessing experiences of anger, relative to non-firesetters, firesetters reported higher levels of anger $t(236) = 2.34, p < .02$ (two-tailed). The magnitude of the difference in the means (mean difference = 1.54, 95% CI: .24, .28) was small, $d = -.34$. There were no significant differences between firesetters' and non-firesetters' self reports relating to items assessing boredom, assertiveness, or on the combined measure of two items assessing loneliness.

Questionnaire measures.

The *Impression Management (IM)* subscale of the *BIDR (BIDR-IM)* significantly negatively correlated with the *Fire Setting Scale* and the *Fire Proclivity Scale* when computed separately for both firesetters ($r = -.47$, $r = -.34$ respectively) and non-firesetters ($r = -.34$, $r = -.24$ respectively). Therefore the *BIDR-IM* was used as a covariate in the subsequent analyses.

Mean scale scores were calculated separately for firesetters and non-firesetters, see Table 7.5. Separate one-way between-groups multivariate analysis of covariance (MANCOVA) were conducted to establish any differences between firesetters and non-firesetters on the *Fire Setting Scale* and *Fire Proclivity Scale*. A-priori power analyses of the MANCOVA was computed using G Power 3 (Faul et al., 2007) and indicated that 128 participants were required to detect a medium effect with a power of .80 and therefore the sample size is adequate for detecting medium effects. However, smaller effects are unlikely to be detected as 787 participants were required.

None of the assumptions of normality, linearity, outliers, multicollinearity, and homogeneity of variance-covariance were violated. Controlling for the covariate of the *BIDR-IM* the results of the MANCOVA showed that firesetters scored significantly higher compared to non-firesetters on the combined Firesetting Scale $F(2,236) = 11.13$, $p < .01$; Wilks' $\Lambda = .91$; $\eta_p^2 = .09$; $d = .78$. The separate subscales of the *FSS* were also significant, (*Behavioural* subscale $F(1,237) = 13.40$, $p < .01$; $\eta_p^2 = .05$; $d = .64$, and *Fire Interest* subscale $F(1,237) = 13.16$, $p < .01$; $\eta_p^2 = .05$; $d = .62$). On the combined *Fire Proclivity Scale*, firesetters also scored significantly higher compared to non-firesetters, $F(4,234) = 4.74$, $p < .01$; Wilks' $\Lambda = .91$; $\eta_p^2 = .08$; $d = .65$ and scored higher on all of the subscales (*Fascination* $F(1,237) = 9.65$, $p < .01$; $\eta_p^2 = .04$; $d = .55$, *Behavioural Propensity* $F(1,237) =$

18.21, $p < .01$; $\eta_p^2 = .07$; $d = .71$, *Arousal Index* $F(1,237) = 9.83$, $p < .01$; $\eta_p^2 = .04$; $d = .57$, and *Antisocial Index* $F(1,237) = 4.94$, $p < .03$; $\eta_p^2 = .02$; $d = .33$).

Table 7.5. Reliability and scale scores for self-reported deliberate firesetters and non-firesetters.

Scale	Cronbach Alpha	Firesetters ($n = 60$)		Non- Firesetters ($n = 180$)		Scale range
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Fire Setting Scale	0.90	71.60***	(19.44)	57.03	(17.76)	20-140
Behavioural items	0.81	31.03***	(10.34)	24.89	(8.78)	10-70
Fire Interest items	0.94	40.57***	(13.52)	32.14	(13.46)	10-70
Fire Proclivity Scale	0.90	57.67***	(13.34)	49.09	(12.97)	24-120
Fire Fascination	0.78	17.68***	(4.82)	15.08	(4.62)	6-30
Behavioural Propensity	0.62	13.17***	(3.64)	10.73	(3.24)	6-30
Fire Arousal	0.75	16.48***	(4.25)	13.97	(4.48)	6-30
Antisociality	0.74	10.33*	(3.38)	9.31	(2.79)	6-30
Parental Bonding Instrument						
Maternal Care	0.93	26.37	(7.62)	27.79	(7.65)	0-36
Maternal Over protectiveness	0.90	14.57	(7.93)	13.19	(7.39)	0-36
Paternal Care	0.94	21.96	(10.12)	23.66	(8.47)	0-36
Paternal Over protectiveness	0.87	9.75	(7.19)	10.61	(7.16)	0-36
Parental Care	0.95	48.20	(15.09)	51.41	(14.40)	0-36
Parental Over protectiveness	0.90	24.53	(11.60)	23.80	(12.16)	0-36
BIDR - Impression Management	0.75	53.88	(11.58)	58.06	(10.25)	20-100

* $p \leq .05$, ** $p < .01$, *** $p \leq .001$

Firesetters and non-firesetters did not significantly differ on their retrospective accounts of parental care on the *Parental Bonding Instrument* (e.g., *maternal care*, *maternal over protectiveness*, *paternal care*, *paternal over protectiveness*, *parental care*, or *parental over protectiveness*). When using a 7 point Likert scale to score the single items relating to attachment styles on the *Relationship Questionnaire* (e.g., *secure*, *preoccupied*, *fearful*, or

dismissing) t-tests revealed that firesetters and non-firesetters were statistically similar in their attachment style ratings. Firesetters predominantly rated themselves as either *secure* ($M = 4.22$, $SD = 1.91$) or *fearful* ($M = 4.22$, $SD = 1.90$) and similarly non-firesetters were predominantly classified as *fearful* ($M = 4.52$, $SD = 1.81$) or *secure* ($M = 4.05$, $SD = 1.78$). A chi-square test highlighted that when participants selected only a single attachment style on the *Relationship Questionnaire*, firesetters and non-firesetters were also not significantly distinguishable, see Table 7.6.

Table 7.6. Relationship style based on the *Relationship Questionnaire*

Variable	Firesetters ($n = 60$) M (SD)	Non-firesetters ($n = 180$) M (SD)
Relationship style based on the Likert scale data		
Secure	4.22 (1.91)	4.05 (1.75)
Fearful	4.22 (1.90)	4.52 (1.81)
Preoccupied	3.65 (1.86)	4.03 (1.77)
Dismissing	4.00 (1.94)	3.77 (1.85)
Categorical selection of relationship style		
Secure	36.7 (22)	31.1 (56)
Fearful	18.3 (11)	21.1 (38)
Preoccupied	25.0 (15)	35.0 (63)
Dismissing	20.0 (12)	12.8 (23)

Classifying Firesetters and Non-firesetters

Seventeen variables significantly differentiated the deliberate firesetters and non-firesetters. However, to reduce the number of variables in the Logistic Regression some variables were condensed (e.g., the drugs variables of Dope and Cannabis, and Cocaine,

Ecstasy, or Heroin were combined as *taken any illegal drugs* and still significantly differentiated the firesetters and non-firesetters $\chi^2(1, n = 240) = 9.80, p \leq .01, \phi = -.21$, see Table 7.1 for the frequency of historical and demographic variables. In addition, behaviours relating to criminal behaviour (e.g., robbery, assault, shop theft, and vandalism) were combined into one variable, *criminal behaviour*, indicating that firesetters partake in more general criminality relative to non-firesetters $\chi^2(1, n = 240) = 16.82, p \leq .01, \phi = -.28$ see Table 7.1 for recorded frequencies of criminal behaviour. This reduced the number of variables entered into the Logistic Regression to 13. The 13 variables were classified into three main factors and subsequently used in three Logistic Regression analyses; Parental issues (e.g., supervision as a teenager, witnessing domestic violence, experimenting with fire before age 10, and family history of deliberate firesetting), general variables (e.g., having criminal friends, impulsivity, teenage access to fire paraphernalia, skipped class more than once a week, taken any illegal drugs, participation in criminal behaviour, and anger), and the fire related scales (e.g., *Fire Setting Scale* and *Fire Proclivity Scale*).

The complete model relating to Parental issues was significant $\chi^2(4, n = 204) = 31.25, p < .01$, and therefore able to distinguish between self-reported firesetters and non-firesetters. As a whole the model explained between 14.2% (Cox and Snell R Square), and 21.6% (Nagelkerke R squared) of the variance in firesetting status, and correctly classified 79.9% of cases overall, 28.3% of the firesetters, and 94.9% of the non-firesetters. Two independent variables, having experimented with fire before age 10 and having a family history of deliberate firesetting were statistically significant contributors to the model with odds ratios of 2.89 and 5.50 respectively. Therefore participants who had experimented with fire before 10 years old were over twice as likely to be firesetters and participants who had a family history of firesetting were over five times likely to be firesetters, see Table 7.7.

Table 7.7. Logistic Regression predicting firesetter status based on parental variables.

	β	S.E.	Wald	df	p	Odds Ratio	95% C.I. For Odds Ratio	
							Lower	Upper
Supervision as a teenager	-.10	.14	.48	1	.49	.91	.69	1.20
Witnessing domestic violence	.96	.49	3.80	1	.05	2.60	.99	6.81
Experimented with fire before age 10	1.06	.37	8.16	1	<.01	2.89	1.40	55.99
Family history of deliberate firesetting	1.70	.48	12.78	1	<.01	5.50	2.16	13.99
Constant	-1.71	.64	7.00	1	.01	.18		

The model relating to general variables was also significant $\chi^2 (7, n = 240) = 46.45, p < .01$, and therefore able to distinguish between the self-reported firesetters and non-firesetters. As a whole the model explained between 17.6% (Cox and Snell R Square), and 26.1% (Nagelkerke R squared) of the variance in firesetting status, and correctly classified 78.8% of cases overall, 31.7% of the firesetters, and 94.4% of the non-firesetters. Three independent variables, impulsivity, teenage access to fire paraphernalia, and criminal behaviour were statistically significant contributors to the model with very small odds ratios of .76, .20, and .46 respectively meaning participants reporting themselves to be impulsive were .76 times more likely to be firesetters. Participants having access to fire related paraphernalia as teenagers and reporting engagement in criminal activity were .20 and .46 times as likely to be classified as firesetters rather than non-firesetters, see Table 7.8.

Table 7.8. Logistic Regression predicting firesetter status based on personal variables.

	β	S.E.	Wald	df	p	Odds Ratio	95% C.I. For Odds Ratio	
							Lower	Upper
Having criminal friends	0.12	0.10	1.41	1	0.24	0.89	0.73	1.08
Impulsivity	-0.28	0.12	5.24	1	0.02	0.76	0.60	0.96
Teenage access to fire paraphernalia	-1.63	0.64	6.43	1	0.01	0.20	0.56	0.69
Skipped class more than once per week	-0.53	0.44	1.44	1	0.23	0.59	0.25	1.40
Taken any illegal drugs	-0.33	0.37	0.79	1	0.38	0.77	0.35	1.48
Participated in criminal behaviour	-0.77	0.37	4.43	1	0.04	0.46	0.23	0.95
Anger	-0.10	0.10	0.92	1	0.34	0.91	0.74	1.11
Constant	4.84	0.84	33.61	1	<.01	126.77		

The final model concerned with the *Fire Setting Scale* and the *Fire Proclivity Scale* was also significant $\chi^2(2, n = 240) = 28.08, p < .01$, and therefore able to distinguish between the self-reported firesetters and non-firesetters. As a whole the model explained between 11.0% (Cox and Snell R Square), and 16.3% (Nagelkerke R squared) of the variance in firesetting status, and correctly classified 75.8% of cases overall, 15% of the firesetters and 96.1% of the non-firesetters. However, only the *Firesetting Scale* was a statistically significant contributor to the model with a small odds ratio of 1.03, meaning that individuals scoring higher on the *FSS* were more likely to be firesetters, see Table 7.9.

Table 7.9. Logistic Regression predicting firesetter status based on fire related scales.

	β	S.E.	Wald	<i>df</i>	<i>P</i>	Odds Ratio	95% C.I. For Odds Ratio	
							Lower	Upper
Fire Setting Scale	0.03	0.01	8.97	1	<.01	1.03	1	1.06
Fire Proclivity Scale	0.01	0.02	1.82	1	0.18	1.02	1	1.05
Constant	-4.32	0.75	33.34	1	<.01	0.01		

Discussion

The current study is the first of its kind to offer an insight into the psychological characteristics of un-apprehended adolescent firesetters living in the UK. Twenty-five percent of participants ($n = 40$) were classified as deliberate firesetters. This prevalence rate is considerably higher compared to previous research detailing the prevalence rates of UK un-apprehended deliberate firesetters (11%, Gannon & Barrowcliffe, 2012; 11.5%, Study 1; and 17.8% in Study 2) but appears to fit with the wider literature on the prevalence of self-reported un-apprehended adolescent firesetters (7.2% to 37.5%; Del Bove et al., 2008; Martin et al., 2004; Tanner et al., 2014; Watt et al., 2015). One explanation for the increase in UK self-reported firesetters is that in contrast to the previous UK studies which recruited participants aged over 18 with no specific upper age limits (Gannon & Barrowcliffe 2012; Barrowcliffe & Gannon 2015, 2016), the current study (Study 3a) reduced the potential of recollection errors and memory failures by specifically recruiting younger participants aged 18 to 23 years.

This study also evaluated factors relating to firesetting behaviour which are included in the identified adolescent firesetting literature but have not previously been assessed in UK un-apprehended firesetting populations (e.g., supervision as a teenager, witnessing domestic violence). For example, identified adolescent firesetters are noted to have limited parental

supervision characterised by ineffective discipline (Kolko & Kazdin, 1986; McCarty & McMahon, 2005). Adolescents exposed to domestic violence are also reported to be at an increased risk of developing behavioural problems (Holt et al., 2008), and un-apprehended firesetters report that parental influence can lead to the cessation of firesetting (Perrin-Wallqvist & Norlander, 2003). The results of the current study indicate that relative to non-firesetters, un-apprehended firesetters were more likely to have experimented with fire before age 10, lack supervision as a teenager, and witness domestic violence. Thus, education programmes for parents may help to reduce the incidences of firesetting. Most psychologically healthy children are reported to have easy access to matches and lighters and yet choose not to ignite fires (Sakheim et al., 1999). However, in the current research relative to non-firesetters, firesetters reported having easier access to fire paraphernalia as teenagers. It is possible that this in combination with lower levels of parental supervision is a contributing factor to firesetting which warrants additional research.

Further, 10 firesetters (16.7%) reported igniting fires as a result of copying something they had seen in the media. This supports the hypothesis that firesetting is perhaps 'triggered' by knowing someone or having encountered a fire recently through the media or social media (Doley, Ferguson, & Surette, 2013; Stewart, 1993; Thomas, MacKay, & Salsbury, 2012). Therefore it may also be beneficial for parents to monitor the appropriateness and content of their children's social media viewing as a preventative measure for deliberate firesetting.

Logistic Regression analyses were used to gauge the ability to predict firesetting status. Like Studies 1 and 2, a number of variables significantly differentiated non-firesetters and UK un-apprehended firesetters which were entered into three separate Logistic Regression analyses assessing parental issues (e.g., level of parental supervision, witnessing domestic violence, experimenting with fire before age 10, and family history of firesetting), general personal variables (e.g., having criminal friends, impulsivity, teenage access to fire

paraphernalia, skipping class more than once per week, taken any illegal drugs, participated in criminal behaviour, and anger), and the fire related scales (e.g., *Fire Setting Scale* and *Fire Proclivity Scale*). All three Logistic Regression models were significant and within each model a number of variables were statistically significant predictors of firesetting status. Three variables were statistically significant predictors of firesetting status in the general variables model (e.g., impulsivity, teenage access to fire paraphernalia, and participated in criminal behaviour). In terms of the fire related scales, only the *FSS* was a significant contributor to the model in its own right. However, the largest predictors of firesetting status were in the model assessing parental variables. Participants who experimented with fire before 10 years of age were more than twice as likely to be classified as firesetters, and participants with a family history of firesetting were more than five times as likely to be firesetters. The preceding results offer a starting point relating to researching the psychological characteristics associated with un-apprehended adolescent firesetters and highlight that a number of variables are significant predictors of firesetting status. Although it would be beneficial to conduct additional larger scale and cross cultural research, this information may be helpful in directing resources appropriately (e.g., fire education and prevention resources).

Positive affect towards fire and greater fire interest have also been found to increase the likelihood of firesetting with UK un-apprehended firesetters (Studies 1 and 2; Barrowcliffe & Gannon, 2015, 2016; Gannon & Barrowcliffe, 2012), identified adolescent firesetting populations (MacKay et al., 2006; Watt et al., 2015) and apprehended adult firesetters (Barnoux et al., 2015; Gannon et al., 2013; Ó Ciardha & Gannon, 2012). Although firesetters may have an interest or fascination with fire their motivations may vary. For example, none of the un-apprehended firesetters in this current study (nor previous UK un-apprehended firesetter studies) cited revenge as a motive. It appears that un-apprehended

adolescent firesetters are not igniting fires out of malice but instead report igniting fires to create excitement, alleviate boredom, or to satisfy curiosity. These fires are likely to be smaller fires which are perhaps less likely to come to the attention of the authorities. On the contrary, revenge fires are likely to target an acquaintance or their property which are presumably larger more destructive fires which therefore have an increased potential to be investigated by the authorities. This offers an explanation as to why revenge is a common motive cited by identified adolescent firesetters (Swaffer & Hollin, 1995) and apprehended firesetters (Bourget & Bradford, 1989; Gannon et al., 2012; Inciardi 1970; Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Rix, 1994).

The current research does not support the idea that un-apprehended adolescent firesetters are more likely to have a behavioural disorder diagnoses. However, firesetters report increased impulsivity and it is clear that relative to non-firesetters, un-apprehended adolescent firesetters report increased antisocial behaviour and engagement in criminal activity such as robbery, assault, theft, vandalism, and have taken drugs (e.g., Dope, Cannabis, Cocaine, Ecstasy, and or Heroin). Similarly, self-reported and identified adolescent firesetters report high fun seeking behaviours with low inhibition behaviour systems (Tanner et al., 2014), and are noted to have varied criminal repertoires (Lambie et al., 2013; Martin et al., 2004). For example, relative to non-firesetters, identified adolescent firesetters participate in more antisocial acts, engage in more serious drug use, and have higher risk taking behaviour (Martin et al., 2004). Forehand et al. (1991) hypothesised that firesetting is an advanced level of antisocial behaviour, and certainly the firesetters in the current study engaged in a wide range of antisocial behaviour. However, it should be noted that firesetters are typically not under the influence of alcohol or substances during ignition. Perhaps as firesetting predominantly occurred during adolescence firesetters may have been unable to procure alcohol (i.e., they may simply be too young) or alternatively such firesetters may

choose to ignite a fire as an alternative form of excitement rather than ingesting alcohol. It would therefore be beneficial for future research to explore the frequencies and types of antisocial behaviour in more detail.

Both self-reported un-apprehended adolescent firesetters (Lambie et al., 2013; Martin et al., 2004) and the UK un-apprehended adolescent firesetters in the current study participated in a variety of antisocial behaviours and hold varied criminal repertoires. In light of this research, it is apparent that adolescent firesetters require more than just firesetting education and intervention programmes, but instead exhibit a wide range of antisocial behaviour which needs to be addressed in order to reduce offending in general. As well as highlighting potential aspects for fire preventative work, this study also brings to light other areas of intervention which may benefit the general adolescent population and not just firesetters. For example, approximately 30% of both firesetting and non-firesetting youths reported engaging in self harm.

However, there are some methodological limitations within which these results should be considered. For example, participants received financial remuneration and although 276 participants accessed the online questionnaire and 270 completed the questionnaire (97.8% completion rate), it is not possible to ascertain how many individuals viewed the title of the study online but chose not to access it. Therefore it is unclear if the results are representative of all Prolific Academic users. Furthermore, the data is limited as it is based on self report measures and although firesetters and non-firesetters were similar in their scores of impression management, the *BIDR-IM* negatively correlated with the *FSS* and *FPS* and was therefore included as a covariate in the analyses. However, Miller and Chapman (2001) report that there is no ideal way to know what are real group differences and control for them effectively and therefore it is unclear if impression management affected the results.

The firesetting literature suggests that a prior history of firesetting is the best predictor of future firesetting for identified or apprehended children, adolescent, and adult firesetters (Edwards & Grace, 2014; Kennedy et al., 2006; Kolko, 2001). Similarly, in the current study, the majority of firesetters ignited multiple fires ($n = 23$, 55%), and 35% ($n = 21$) continued igniting fires into adulthood. Early detection of un-apprehended firesetters in the community warrants further research to reduce the likelihood of firesetting persisting throughout adolescence and perhaps even into adulthood. Furthermore, it would also be beneficial for future research to focus on the protective factors or inhibitory mechanisms associated with firesetters. The current research supports and enhances the research associated with un-apprehended firesetters living in the UK and offers an indication of the level of firesetting behaviour within the UK adolescent population.

Summary

Study 3a is the first study to assess the prevalence and psychological characteristics of UK un-apprehended adolescent firesetters as reported by 18 to 23 year olds. Unlike Studies 1 and 2, younger participants were recruited in Study 3a with the aim of reducing recollection errors and evaluating the characteristics of un-apprehended deliberate firesetters in further detail.

Three Logistic regression analyses were conducted assessing; parental issues (e.g., level of parental supervision, witnessing domestic violence, experimenting with fire before age 10, and family history of firesetting), general variables (e.g., having criminal friends, impulsivity, teenage access to fire paraphernalia, skipping class more than once per week, taken any illegal drugs, participated in criminal behaviour, and anger), and the fire related scales (e.g., *Fire Setting Scale* and *Fire Proclivity Scale*). Within each Logistic Regression some key variables were successful at predicting firesetting status. Three variables were

statistically significant predictors of firesetting status in the personal variables model (e.g., impulsivity, teenage access to fire paraphernalia, and participated criminal behaviour). Two variables were statistically significant predictors of firesetting status in the model assessing personal variables (e.g., experimented with fire before 10 years of age, and a family history of firesetting). In the model assessing the predictive ability of the fire related scales only the *FSS* was a significant contributor to the model in its own right.

