

Home and Away: Comparing adolescents referred for firesetting at home and away from home.

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## Abstract

In New Zealand, adolescents contribute to almost half of property damage caused by fire. Adolescents are reported to set fires in multiple locations including home, schools or in public places. Understandably, the risk is too high to ignore, given that these locations are highly populated areas. This is the first known study targeting adolescents referred for deliberately setting a fire at home, within a careful consideration of firesetting location as a key feature of interest. The aims of the study were to identify whether distinct subgroups could be observed based on the location of the firesetting. Data were sourced from a larger study of adolescents who had been referred to the New Zealand Fire Awareness Intervention Programme (FAIP). Of the young people referred to FAIP, 981 adolescents met the study's exclusion criteria. The analysis was completed in two parts. Part One compared adolescents referred for firesetting at home (at-home group) and firesetting away from home (away-from-home group). The second part of the analysis compared the at-home group with those who had set a fire at a school (at-school group). Results indicated significant associations with risk factors and predictors based on the firesetting location. The at-home group was predicted by setting a fire alone; a history of misusing fire; a history of a psychiatric diagnosis; no history of offending; firesetting motivated by experimentation; and being identified as non-Māori or non-Pacific. Conversely, the away-from-home group were predicted by firesetting with peers; an offending history; firesetting motivated by peer pressure; this being their first misuse of fire; experiencing negative feelings of being scared or ashamed after the fire; and being identified as either Māori or Pacific. The at-school group showed the same associations as those observed in the away-from-home group, with the exception of reporting negative feelings – the school firesetters did not report being scared or ashamed. The study provides evidence for distinct subgroups within the adolescent firesetting population, which has largely been treated as a more homogenous group, which may mean that interventions are less appropriately targeted and less effective. Further research is needed to elucidate the subgroups and develop targeted interventions to address the specific needs of each group.

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## List of abbreviations

**CPT** - Crime Pattern Theory

**CYF** - Child Youth and Family Service

**CYRAS** - Care and Protection, Youth Justice, Residential and Adoption Services

**FAIP** - Fire Awareness Intervention Programme

**NZFS** - New Zealand Fire Service

**NIA** - The New Zealand Police National Intelligence Agency database

**NSSI** - Non-suicidal self-injury

**RAT** - Routine Activity Theory

**ROC** - Receiver Operating Characteristics

**YMF** - Youth misuse of fire

## Chapter One: Introduction

What is it about a young person and their environment that sways them to use fire in a dangerous way? Although fire usage has been a part of our story of productivity, it has equally played a role in our history of disasters. For many people at some point in their lives, the flames from a fire have been alluring. This fixation with fire is considered normal in human development. However, it becomes a concern when the interest towards fire extends outside of what is appropriate, especially if channelled unsafely, which in turn increases the risk of a disastrous outcome, intentional or not. There is mounting concern about the use of unsanctioned fires within the youth community. For example, a more recent trend on social media called the 'Fire Challenge' gained momentum across the world, where young people doused their bodies with alcohol and set themselves alight (O'Brien, 2018). Outside of this 'trending' behaviour, unsanctioned fires by young people continue to have the potential to injure, cause fatalities and costly damage to property and the economy. Innately, deliberately setting a fire has elements of danger and challenges societal boundaries, while at the same time can be passed off as a victimless act. Having such elements, attributed to deliberately setting an object alight, may provide reasons as to why making a fire is developmentally attractive to adolescents (Pinsonneault, 2002). However, further research is needed to understand young people's relationship with deliberately setting unsanctioned fires, especially if we would like to prevent the damage they cause.

Deliberate firesetting causes significant, costly damage. In the United States, an estimated average of 355,400 home structure fires occurred annually between 2012 and 2016 (Ahrens, 2018). Furthermore, 2,560 civilian deaths, 11,670 civilian fire injuries and \$6.5 billion in direct property damage was reported annually (Ahrens, 2018). According to the Federal Bureau of Investigation (