The first three studies in this thesis have focussed on comparing the psychological characteristics of non-firesetters and un-apprehended deliberate firesetters in the UK. In contrast, Study 3b compares the characteristics of single episode un-apprehended firesetters (i.e., one-time firesetters) and recidivistic firesetters (i.e., repeat firesetters).

Chapter 8

Study 3b: A Comparison of Single Episode versus Recidivistic Self-reported Deliberate Firesetters Aged 18 to 23 Years

Introduction

It became evident in Studies 1 and 2 that the majority of firesetters ignited fires during adolescence but were self-reporting their firesetting many years afterwards. Therefore to reduce recollection issues the preceding study (Study 3a) compared the characteristics of non-firesetters and un-apprehended self reported deliberate firesetters aged 18 to 23 years. In Study 2 and Study 3a approximately half of the firesetters aged between 18 and 23 years were recidivistic with fire ($n = 18, 45.0\%$ and $n = 33, 55.0\%$ respectively). This provided the unique opportunity to compare the characteristics of firesetters reporting one deliberate firesetting incident (i.e., single episode firesetters) and recidivistic firesetters. Thus, Study 3b compares the characteristics of un-apprehended single episode firesetters and recidivistic firesetters aged 18 to 23 years.

The identified adolescent and apprehended adult firesetting research tends to focus on two main assumptions; firstly that firesetters and non-firesetters are different, and secondly that recidivistic firesetters are different to those who commit single acts of firesetting (Doley, 2009). Research suggests that apprehended adult recidivistic firesetters are typically male (Ducat et al., 2014), have low intelligence (Rice & Harris, 1996), poor school adjustment (Dickens et al., 2009; Doley, 2009; Rice & Harris, 1996), are younger at first firesetting incident (Dickens et al., 2009; Ducat et al., 2014) and single (Dickens et al., 2009; Rice & Harris, 1996). Increased fire interest has also been found to be positively associated with both apprehended adult firesetting recidivism (Doley, 2009; Rice & Harris, 1991, 1996; Tyler et al., 2015) and repeat firesetting in adolescence (Kennedy et al., 2006; MacKay et al., 2006).

For example, in terms of identified adolescent firesetters, MacKay et al. (2006) report that fire interest adds to the prediction of firesetting severity at both initial assessment, and the level of recidivism at an 18 month follow up above and beyond antisocial behaviour alone. Additionally, apprehended adult firesetting recidivists are also noted to misuse substances (Ducat et al., 2014; Koson & Dvoskin, 1982; Lindberg et al., 2005; Repo et al., 1997) and have varied criminal repertoires (Bourget & Bradford, 1989; Ducat et al., 2014; Jayaraman & Frazer, 2006; Muller, 2008; Soothill et al., 2004). However, rather than being associated with a single variable, firesetting recidivism is typically associated with a combination of risk factors (Ducat et al., 2014).

Firesetting recidivism rates for apprehended adult firesetters are reported to range from 4% to 61% (Bourget & Bradford, 1989; Dickens et al., 2009; Ducat et al., 2014; Koson & Dvoskin, 1982; Rice & Harris, 1996; Soothill & Pope, 1973; Tennent et al., 1971), and general recidivism rates for apprehended adult firesetters who reoffend by some other means not related to fire range from 45% to 66% (Ducat et al., 2014; Muller, 2008; Rice & Harris, 1996). However, much of this research has been conducted retrospectively by examining police or court records for further convictions of arson. As explained in Chapter 2, there are inherent difficulties associated with detecting or securing an arson conviction and therefore a lack of conviction is not necessarily indicative of a lack of offence. Therefore, assessing recidivism solely through reconviction rates is problematic and researchers are unlikely to be aware of the true extent of firesetting recidivism. For example, firesetters enrolled into a specialist firesetting treatment programme at medium secure prisons within the UK were officially recorded to have an average of 2.1 firesetting offences, but self-disclosed igniting over double that number of fires ($M = 5.3$ fires; Gannon et al., 2015).

Estimates and correlates of firesetting recidivism in community samples are rare (MacKay et al., 2012). This study is therefore the first to assess the characteristics of un-

apprehended recidivistic firesetters in the UK. It is hypothesised that un-apprehended recidivistic firesetters are likely to share similar characteristics to those reported for identified adolescent and apprehended adult recidivistic firesetters. For example, it is hypothesised that un-appended recidivist firesetters will typically be male (Ducat et al., 2014), have significantly higher levels of fire interest (Doley, 2009; Kennedy et al., 2006; MacKay et al., 2006; Rice & Harris, 1991, 1996), and be criminally versatile (Bourget & Bradford, 1989; Ducat et al., 2014; Jayaraman & Frazer, 2006; Muller, 2008; Soothill et al., 2004).

Method

Participants

Eighty nine deliberate firesetters aged 18 and 23 years previously recruited for Studies 2 and 3a⁹ were included (29 firesetters were included from Study 2 and 60 firesetters from Study 3a). There were 56 male and 33 female firesetters. Overall, 38 firesetters ignited only one fire (i.e., single episode firesetters) and 51 firesetters were recidivistic with fire.

Measures and Procedure

The measures and procedure are described in detail in Chapter 5. In line with the preceding studies participants answered three main sections a *demographic and background section*, a *firesetting disclosure section*, and scales relating to fire interest, attitudes towards fire and firesetting behaviour. The number of scales presented in the questionnaires for each recruitment method varied however all participants answered the *Fire Setting Scale (FSS)*, the *Fire Proclivity Scale (FPS)* (Gannon & Barrowcliffe, 2012) and the *Impression Management* subscale of the *Balanced Inventory of Desirable Responding (BIDR-IM)*;

⁹ Firesetters were not included from Study 1 as they were older than 23 years of age.

Paulhus 1984, 1988) which are described in full in the Method Section of Chapter 5 (pp 65 to 66).

In the current study the *FSS* showed good to excellent internal consistency (overall $\alpha = .89$, *Antisocial Behaviour* subscale $\alpha = .83$, *Fire Interest* subscale $\alpha = .93$). The internal consistency of the *FPS* overall was also excellent ($\alpha = .91$) and the internal consistency of the subscales ranged from questionable to good (*Fire Fascination* $\alpha = .81$, *Behavioural Propensity* $\alpha = .67$, *Fire Arousal* $\alpha = .73$, and *General Antisocialism* $\alpha = .78$). The *BIDR-IM* had acceptable internal consistency in the current study ($\alpha = .73$).

Results

Firesetting Prevalence and Features

A-priori power analysis was computed using G Power 3 (Faul et al., 2007). Cohen's (1988) guidelines suggest that 88 participants are required for the Chi-square analyses to detect a medium sized effect at a power of .80. Therefore as the analyses were conducted with data from 89 participants it is likely that medium effects can be detected. However, in order to detect smaller effects the Chi-square analyses required 785 participants and therefore more subtle effects are unlikely to be detected.

Thirty eight firesetters reported igniting just one fire and are referred to as single episode firesetters and 51 firesetters reported having ignited multiple fires (ignited two fires [$n = 17$], three fires [$n = 11$], four fires [$n = 1$], five or more fires [$n = 22$]). Significantly more recidivistic firesetters were male (male, $n = 37$, 72.5%; $\chi^2 (1, n = 89) = 3.83, p = .05, \phi = .23$). None of the firesetters had been formally apprehended for firesetting and none had received any fire related therapy. The majority of both single episode and recidivistic firesetters were White British (68.4% and 66.7% respectively). Not all firesetters indicated their level of qualifications but of those who did the majority of the single episode firesetters

($n = 21, 77.8\%$) and all of the recidivistic firesetters ($n = 33, 100\%$; $\chi^2(1, n = 60) = 8.15, p < .01, \phi = -.37$) indicated they had five GCSE qualifications graded A* to C. In terms of Advanced Level qualifications (A Levels) over half of the single episode and recidivistic firesetters held three A Level qualifications grades A* to C ($n = 15, 55.6\%$, $n = 18, 54.5\%$ respectively). See Table 8.1 for further demographic information.

Comparing the characteristics of single episode firesetters and recidivistic firesetters

Demographic and historical variables.

Apart from recidivistic firesetters tending to be male, univariate comparisons (see Table 8.1) revealed very few significant differences between the single and recidivistic firesetters. For example, single episode and recidivistic firesetters could not be significantly differentiated in terms of demographic or historical variables (e.g., age, number of siblings, history of enuresis, physical disability, psychiatric illness, behavioural disorder diagnoses, suspension or expulsion from school, history of self-harm or suicide, criminal convictions, witnessing domestic violence, or parental psychiatric history). However, relative to single episode firesetters, recidivistic firesetters were noted to report having participated in more incidences of robbery $\chi^2(1, n = 60^{10}) = 4.59, p < .04, \phi = .01$, and underage drinking, $\chi^2(1, n = 60) = 6.21, p < .02, \phi = .36$. See Table 8.1.

¹⁰ The question relating to criminal behaviour was only included in the questionnaire answered by the participants from Study 2 ($n = 60$).

Table 8.1. Single and recidivistic firesetters' historical characteristics and demographics.

Variable	Single Firesetters (<i>n</i> = 38)	Recidivistic Firesetters (<i>n</i> = 51)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Demographics		
Age	19.8 (1.4)	19.9 (1.4)
Siblings (number)	2.3 (1.2)	2.7 (1.1)
	Percentage yes (<i>n</i>)	Percentage yes (<i>n</i>)
Males	50.0 (19)	72.5 (37)
Females	50.0 (19)	27.5 (14)
White British	68.4 (26)	66.7 (34)
White Other	13.2 (5)	11.8 (6)
Qualifications 5 GCSE (A* to C)	77.8 (21)	100 (33)**
Qualifications 3 A Levels (A* to C)	55.6 (15)	54.6 (18)
History of enuresis	2.6 (1)	11.8 (6)
Psychiatric illness diagnosis	26.3 (10)	23.5 (12)
Physical disability diagnosis	0	3.9 (2)
Behavioural problem diagnosis	5.3 (2)	9.8 (5)
Suspension from school	15.8 (6)	21.6 (11)
Expulsion from school	2.6 (1)	7.8 (4)
History of suicide	15.8 (6)	11.8 (6)
History of self-harm	36.8 (14)	33.3 (17)
Criminal convictions	2.6 (1)	3.9 (2)
Taken drugs e.g., Dope/Cannabis	66.7 (18)	72.7 (24)
Taken drugs e.g., Cocaine/Ecstasy/Heroin	29.6 (8)	39.4 (13)
Assault	18.5 (5)	18.2 (6)
Sexual assault	0	0
Robbery	0	21.2 (7)*
Shop theft	29.6 (8)	45.5 (15)
Vandalism	11.1 (3)	30.3 (10)
Burglary	1.7 (1)	0
Fraud	0	12.1 (4)
Threatened someone with a weapon	0	0
Car theft	0	0
Underage drinking	51.9 (14)	84.9 (28)*
Smoking	51.9 (14)	72.7 (24)
Experimented with fire before age 10	13.2 (5)	19.6 (10)
Family Background		
Lack of money (i.e., sometimes not enough money for food)	18.4 (7)	15.7 (8)
Witnessed domestic violence	31.6 (12)	19.6 (10)
Mother diagnosed with a psychiatric illness	21.1 (8)	21.6 (11)
Father diagnosed with a psychiatric illness	13.2 (5)	19.6 (10)
Family history of firesetting	15.8 (6)	25.5 (13)

χ^2 with 95% confidence * $p < .05$, ** $p < .01$.

For single episode firesetters, firesetting was predominantly reported to have occurred in childhood and adolescence, with only 15.8% ($n = 6$) reporting having ignited a fire in adulthood. However, 51% ($n = 26$) of the recidivistic firesetters continued igniting fires in adulthood. None of the firesetters had convictions for arson, but three male recidivistic firesetters had convictions (one male was convicted of a violent crime and antisocial behaviour, a second male was convicted for antisocial behaviour, and the third conviction was theft related), and one female single episode firesetter had a convicted for vandalism.

Significantly more single episode firesetters ($n = 29$, 76.3%) ignited their fires within a mile of their home (i.e., within walking distance) compared to recidivistic firesetters ($n = 28$, 54.9%; $\chi^2(2, n = 89) = 7.25, p < .03, \phi = .27$). During ignition the majority of both single episode and recidivistic firesetters ignited fires with other people ($n = 22$, 57.9%; $n = 40$, 78.4% respectively) and were sober ($n = 35$, 92.1%; $n = 39$, 76.5% respectively). None of the single episode firesetters, and only three recidivistic firesetters (5.9%) reported being under the influence of drugs (see Table 8.2).

In terms of firesetting targets, again single episode firesetters and recidivistic firesetters were similar. Single episode firesetters predominantly ignited paper products (e.g., *paper, books or newspaper*, $n = 17$, 44.7%) and *countryside, grass, leaves, or shrubbery* ($n = 8$, 21.1%). The target trends were reversed for firesetters igniting multiple fires who predominantly ignited the *countryside, grass, leaves, or shrubbery* ($n = 17$, 33.3%) followed by *paper, books or newspapers* ($n = 9$, 17.7%). None of the firesetters reported igniting evidence relating to another crime and the majority of single episode and recidivistic firesetters took part in extinguishing their fires ($n = 32$, 84.2% and $n = 39$, 76.5% respectively). Table 8.2 contains further offence characteristics.

Table 8.2. Deliberate firesetting offence characteristics.

Offence Characteristics	Single Firesetters (<i>n</i> = 38) Percentage yes (<i>n</i>)	Recidivistic Firesetters (<i>n</i> = 51) Percentage yes (<i>n</i>)
Ignition points and targets		
One ignition point	73.7 (28)	56.9 (29)
Multiple ignition points	26.3 (10)	43.1 (22)
Ignited a fire within a mile of home	76.3 (29)*	54.9 (28)
Paper, books or newspapers	44.7 (17)	17.7 (9)
Ignited countryside, grass, leaves, or shrubbery	21.1 (8)	33.3 (17)
Ignited a bin outside	13.1 (5)	23.5 (12)
Ignited a bin inside	5.3 (2)	11.8 (6)
Ignited a toilet roll dispenser	5.3 (2)	17.6 (9)
Ignited an unoccupied car	2.6 (1)	0
Ignited clothing	0	21.6 (11)
Furniture	0	2.0 (1)
Ignited an animal which was alive	0	5.9 (3)
Ignited a house knowing it was occupied	0	2.0 (1)
Mattress or bedding	0	2.0 (1)
Evidence relating to another crime	0	0
Fires ignited alone or with accomplices		
Ignited fire alone	42.1 (16)	21.6 (11)
Ignited fire with 1 other person	26.3 (10)	15.7 (8)
Ignited fire with 2 other people	13.2 (5)	21.6 (11)
Ignited fire with 3 ⁺ people	18.4 (7)	41.1 (21)

Note: Ignition targets do not add up to 100% due to multiple targets

χ^2 with 95% confidence * $p \leq .05$

Chi-square analyses revealed that single episode and recidivistic firesetters were similar in terms of motivations (see Table 8.3) with the majority of single episode and recidivistic firesetters self-reported multiple motivations ($n = 27$, 71.1% and $n = 40$, 78.4% respectively). For both single episode and recidivistic firesetters the predominant firesetting motivations were to *create fun/ excitement* or *alleviate boredom* (single episode firesetters, n

= 29, 76.3%; recidivistic firesetters $n = 39$, 76.5%) and *curiosity or experimenting with fire* (single episode firesetters, $n = 29$, 76.3%; recidivistic firesetters $n = 38$, 74.5%). Eight single episode firesetters (21.2%) and 18 recidivistic firesetters (35.3%) reported *a love of fire* and none of the firesetters were motivated by revenge, or financial gain (e.g., insurance payouts).

Table 8.3. The motivations behind deliberate firesetting.

Motivation	Single Firesetters ($n = 38$) Percentage yes (n)	Recidivistic Firesetters ($n = 51$) Percentage yes (n)
To create fun/excitement or alleviate boredom	76.3 (29)	76.5 (39)
Curiosity or experimenting with fire	76.3 (29)	74.5 (38)
Love fire	21.2 (8)	35.3 (18)
Dared or pranked	7.9 (3)	15.7 (8)
Other not specified	7.9 (3)	3.9 (2)
Vandalism	2.6 (1)	7.8 (4)
Stressed or frustrated	2.6 (1)	9.8 (5)
Problems at home or school	2.6 (1)	3.9 (2)
Protecting themselves	0	2.0 (1)
Wanted attention	0	2.0 (1)
Due to anger	0	3.9 (2)
Covering up another crime/ destroying evidence	0	2.0 (1)
Revenge	0	0
Insurance payout or financial gain	0	0

Note: Motivations do not add up to the number of firesetters as the majority of firesetters (single episode firesetters $n = 27$, 71.1% and recidivistic firesetters $n = 40$, 78.4%) indicated multiple motives.

Chi-square tests did not significantly differentiate between single episode and recidivistic firesetters reports of what they believed would have prevented them from

firesetting. Ten single episode firesetters (26.3%) and 13 recidivistic firesetters (25.5%) reported *nothing* would have prevented them from firesetting. However nine single episode firesetters (23.7%) and 12 (23.5%) recidivistic firesetters reported that being able to control their impulsivity would have prevented their firesetting, see Table 8.4.

Table 8.4. Factors firesetters believe would have prevented them from firesetting.

Preventative Measures	Single Firesetters (<i>n</i> = 38) Percentage yes (<i>n</i>)	Recidivistic Firesetters (<i>n</i> = 51) Percentage yes (<i>n</i>)
Nothing	26.3 (10)	25.5 (13)
Increased impulse control	23.7 (9)	23.5 (12)
Increased fire safety knowledge	21.1 (8)	3.9 (2)
Other not specified	13.2 (5)	15.7 (8)
Increased confidence to stand up to peers	10.5 (4)	5.9 (3)
More parental supervision	7.9 (3)	5.9 (3)
Increased anger control	5.3 (2)	2.0 (1)
Being less bored	5.3 (2)	2.0 (1)

Note: Firesetters were able to select multiple options therefore preventative measures may not add up to 100.

Questionnaire measures.

The *BIDR-IM* significantly negatively correlated with the *Fire Setting Scale* for both the single episode and recidivistic firesetters ($r = -.41$, $r = -.34$ respectively). The *BIDR* also significantly negatively correlated with the scores of the recidivistic firesetters ($r = -.40$) but not the single firesetters on the *Fire Proclivity Scale* and was therefore included as a covariate in the subsequent analyses. Mean scale score can be seen in Table 8.5.

Table 8.5. Reliability and scale scores for self-reported single firesetters and recidivistic firesetters.

Scale	Cronbach Alpha	Single Firesetters (<i>n</i> = 38)		Recidivistic Firesetters (<i>n</i> = 51)		Scale range
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Fire Setting Scale	0.89	64.47	(19.93)	76.86	(18.36)	20-140
Behavioural items	0.83	29.03	(11.03)	34.82	(10.09)	10-70
Fire Interest items	0.93	35.45	(13.45)	42.04	(13.27)	10-70
Fire Proclivity Scale	0.91	55.13	(15.50)	59.29	(13.84)	24-120
Fire Fascination	0.81	16.79	(5.40)	17.71	(5.04)	6-30
Behavioural Propensity	0.67	12.84	(3.90)	13.92	(3.95)	6-30
Fire Arousal	0.73	15.61	(4.91)	16.88	(4.32)	6-30
Antisociality	0.78	9.89	(3.34)	10.78	(3.47)	6-30
BIDR - IM	0.73	56.34	(11.12)	52.26	(9.22)	20-100

Two one-way between-groups multivariate analysis of covariance's (MANCOVA) were conducted to examine whether single episode and recidivistic firesetters differed on the *FSS* and *FPS* respectively, whilst controlling for participant's *BIDR-IM* scores. A-priori power analysis for the MANCOVA indicated that 52 participants were required to detect a large effect with a power of .80, and 128 participants were required to detect a medium effect at a power of .80. In the current study, although the sample size of 89 is underpowered to detect a medium effect size, the analyses are likely to be fine for detecting larger differences. The assumptions of normality, linearity, outliers, multicollinearity, and homogeneity of variance-covariance were not found to be violated in the analysis. The results of the MANCOVAs revealed that, after controlling for the *BIDR-IM*, single episode and recidivistic firesetters' did not significantly differ on the scores of the *FSS*, $F(2,84) = 2.67, p > .05$; Wilks' $\Lambda = .94$; $\eta_p^2 = .06$; $d = .65$, or the *FPS*, $F(4,82) = 3.56, p > .05$; Wilks' $\Lambda = .98$; $\eta_p^2 = .02$; $d = .28$.

Discussion

This study is the first of its kind to compare the characteristics of un-apprehended deliberate single episode firesetters and recidivistic firesetters. Although it is problematic that recidivism was not evaluated via a longitudinal study the data obtained from the previous studies provided an opportunity to assess single episode and recidivistic firesetters. Eighty nine deliberate firesetters from Studies 2 and 3 aged between 18 to 23 years were compared. Thirty eight firesetters had ignited only one fire and the remaining 51 firesetters had ignited multiple fires. In support of the identified adolescent firesetting literature (Ducat et al., 2014), the majority of recidivistic firesetters in the current study were male. However, there were no notable differences between single episode and recidivistic firesetters in terms of other demographic or historical variables (e.g., age, educational achievement, number of siblings, history of enuresis, physical disability, psychiatric illness, behavioural disorder diagnoses, suspension or expulsion from school, history of self-harm or suicide, criminal convictions, witnessing domestic violence, or parental psychiatric history). Apprehended adult recidivistic firesetters are reported to hold varied criminal repertoires (Bourget & Bradford, 1989; Ducat et al., 2014; Jayaraman & Frazer, 2006; Muller, 2008; Soothill et al., 2004). Although single episode and recidivistic firesetters could not be differentiated in terms of criminal convictions, relative to single episode firesetters, recidivistic firesetters reported having engaged in significantly more criminal activity (e.g., robbery and underage drinking).

Based on the identified adolescent and apprehended adult firesetting literature (Doley, 2009; Kennedy et al., 2006; MacKay et al., 2006; Rice & Harris, 1991; Rice & Harris, 1996) it was hypothesised that recidivistic firesetters would hold higher levels of fire interest compared to single episode firesetters. After controlling for the *BIDR-IM* there were no significant differences between recidivistic and single episode firesetters in respect of their scores on the *Fire Setting Scale* (i.e., their interest in fire) or *Fire Proclivity Scale* (i.e., their

propensity to set fires). As explained in the previous studies within this thesis, and in contrast to the research with apprehended adult firesetting recidivists (Ducat et al., 2014; Koson & Dvoskin, 1982; Lindberg et al., 2005; Repo et al., 1997) substance misuse was not a significant firesetting variable for un-apprehended firesetters and did not distinguish between single episode and recidivistic firesetters. It is unclear why this is the case but perhaps un-apprehended firesetters were too young to procure alcohol or firesetting was chosen as an alternative activity to alleviate boredom. Alternatively, substance abuse is likely to be a factor which increases the likelihood of apprehension (i.e., affecting cognitive capacity to evade detection) and therefore perhaps a lack of alcohol and substance use may in part explain why some firesetters remain un-apprehended.

In the current study, 10 (26.3%) single episode firesetters reported that nothing would have prevented them from firesetting. This is in contrast to previous research in the area which has suggested that those who commit single acts of deliberate firesetting tend to report being worried about the consequences of the fire (e.g. being caught or endangering lives; Doley, 2009) which is enough to discourage such individuals igniting additional fires. However, interestingly, nine (23.7%) single episode firesetters and 12 (23.5%) recidivistic firesetters reported that the ability to control their impulsivity would have prevented their firesetting. Future developments in prevention and intervention strategies for deliberate firesetting may benefit from considering including developing participant's protective factors, coping strategies, and self-regulation skills (e.g., reducing impulsivity).

There are some methodological limitations associated with Study 3b within which the findings should be considered. The information in this current study is based upon data collected in the preceding studies and therefore there are limitations associated with self reports. Although firesetters and non-firesetters were statistically similar in terms of their impression management scores, the *BIDR-IM* negatively correlated with the *FSS* and *FPS*

and was therefore included as a covariate in the analyses. However, there is no ideal way to know what are real group differences and control for them effectively (Miller & Chapman, 2001). Further, although the sample size for Study 3b was sufficiently powered to detect medium effects, the overall sample size is still relatively small. Thus, smaller differences are unlikely to have been detected. Future research would therefore benefit from employing a larger sample size so as to compare the characteristics of un-apprehended single episode and recidivistic firesetters further. With regard to assessing repeat firesetting, reoffending can take place at any time over the lifespan. Since the participants in the current study were 18 to 23 years old it is likely that some of the single episode firesetters have the potential to reoffend with fire in the future and would therefore subsequently be categorised as recidivistic firesetters later on. For example, although 37% of the apprehended adult recidivistic firesetters ($n = 7$) in O'Sullivan's and Kelleher's (1987) research reoffended within six months of the original firesetting incident, for six firesetters recidivism occurred between six months and ten years. Thus, to truly compare and evaluate single episode and recidivistic un-apprehended firesetters it would be beneficial to conduct longitudinal research which examines self-reported recidivism over a longer period of time.

Summary

In Study 3b, younger participants (aged 18 to 23 years) who were recruited for Studies 2 and 3a and who self reported a single episode of deliberate firesetting were compared to recidivistic firesetters with few noticeable differences. Nevertheless, a few key factors emerged, for example, relative to single episode firesetters, recidivistic firesetters were more likely to be male, hold five GCSE qualifications (A* to C), and participated in more underage drinking and robbery. Although the majority of firesetters reported that nothing would have prevented them from firesetting, both single episode and recidivistic

firesetters reported that better fire safety knowledge and increased ability to control impulsivity would have prevented firesetting. This suggests that future research and prevention education should aim to develop fire safety knowledge and pro-social skills.

The previous studies have been concerned with comparing firesetters' characteristics based on self-report measures. However, although the *BIDR* was included in order to negate any effects of impression management there is the possibility that participants attempted to present themselves in a more socially desirable manner. Therefore, Study 4 adopts an implicit measure to evaluate the unconscious factors thought to be influential in driving firesetting behaviour.

Chapter 9

Study 4: Examining the Implicit Beliefs of Un-apprehended Firesetters Using a Lexical Decision Task

Introduction

In the preceding studies non-firesetters and un-apprehended firesetters were found to be distinguishable based upon explicit measures of fire interest. For example, firesetters reported significantly higher levels of fire interest as measured using the *Fire Setting Scale*. Whilst explicit measures (e.g., interviews and questionnaires) can provide an indication as to participants' attitudes or thoughts about a particular topic there are several methodological issues which limit their usefulness in capturing participants' underlying cognitions. One key issue associated with explicit measures is that they directly and transparently ask participants about their own cognitions and thus allow participants to deliberate about their responses before providing these (Snowden, Craig, & Gray, 2001). In other words, participants have full and conscious awareness of their responses and are therefore able to tailor their replies. As a result, self-report methods are fraught with issues related to social desirability and impression management (Paulhus, 1986). Furthermore, it is hypothesised that self report measures only capture surface level attitudes and not underlying cognitive mechanisms (Gannon, 2009; Ó Ciardha & Ward, 2013).

The impression management subscale of the *BIDR* was used as a covariate in the previous studies in this thesis to minimise any effects of impression management. However, including the *BIDR-IM* as a covariate is not free from problems. For example, Miller and Chapman (2001) report that in terms of data analysis there is no ideal way to know what are real group differences and control for them effectively (e.g., ANOVA versus ANCOVA). Furthermore, it has been argued that using social desirability as a covariate is ineffective at

negating the effects of intentional impression management (Ellingson, Sackett, & Hough, 1999). In order to reduce the effects of social desirability associated with self report measures and to assess underlying cognitive structures, researchers have begun to employ less transparent measures that examine non-conscious processes, known as implicit methods. Implicit measures assess the automatic unconscious processes which underlie behaviours and are therefore not open to conscious interpretations or misrepresentations. These indirect measures of cognition have been important in researching cognitions associated with other types of offending behaviour, for example, child sexual offending and rape (Abel, Becker, & Cunningham-Rathiner, 1984; Polaschek & Gannon, 2004; Snowden et al., 2011; Ward, 2000; Ward, Hudson, Johnston, & Marshall, 1997; Ward & Keenan, 1999).

Definition of implicit theories

Ward (2000) was the first to propose the idea of implicit theories as a form of underlying offence supportive cognition. Implicit theories represent a form of unconscious schema-based information processing which effects how an individual interprets, incorporates, and manipulates incoming information. For example, an implicit theory enables and directs an individual to explain, predict, and interpret the behaviour of others (Ó Ciardha & Ward, 2013) and guides individual choices and beliefs about themselves and the world (Ward, 2000). In particular, implicit cognitions are interconnected beliefs which underpin and facilitate offending behaviour (Ó Ciardha & Ward, 2013; Ward, 2000). There has been much research supporting the existence of implicit theories in relation to sexual offending (Abel et al., 1984; Babchinishin, Nunes, Hermann, 2012; Beech, Ward & Fisher, 2006; Kamphuis, De Ruiter, Janssen, & Spiering, 2005; Polaschek & Gannon, 2004; Snowden et al., 2011; Ward, 2000; Ward & Keenan, 1999). However, to date, there has been little focus on exploring the underlying cognitive structures of deliberate firesetters.

Implicit theories associated with firesetting

As explained in detail in Chapter 2, identified adolescent and apprehended adult firesetters have been found to report holding an interest or fascination in fire (Doley, 2009; Gallagher-Duffy et al., 2009; Gannon et al., 2013; Kennedy et al., 2006; MacKay et al., 2006; Rautaheimo, 1989; Rice & Harris, 1991, 1996; Sakheim et al., 1999; Tyler et al., 2015). Similarly, in the preceding studies within this thesis, relative to non-firesetters, unapprehended firesetters also reported higher levels of fire interest as measured via the *Fire Setting Scale*. In line with Ó Ciardha and Ward (2013), this self reported interest/fascination with fire may reflect fire-related cognitive structures or implicit theories.

Ó Ciardha and Gannon (2012) hypothesise that apprehended adult firesetters show evidence of holding five implicit theories which facilitate firesetting; *Dangerous World*, *Normalisation of Violence*, *Fire is Fascinating or Exciting*, *Fire is a Powerful tool*, and *Fire is Controllable*. Individuals holding the first implicit theory, a belief in a *Dangerous World*, are hypothesised to see the world as an inherently dangerous and hostile place where it is not safe to trust others. As a result, firesetters with a belief in a *Dangerous World* may ignite fires as a 'cry for help'. Individuals holding the second implicit theory of *Normalisation of Violence* are hypothesised to believe that violence is a normal, suitable, and acceptable way to resolve grievances. Therefore, in terms of firesetting, firesetters holding the *Normalisation of Violence* implicit theory are likely to believe that igniting a fire for retaliation or revenge is acceptable behaviour. *Fire is Fascinating or Exciting* is the third implicit theory and is associated with fires being ignited to create excitement or as a thrill (in other words, individuals experience high levels of fire interest). The implicit theory *Fire is a Powerful Tool* is hypothesised to be associated with fires being ignited to send a clear message. For example, a fire could be ignited as a result of possessing poor problem solving skills or as a 'cry for help'. The final implicit theory, *Fire is Controllable*, refers to firesetters' naivety

around fire and its development. For example, a firesetter may have the false belief that fires are predictable and controllable. Ó Ciardha and Gannon (2012) argue that it is not necessary for a firesetter to hold all five implicit theories but hypothesise that recidivistic firesetters are likely to hold stronger fire related implicit theories. However, the existence of these implicit theories has not been empirically validated with either identified, apprehended, or unapprehended firesetting populations.

Assessing implicit beliefs using a Lexical Decision Task (LDT)

As discussed earlier in this chapter, implicit measures enable the automatic unconscious processes which underlie behaviours to be assessed without the interference of impression management. A lexical decision task (LDT) is one method used to measure implicit beliefs, and involves participants deciding if a string of letters make up a word (e.g., slope) or a non-word (e.g., slape). LDTs are utilised to emphasise the link between concepts. For example, LDT's have been shown to link sexual harassment, sexual aggression, and child sex offending to automatic thoughts of sex and power (Bargh, Raymond, Pryor, & Strack, 1995; Kamphuis et al., 2005). In a LDT assessing the implicit beliefs of child sex offenders, participants were presented with a series of priming sentences and asked to identify if the subsequent letter strings formed a word or a non-word (Keown, Gannon, & Ward, 2008). The words either completed the sentence in an offence supportive manner reflecting one of the implicit theories associated with sexual offending or completed the sentence in a non-offence supportive manner. For example, the sentence *Having sex with children won't do them any...* could be completed in an offensive supportive manner (e.g., *harm*), non-offence supportive manner (e.g., *good*), or completed with a non-word, (e.g., *knid*). Keown et al. (2008) predicted that if participants rely on automatic implicit beliefs, child sex offenders ($n = 32$) should be faster to correctly identify offence supportive words relative to non-offence

supportive words compared to offender controls ($n = 37$), and community controls ($n = 31$). Relative to offender controls, child sex offenders were faster to respond to offense supportive words versus non-supportive words in relation to the *Uncontrollability* implicit theory but not the remaining four implicit theories (e.g., *Dangerous World*, *Entitlement*, *Nature of Harm*, and *Children as Sexual Beings*). Keown et al. (2008) explain that relative to the control groups a disproportionate number of child sex offenders' data was removed as a result of high error rates or non-responding. However, it is unclear if these errors were genuine or attempts to 'hide' true beliefs. Consequently the deletion of data may explain why the child sex offenders were not faster to classify offence supportive words for all of the implicit theories (Keown et al., 2008).

In research conducted by Gannon and Barrowcliffe (2012) and in the previous studies within this thesis, relative to non-firesetters, un-apprehended deliberate firesetters in the UK demonstrated increased fire interest and fire fascination measured using explicit measures (e.g., the *Fire Setting Scale*). However, the implicit beliefs underpinning the fire interest and firesetting behaviour have not been assessed. Therefore the current study aims to further the understanding of the underlying cognitive structure of un-apprehended firesetters by using an implicit measure, a lexical decision task, to examine if un-apprehended firesetters hold any of the implicit theories hypothesised to be instrumental in deliberate firesetting (e.g., *Dangerous World*, *Normalisation of Violence*, *Fire is Fascinating or Exciting*, *Fire is a Powerful Tool*, *Fire is Controllable*). As Study 4 is the first of its kind assessing the implicit beliefs of un-apprehended firesetters specific hypotheses are not reported. However, as five implicit theories are hypothesised as being applicable to apprehended firesetters it is expected that firesetters would hold some if not all of the implicit theories. As explained in Chapter 7 the majority of firesetters in the studies within this thesis self reported ignited fires during adolescence and therefore it is hypothesised that firesetters completing offence characteristics

questions were more likely to have detailed memories of the firesetting in the subsequent few years following the firesetting behaviour (i.e., early adulthood). A similar principle applies to this study and therefore the implicit beliefs of participants aged between 18 and 23 years old will be analysed. In addition, to measure fire fascination comprehensively, the LDT measuring the *Fire is Fascinating or Exciting* implicit theory and the fire interest items of the *FSS* assessing self-reported fire interest will be compared.

Method

Participants

After completing the online firesetting questionnaire in Studies 2 and 3a, 204 participants were invited to participate in a Lexical Decision Task (LDT) which was described to the participants as a short word task taking no longer than 10 minutes.

Participants were requested to download a plug-in to their own computer in order to complete the LDT task. Eighty four individuals aged between 18 and 23 years took part in the LDT, which represents a 41.2% participation rate (83.3%, $n = 70$ females, 16.7%, $n = 14$ males).

In line with Studies 1, 2, and 3a participants were classified as firesetters if they disclosed they had deliberately ignited a fire to *annoy other people, to relieve boredom, to create excitement, for insurance purposes, as a result of peer pressure or to get rid of evidence* in the firesetting questionnaire. Individuals who had only ignited fires before 10 years of age, ignited accidentally or set as part of an organized event (i.e. a bonfire) were excluded.

Twenty participants (23.8%) were classified as deliberate firesetters (females $n = 14$, 70%; males $n = 6$, 30%) and 64 were classified as non-firesetters (females $n = 56$, 87.5%; males $n = 8$, 12.5%). Participants' demographic information can be viewed in Table 9.1.

Table 9.1. Demographic information.

	Firesetter (<i>n</i> = 20)	Non-Firesetters (<i>n</i> = 64)
	<i>M</i> <i>SD</i>	<i>M</i> <i>SD</i>
Age (years)		
Mean	19.5 (1.4)	19.1 (1.1)
	Percentage yes (<i>n</i>)	Percentage yes (<i>n</i>)
Gender		
Male	30.0 (6)	12.5 (8)
Female	70.0 (14)	87.5 (56)
Ethnicity		
White British	85.0 (17)	85.9 (55)
White Other	10.0 (2)	3.1 (2)
Black		
Caribbean	0	1.6 (1)
Black African	5.0 (1)	4.7 (3)
Indian	0	1.6 (1)
Chinese	0	1.6 (1)
Other	0	1.6 (1)
Formal qualifications	90.0 (18)	87.5 (56)

Materials

Self Report Measures

The fire interest items of the *Fire Setting Scale (FSS)* were used as a measure of explicit fire interest and the *Impression Management* items of the *Balanced Inventory of Desirable Responding (BIDR-IM)* were included as a measure of impression management. According to George and Mallery's (2003) guideline the reliability of the *fire interest* items in Study 4 was excellent, $\alpha = .94$. The *BIDR-IM* had questionable internal consistency ($\alpha = .69$). Both scales are described in full in the Method section of Chapter 5 (p 65 and 66 respectively).

Reading Speed Task. Individual differences in reading speed are likely to confound reaction time data (Keown et al., 2008) and therefore participants' reading speed was calculated prior to the start of the lexical decision task. Twenty sentences were individually displayed in black, 16pt Arial font. Using the coding method of Fischler and Bloom (1980), there were 10 simple structure and 10 complex structure sentences (see Table 9.2). Each sentence (e.g., *the hungry bear found some stale bread*) appeared on the screen in a randomized order and participants were instructed to read each sentence at a comfortable pace and press a computer key (the space bar) when they had done so. After each key press a question appeared relating to the preceding sentence (e.g., *which animal was hungry?*). Participants used a mouse to indicate which of three options was the correct answer (e.g., A. *Bear*, B. *Boar*, C. *Lion*). These responses were used as a measure of reading comprehension and used to ensure that the participants were fully engaged with the task and reading appropriately.

Table 9.2. Simple and complex syntactic sentences used for the reading speed assessment (taken from Fischler & Bloom, 1980).

Simple Sentences	Flesch reading ease score¹¹	Number of words
The hungry bear found some stale bread	100	7
The death of his dog was a great shock	100	9
Billy hit his sister on the head	90.9	7
Jim had learned the special passage by heart	92.9	8
They rested under a tree in the shade	92.9	8
He mailed the letter without a stamp	90.9	7
He bought them in a candy store	100	7
He drove the nail into the wood	100	7
Plants will not grow in dry soil	100	7
She called her husband at his office	90.9	7
Complex sentences		
Three people were killed in a major highway accident	66.1	9
The judge warned about the dangers of drinking	82.3	8
The person who caught the thief deserves our thanks	94.3	9
The surgeon tried vainly to save his patient	71.8	8
The car stalled because the engine failed to start	94.3	9
Rushing out he forgot to take his coat	92.9	8
The police had never seen a man so drunk	94.3	9
The surface of the water was nice and smooth	94.3	9
Few had the nerve to take the needed shot	100	9
George could not believe his son stole the car	94.3	9

Lexical Decision Test (LDT). The current study utilises a similarly designed LDT to that of Keown et al. (2008). The sentence stems for the LDT were developed to fit with each of the five implicit theories hypothesised by Ó Ciardha and Gannon (2012) as being associated with deliberate firesetting. Each sentence stem (e.g., *it is safe for people to play with*) with its two possible word endings, implicit theory supportive words (e.g., *fire*) or

¹¹ Flesch reading ease was calculated using Microsoft Office Word (version 2007). Flesch reading ease scores ranged from 73.0 to 83.4. A score of zero indicates the text is extremely difficult to read and 100 indicates the text is easy for any literate person to read (Flesch, 1948).

implicit theory non-supportive words (e.g., *toys*) were rated by 5 independent raters using a 7 point Likert scale (1 = *definitely did not fit with the implicit theory*, 7 = *perfect fit*). Complete sentences with their word endings which scored on average > 5 were selected as representing the implicit theory and those with an average score of < 3 were included as not supporting the implicit theory. This resulted in a total of 45 sentence stems, (9 sentences relating to each implicit theory) and a total of 135 letter strings (see Table 9.3).

The 45 non-words were generated by changing a letter in 22 implicit theory supportive words and 23 implicit theory non-supportive words. The changed letters were not at the start or the end of the word and all of the non-words were pronounceable. Words relating to colours which have the potential to conjure images were not included (e.g., red and yellow being related to images of fire).

Table 9.3. Sentence stems with their possible word endings.

Implicit Theory	Sentence stem	Implicit Theory Supportive Word	Implicit Theory Non-Supportive Word	Non-Word
Dangerous World	the world has a lot of	danger	beauty	dadger
	there are a lot of people who are	unkind	short	shert
	trusting other people is	stupid	natural	stufid
	the majority of people are	mean	nice	meln
	you should always watch your	back	weight	baud
	relying on other people is pointless	pointless	sensible	sengible
	most people are not	trustworthy	overweight	overkeight
	when meeting new people it is best to be people should take care of	suspicious themselves	polite others	pogite otpers
Normalisation of Violence	being aggressive to get something you want is	acceptable	unacceptable	aceptable
	the best way to get something you want is to be	forceful	polite	pomite
	hurting others to get what you want is	fine	rotten	fike
	a lot of people are	violent	happy	hapdy
	seeing lots of violence is	normal	abnormal	noemal
	sometimes people need to be	cruel	inventive	invengive
	a lot of people carry	weapons	phones	wempons
	using violence to get what you want is lots of people	cool fight	naughty sing	naushty fimht
Fire is Fascinating or Exciting	fires can be really	exciting	dangerous	emciting
	I like to watch	flames	birds	bimds
	the temptation to set a fire is	normal	abnormal	abnorgal
	playing with fires is	fun	bad	fon
	watching a car on fire is	splendid	senseless	sensemess
	starting a fire on purpose is	stimulating	terrible	stisulating
	watching the flames of a fire is	fascinating	mundane	fascibating
	I enjoy watching different types of the heat from a garage on fire is	fires thrilling	films scary	fiems scamy
Fire is a Powerful Tool	by setting fires people get	attention	burnt	burft
	people set fires when they are	angry	cold	cald
	you can send a message using	fire	letter	legters
	starting a fire to get revenge is	clever	shameful	clemer
	if I start a fire people will be	impressed	disappointed	imprised
	lighting fires to get what you want is	skilful	crazy	skilgul
	starting a fire on purpose can be	persuasive	lethal	letmal
	igniting fires is the answer to people who start fires are	everything powerful	nothing irresponsible	notding powerful
Fire is Controllable	smoke can be	avoided	lethal	avomded
	fires are	predictable	unpredictable	predimtable
	the majority of fires are	manageable	uncontrollable	manapeable
	it is easy to control a wild	fire	dog	deg
	It is easy to control the majority of	blazes	animals	anigals
	it is safe for people to play with	flames	toys	tovs
	getting burnt is	avoidable	painful	paisful
	setting a field on fire is people who get burnt in a fire need to be	harmless faster	harmful helped	harmkess helsed

There were three LDT conditions each containing the same sentence stems presented randomly but the letter string endings varied (e.g., in condition A the sentence *the world has a lot of ...* was completed with the implicit theory supportive word *danger*, condition B contained the non-supportive word *beauty*, and condition C included the non-word *dadger*). Therefore each LDT contained a mixture of 15 implicit theory supportive words, 15 non-supportive words, and 15 non-words. Participants were randomly assigned to one of the three conditions and only saw each letter string once (e.g., implicit theory supportive word, implicit theory non-supportive word, or non-word). G Power 3 (Faul et al., 2007) was used to compute a-priori power analysis of ANOVA and indicated that 128 participants were required to detect a medium sized effect and 52 participants were required to detect a large effect with a power of .80 (Cohen, 1988). A-priori power analysis was also conducted for the Chi-square analyses. According to Cohen's (1988) guidelines 88 participants were required in order to detect medium effects at a power of .80 using Chi-square analyses. Therefore, for both the chi-square analyses and ANOVA analyses, with 84 participants the analyses are likely to detect larger effects but just fall short of detecting medium effects.

A one way between subjects ANOVA analysis indicated that the participants allocated to each LDT condition were statistically similar in terms of age, and level of education, and Chi-square analyses highlighted no significant differences in gender or ethnicity. A separate one way between subjects ANOVA analysis also indicated that the number of characters in the supportive words, non-supportive words, and non-words within each implicit theory and within each LDT condition were statistically similar (see Table 9.4). Furthermore, the words (supportive and non-supportive) were statistically similar in terms of ranked frequency in American English¹² and there were no significant differences in the commonality of the supportive words and non-supportive words within each implicit theory

¹² Ranked frequency of the implicit theory supportive and non-supportive words was calculated using www.corpus.byu.edu.

and each version of the LDT. ANOVA analyses indicated that there were no significant differences between the Flesch reading ease of the sentences ending in supportive or non-supportive words within each implicit theory or within each condition of the LDT.

Table 9.4. Detailed information relating to the sentences and words within each implicit theory.

Implicit theory	Word type	Mean Flesch reading ease score	Mean number of words	Mean number of characters per sentence	Mean words per sentence	Mean characters per word
Dangerous World	Supportive	80.2	60	277	6.6	4.4
	Non-supportive	80.2	60	273	6.6	4.4
Normalisation of Violence	Supportive	76.7	67	291	7.4	4.2
	Non-supportive	73.0	67	298	7.4	4.3
Fire is Fascinating or Exciting	Supportive	80.6	61	275	6.7	4.3
	Non-supportive	83.4	61	265	6.7	4.1
Fire is a Powerful Tool	Supportive	78.9	66	305	7.3	4.4
	Non-supportive	78.9	66	303	7.3	4.4
Fire is Controllable	Supportive	75.9	60	260	6.6	4.1
	Non-supportive	77.3	60	260	6.6	4.1

The reading task and LDT were programmed in millisecond.com and presented on the participants' own computers. Millisecond runs using a plug-in called Inquisit which is downloaded to each individuals' computer and has been found to have millisecond precision in recording reaction times (De Clercq, Crombez, Buysse, & Roeyers, 2003). If the

programme was to record reaction time data over the internet it is likely that the data would be affected by individuals' internet speed. However, as Inquisit was downloaded and only uses a small amount of a computer's own resources it is unlikely that using the programme on different computers affected the reaction time data.

To ensure that the task could be viewed easily, black, 16pt Arial text was presented on a white screen. It was not possible to complete the task on a mobile phone. Participants indicated that the letter string was a word by pressing the P key or pressed the Q key on their keyboard for non-words. The millisecond program controlled the randomisation of the sentence stem presentation, recorded the reaction time to respond to the letter string as being a word or non-word and recorded the error rate (i.e., whether the response was correct or incorrect). Each sentence stem was presented for 2500ms. The screen was blank for 500ms before the presentation of the letter string which remained on screen until the participant responded by pressing either the P or Q key. After completing the LDT, participants used a Likert scale to indicate whether they thought the sentence stems appeared on the screen for long enough (1 = *definitely too slow*, 4 = *perfectly fine*, 7 = *definitely too fast*).

Procedure

As part of Studies 2 and 3a the Lexical Decision Task was ethically approved by the University of Kent's Research Ethics Committee. After completing the firesetting questionnaire participants were requested to download a plug-in in order to view the task. The LDT was hosted by www.millisecond.com. Participants created a unique participant number which could be used to withdraw from the study before data analysis and was used to link the participants' LDT reaction times to their responses on the previously completed firesetting questionnaire. Participants were reassured that the study was anonymous and were

not required to provide any personally identifying information. Furthermore, participants were informed that IP addresses would not be recorded.

After viewing instructions and completing the reading speed test, LDT instructions were displayed. Following the successful completion of 12 practice questions¹³ participants began the LDT. Half way through the task participants were presented with an encouragement screen (e.g., *you are doing really well. Take a little rest, you are half way through the task*). Participants were debriefed online after completion of the LDT.

Results

Data analysis

Firesetters and non-firesetters were statistically similar in terms of BIDR-IM scores, average general reading speed, and the number of correct comprehension questions (see Table 9.5). Participants were also similar in their Likert score relating to the length of time the sentences remained on the screen, rating the exposure times as *perfectly fine* ($M = 4.0$, $SD = .5$). In addition firesetters and non-firesetters were statistically similar in terms of the number of LDT practice sessions required, see Table 9.5. Only the reaction times from correct responses were analyzed (96.8% of the reaction times for the implicit theory supportive words, 97.7 % of the reaction times for the non-supportive words, and 98.0% for the non-words).

¹³ Participants making four or more errors in the practice session were instructed to repeat it.

Table 9.5. Comparison of firesetter and non-firesetter general data.

	Firesetter (n = 20)		Non-Firesetters (n = 64)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
BIDR-IM score	55.85	7.81	59.09	8.42
Average general reading speed	3303.99	1228.85	2891.83	751.48
Number of correct comprehension questions	19.70	0.47	19.78	0.45
Likert score relating to the length of time the sentences were visible	4.00	0.46	3.94	0.53
	Percentage yes (n)		Percentage yes (n)	
One LDT practice session	95.0 (19)		98.4 (63)	
Two LDT practice sessions	5.0 (1)		1.6 (1)	

Note: In regards to the above data firesetters and non-firesetters were statistically similar.

Reaction time data often contains outliers. For example, excessively slow reaction times may be due to lapses in attention and excessively fast responses a result of accidental key pressing. Alternatively, slower reaction times may genuinely be due to slower processing speeds and quicker responses may be indicative of faster processing speeds. Therefore in order to retain all data points the reaction times were Winsorised¹⁴, see Table 9.6. The reaction times for the implicit theory supportive words, the implicit theory non-supportive words, and the non-words were totalled. In addition the mean reaction times for the 45 implicit theory supportive words for *Dangerous World*, *Normalisation of Violence*, *Fire is Fascinating or Exciting*, *Fire is a Powerful Tool*, *Fire is Controllable*, and the equivalent

¹⁴ Excessively high reaction times (meaning slow responses) were reduced to within two standard deviations of the mean and excessively low (meaning fast reaction times) scores were raised to within two standard deviations of the mean.

means for the implicit theory non-supportive words were calculated, resulting in 13 sets of reaction time data.

Table 9.6. Mean Winsorised reaction times to classify the words and non-words.

	Firesetter (n = 20)		Non-Firesetters (n = 64)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Implicit Theory Supportive Words				
Total	3329.37	632.69	3387.20	724.89
Dangerous World	596.74	110.90	658.33	187.65
Normalisation of Violence	620.07	161.79	641.52	137.90
Fire is Fascinating or Exciting	715.24	225.77	633.39	155.99
Fire is a Powerful tool	665.12	129.00	729.63	262.31
Fire is Controllable	732.20	196.18	724.33	185.96
Implicit Theory Non-Supportive Words				
Total	3313.89	517.14	3240.56	584.33
Dangerous World	625.93	119.31	583.66	101.28
Normalisation of Violence	667.30	144.29	695.44	202.88
Fire is Fascinating or Exciting	660.17	139.61	688.60	178.27
Fire is a Powerful tool	685.60	204.43	630.79	133.34
Fire is Controllable	674.89	99.53	642.06	158.34
Non-Words Total	3511.94	449.48	3653.41	635.02
Mean difference in Reaction times to classify Implicit Theory Supportive and Non-Supportive Words				
Total	-38.29	384.87	-157.13	420.05
Dangerous World	29.19	135.15	-74.67	161.79
Normalisation of Violence	47.23	192.23	53.93	181.98
Fire is Fascinating or Exciting	-55.07	201.39	55.22	189.83
Fire is a Powerful tool	20.49	172.48	-98.84	273.28
Fire is Controllable	-57.31	177.30	-82.27	160.44

The reaction times for the implicit theory supportive words were subtracted from the reaction times for the implicit theory non-supportive words to produce a mean difference in reaction time. A positive mean difference in reaction time indicates a faster response to the

implicit theory supportive words, relative to the non-supportive words. Negative reaction times highlight that participants responded to the non-supportive words faster compared to implicit theory supportive words. Similar to the research conducted by Keown et al. (2008) the total reaction time to classify non-words was included as a covariate and used to control for differences in general cognitive processing and response speed. One way between-groups analysis of covariance (ANCOVA) were conducted to investigate any difference between firesetters and non-firesetters in mean differences in reaction times to classify the words (e.g., implicit theory supportive and non-supportive words).

Preliminary checks showed no violations of the assumptions of normality, linearity, homogeneity of variance, or homogeneity of regression slopes. Firesetting status was entered as the fixed factor, and mean difference in reaction time was included as the dependent variable. In terms of the mean difference in reaction times associated with three of the implicit theories, *Normalisation of Violence*, *Fire is a Powerful Tool*, and *Fire is Controllable*, firesetters and non-firesetters were statistically similar. When assessing the *Dangerous World* implicit theory, relative to non-firesetters (*Mean difference* = -74.67, *SD* = 161.79), the firesetters were significantly faster at classifying the *Dangerous World* implicit theory supportive words relative to the non-supportive words (*Mean difference* = 29.19, *SD* = 135.15; $F(1, 81) = 5.77, p < .02, \eta_p^2 = .07; d = -.40$). However, relative to non-firesetters (*Mean difference* = 55.22, *SD* = 189.83), firesetters were significantly slower at classifying the *Fire is Fascinating or Exciting* implicit theory supportive words compared to the non-supportive words (*Mean difference* = -55.07, *SD* = 201.39; $F(1, 81) = 5.20, p < .03, \eta_p^2 = .06; d = -.56$).

Comparison of explicit and implicit measures in classifying firesetters and non-firesetters

Power analyses of the t-test indicated that 82 participants were required to detect medium effects at a power of .80 and therefore the t-test analysis is likely to detect medium to large effects. Relative to non-firesetters ($M = 26.81$, $SD = 11.71$), firesetters scored significantly higher on the fire interest items of the *Fire Setting Scale* ($M = 33.50$, $SD = 14.25$; $t(82) = 2.12$, $p < .04$; $d = .47$).

A Logistic Regression was performed to assess the impact of explicit measures of fire interest (e.g., the fire interest items in the *FSS*) and implicit measures of fire interest (e.g., the mean difference in classifying non-supportive and supportive words for the *Fire is Fascinating or Exciting* implicit theory). The full model containing both the implicit and explicit measures of fire interest was significant $\chi^2(2, n = 84) = 9.18$, $p < .02$, and able to distinguish between self-reported firesetters and non-firesetters. As a whole the model explained between 10.4% (Cox and Snell R Square) and 15.5% (Nagelkerke R squared) of the variance in firesetting status, and correctly classified 77.4% of cases overall. The sensitivity of the model to correctly classify the firesetters was 15% and the specificity of the model to correctly predict non-firesetting status was 96.9%. The implicit measure of fire fascination was a significant contributor to the model in its own right with a small odds ratio of 1.00, meaning participants who were slower to categorise the fire implicit supportive words relative to the non-supportive words were more likely to be firesetters. The explicit measure of fire interest was also a significant predictor of firesetting status but also had a small odds ratio of 1.04, meaning that participants who scored highly on the fire interest items of the *FSS* were more likely to be classified as firesetters.

Table 9.7. Logistic Regression predicting firesetting status based on implicit and explicit measures of fire interest.

	β	S.E.	Wald	<i>df</i>	<i>P</i>	Odds Ratio	95% C.I. For Odds Ratio	
							Lower	Upper
Mean difference in the Fire is Fascinating Implicit Theory	-0.01	0.01	4.34	1	<0.04	1.00	1.00	1.00
Total Fire Interest items in the Fire Setting Scale	0.02	0.02	3.90	1	<0.05	1.04	1.00	1.09
Constant	-2.47	0.75	10.87	1	0.01	0.08		

Discussion

The current study aimed to examine firesetting implicit theories in an un-apprehended firesetter population and used both an explicit measure (e.g., self-report) and an implicit measure (e.g., LDT). Five implicit theories have been hypothesised to be applicable to deliberate firesetters (e.g., *Dangerous World*, *Normalisation of Violence*, *Fire is Fascinating or Exciting*, *Fire is a Powerful Tool*, and *Fire is Controllable*; Ó Ciardha & Gannon, 2012). However, these have not been empirically evaluated previously. After controlling for general cognitive processing speeds, relative to non-firesetters, un-apprehended deliberate firesetters were found to be statistically similar in their reaction times associated with the *Normalisation of Violence*, *Fire is a Powerful Tool*, and *Fire is Controllable* implicit theories. However, relative to non-firesetters, firesetters were significantly faster at classifying the *Dangerous World* implicit theory supportive words relative to the non-supportive words but were significantly slower at classifying the *Fire is Fascinating or Exciting* implicit theory supportive words relative to the non-supportive words.

Although implicit beliefs are hypothesised to be factors which facilitate offending, the exact contribution is unclear (Helmond, Overbeek, Brugman, & Gibbs, 2014; Ward & Keenan, 1999). Firesetters being significantly faster at classifying the *Dangerous World* implicit theory supportive words relative to the non-supportive words, could as hypothesised by Ó Ciardha and Gannon (2012), indicate that similar to apprehended adult firesetters, unapprehended firesetters see the world as an inherently dangerous and hostile place where it is not safe to trust others. However, in order to support this theory further it would be advisable to conduct additional larger scale research.

The reasons behind firesetters being significantly slower at classifying the *Fire is Fascinating or Exciting* implicit theory supportive words, relative to the non-supportive words and compared to the non-firesetters are perhaps more complicated, and require additional investigation. The fire interest items of the *FSS* were included as an explicit measure of fire interest and in their own right highlighted that relative to non-firesetters, firesetters self-reported more interest and fascination in fire. However, in terms of the *Fire is Fascinating or Exciting* implicit theory, relative to non-firesetters, firesetters were significantly slower to complete the sentences with fire related words compared to non-fire related words. One possible explanation is that firesetters could have been distracted by the fire related words, or alternatively may have been trying to intentionally mislead the researcher about their true level of fire interest by deliberately slowing down their reaction times. Gawronski and De Houwer, (2014) note that priming effects are often only in the range of a few milliseconds and therefore LDTs are prone to measurement issues (e.g., distractions). Therefore, measurement issues may result in LDTs failing to produce consistent results in terms of offence supportive attitudes. As the researcher was not present when participants undertook the LDT it is possible that unintentional or deliberate lapses in

concentration or distraction may play a part, therefore it would be beneficial to use eye tracking equipment to assess length of eye gaze for example.

Assessing the existence of implicit attitudes has produced mixed results. Studies assessing the role of implicit cognitions in rape proclivity are typically unsupported (Bartels & Gannon, 2009; Blake & Gannon, 2010). For example, in relation to sex offenders, Blake and Gannon (2010) found no evidence of implicit theories, and noted that only an explicit self-report questionnaire and not an implicit measure (i.e., an LDT) was a significant predictor of rape proclivity. Similarly, Keown, Gannon, and Ward (2010) found a lack of evidence to support the role of implicit attitudes in relation to child sex offenders. However, Keown et al.'s (2008) work in relation to child sex offenders produced mixed results, offering support for some implicit theories but not others.

Despite aiming to identify implicit attitudes, LDTs are open to deliberate faking of responses through excessively slow or excessively quick reaction times. In addition, it may be of no surprise, that participants who have wider vocabulary knowledge are faster and more accurate at recognising words (Yap, Baolta, Sibley & Ratcliff, 2012). However, although the majority of participants held formal qualifications and their general reading speed was calculated, participants' general vocabulary knowledge was not assessed. Furthermore, it is possible that simply alternating one letter contained in the supportive or non-supportive words to create the non-words may not have been a significant enough change, and may have resulted in some participants accidentally misidentifying the non-words as words. However, this is unlikely to have been the case as participants correctly classified 96.8% of the implicit theory supportive words, 97.7 % of the non-supportive words, and 98% of the non-words. Furthermore, although the word lengths of the implicit theory supportive, non-supportive, and non-words were matched for each sentence within each implicit theory, the orthographic neighbours of the supportive and non-supportive words were not considered. For example, in

terms of orthographic neighbourhood size, non-words which have more words as orthographic neighbours have been found to take longer to reject (Coltheart, Davelaar, Jonasson, & Besner, 1977). A further problem is that target words which have an orthographic neighbour which is of a higher frequency also take longer to recognise as words (Grainger, O'Regan, Jacobs, & Segui, 1989). Orthographic word neighbours could have had an effect on the data and therefore warrants further research.

Although Study 4 had a reasonable level of power, the implicit theories associated with firesetting were typically not evident. However, essentially, the LDT measured the participants' implicit theories at the time of assessment and not at the time of the firesetting behaviour. In addition, as a result of small sample sizes the current study was unable to make comparison between single episode and recidivistic firesetters. Perhaps, as Ó Ciardha and Gannon (2012) suggest, recidivistic firesetters hold stronger fire related implicit theories and therefore it would be beneficial to conduct additional larger scale research with single episode and repeat firesetters. Furthermore, when making a lexical decision the participant simply decides if a string of letters is a real word or a non-word this methodology only assesses the general activation of a word and does not involve a direct pairing of an attitude or belief. Therefore it would be beneficial to assess implicit attitudes using alternative methods (e.g., Implicit Association Task [IAT], Pictorial Stroop Task).

Despite some limitations, the current study is the first of its kind to use an implicit measure to assess the implicit beliefs of deliberate firesetters. It is also the first study to compare the predicative ability of fire interest items in relation to predicting firesetting status (e.g., firesetter or non-firesetter). Similar to implicit research conducted with rape prone men (Bartels & Gannon, 2009; Blake & Gannon, 2010) the idea of implicit theories were generally unsupported with un-apprehended firesetters. However, it would be beneficial to

conduct additional research measuring the implicit beliefs of both apprehended and un-apprehended firesetters using other types of implicit measures.

Summary

The previous studies in this thesis examined self reported psychological and offence characteristics. In contrast to this, Study 4 adopted both explicit (e.g., questionnaire) and implicit measure (e.g., a lexical decision task) to evaluate the cognitive structures hypothesised to be influential in driving deliberate firesetting. Study 4 is the first of its kind to assess the five implicit theories hypothesised as being relevant to firesetters. Relative to non-firesetters, deliberate un-apprehended firesetters were not found to significantly differ in terms of the *Normalisation of Violence*, *Fire is a Powerful Tool*, or *Fire is Controllable* implicit theories. However, relative to non-firesetters, firesetters were significantly faster at classifying *Dangerous World* implicit theory supportive words relative to non-supportive words, but were significantly slower at classifying *Fire is Fascinating or Exciting* implicit theory supportive words relative to non-supportive words and non-firesetters. The findings of Study 4 therefore provide some preliminary evidence for the presence of fire specific implicit theories in deliberate firesetters. However, the exact nature of these and the impact that these might have upon offending behaviour requires further exploration.

Chapter 10

General Discussion

The primary aim of this thesis was to develop the knowledge relating to un-apprehended deliberate firesetters in the UK. The studies within this thesis first examined the prevalence of deliberate firesetting amongst UK community samples. Second, the sociodemographic and developmental variables, psychopathology, offence characteristics, motives, and psychological characteristics associated with un-apprehended firesetters were also examined. The key findings of each of the studies presented in this thesis are discussed and interpreted in the following chapter. Following this, the limitations of the research and directions for future research are considered.

Overview Study 1: The Characteristics of Un-apprehended Firesetters Living in the UK Community

Study 1 was the first of its kind to highlight the prevalence of un-apprehended, self-reported deliberate firesetters living in a high firesetting prevalent community, and provided an opportunity to examine and compare the characteristics of self reported deliberate firesetters and non-firesetters. Ten percent of households in Thanet, Kent, UK ($n = 5,568$) were randomly invited to participate in an online study investigating deliberate firesetting. Participants answered demographic questions, questions relating to any deliberate fires ignited, and five questionnaires: *The Fire Setting Scale* and *Fire Proclivity Scale* (Gannon & Barrowcliffe, 2012), the *BID-IM* (version 6; Paulhus, 1984, 1988), the *Identification with Fire Scale* (Gannon et al., 2011), and the *Fire Attitude Scale* (Muckley, 1997). A question relating to deliberate firesetting was answered by 157 participants and 18 (11.5%) were classified as deliberate firesetters. Firesetters and non-firesetters could not be differentiated

on the majority of demographic and historical variables. However, relative to non-firesetters, significantly more firesetters self reported a history of self-harm, having a family member who ignited a deliberate fire, and a father with a psychiatric illness. Interestingly, relative to firesetters, significantly more non-firesetters reported experimenting with fire before the age of 10, perhaps indicating that firesetters hold restricted experiences in manipulating fire as children which feeds into their motivation to experiment and misuse fire later on. Further, relative to non-firesetters, firesetters scored significantly higher on the *Fire Setting Scale*, the *Fire Proclivity Scale*, the *Identification with Fire Scale*, and the *Fire Attitude Scale*.

The findings of this study highlighted several key psychological factors (e.g., fire interest, identification with fire, attitudes which support firesetting) and background factors (e.g., history of self harm, having a family history of firesetting, and a father with a psychiatric illness) which appear to distinguish un-apprehended firesetters and non-firesetters. These factors show promise for the identification of community individuals who may require fire safety education or preventative work.

Overview Study 2: Comparing the Psychological Characteristics of Un-apprehended Firesetters and Non-Firesetters Living in the UK

Study 2 aimed to build upon the findings of Study 1 by examining in detail the psychological characteristics of un-apprehended firesetters living in the UK (e.g., anger, boredom proneness, assertiveness, and criminal associates). To further assure anonymity, social media was utilised to recruit 232 participants for an online firesetting questionnaire. Two hundred and twenty five people answered a question relating to deliberate firesetting. Forty participants (17.8%) indicated they had ignited a deliberate fire and were therefore classified as un-apprehended deliberate firesetters. Firesetting was most common in childhood and adolescence. Relative to non-firesetters, un-apprehended deliberate firesetters

were more likely to report; a diagnoses of a psychiatric illness, a diagnosis of a behavioural problem, having been suspended from school, a history of suicide attempts, experimenting with fire before the age of 10 years old, and having a family history of firesetting. Un-apprehended firesetters also scored significantly higher compared to non-firesetters on the *Fire Setting Scale* and the *Fire Proclivity Scale* (Gannon & Barrowcliffe, 2012), the *Fire Interest Rating Scale* (Murphy & Clare, 1996), the *Novaco Anger Scale and Provocation Inventory* (NAS-PI; Novaco, 2003), the *Boredom Proneness Scale - short form* (Vodanovich et al., 2005), and the *Measure of Criminal Attitudes and Associates* scale (*M-CAA-Part B*; Mills & Kroner, 1999). The findings of Study 2 suggest that a history of psychiatric disturbance, fire related factors (e.g., early experimentation with fire, fire interest), anger, boredom proneness, and holding antisocial attitudes are vulnerabilities associated with un-apprehended deliberate firesetters.

Overview Study 3a: Narrowing the Focus: Prevalence and Psychological Characteristics of Un-apprehended Firesetter and Non-Firesetters as Reported by 18 to 23 Year Olds in the UK

Studies 1 and 2 highlighted that there are un-apprehended deliberate firesetters in the UK and focussed on the psychological characteristics of adult perpetrators of this behaviour. However, it was apparent that the majority of firesetters ignited fires in adolescence. Therefore, Study 3a focused on recruiting younger participants (e.g., aged 18 to 23 years) in order to more accurately evaluate their firesetting behaviour and characteristics. In addition to the variables examined in Study 2, Study 3a also incorporated variables which have been found to be pertinent to firesetting in the identified and un-apprehended adolescent literature.

Data from 240 participants recruited through the crowd sourcing platform Prolific Academic revealed a 25% firesetting prevalence rate, which was higher than that detected in

previous studies with adult un-apprehended firesetters. Relative to non-firesetters, firesetters self reported witnessing domestic violence, and reported having experimented with fire before 10 years of age. They also self reported having lower levels of supervision as teenagers, more criminal friends, higher levels of impulsivity, higher levels anger, a fiery temper, easier access to firesetting paraphernalia as teenagers, and skipped class more than once a week. In comparison to non-firesetters, firesetters reported taking more drugs (e.g., Dope, Cocaine, Ecstasy, and/or Heroin), took part in criminal behaviour (e.g., robbery, assault, theft from a shop, and/or vandalism), and had a family history of firesetting. Relative to non-firesetters, firesetters also scored higher on the *Fire Setting Scale* and the *Fire Proclivity Scale* (Gannon & Barrowcliffe, 2012), indicating that un-apprehended firesetters reported higher levels of fire interest and a proclivity to ignite fires.

Consistent with Studies 1 and 2, Study 3a highlighted that having a family history of firesetting, having antisocial peers, increased levels of anger, and fire interest appear to be factors which distinguish un-apprehended firesetters from non-firesetters. Further, consistent with Study 2 un-apprehended firesetter in Study 3a had early experimentation with fire. Additionally, Study 3a also highlighted that low levels of supervision during adolescence, easy access to fire paraphernalia, engagement in other antisocial behaviour (e.g., substance use, criminal behaviour, vandalism), and increased levels of impulsivity were also higher amongst un-apprehended firesetters compared to non-firesetters. The findings of Study 3a further suggest that holding an increased interest in fire, antisocial attitudes and associates, self regulation issues (e.g., emotional and behavioural), and an increased exposure to firesetting/fire paraphernalia may be potential criminogenic needs for both un-apprehended adolescent and adult firesetters. These factors may therefore be particularly pertinent to focus on as part of community prevention and intervention strategies.

Overview Study 3b: A Comparison of Single Episode versus Recidivistic Self-reported Deliberate Firesetters Aged 18 to 23 Years

Having compared the psychological characteristics of un-apprehended deliberate firesetters and non-firesetters in the previous studies, Study 3b compared un-apprehended deliberate firesetters reporting a single firesetting episode and deliberate firesetters igniting multiple fires (i.e., recidivistic firesetters). Analysis was conducted with 89 deliberate firesetters from Studies 2 and 3 aged between 18 and 23 years. There were 38 single episode firesetters and 51 recidivistic firesetters. The majority of recidivistic firesetters were male. There were no significant notable differences between single and recidivistic firesetters in terms of demographic or historical variables (e.g., age, number of siblings, history of enuresis, physical disability, psychiatric illness, behavioural disorder diagnoses, suspension or expulsion from school, history of self-harm or suicide, criminal convictions, witnessing domestic violence, or parental psychiatric history), or their scale scores on the *Fire Setting Scale*, the *Fire Proclivity Scale* (Gannon & Barrowcliffe, 2012), or the *BIDR-IM* (version 6; Paulhus, 1984, 1988). However, in terms of participating in criminal behaviour (not resulting in arrest), relative to single episode firesetters, recidivistic firesetters participated in significantly more incidences of robbery and reported more underage drinking. The findings of study 3b suggest that individuals who engage in repeat firesetting are generally more antisocial compared to single episode firesetters.

Overview Study 4: A Lexical Decision Task Examining the Underlying Implicit Beliefs of UK Un-apprehended Firesetters

The research conducted in the previous studies utilised self report measures (e.g., questionnaires) to assess firesetting behaviour. However, Study 4 focused on examining the

underlying cognitive structures (e.g., the implicit theories) of un-apprehended deliberate firesetters living in the UK.

Five implicit theories have been hypothesised as being relevant to deliberate firesetting; *Dangerous World*, *Normalisation of Violence*, *Fire is Fascinating or Exciting*, *Fire is a Powerful Tool*, and *Fire is Controllable* (Ó Ciardha & Gannon, 2012). Eighty four participants, comprising of 20 self-reported deliberate firesetters and 64 non-firesetters, participated in an online lexical decision task. Firesetters and non-firesetters could not be significantly differentiated in terms of the mean difference in reaction times to correctly classify implicit theory supportive and implicit theory non-supportive words for the implicit theories of *Normalisation of Violence*, *Fire is a Powerful Tool*, or *Fire is Controllable*. However, relative to non-firesetters, firesetters were significantly faster at classifying the *Dangerous World* implicit theory supportive words compared to the non-supportive words, and significantly slower at classifying the *Fire is Fascinating or Exciting* implicit theory supportive words compared to the non-supportive words.

A Logistic Regression compared the impact of the explicit measure of fire interest (e.g., the *fire interest* subscale of the *Fire Setting Scale*; Gannon & Barrowcliffe, 2012) and the implicit measures of fire interest (e.g., the mean difference in classifying non-supportive and supportive words for the *Fire is Fascinating or Exciting* implicit theory) and revealed that both the explicit measure of fire interest and the implicit measure of fire fascination were significant contributors to the model and were able to predict firesetting status in their own right. In other words, participants who were slower to categorise the *Fire is Fascinating or Exciting* implicit supportive words relative to the non-supportive words, were more likely to be firesetters. In addition, participants scoring higher on the fire interest items of the *FSS* were also more likely to be firesetters.

This thesis is exploratory in nature and therefore in the next section the key findings (e.g., sociodemographic and developmental variables, psychopathological variables, and offence characteristics) from each of the studies within this thesis are combined to produce an overarching and detailed picture of UK un-apprehended firesetters. In addition, the findings within this thesis are compared to findings relating to identified adolescent firesetters and apprehended adult firesetters and like Chapters 2 and 3 vulnerabilities are framed in terms of the *Multi-Trajectory Theory of Adult Firesetting (M-TTAF)*; Gannon et al., 2012).

Sociodemographic and developmental variables

Contrary to the literature associated with apprehended adult firesetters, un-apprehended firesetters generally appear to hold good levels of education. For example, all of the firesetting respondents in Study 1 indicated they had a formal qualification (e.g., GCSE or higher). Similarly, all of the firesetters in Study 2 held formal qualifications (e.g., A levels or higher) and in Study 3a firesetters and non-firesetters were found to be similar in their level of qualifications with 90% of firesetters holding five top grade GCSE qualifications (A* to C) and 55% holding three A Level qualifications (A* to C). In terms of single episode and recidivistic firesetters (Study 3b), although not all firesetters indicated their qualification grades, the majority of single episode firesetters ($n = 21$, 77.8%) and all of the recidivistic firesetters ($n = 33$, 100%) indicated they held five GCSE qualifications graded A* to C. In addition, over half of the single episode and recidivistic firesetters held three A Level qualifications graded A* to C. However, as the studies within this thesis required participants to volunteer to take part, it is unlikely that individuals with lower levels of IQ or poorer education completed the firesetting questionnaire. Furthermore, the disparity between the education levels of un-apprehended and apprehended adult firesetters may occur as

individuals with low IQ and poorer educational outcomes are likely to be over-represented in apprehended adult populations due to lacking the cognitive ability to evade detection.

Both identified adolescent and apprehended adult firesetters are repeatedly reported to have disturbed childhoods (Dickens, et al., 2007; Kolko & Kazdin, 1986; Martin et al., 2004; McCarty & McMahon, 2005; Noblett & Nelson, 2001; Root et al., 2008; Stewart, 1993). However, mixed results were found with un-apprehended firesetters. Relative to non-firesetters, un-apprehended firesetters in Study 1 reported having a father diagnosed with a psychiatric illness, however, it is not possible to fully comment on the effects this may have had on the home environment as it is unclear if firesetters' fathers' psychiatric disturbances were displayed, affected childhood, or if the issues and diagnosis occurred in later life. In Study 3a, relative to non-firesetters, un-apprehended adolescent firesetters were more likely to report witnessing domestic violence. Adolescents living with domestic violence are reported to be at increased risk of developing behavioural problems (Holt, et al., 2008). However, non-firesetters and firesetters in Studies 1 and 2 were not distinguishable in terms of witnessing domestic violence. This may have been as a result of memory recall issues, for example, these participants were generally older, and commenting on their adolescent firesetting behaviour which occurred many years earlier. However, single episode and recidivistic firesetters (e.g., Study 3b) were also not distinguishable based on witnessing domestic violence. The finding in Study 3a may therefore have been a spurious result. It would be beneficial to conduct additional firesetting research similar to that of Study 3a (e.g., with younger participants) and to include additional items relating to witnessing or experiencing domestic violence and associated abusive behaviours (e.g., assessing if firesetting correlates with witnessing a single episode of domestic violence or whether firesetters tend to reside in homes with repeated domestic violence incidences). To fully assess and evaluate the effects of domestic violence, it would also be beneficial to evaluate

the types of domestic violence, the gender of the aggressor, and if the violence was also directed toward the firesetter as a child.

In Studies 1, 2, and 3a, relative to non-firesetters, firesetters were significantly more likely to report a family history of firesetting. These findings offer further support for theoretical models of firesetting which suggest there is a social learning aspect associated with firesetting behaviour (see Gannon et al., 2012; Jackson et al., 1987). Further, in Study 3a 16.7% of un-apprehended adolescent firesetters reported igniting fires as a result of copying something they had seen in the media. Stewart (1993) hypothesised that firesetting is 'triggered' by perhaps knowing someone who has ignited a fire, recently watching a film or reading a book with a fire in. In addition, recent research highlights that youths enrolled in an arson prevention programme had viewed inappropriate models of firesetting (e.g., videos on social media; Thomas, MacKay, & Salsbury, 2012). Taken together these findings suggest that increased exposure to fire and fire paraphernalia may be a potential risk factor for deliberate firesetting.

In terms of experimenting with fire at a young age the results are mixed and require further investigation. For example, in Study 1, significantly more non-firesetters reported experimenting with fire prior to age of 10 compared to firesetters. As a result it was hypothesised that firesetters held less experience manipulating fire in childhood, which is perhaps what led firesetters to 'experiment' and misuse fire in later life. However, in Studies 2 and 3a the results were reversed; relative to non-firesetters, firesetters reported increased experimentation with fire before the age of 10 years which appears to be more consistent with the identified adolescent and apprehended firesetting literature. Although fire interest is common in childhood, by the age of 10 the majority of children are reported to have reasonable fire safety knowledge (Dolan et al., 2011). Firesetting has been reported to develop into a problematic issue for children who lack adequate supervision and have

ineffective discipline (Dolan et al., 2011; Kolko & Kazdin, 1986; McCarty & McMahon, 2005). The participants in the first two studies within this thesis were not requested to comment on parental supervision but certainly for the participants in Study 3a, relative to non-firesetters, firesetters reported significantly less supervision as teenagers. The historical and background information self-reported by un-apprehended firesetters suggests that parental education and increased parental supervision could have an effect on the reduction of deliberate firesetting by adolescents.

In addition, relative to non-firesetters, firesetters reported increased issues at school. For example, in Study 2, un-apprehended firesetters reported more suspensions from school, and the un-apprehended adolescent firesetters in Study 3a were more likely to have deliberately skipped classes (e.g., more than once a week). However, when comparing single episode and recidivistic firesetters (Study 3b) there were no significant differences in terms of suspension or expulsion from school. Further to sociodemographic vulnerabilities, firesetting is also hypothesised to be related to psychopathological variables which are explored in the next section.

Psychopathological variables

Both identified adolescent firesetters (Roe-Sepowitz & Hickle, 2011) and apprehended adult firesetters are reported to hold a high prevalence of mental health issues (Räsänen et al., 1995; Tyler & Gannon, 2012). Identified adolescent firesetters are most often reported to have a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD; Roe-Sepowitz & Hickle, 2011), and Conduct Disorder (Martin et al., 2004; Repo, & Virkkunen, 1997). Similarly apprehended adult firesetters are also reported to have mental health issues, mainly Depression (Jackson, 1987b; Ó Ciardha et al., 2015a; Tennent et al., 1997), Conduct Disorder with aggressive features (Repo & Virkkunen, 1997), Psychotic Disorders (Lindberg

et al., 2005), and Personality Disorders (Bradford, 1982; Ducat et al., 2013b; Harmon et al., 1985; Ó Ciardha et al., 2015a; Repo, Virkkunen et al., 1997). However, the majority of apprehended adult firesetters are not reported to be mentally ill (Barker, 1994; Tyler & Gannon, 2012) and similarly the un-apprehended firesetters in Studies 1 and 3a were not distinguishable in terms of psychiatric illness. In contrast, relative to non-firesetters, un-apprehended firesetters in Study 2 were more likely to report a diagnosis of a psychiatric illness (e.g., Depression, Schizophrenia, Obsessive Compulsive Disorder, Eating Disorders, and/or Anxiety Disorders), and a diagnosis of a Behavioural Disorder (e.g., ADHD). However, it is unclear from this research if the psychiatric illness played a contributory role to the firesetting behaviour, or if the symptoms and diagnosis occurred many years afterwards. Therefore, it would be beneficial to conduct additional research into the psychopathological features of un-apprehended firesetters including obtaining information relating to age of diagnosis and previous contact with mental health services.

Deliberate firesetting offence characteristics

Throughout the studies within this thesis un-apprehended firesetters were requested to report detailed offence characteristics. Although the firesetting targets of identified adolescent firesetters are not well documented, apprehended adult firesetters have been found to ignite fires close to home (Bradford, 1982; Fritzon, 2001; Rautaheimo, 1989; Wachi et al., 2007). Similarly, the majority of firesetters in Studies 1, 2, and 3a ignited fires close to home, with single episode firesetters being more likely to ignite fires close to home compared to recidivistic firesetters.

Dickens et al. (2009) report that the majority of psychiatric patients referred for forensic assessment were reported not to have attempted extinguishing their fires. For example, 81 participants were recorded to have ignited one fire and 86 recorded to have

ignited multiple fires. Of these, 84% of the single episode firesetters and 97% of the recidivists made no attempt to extinguish the fires (Dickens et al., 2009). However, in contrast the majority of firesetters in Studies 1, 2, and 3a reported taking part in extinguishing their fires. Similarly, in contrast to the literature associated with apprehended adult males (Molnar et al., 1984; O'Sullivan & Kelleher, 1987) and identified adolescent females (Hickle & Roe-Sepowitz, 2010) but in support of the previous research with UK un-apprehended firesetters (Gannon & Barrowcliffe, 2012) the majority of un-apprehended firesetters reported igniting fires with other people suggesting that firesetting is a social activity for this group.

In terms of firesetting targets, the majority of un-apprehended firesetters reported igniting *the countryside, grass, leaves, or shrubbery, or paper, books, or newspaper*. Similarly, single episode firesetters predominantly ignited *paper, books, or newspaper* and *countryside, grass, leaves, or shrubbery*. The target trends were reversed for recidivistic firesetters who predominantly ignited *countryside, grass, leaves, or shrubbery* followed by *paper, books, or newspaper*. In the apprehended adult literature the firesetting target is hypothesised to be related to the motive behind ignition (Canter & Fritzon, 1998). For example, building fires are unlikely to be related to suicide but more likely to be related to emotional expression or frustration (e.g., revenge; Canter & Fritzon, 1998). However, as explained in the subsequent section of this thesis, the majority of firesetters in the studies within this thesis were motivated by *curiosity or experimentation* and to *create fun/ excitement or alleviating boredom*. Perhaps this offers an explanation as to why paper products and countryside were the ignition targets of choice rather than buildings and property which may be more likely to be targeted in revenge fires.

Motives

Un-apprehended firesetters reported holding a variety of motivations for their firesetting. In contrast to the literature with identified adolescent (Swaffer & Hollin, 1995) and apprehended adult firesetters (Gannon et al., 2012; Koson & Dvoskin, 1982; Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Rix, 1994) revenge was not cited as a motive by the un-apprehended firesetters in Gannon and Barrowcliffe's (2012) UK research or by any of the un-apprehended firesetters in this thesis. Instead the un-apprehended firesetters in Studies 1, 2, and 3a, (and both the single episode and recidivistic firesetters in Study 3b) were predominantly motivated by *curiosity or experimentation* and to *create fun/ excitement or alleviating boredom*.

Un-apprehended firesetters were asked to indicate what they believed would have prevented them from firesetting. Although a high proportion of firesetters ($n = 80, 72.1\%$) indicated that they were motivated to ignite fires to *create fun/excitement or alleviate boredom*, only a small proportion (4.5%) of firesetters reported that being less bored would have prevented their firesetting. The *Boredom Proneness Scale* (which was only included in Study 2) also confirmed that relative to non-firesetters, the un-apprehended firesetters in Study 2 reported higher levels of boredom. However, boredom was a motivation which appeared to only be associated with un-apprehended adolescent firesetters. For this reason, encouraging adolescents to attend youth engagement programmes (e.g., after school activities and youth clubs) may help to alleviate boredom and prevent these individuals from deliberately igniting fires. However, it is perhaps not the case that firesetters are more prone to boredom compared to other offenders. For example, in the apprehended adult literature, the *Boredom Proneness Scale* revealed that the level of boredom of male imprisoned firesetters ($M = 45.26$) and other incarcerated male offenders ($M = 42.86$) was in the mid range and statistically similar (possible scale range = 12 - 84; Gannon et al., 2013). Therefore

addressing boredom may not only impact on firesetting statistics but may also have an impact on general offending.

Firesetting theories

The firesetting literature has not specifically extended firesetting theories to un-apprehended populations. Nevertheless, the un-apprehended firesetter research within this thesis will now be framed based on the trajectories of the *Multi-Trajectory Theory of Adult Firesetting* which have been developed and applied using identified and apprehended firesetting populations (*M-TTAF*; Gannon et al., 2012).

Antisocial cognitions trajectory

Firesetters on the first *M-TTAF* trajectory are hypothesised to ignite fires as a result of antisocial motivations. Typically, the identified adolescent and apprehended adult literature reports an association between firesetting and antisocial and delinquent behaviour (Britt, 2011; Doley, Fineman, Fritzon, Dolan, & McEwan, 2011; Kolko, Kazdin, & Mayer, 1985; Stickle & Blechman, 2002). Similarly, relative to non-firesetters, the firesetters in Studies 1, 2, and 3a scored higher on the *antisocial behavioural* items contained within the *Fire Setting Scale*, suggesting they hold higher levels of antisocial behaviour. In addition, relative to non-firesetters, firesetters in Studies 1, 2, and 3a scored significantly higher on the complete *Fire Proclivity Scale* and its subscale measuring *antisociality* which supports the identified and apprehended literature in relation to the association of firesetting and antisocial behaviour. However, to further assess antisocial behaviour it would be advisable to evaluate the frequency of antisocial behaviour. For example, as Palmer and Hollin (1999) state, simply addressing antisocial behaviour in terms of a checklist may not distinguish subtle differences between individuals who all have antisocial behaviour. Instead, in order to obtain a more

detailed picture of the level of antisocial behaviour it would be beneficial to measure frequency of antisocial acts. The recently developed treatment programmes currently being evaluated with apprehended adult firesetters (e.g., *FIPP* and *FIP-MO*, discussed in detail in Chapter 4) include cognitive behavioural treatment relating to antisocial behaviour. Similarly, it appears that un-apprehended firesetters display antisocial behaviours which need addressing.

Both identified adolescent, un-apprehended adolescent firesetters (Mackay et al., 2009; Martin et al., 2004) and apprehended adult firesetters (males and females) also report substance abuse problems (e.g., alcohol and/or drug abuse; Bradford, 1982; Jayaraman & Frazer, 2006; Räsänen et al., 1995; Saunders & Awad, 1991) and alcohol intoxication is reported to correlate with firesetting (Jayaraman & Frazer, 2006; Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987). Similarly, relative to non-firesetters, un-apprehended firesetters in Study 3a reported taking more Cannabis, Cocaine, Ecstasy, or Heroin. Furthermore, relative to un-apprehended single episode firesetters, un-apprehended recidivistic firesetters reported participating in more incidences of underage drinking. However, despite the general self-reported substance abuse, at the time of ignition the majority of un-apprehended firesetters reported being sober ($n = 104, 88.1\%$), and only two firesetters reported being under the influence of drugs ($n = 3, 2.5\%$) therefore un-apprehended firesetters do not generally appear to be under the influence when igniting fires. It is unclear why this is the case but it is likely that firesetters under the influence of alcohol or substance may lack the cognitive capacity to evade detection and may in part explain why some firesetters are apprehended and others are not. Un-apprehended firesetters were not requested to report why they were not under the influence at the time of ignition and is an area which future research may wish to explore (e.g., were un-apprehended firesetters unable

to procure alcohol or did they choose to ignite fires to alleviate boredom instead of ingesting alcohol).

Hyperactivity and impulsivity are common behaviours associated with identified and un-apprehended adolescent firesetters (Dadds & Fraser, 2006; Del Bove et al., 2008; Hoerold & Tranah, 2014; Howell Bowling et al., 2013; Kolko et al., 1985; Martin et al., 2004; McCarty & McMahon, 2005). In comparison to non-firesetting offenders, apprehended adult firesetters are also reported to have poor impulse control (Ducat et al., 2013; Ó Ciardha et al., 2015a; Räsänen et al., 1995). Disorders associated with deficits in impulse control (e.g., drug dependence and pathological gambling) were also found to have a strong association with firesetting in the NESARC study assessing un-apprehended firesetters (Blanco et al., 2010). Similarly, although the impulsivity of un-apprehended firesetters was not evaluated in Studies 1 and 2, in Study 3a relative to non-firesetters, un-apprehended adolescent firesetters reported higher levels of impulsivity. Furthermore, when asked to comment on what they believed would have prevented them from firesetting 23.7% ($n = 9$) of single episode firesetters and 23.5% ($n = 12$) of recidivistic firesetters reported that being able to control their impulsivity would have prevented their firesetting which further supports links with the identified and apprehended firesetting literature.

Although both identified adolescent (Lambie et al., 2013; Martin et al., 2004) and apprehended adult firesetters are reported to be criminally versatile (Alexander et al., 2015; Bourget & Bradford, 1989; Ducat et al., 2014; Hagenauw et al., 2015; Jayaraman & Frazer, 2006; Muller, 2008; Repo et al., 1997; Rice & Harris, 1996; Soothill et al., 2004) the un-apprehended firesetters reported in this thesis did not typically self-report holding criminal records. For example, un-apprehended firesetters and non-firesetters could not be significantly differentiated in terms of criminal convictions in Studies 1 or 2. However, as discussed in Chapter 2, conviction rates are not necessarily good indicators of criminal

activity. Therefore, in Study 3a participants were asked to comment on their criminal activity which may or may not have resulted in conviction. Using this method, relative to non-firesetters, significantly more firesetters reported engaging in assault, robbery, shop theft, vandalism, and had taken drugs (e.g., Cannabis, Cocaine, Ecstasy, or Heroin) further highlighting that like their identified and apprehended counterparts un-apprehended firesetters may also have issues relating to antisocial behaviour and self control. As a result, the first of the *M-TAFF* trajectories, the *Antisocial cognitions trajectory*, is likely to be applicable to both un-apprehended and identified and apprehended firesetters.

Grievance trajectory

Typically, identified adolescent firesetters are not requested to report motivations (Chen et al., 2003, Del Bove et al., 2008; Martin et al., 2004). However, Swaffer and Hollin (1995) state that 29% ($n = 5$) of identified adolescent firesetters self-report igniting fires for revenge. Similarly, both male and female apprehended adult firesetters report igniting fires out of revenge (Bourget & Bradford, 1989; Gannon et al., 2012; Harmon et al., 1985; Icove & Estep, 1987; Inciardi 1970; Lewis & Yarnell, 1951; O'Sullivan & Kelleher, 1987; Rix, 1994; Stewart, 1993, Tennent et al., 1971) and are therefore classified within the second *M-TTAF* trajectory, the *Grievance trajectory*. However, in contrast to the identified adolescent and apprehended adult literature none of the un-apprehended firesetters in the studies within this thesis reported igniting fires out of revenge, and therefore at first analysis this trajectory appears to lack relevance for un-apprehended firesetters. Further, in terms of violence, relative to non-firesetters, un-apprehended firesetters were not found to show a response pattern supporting the *Normalisation of Violence* implicit theory evaluated in Study 4.

However, the grievance trajectory also relates to individuals with anger and aggression issues. Both identified adolescent firesetters (Chen et al., 2003; Sakheim et al.,

1991) and apprehended adult firesetters (Hagenauw, Karsten, Akkerman-Bouwsema, de Jager, & Lancel, 2015) are reported to have poor relations with others, feelings of anger, and display hostile and aggressive behaviour. Although aggression levels were not specifically measured within this thesis, relative to non-firesetters, un-apprehended firesetters were noted to have anger issues. For example, in Study 2, relative to non-firesetters, un-apprehended firesetters scored significantly higher in terms of *anger cognitions*, *anger arousal*, *angry behaviour*, and *provocation* as measured using the *Novaco Anger Scale and Provocation Inventory*. The characteristics of un-apprehended adolescent firesetters, evaluated using single items in Study 3a, also revealed that compared to non-firesetters, firesetters were more likely to consider themselves to be angry and therefore the *Grievance trajectory* may be applicable to some un-apprehended firesetters.

Fire interest trajectory

The third *M-TTAF* trajectory relates to fire interest. Like the research with identified adolescent firesetters (Doley, 2009; Gallagher-Duffy, Mackay, Duffy, Sullivan-Thomas, & Peterson-Badali, 2009; Kennedy et al., 2006; MacKay et al., 2006; Sakheim et al., 1991) and apprehended adult firesetters (Dickens, et al., 2009; Gannon et al., 2013b; Rautaheimo, 1989; Rice & Harris, 1991, 1996; Tyler et al., 2015), relative to non-firesetters, the un-apprehended firesetters in all of the studies within this thesis were noted to have higher levels of fire interest as measured using the *fire interest* subscale of the *Fire Setting Scale*. In addition, relative to non-firesetters, firesetters in Study 1 scored significantly higher on the *Identification with Fire Scale*, and the *Fire Attitude Scale* also suggesting a stronger interest and identification with fire. Furthermore, in Study 4, relative to non-firesetters, un-apprehended firesetters were significantly slower to respond to words supporting the *Fire is Fascinating or Exciting* implicit theory relative to non-supportive words. One explanation for

this is that firesetters were distracted by the *Fire is Fascinating or Exciting* implicit theory supportive words. This finding may provide support for the *Fire interest trajectory* but warrants further exploration.

In contrast to the identified and apprehended literature hypothesising that recidivistic firesetters hold higher levels of fire interest (Doley, 2009; Kennedy et al., 2006; MacKay et al., 2006; Rice & Harris, 1991, 1996), the un-apprehended single episode and recidivistic firesetters in Study 3b were not distinguishable in terms of fire interest. However, it is acknowledged that due to a small sample size ($n = 89$) the analyses were under-powered, and as a result are unlikely to detect more subtle effects. Therefore, it would be beneficial to replicate this research with larger samples of participants.

Emotionally expressive and need for recognition trajectory

The fourth *M-TTAF* firesetting trajectory relates to *emotionally expressive* firesetters and firesetters igniting fires out of a *need for recognition*. Identified and apprehended firesetters on the *emotionally expressive* trajectory are hypothesised to have issues with communication, problems solving deficits, and impulsivity. For example, Gannon et al. (2012) hypothesise that *emotionally expressive* firesetters may ignite fires as a reaction to the death of a loved one or as a reaction to financial issues. Such firesetters may feel unheard and unable to communicate their needs in a pro-social manner and therefore use fire to draw attention to themselves (e.g., an emotional 'cry for help').

Need for recognition firesetters are also hypothesised to have issues with communication and social skills deficits and therefore also ignite fires in order to send a message. However, *need for recognition* firesetters are hypothesised to be educated, possess fire expertise, and pre-plan their fires. Relative to *emotionally expressive* firesetters who draw attention to themselves as a direct result of firesetting, *need for recognition* firesetters are

hypothesised to ignite fires with the aim of gaining social attention and recognition for extinguishing the fire or averting others from the fire (e.g., heroic firesetter).

It would be expected that firesetters igniting fires as a form of communication may also hold particular implicit beliefs associated with fire. For example, the implicit belief in a *Dangerous World* or believing that *Fire is a Powerful Tool* (Ó Ciardha & Gannon, 2012). In Study 4, un-apprehended firesetters did not appear to hold the *Fire is a Powerful Tool* implicit theory, relative to non-firesetters. However, un-apprehended firesetters were significantly faster at classifying the *Dangerous World* implicit theory supportive words compared to the non-supportive words, therefore showing support for un-apprehended firesetters holding a belief in a *Dangerous World*.

Typically the un-apprehended firesetters within this thesis did not report igniting fires as a form of communication. Whilst problem solving deficits are a feature associated with *emotionally expressive* firesetters, *need for recognition* firesetters are likely to be better at problem solving. However, the problem solving abilities of the un-apprehended firesetters within this thesis were not specifically measured. Apprehended adult firesetters are typically reported to have low IQ and have poor levels of education (Bradford, 1982; Harmon et al., 1985; Lewis & Yarnell, 1951; Rautaheimo, 1989) however, this was not the case for un-apprehended firesetters. Perhaps increased IQ in un-apprehended firesetters increases the likelihood of holding sufficient communication and problem solving skills to avoid detection and therefore unlike *emotionally expressive* firesetters, un-apprehended firesetters are more akin to *need for recognition* firesetters. Clearly, further research would be needed to establish this.

Multi-faceted trajectory

The final trajectory, hypothesised to be relevant to apprehended adult firesetters is the *multi-faceted trajectory* which refers to firesetters with an interaction of vulnerabilities. For example, a combination of antisocial behaviour and fire interest are hypothesised to interact and be associated with firesetting behaviour (Doley et al., 2011; Gannon et al., 2012; MacKay et al., 2006). Similarly, relative to non-firesetters, un-apprehended firesetters in Studies 1, 2, and 3a were found to score higher on the *FSS* measuring fire interest and antisocial behaviour. Therefore like their apprehended counterparts this final *M-TTAF* trajectory also appears to be applicable to un-apprehended firesetters.

Clinical Implications; prevention and treatment of un-apprehended deliberate firesetters

A key theme to emerge from the findings within this thesis is that like their identified adolescent and apprehended adult counterparts, un-apprehended firesetters require firesetting prevention and interventions. Identified adolescent and apprehended adult firesetters are heterogeneous with a wide variety of socio-developmental and historical background issues, psychological vulnerabilities, and motivations underpinning their firesetting. Chapter 2 discussed the variables associated with both identified adolescent and apprehended adult firesetters in detail, Chapter 4 explained the current prevention initiatives aimed at preventing adolescents from firesetting regardless of firesetting history (e.g., fire safety education), and the current intervention and treatment programmes available to adolescents (e.g., *TAPP-C*) and adults (e.g., *FIPP* and *FIP-MO*) with a history of firesetting. Due to the distinct lack of research with un-apprehended firesetters, there is a lack of theory or clinical guidelines in relation to the treatment needs of this group of firesetters. However, based on the findings within this thesis a number of recommendations are proposed.

In terms of prevention, currently, fire services around the UK provide fire education in schools, and whilst such programmes may appear valuable, they have not been systematically reviewed or empirically tested (Palmer et al., 2007; Palmer et al., 2005). The un-apprehended firesetters within this thesis were asked to indicate what they believe would have prevented them from firesetting and interestingly 24 firesetters (21.6%) reported that increased fire safety knowledge would have prevented them igniting fires. For example, in Study 2, 35% of firesetters ($n = 14$) indicated that having better fire safety knowledge would have prevented them from firesetting. Of these 14 firesetters, seven ignited just one fire but the remaining seven firesetters ignited multiple fires. It is unclear if these firesetters participated in any of the fire safety programmes offered by fire personnel and this is an aspect that further research could seek to establish. Certainly however, more needs to be done to educate young people about the dangers of fire in order to prevent them from engaging in deliberate firesetting.

In addition to focussing on fire related aspects (e.g., reducing fire interest and fascination), preventative fire education and treatment should also include elements aimed at addressing confidence, antisocialism, boredom proneness, and impulsivity. For example, 13 firesetters (11.7%) across the studies indicated that having increased confidence to stand up to peers would have reduced their likelihood of firesetting. In line with the identified adolescent and apprehended adult firesetting prevention and treatment literature explored in Chapter 4 it appears that like identified adolescent and apprehended adult firesetters, un-apprehended deliberate firesetters also require a multifaceted approach to prevention and treatment. However, worryingly, over a third of firesetters across the studies indicated that nothing would have prevented their firesetting. It would be beneficial to further research the area of prevention to help reduce firesetting particularly as there is a general lack of information pertaining to what firesetters believe would have prevented them from

deliberately igniting fires. Furthermore, it would be advantageous to include qualitative methodology to explore why some firesetters report that *nothing* would prevent them from firesetting.

The un-apprehended firesetters within this thesis reported not having received any firesetting treatment, but firesetting treatment (e.g., the *FIPP*; Gannon et al., 2015) has been shown to successfully reduce problematic fire interest, associations with fire, and produce improvements on secondary outcomes (e.g., attitudes towards violence and aggressive attitudes) at three month post treatment follow-up. Therefore it seems appropriate and beneficial to develop similar programmes but in the form of preventative educational programmes which can be delivered to school pupils in order to prevent them from firesetting. Alternatively since the firesetters in the studies within this thesis were willing to disclose their firesetting behaviour and general antisocial behaviour, such individuals may also be willing to attend community programmes to address their behaviour. Community treatment programmes which encompass cognitive social learning, problem solving skills, self management, and social skills training enabling adult offenders to address, change, and plan appropriate behaviour (e.g., *Think First*; McGuire, 2005) are reported to help reduce reoffending in apprehended adults with a variety of offending behaviours (e.g., theft, violence, drug offences; Hollin, McGuire, Hounsome, Hatcher, Bilby, & Palmer, 2008; McGuire, 1995, 2005; McGuire, Bilby, Hatcher, Hollin, Hounsome, & Palmer, 2008; Palmer, McGuire, Hounsome, Hatcher, Bilby, & Hollin, 2007). Such intervention programmes combined with fire related treatment programmes may have a positive effect on un-apprehended firesetters.

There is a general lack of research exploring un-apprehended deliberate firesetters. However, un-apprehended firesetters are described in detail within this thesis and in contrast to the identified and apprehended firesetting literature, un-apprehended firesetters appear to

be educated, and do not report being motivated by revenge but instead report being motivated by *curiosity and experimentation, creating excitement, and relieving boredom*. Un-apprehended firesetters report that having the *confidence to stand up to peers*, being able to *control their impulsivity*, and *having better fire safety knowledge* would have prevented them from firesetting. These findings are likely to aid researchers and professionals in identifying individuals who would benefit from early firesetting intervention. For example, researchers may wish to develop empirically evaluated educational programmes designed at targeting particularly vulnerable children, such as children likely to lack social skills, or lack the confidence to stand up to their peers. The findings of this thesis provide a starting point for researchers to build upon in order to identify individuals most in need of firesetting interventions, in an attempt to reduce the number, and devastating consequences of deliberate firesetting.

Limitations

Specific limitations relating to each study are discussed in the relevant chapters; however, there are some overall research limitations within which the findings of this thesis should be considered. Firstly, the research was conducted in the UK and has not been validated cross-culturally. In addition, the studies within this thesis, (excluding Study 4, the LDT), relied on self reports. Although participants were assured of anonymity, and were specifically requested not to disclose any personally identifying information or specific information relating to any fires they had ignited, individuals may have been reluctant to participate in the research or fully disclose their firesetting behaviour for fear of repercussions. This potential underestimation of un-apprehended firesetters is particularly concerning in Study 3a which reports a 25% prevalence of un-apprehended firesetters.

Further, as the sample sizes are relatively small it would be advisable to conduct larger studies with wider population samples. It is also apparent that the different recruitment methods elicited different prevalence rates of deliberate firesetters. Across Studies 1, 2, and 3a, firesetting prevalence rates ranged from 11.5% to 25%. It appears that as the recruitment methods varied between the three studies (e.g., hand delivered letters, social media, Prolific Academic); perhaps each method further assured individuals of anonymity, which in turn encouraged participation. However, in the cases of Studies 2 and 3 which utilised social media and Prolific Academic respectively, the response rate is undetermined and therefore it is unclear how many individuals chose not to participate in the research. As respondents volunteered to participate in the research it is possible that those who volunteer for research have different characteristics compared to individuals who choose not to participate. Furthermore, social desirability, in particular impression management, is an issue with any data based on self reports. However, although the *BIDR-IM* scale was included to reduce and counter-act the effect of impression management, it is worth noting but unclear why in Study 2 the *BIDR-IM* was found to have questionable reliability ($\alpha = .66$). Although non-firesetters and firesetters were statistically similar in their *BIDR-IM* scale scores in Studies 2, 3a, 3b, and Study 4 the *BIDR-IM* scale negatively correlated with some of the fire related scales (e.g., the *FSS* and *FPS* in Study 3a). Although MANCOVA analysis were conducted in order to reduce the effects of the *BIDR-IM*, Miller and Chapman (2001) report that there is no ideal way to know what are real group differences and control for them effectively (e.g., ANOVA versus ANCOVA).

A further limitation apparent in Studies 1 and 2 (which recruited adults of any age) is that firesetting typically occurred in adolescence. However, firesetters were commenting on their behaviour retrospectively, therefore recollection issues may have had an effect on retrospective self reports. As a result, younger participants were recruited for Study 3 to

avoid any unintentional misrepresentations through memory lapses. In addition to recollection issues, a further limitation of assessing firesetting behaviour retrospectively is that the questionnaires measuring attitudes and behaviour (e.g., fire interest, fire proclivity, anger, impulsivity, and boredom proneness) and the LDT measuring implicit beliefs captured how individuals felt at the time of completing the questionnaire and not how they may have felt at the time of their firesetting. Therefore, although this information is useful in furthering our knowledge of un-apprehended firesetters it would be advisable for researchers to capture how firesetters feel as near to committing the offense as possible. With the passing of time participants may have had time to rationalise and form opinions based on their actions. As the LDT measures implicit beliefs this is perhaps less likely to be the case, but nevertheless it would be beneficial for additional research to utilise implicit measures to assess cognitions as close to the time of the offence as possible.

Furthermore, it is acknowledged that the Cronbach alpha values relating to the reliability of the scales varied from study to study. Ideally, according to George and Mallery's (2003) guideline it is acceptable to have an alpha of $>.70$, however, the internal consistency and reliability of some of the scale measures is questionable (e.g., the *Fire Attitude Scale* in Study 1, $\alpha = .64$, and the *Identification with Fire Scale*, $\alpha = .66$, in Study 2). Furthermore, the *Behavioural Propensity subscale* of the *Fire Proclivity Scale (FPS)* was noted to have questionable alpha levels in Studies 1, 3a, and 3b ($\alpha = .66$, $\alpha = .62$, $\alpha = .67$ respectively). Although Cronbach alpha is predominantly robust for samples of 30 participants (Iacobucci, & Duhachek, 2003) it is sensitive to the number of items in the scale (Cortina, 1993; De Vaus, 2002; Gliem & Gliem, 2003; Iacobucci & Duhachek, 2003). For example, Pallant (2010) states that it is common to find lower alpha values (e.g., $.5$) for scales with fewer than 10 items. Therefore, the questionable alpha values for the *Behavioural Propensity* items within the *FPS* could simply be as a result of a small number of scale items (e.g., six items).

However, it could be argued that the other subscales within the *FPS* also had six items but had acceptable levels of reliability. Thus, it is possible that the *Behavioural Propensity* items are not a suitable measure of firesetting behavioural propensity. In terms of the questionable alpha for the 40 item *Nowicki Strickland Locus of Control Scale*, previous research has also documented that the reliability for this scale ranges from questionable to good, (e.g., $\alpha = .66$ to $\alpha = .75$, Duke & Nowicki, 1973), and although not ideal, similarly the internal consistency in the current study ($\alpha = .69$) falls within this range.

Future research

The research within this thesis is the first of its kind to consider both the psychological characteristics and offence characteristics of un-apprehended deliberate firesetters. Thus, the studies conducted as part of this thesis are exploratory in nature and provide a springboard for further research in this area.

Future research would benefit from refining and addressing some of the limitations of the current research. Since the current research was only conducted in the UK, future research may benefit from replicating the existing studies cross-culturally to fully evaluate the characteristics of un-apprehended deliberate firesetters in different countries (e.g., Australia where bush fires are prevalent). Furthermore, it is advisable to conduct additional research using larger sample sizes, particularly in the case of Study 3b which compared the characteristics of single episode firesetters and recidivistic firesetters, and Study 4 which was concerned with the implicit beliefs of firesetters. In addition to this, as many of the firesetters were commenting on their firesetting behaviour retrospectively, it is advisable to conduct further research with younger participants. Specifically focusing on factors which prevent individuals from firesetting, and the factors which differentiate single and recidivistic

firesetters would also further enhance the firesetting literature, and may prove beneficial in the development of future firesetting prevention and treatment.

There are a number of factors highlighted in the apprehended adult literature also associated with un-apprehended firesetters which warrant further investigation. For example, apprehended adult firesetters have repeatedly been found to have varied criminal repertoires (Bourget & Bradford, 1989; Ducat et al., 2014; Jayaraman & Frazer, 2006; Muller, 2008; Soothill et al., 2004) with firesetting representing just one form of antisocial behaviour. Certainly in the preceding research, un-apprehended firesetters also exhibited a wide range of antisocial behaviour (e.g., underage drinking, drug use, theft, and robbery) and it would therefore be beneficial to evaluate the developmental pattern of antisocial behaviour and the frequency of antisocial acts in more detail. If firesetting is at the extreme end of a continuum of antisocial behaviour, appropriate intervention programmes could be directed more effectively at individuals showing general signs of antisocial attitudes or behaviour in order to reduce both general criminality and firesetting.

Final conclusions

Deliberate firesetting is a dangerous and complex offence with devastating consequences, however, little is known about the perpetrators. The majority of what researchers understand about the act of firesetting and the psychological characteristics of the perpetrators has originated from crime scene investigations, arrest reports, and interviews with apprehended adult firesetters. The research contained within this thesis is concerned with un-apprehended firesetters and opens the door to a plethora of new information.

This novel research provides a comprehensive evaluation of the psychological characteristics of un-apprehended deliberate firesetters, and a comparison of single episode firesetters and recidivistic firesetters. Some interesting results emerged; firstly there are some

clear differences between un-apprehended firesetters and non-firesetters (e.g., firesetters have a clear interest in fire, typically experiment with fire before age 10, and have a family history of firesetting), and relative to single episode firesetters, recidivistic firesetters participated in more criminal behaviour such as underage drinking and robbery. In terms of implicit theories, although five implicit theories are hypothesised as being relevant for firesetting these have not been empirically tested. This is the first study to evaluate the implicit theories in detail and whilst relative to non-firesetters, firesetters were significantly faster at identifying letter strings as words supporting the *Dangerous World* implicit theory and relatively slower at classifying words supporting the *Fire is Fascinating or Exciting* implicit theory additional research assessing the implicit theories of firesetters is recommended.

Aspects of this new un-apprehended firesetting research supports the information associated with identified adolescent and apprehended adult firesetters reporting that firesetters tend to be male and have an interest or fascination in fire. Other information highlights a disparity between identified/apprehended and un-apprehended firesetters. Unlike many apprehended firesetters, the un-apprehended firesetters in the current research tended to be educated. In addition, although apprehended firesetters cite revenge as a common motive, none of the un-apprehended firesetters reported in this thesis or in the un-apprehended firesetting study by Gannon and Barrowcliffe (2012) cite revenge as a motive.

The preceding research should be viewed as a starting point and a foundation upon which to further enhance the deliberate firesetting literature. This new information can be utilised to help identify individuals at risk of firesetting behaviour and aid in the development of fire prevention education and intervention programmes. Such programmes may reduce the number of deliberately ignited fires and the resulting devastating consequences.

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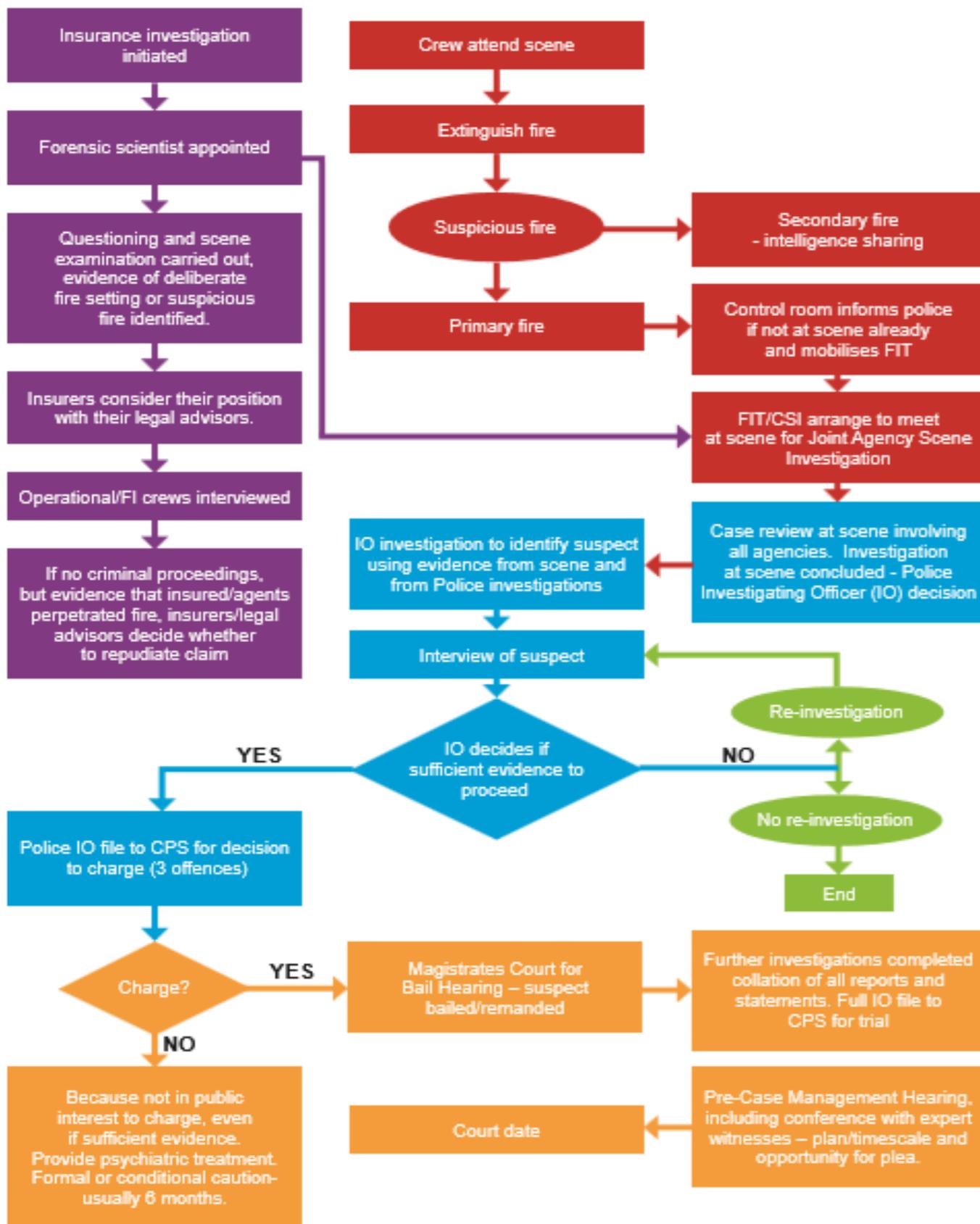
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Appendix 1. The Process Involved in Deliberate Firesetting Investigation and Prosecution



Taken from Arson Prevention Forum, (2014, p27).

Appendix 2. The Fire Setting Scale (Gannon & Barrowcliffe, 2012)

The following 20 items were presented using a 7 point Likert Scale (1 = not at all like me, 7 = very strongly like me).

Fire Interest items

I like to watch and feel fire

I get excited thinking about fire

I like watching fire

I like watching fire being extinguished

I like to feel the heat from fire

I am fascinated by fire

I have a strong interest in fire

I am attracted to fire

Fire equipment paraphernalia interests me

I find fire intriguing

Antisocial Behaviour items

At school I would often truant

I like to engage in acts that are dangerous

I have a behavioural problem

I have intended to cause harm with my behaviour

I am a rule breaker

I like to engage in acts that are exciting

I like to wind people up

I care what other people think of me

I like to engage in acts to annoy other people

I have physically threatened another person

Appendix 3. The Fire Proclivity Scale Vignettes (Gannon & Barrowcliffe, 2012)

The following 6 vignettes were responded to using 4 questions relating to each story.

Billie is a 15-year-old who had spent the weekend being bored. Billie decided to go to the local wreck to see if anyone wanted to hang out. There were already a few people there just hanging around and chatting. One of them lit a cigarette. The sight of the flame shooting out of the lighter gave Billie an idea. Billie decided to set a rubbish bin alight. Billie lit a piece of rubbish and dropped it into the bin. The rest of the rubbish burned and the bin began to melt whilst Billie and the group carried on chatting and hanging out.

Tony felt constrained by life, conforming to the rules and regulations of society but in the country Tony felt free and relaxed. Nature appealed to Tony because it is free and natural. One quiet Sunday evening Tony decided to light a twig on fire. Tony watched as the flames were also free to flicker and move as they pleased. From the burning twig, Tony then lit a pile of dried leaves and watched and listened as the leaves crackled in the flames.

Hillary had finished sorting through the paperwork and had accumulated a large pile of old papers. Hillary took the old papers to the bottom of the garden and put them in a pile. Hillary then lit the corners of a few of the papers at the bottom of the pile. Hillary stood back and watched as the flames slowly crept up the side of the stack of papers. Hillary watched as the flames danced about freely in the breeze engulfing the whole stack of papers until eventually the old pile of papers were reduced to a pile of ashes.

Jo and the other locals would often dare each other to play pranks on the adults in the street. The neighbourhood was fairly posh and most people lived in large gated properties with big gardens. Some people had electric gates whilst others had picket fences but most people had letter and newspaper boxes attached to either their fence or gate. One day whilst Jo was

delivering papers it was agreed that when the paper was put into the newspaper box it would be set alight. So Jo lit the corner of the paper and put it into the newspaper box and then carried on with the rest of the paper round.

Terry had always had an interest in fire and became excited when thinking about fire. Often when alone either at work or at home Terry would light matches. Terry watched as the intensity and the colour of the flame changed as more of the match began to burn. As the flame began to die out but before totally extinguished Terry lit another match from the original flame. Terry was fascinated by the falling trail of ash left behind by the burning match and by the intensity of the heat from one little flame.

Sammy and the others in the group were very mischievous. They spent most of their weekends creating some sort of graffiti on the local bus station walls. One weekend they decided to reduce the problem of old bus tickets littering the floor by setting fire to them. This then progressed to lighting the corners of posters hanging on the walls and watching them crinkle up and fall off the walls creating little piles of ashes.

Appendix 4. Firesetting Questionnaire

1. Please create a unique participation number. If you wish to withdraw from the study before the data has been analysed you will need to quote your unique participation number.

Please use the last two digits of your phone number, the last two letters of your mother's maiden name, and the last two digits in the year you were born. For example phone number = 07712345678, Mother's maiden name = Smith, year you were born = 1969 In this case the unique participation number would be 78th69

Please write down your unique participation number

2. Please indicate your gender

- Male
- Female

3. How many siblings (brothers & sisters) did you live with as a child?

- 0 I am an only child
- 1 sibling
- 2 siblings
- 3 siblings
- 4 or more siblings

4. Please select your ethnic group

- White British
- White Irish
- White Other
- Black Caribbean
- Black African
- Mixed White & Black Caribbean
- Mixed White and Black African
- Mixed White and Asian
- Indian
- Pakistani
- Bangladeshi
- Chinese
- Any other ethnic background

5. Please select the qualifications you have

- No qualifications
- GCSE or O levels, NVQ level 1 or 2
- A levels, NVQ level 3 or above
- Apprenticeship
- Degree (for example BA/BSc)
- A Masters degree or higher (for example MSc, MA, PGCE, PhD)
- Foreign Qualifications

6. How old are you? _____

7. Are you currently employed?

- Yes - Please state your job title below _____
- No

8. Please answer the following questions by selecting either yes or no.

	Yes	No
Do you consider yourself to have a physical disability?	<input type="radio"/>	<input type="radio"/>
Have you ever been diagnosed with a psychiatric illness? (for example; Depression, Schizophrenia, Obsessive Compulsive Disorder, an eating disorder or an anxiety disorder)	<input type="radio"/>	<input type="radio"/>
Have you ever been diagnosed with a behavioural problem? (for example ADHD)	<input type="radio"/>	<input type="radio"/>

9. Please answer the following questions by selecting the appropriate answer.

	Yes	No
Were you ever suspended from school?	<input type="radio"/>	<input type="radio"/>
Were you ever excluded or expelled from school?	<input type="radio"/>	<input type="radio"/>

10. Was a lack of money a big problem in your family? (for example; was there sometimes not enough money for food or clothes)

- Yes
- No

11. Have you ever been convicted of a crime?

- Yes
- No, if no skip to question 15

12. If you have ever been convicted of a crime? Please select all that apply

- Vandalism
- A violent crime
- Anti-Social Behaviour
- Arson
- Other - please be more specific below _____

13. Please answer the following questions

	Yes	No
Have you ever attempted suicide?	<input type="radio"/>	<input type="radio"/>
Have you self harmed? (for example; cutting or burning yourself, swallowing things you know are harmful for example deliberately taking too many tablets)	<input type="radio"/>	<input type="radio"/>
Do you have a history of wetting the bed? (for example; did you/do you wet the bed at least twice a week for 3 months either deliberately or accidentally and not caused by a medical condition or medication)	<input type="radio"/>	<input type="radio"/>

14. Please answer the following questions

	Yes	No
Have you ever witnessed any domestic violence between your parents/guardians? (for example; one parent physically assaulting the other parent or deliberately making a partner feel inferior)	<input type="radio"/>	<input type="radio"/>
Have you ever repeatedly and deliberately tried to exert your power over a partner? (for example physically dominating a partner or deliberately making a partner feel inferior)	<input type="radio"/>	<input type="radio"/>

15. Please answer the following questions which relate to your parents

	Yes	No	Don't know
Has your mother ever been diagnosed with a psychiatric illness? (for example; Depression, Schizophrenia, Obsessive Compulsive Disorder, an eating disorder or an anxiety disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Has your father ever been diagnosed with a psychiatric illness? (for example; Depression, Schizophrenia, Obsessive Compulsive Disorder, an eating disorder or an anxiety disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Did you experiment with fire at a young age e.g. before the age of 10? (for example play with matches or lighters, practice starting fires, enjoyed lighting pieces of paper and watching them burn)

- Yes
- No, if no skip to question 19

17. Please indicate how old you were when you first experimented with fire?

_____ years old

18. If you experimented with fire please select all that apply to you

- I regularly played with matches and/or lighters
- I collected matches and/or lighters
- I experimented with candles
- I enjoyed burning pieces of paper
- I enjoyed watching things burn
- I experimented starting fires a lot
- I understood fire safety but continued to light fires in secret
- I enjoyed lighting fires so that I could put them out
- I enjoyed lighting fireworks
- I enjoyed adding fuel to intensify the fire
- I often used a magnifying glass to start a fire
- I often created burn marks on walls and furniture
- I liked to watch fires burn

- I didn't understand the dangers of fire
- Other _____

19. Have you ever called the fire brigade when there wasn't a fire e.g. a false alarm?

- Yes
- No

20. When thinking about the dangers of fire;

	Yes	No
Do you consider the flames?	<input type="radio"/>	<input type="radio"/>
Do you consider the smoke?	<input type="radio"/>	<input type="radio"/>

21. When answering the next question please think about fires which have been started deliberately for example;

- Fires set to annoy other people
- Fires that are set as a result of boredom (e.g. setting fire to things because it is something to do)
- Fires set to create excitement (e.g. fires set because they are interesting and exhilarating)
- Fires set for revenge (e.g. to get back at someone and to scare or harm them or their property)
- Fires set for insurance purposes (e.g. to gain money from a false insurance claim)
- Fires set as a result of peer pressure (e.g. because of a dare, or being bullied or just going along with a group of friends)
- Fires set to destroy evidence (e.g. to get rid of evidence and cover up another crime)

- Please do not consider fires set accidentally, fires set for organised or social events (e.g. bonfire night, social occasions or hog roasts) or fires set before the age of 10.

Has anyone in your family ever set an intentional fire?

- Yes
- No
- Don't know

22. The following questions relate to your firesetting behaviour. Please think about fires that you may have set intentionally.

- For example please think about fires you may have set on purpose;
- Fires set to annoy other people
- Fires that are set as a result of boredom (e.g. setting fire to things because it is something to do)
- Fires set to create excitement (e.g. fires set because they are interesting and exhilarating)
- Fires set for revenge (e.g. to get back at someone and to scare or harm them or their property)
- Fires set for insurance purposes (e.g. to gain money from a false insurance claim)
- Fires set as a result of peer pressure (e.g. because of a dare, or being bullied or just going along with a group of friends)
- Fires set to destroy evidence (e.g. to get rid of evidence and cover up another crime)
- Please do not consider fires set accidentally, fires set for organised or social events (e.g. bonfire night, social occasions or hog roasts) or fires set before the age of 10.

How many intentional fires have you started?

- 0, please skip this section
- 2
- 3
- 4
- 5 or more
- I am thinking of a fire which does not fit into these categories. Please specify the fire you are thinking about below

23. Please indicate your age;

_____ when you first started a deliberate fire

_____ when you last/most recently started a deliberate fire

24. Please think about any fires you have started after the age 10 and answer the following questions by selecting either yes or no.

	Yes	No
Have you ever been caught starting a fire on purpose?	<input type="radio"/>	<input type="radio"/>
Have you ever received any therapy for your deliberate firesetting?	<input type="radio"/>	<input type="radio"/>
Have you ever set a deliberate fire at your house?	<input type="radio"/>	<input type="radio"/>
Have you ever set a deliberate fire at your workplace?	<input type="radio"/>	<input type="radio"/>
I tend to plan the deliberate fire before setting it	<input type="radio"/>	<input type="radio"/>
I tend to start the deliberate fire impulsively	<input type="radio"/>	<input type="radio"/>
I tend to light the deliberate fire with things I have taken with me	<input type="radio"/>	<input type="radio"/>
I tend to light the deliberate fire using things I find at the scene	<input type="radio"/>	<input type="radio"/>

25. Thinking about all of the intentional fires you have set;

	Yes (1)	No (2)
Do you tend to stay at the scene of the deliberate fire?	<input type="radio"/>	<input type="radio"/>
Do you tend to revisit the scene of the deliberate fire afterwards?	<input type="radio"/>	<input type="radio"/>
Do you tend to take part in putting out the deliberate fire?	<input type="radio"/>	<input type="radio"/>

26. Do you tend to be under the influence of alcohol when starting a deliberate fire?

- Sober
- Slight intoxication
- Moderate intoxication
- Drunk/Heavy intoxication

27. Do you tend to be under the influence of drugs when starting a deliberate fire?

- Yes
- No

28. How many other people tend to be with you when you light a deliberate fire(s)?

- Zero (0) I started the fire(s) alone
- 1
- 2
- 3
- 4 or more other people

29. What were your motives or reasons for deliberately starting a fire(s)? Please tick all that apply. I started a fire deliberately because;

- I was experimenting and was curious but I had a lack of fire safety knowledge and did not understand the dangers of fire
- I was experimenting and was curious but understood the dangers of fire
- I was having issues/problems at home
- I was having issues/problems at school
- I was having issues/problems at work
- I was stressed and/or frustrated
- I wanted to get attention
- I was dared to or as a prank
- I was bored
- I was angry
- I wanted to get revenge
- It was a reaction to a stressful life event or crisis (e.g. the death of a loved one, parental separation etc).
- It was as an act of vandalism
- I wanted to create excitement
- I was protecting myself
- I wanted an insurance payout or for other financial gain
- I was covering up another crime and destroying evidence
- I love fire
- Other - please describe your reason _____

30. When starting a deliberate fire do you tend to light one point or more than one point to make sure the fire takes hold?

- I only set fire using one point
- I set fire to more than one point to make sure the fire starts

31. What do you tend to use to start a deliberate fire(s) and keep it lit? Please tick all that apply

- Matches
- A lighter
- Candles
- Petrol
- Lighter fuel, White spirit or other flammable liquid
- Gas bottle
- Tampering with electrical equipment
- Aerosol can
- Cigarette
- Magnifying glass
- A crisp packet
- Other - please give details _____

32. What have you deliberately set fire to? Please tick all that apply

- A waste paper basket or a rubbish bin inside a building
 - A rubbish bin outside
 - Mattress or bedding
 - Clothing
 - A toilet roll dispenser
 - A car with a person inside
 - A car without a person inside
 - An animal that was alive
 - A dead animal
 - A house or building that you knew had a person inside
 - A house or building that you believed did not have a person inside e.g. a derelict building
 - The countryside for example grass or shrubbery
 - A shed or beach hut that you knew had a person inside
 - a shed or beach hut that you believed to be empty
 - Evidence relating to another crime
 - Other - please give details but do not include anything that could specifically identify the location
-

33. Please think about all the fires that you have set;

	Yes	No
Do you tend to think about what the outcome of the fire would be?	<input type="radio"/>	<input type="radio"/>
Did you believe you were in control of the fire?	<input type="radio"/>	<input type="radio"/>
Did you expect the fire to turn out the way it did?	<input type="radio"/>	<input type="radio"/>
Were you surprised at how the flames developed?	<input type="radio"/>	<input type="radio"/>
Were you surprised at the amount of smoke that built up?	<input type="radio"/>	<input type="radio"/>
Do you tend to leave the fire to burn itself out?	<input type="radio"/>	<input type="radio"/>
Do you tend to try and put the fire out yourself?	<input type="radio"/>	<input type="radio"/>
Do the fire service tend to put the fire out?	<input type="radio"/>	<input type="radio"/>

34. Please think about the last/most recent deliberate fire that you started, did you tell anyone that you set the fire?

- Yes
- No

35. At the time of starting your most recent fire, were you;

- Single
- Married
- In a relationship but living separately
- Living with a partner
- Divorced/separated (5)

36. Thinking about the last deliberate/most recent fire that you started please select the number which best applies to the following questions;

	Not at all serious 1	2	3	Don't know 4	5	6	Extremely serious 7
How serious do you think the fire was?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How serious do you believe other people would think the fire was?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

37. How far away from your home or workplace did you start your last/most recent deliberate fire?

- Less than 1 mile away e.g. within walking distance
- Between 2-5 miles
- Over 5 miles away

38. What do you believe would have prevented you from setting a fire(s)? Please tick all that apply

- Having better fire safety knowledge e.g. knowing how to use fire responsibly
- Having more knowledge relating to how fire develops
- Being more aware of the dangers of fire
- Having more support
- Having more confidence to stand up to peers
- Knowing ways to control my anger
- Having more parental supervision
- Nothing would have prevented me from setting a fire
- Other - please give more details _____

39. What do you believe would prevent you from setting a fire(s) in the future?

- Nothing
- If something would prevent you from setting a fire please select this option and give details below _____

Appendix 5. Identification with Fire Scale (Gannon, Ó Ciardha, & Barnoux, 2011)

The 10 items below were presented with a 5 point Likert Scale (1 = strongly disagree, 5 = strongly agree).

Fire is an important part of my identity

I don't need fire

Fire is almost part of my personality

If I never saw another fire again it wouldn't bother me

Fire is an important part of my life

I don't know who I am without fire

I need fire in my life

Without fire, I am nobody

Fire is part of me

I have to have fire in my life

Appendix 6. Fire Attitude Scale (Muckley, 1997)

The 20 items below were presented with a 5 point Likert Scale (1 = strongly disagree, 5 = strongly agree).

Most people carry a box of matches or lighter around

People often set fires when they are angry

I would like to work as a fire fighter

The best thing about fire is watching it spread

I have never put a fire out

I know a lot about how to prevent fires

Setting just a small fire can make you feel a lot better

Fires can easily get out of control

I get bored very easily in my spare time

People who set fires should be locked up

When you are with your mates you act now and think later

If you have got problems, a small fire can help sort them out

Most families have had a fire accident at home

Parents should spend money on buying a fire extinguisher

Most people have set a few small fires just for fun

I usually go along with what my mates decide

Playing with matches can be very dangerous

Most people have been questioned about fires by the police

They should teach you about fire prevention at school

Most people's friends have lit a fire or two

Appendix 7. The Balanced Inventory of Desirable Responding (BIDR-IM; Paulhus, 1998)

The 20 items below were presented with a 5 point Likert Scale (1 = not true, 5 = very true).

I sometimes tell lies if I have to

I never cover up my mistakes

There have been occasions when I have taken advantage of someone

I never swear

I sometimes try to get even rather than forgive and forget

I always obey laws, even if I'm unlikely to get caught

I have said something bad about a friend behind his/her back

When I hear people talking privately, I avoid listening

I have received too much change from a sales person without telling him or her

I always declare everything at customs

When I was young I sometimes stole things

I have never dropped litter on the street

I sometimes drive faster than the speed limit

I never read sexy books or magazines

I have done things that I don't tell other people about

I never take things that don't belong to me

I have taken sick-leave from work or school even though I wasn't really sick

I have never damaged a library book or store merchandise without reporting it

I have some pretty awful habits

I don't gossip about other people's business

Appendix 8. The Fire Interest Rating Scale (Murphy & Clare, 1996)

The 14 items below are rated on a 7 point Likert Scale (1 = extremely upsetting or frightening, 4 = OK, 7 = exciting, fun, or lovely)

Having a box of matches in your pocket

Watching an ordinary coal fire burn in a grate

Watching a bonfire outdoors, like on bonfire night

Seeing firemen get their equipment ready

Watching a fire engine come down the road

Striking a match to light a cigarette

Watching a house burn down

Going to a police station to be questioned about a fire

Watching people run from a fire

Watching a person with his clothes on fire

Striking a match to set fire to a building

Seeing a hotel on fire in the TV news

Seeing firemen hosing a fire

Giving matches back to someone

Appendix 9. The Revised UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980)

The following 20 items are rated by selection the option never, rarely sometimes or often.

I feel in tune with people around me

I lack companionship

There is no one I can turn to

I do not feel alone

I feel part of a group of friends

I have a lot in common with people around me

I am no longer close to anyone

My interests and ideas are not shared by those around me

I am an outgoing person

There are people I feel close to

I feel left out

My social relationships are superficial

No one really knows me well

I feel isolated from others

I can find companionship when I want it

There are people who really understand me

I am unhappy being so withdrawn

People are around me but not with me

There are people I can talk to

There are people I can turn to

Appendix 10. Simple Rathus Assertiveness Scale

The 19 items below are rated on 6 point scale (1 = very much unlike me, 6 = very like me)

Most people stand up for themselves more than I do.

At times I have not made or gone on dates because of my shyness.

When I am eating out and the food I am served is not cooked the way I like it, I complain to the person serving it.

If a person serving in a store has gone to a lot of trouble to show me something which I do not really like, I have a hard time saying "No"

There are times when I look for a good strong argument.

I try as hard in life to get ahead as most people like me do.

To be honest, people often get the better of me.

I do not like making phone calls to businesses or companies.

I feel silly if I return things I don't like to the store that I bought them from.

If a close relative that I like was upsetting me, I would hide my feelings rather than say that I was upset.

I have sometimes not asked questions for the fear of sounding stupid.

During an argument, I am sometimes afraid that I will get so upset that I will shake all over.

If a famous person were talking in a crowd and I thought he/she was wrong, I would get up and say what I thought.

I often have a hard time saying “No.”

I complain about poor service when I am eating out or in other places.

When someone says I have done very well, I sometimes just don’t know what to say.

If a couple near me in the cinema were talking rather loudly, I would ask them to be quiet or to go somewhere else and talk.

I am quick to say what I think.

Appendix 11. Nowicki-Strickland Locus of Control Locus of Control**(Nowicki, 1976)**

We are trying to find out what people your age think about certain things. Please answer the following questions the way *you* feel. There are no right or wrong answers. Don't take too much time answering any one question, and do try to answer them all. Try to pick one response for all the questions and not leave any blanks. Tick 'yes' or 'no' next to each item.

Do you believe that most problems will solve themselves if you just don't fool with them?

Do you believe that you can stop yourself from catching a cold?

Are some people just born lucky?

Most of the time, do you feel that getting good marks at school meant a great deal to you?

Are you often blamed for things that just aren't your fault?

Do you believe that if somebody studies hard enough he or she can pass any subject?

Do you feel that most of the time it doesn't pay to try hard because things never turn out right anyway?

Do you feel that if things start out well in the morning that it's going to be a good day no matter what you do?

Do you feel that most of the time parents listen to what their children have to say?

Do you believe that wishing can make good things happen?

When you get punished does it usually seem it's for no good reason at all?

Do you think that cheering, more than luck helps a team to win?

Did you feel that it was nearly impossible to change your parents mind about anything?

Do you believe that parents should allow children to make most of their own decisions?

Do you feel that when you do something wrong there's very little you can do to make it right?

Do you believe that most people are just born good at sports?

Are most of the other people your age stronger than you are?

Do you feel that one of the best ways to handle most problems is just not to think about them?

Do you feel that you have a lot of choice in deciding who your friends are?

If you find a four leaf clover, do you believe that it might bring you good luck?

Did you often feel that whether or not you did your homework had much to do with what kind of marks you got?

Do you feel that when a person your age is angry at you, there's little you can do to stop him or her?

Have you ever had a good luck charm?

Do you believe that whether or not people like you depends on how you act?

**Appendix 12. The Boredom Proneness Scale - BPS (Vodanovich, Wallace, & Kass,
2005)**

The 12 items below are answered using a 7 point Likert Scale (1 = strongly disagree, 7 = strongly agree)

It is easy for me to concentrate on my activities

Having to look at someone's home movies or travel slides bores me tremendously

I find it easy to entertain myself

Many things I have to do are repetitive and monotonous

I get a kick out of most things I have to do

In any situation I can usually find something to do or see to keep me interested

It would be hard for me to find a job that is exciting enough

Many people would say that I am a creative or imaginative person

Among my friends I am the one who keeps doing something the longest

Unless I am doing something exciting, even dangerous, I feel half-dead and dull

It seems that the same things are on television or the movies all the time, it's getting old

When I was young, I was often in monotonous and tiresome situations

Appendix 13. Measure of Criminal Attitudes and Associates M-CAA - Part B (Mills & Kroner, 1999)

The 46 items below are answered with an agree or disagree option.

It's understandable to hit someone who insults you.

Stealing to survive is understandable.

I am not likely to commit a crime in the future.

I have a lot in common with people who break the law.

There is nothing wrong with beating up a child molester.

A person is right to take what is owed them, even if they have to steal it.

I would keep any amount of money I found.

None of my friends have committed crimes.

Sometimes you have to fight to keep your self-respect.

I should be allowed to decide what is right and wrong.

I could see myself lying to the police.

I know several people who have committed crimes.

Someone who makes you very angry deserves to be hit.

Only I should decide what I deserve.

In certain situations I would try to outrun the police.

I would not steal, and I would hold it against anyone who does.

People who get beat up usually had it coming.

I should be treated like anyone else no matter what I've done.

I would be open to cheating certain people.

I always feel welcomed around criminal friends.

It's all right to fight someone if they stole from you.

It's wrong for a lack of money to stop you from getting things.

I could easily tell a convincing lie.

Most of my friends don't have criminal records.

It's not wrong to hit someone who puts you down.

A hungry man has the right to steal.

Rules will not stop me from doing what I want.

I have friends who have been to jail.

Child molesters get what they have coming.

Taking what is owed you is not really stealing.

I would not enjoy getting away with something wrong.

None of my friends has ever wanted to commit a crime.

It's not wrong to fight to save face.

Only I can decide what is right and wrong.

I would run a scam if I could get away with it.

I have committed a crime with friends.

Someone who makes you really angry shouldn't complain if they get hit.

A person should decide what they deserve out of life.

For a good reason, I would commit a crime.

I have friends who are well known to the police.

There is nothing wrong with beating up someone who asks for it.

No matter what I've done, it's only right to treat me like everyone else.

I will not break the law again.

It is reasonable to fight someone who cheated you.

A lack of money should not stop you from getting what you want.

I would be happy to fool the police.

Appendix 14. Relationship Questionnaire (Bartholomew & Horowitz, 1991)

The following four descriptions relate to relationship styles. Please read the following descriptions and select the one which best describes you or is the closest to the way you are.

It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.

I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.

I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.

I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.

Each of the relationship styles below were presented with a 7 point Likert Scale (1 = disagree strongly, 7 = agree strongly).

Please rate how well or poorly each of the relationship styles below correspond to your relationship style

It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.

I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.

I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.

I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.

Appendix 15. The Parental Bonding Instrument - Mother (Parker, Tupling & Brown, 1979)

The following 25 items were presented with a 4 point scale, very like, moderately like, moderately unlike and very unlike. The equivalent questions relating to relationship with a father figure were also presented.

The next question refers to your mother. Please think about your mother in your first 16 years of life and select the most appropriate answer for each statement. If you had more than one person acting as your mother (e.g., a biological mother and a step mother) answer the questions for the one you feel has most influenced you. If you did not have a mother figure at any point up to age 16 please skip this question.

My mother spoke to me in a warm and friendly voice

My mother did not help me as much as I needed

My mother let me do things I liked doing

My mother seemed emotionally cold to me

My mother appeared to understand my problems and worries

My mother was affectionate to me

My mother liked me to make my own decisions

My mother did not want me to grow up

My mother tried to control everything I did

My mother invaded my privacy

My mother enjoyed talking things over with me

My mother frequently smiled at me

My mother tended to baby me

My mother did not seem to understand what I wanted or needed

My mother let me decide things for myself

My mother made me feel I wasn't wanted

My mother could make me feel better when I was upset

My mother did not talk with me very much

My mother tried to make me feel dependent on her

My mother felt I could not look after myself unless she was around

My mother gave me as much freedom as I wanted

My mother let me go out as often as I wanted

My mother was overprotective of me

My mother did not praise me

My mother let me dress in any way I pleased

Appendix 16

Examples of the Information and Debrief Sheets for the Questionnaire Studies and the Lexical Decision Task

The participant recruitment letter hand delivered in Study 1



Dear householder

You have been randomly selected through your address to take part in new research relating to firesetting. It is important for you to understand why this research is being conducted and what it will involve. Please take time to read the following information carefully before deciding whether you agree to take part. The questionnaire should only take between 10 and 20 minutes to complete and can be accessed using the web address below – please note the



address is case sensitive. <http://bit.ly/16bQTza>

Why is this research being done?

This research will help researchers to learn more about the characteristics and background factors of people living in the community who may or may not choose to set fires. In particular, we are interested in exploring any differences or similarities that exist between people who choose to set fires and people who do not. Examining these differences or similarities is important for increasing our understanding about people who decide to set fires and those who do not set fires.

Who is organising the research?

The research is being organised by researchers at the University of Kent. It will form part of a PhD thesis for Ms. Emma Barrowcliffe who is a postgraduate student at the University of Kent. Emma is being supervised by Professor Theresa Gannon.

Why have I been asked to take part?

You have been randomly invited to take part in this study as the researchers would like to gain more information about people's attitudes to fire and firesetting behaviour. By sharing basic demographic information about yourself and information regarding your background,

we hope that we will get a better idea of the differences or similarities that exist between people who decide to set fires and people who do not set fires.

Do I have to take part?

It is up to you to decide whether or not to take part in this study. If you do decide to take part please read this information sheet fully. You can withdraw at any time without giving a reason.

What will happen to me if I take part?

You will be asked to complete a questionnaire online. You will not be asked to provide your name and all the information that you provide will remain confidential. Your information will only be seen by the research team and when this study is written up and later published you will not be personally identified. Even though we will be asking you questions about fires that you may have set in the community please note that we are not asking you any detailed questions about these acts. This means that we can keep your data confidential and we are not obliged to tell the authorities about any fires that you tell us you set.

If you agree to consent to take part in this research then please visit the website and then continue on to answer the questions <http://bit.ly/16bQTza>

Taking part in this study does not mean that you have to take part in any further research; however, the anonymous data that you provide in this research may be used by the research team for future research. The data will still be kept confidential.

Will my taking part in the study be kept confidential?

You will not be asked to provide your name and any information you provide will remain confidential within the research team. When this study is later written up and published you will not be personally identified. The data will be retained for 5 years in line with psychological guidelines.

What if I have a concern about the research?

If you have any concerns about any aspect of this study please contact Emma or if you wish to complain please contact Dr. Afroditi Pina, the Chair of Kent University Ethics Committee.

What will happen to the results of the research study?

It is intended that the research results will be written up for a doctoral research thesis and also for publication in scientific journals. We may also talk about it at professional conferences. It will not be possible for anyone to tell that you took part in this study.

What if I want to have some further information?

If you would like any further information about participating in this research or you have any specific questions regarding this research please contact Emma (details below).

Thank you for taking the time to read about our research. It may have important implications and so we hope that you will consider taking part and answering the questions online.

Emma Barrowcliffe

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The online study web address is <http://bit.ly/16bQTza>

The information sheet seen online for the Firesetting Questionnaire Study



You are being invited to take part in research relating to arson, the act of deliberately setting fire to things. It is important to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

Why is this research being conducted?

This research will help researchers to learn more about the characteristics and background factors of people living in the community who may or may not choose to set fires. In particular, we are interested in exploring any differences or similarities that exist between people who choose to set fires and people who do not. Examining these differences or similarities is important for increasing our understanding about people who decide to set fires and those who do not set fires.

Who is organising the research?

The research is being organised by researchers at the University of Kent. It will form part of a PhD thesis for Ms. Emma Barrowcliffe who is a postgraduate student at the University of Kent. Emma is being supervised by Professor Theresa Gannon.

Why have I been asked to take part?

You have been invited to take part in this study as the researcher would like to gain more information about people's attitudes to setting fires and fires in general. By sharing basic demographic information about yourself and information regarding your background, we hope that we will get a better idea of the differences or similarities that exist between people who decide to set fires and people who do not set fires.

What will happen to me if I take part?

You will be asked to complete a questionnaire online. You will not be asked to provide your name and therefore all the information that you provide will remain anonymous. Even though we are asking you questions about fires that you may have set in the community please note that we are not asking you any questions about these acts in detail e.g. don't include specific names of people or places. This means that we can keep your data confidential and we are not obliged to tell the authorities about any fires that you tell us you set. You can withdraw at any time without giving a reason.

Will my taking part in the study be kept confidential?

You will not be asked to provide your name and any information you provide will remain confidential within the research team. When this study is later written up and published you will not be personally identified. The data will be retained for 5 years in line with psychological guidelines.

What if I have a concern about the research?

If you have any concerns about any aspect of this study please contact Emma or if you wish to complain please contact Dr. Afroditi Pina, the Chair of Kent University Ethics Committee.

If you feel that this research may bring up things that you may need to talk about you can contact the Samaritans at any time on 08457 90 90 90.

What will happen to the results of the research study?

It is intended that the research results will be written up for a doctoral research thesis and also for publication in scientific journals. We may also talk about it at professional conferences. It will not be possible for anyone to tell that you took part in this study.

What if I want to have some further information?

If you would like any further information about participating in this research or you have any specific questions regarding this research please contact Emma (details below).

Thank you for taking the time to read about our research. It may have important implications and so we hope that you will consider taking part and answering the questions that follow. Please be aware that attention checks are included in this study and these need to be answered correctly in order to receive your credits.

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Dr. Afroditi Pina
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Please select the option below to confirm that you have read the information above and that you agree to take part in the research.

- I have read about the nature of the study on the information sheet above. I understand that all the information collected in this study is confidential and anonymous. The information may be published but I understand that I will not be personally identified. My participation is voluntary and I am free to withdraw from the study at anytime without any negative consequences. I understand that I need to answer the attention check questions correctly in order to receive payment.

The debrief sheet seen online for the Firesetting Questionnaire Studies



THANK YOU for volunteering to take part in this research. The information you provided will remain confidential and you will not be personally identified. You can withdraw your information by quoting your unique personal identification number that you created at the beginning of this study.

The overall results of this study will help researchers gain information into the area of firesetting and the differences and similarities between people who choose to set fires and people who do not. The information may then be used to help develop a screening tool, fire education and preventative treatment programmes.

This study will be written up as part of a PhD thesis and also aspects of this research may be published and spoken about at conferences. Please be assured that the information will remain confidential and no one will know that you took part in this research.

If you have any concerns about any aspect of this study you can contact Emma (eb34@kent.ac.uk) or Dr. Afroditi Pina (psychethics@kent.ac.uk) the Chair of Kent University Ethics Committee. If this study has raised anything that you feel you need to talk about you can contact the Samaritans at anytime on 0845790 90 90.

The information sheet seen online for the Lexical Decision Task



You are being invited to take part in a new research study relating to arson, the act of deliberately setting fire to things. It is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. The word task will involve deciding if strings of letters make up a valid English word (e.g. food) or if the string of letters do not make up a valid English word (e.g. fogd).

Why is this research being conducted?

This research will help researchers to learn more about the characteristics and background factors of people living in the community who may or may not choose to set fires. In particular, we are interested in exploring any differences or similarities that exist between people who choose to set fires and people who do not. Examining these differences or similarities is important for increasing our understanding about people who decide to set fires and those who do not set fires.

Who is organising the research?

The research is being organised by researchers at the University of Kent. It will form part of a PhD thesis for Ms. Emma Barrowcliffe who is a postgraduate student at the University of Kent. Emma is being supervised by Professor Theresa Gannon.

Why have I been asked to take part?

You have been invited to take part in this second study as the researcher would like to gain more information about people's attitudes to fires in general.

What will happen to me if I take part?

You will be asked to complete a word task. You will not be asked to provide your name and therefore all the information that you provide will remain anonymous. At the end of the task you will be eligible to enter a prize draw to win an Amazon voucher. You can enter the prize draw via email and we request that you do not include any personal information and do not tell us if you have set a fire in the email. This means that we can keep your data confidential and we are not obliged to tell the authorities about any fires that you tell us you set. You can withdraw at any time without giving a reason.

Will my taking part in the study be kept confidential?

You will not be asked to provide your name and any information you provide will remain confidential within the research team. When the study is later written up and published you will not be personally identified. The data will be retained for 5 years in line with psychological guidelines.

What if I have a concern about the research?

If you have any concerns about any aspect of this study please contact Emma or if you wish to complain please contact Dr. Anna Brown, the Chair of Kent University Ethics Committee.

If you feel that this research may bring up things that you may need to talk about you can contact the Samaritans at any time on 08457 90 90 90.

What will happen to the results of the research study?

It is intended that the research results will be written up for a doctoral research thesis and also for publication in scientific journals. We may also talk about it at professional conferences. It will not be possible for anyone to tell that you took part in this study.

What if I want to have some further information?

If you would like any further information about participating in this research or you have any specific questions regarding this research please contact Emma (details below).

Thank you for taking the time to read about our research. It may have important implications and so we hope that you will consider taking part in the word task which follows.

Emma Barrowcliffe

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By continuing onto the next page you are confirming that you have read the information above and that you agree to take part in the research. By continuing you are also confirming that you understand that all the information collected in this study is anonymous and that the information may be published but you will not be personally identified. Participation is voluntary and you are free to withdraw from the study at anytime without any negative consequences.

The debrief sheet seen online after the Lexical Decision Task



THANK YOU for volunteering to take part in this research. The information you provide will remain confidential and you will not be personally identified. You can withdraw your information by quoting your unique personal identification number that you created at the beginning of this study.

The overall results of this study will help researchers gain information into the area of firesetting. The word task will help to show if there are any similarities or differences in the time it takes for people who set fires and people who do not set fires to classify letter strings as making up a valid English word or a non-word. The information may then be used to help develop a screening tool, fire education and preventative treatment programmes.

This study will be written up as part of a PhD thesis and aspects of this research may be published and spoken about at conferences. Please be assured that the information will remain confidential.

If you have any concerns about any aspect of this study you can contact Emma (eb34@kent.ac.uk) or Dr. Anna Brown (psychethics@kent.ac.uk) the Chair of Kent University Ethics Committee. If this study has raised anything that you feel you need to talk about you can contact the Samaritans at anytime on 0845790 90 90.

If you would like to be included in the prize draw to win Amazon vouchers please send an email to eb34@kent.ac.uk

By sending a separate email it will ensure anonymity as it will not be possible to link you to your word task. Please do not include your name or any personal information and do not include anything related to any fires you may or may not have set. If you are sending an email please just write 'I have completed the word task' in the subject line. You will receive an email in reply to say that you have been entered into the prize draw. The draw will take place once the research has finished. If you do not hear anything else then sorry you have been unsuccessful. If your email address is selected you will receive an email with the Amazon voucher number.

Thank you again for your participation.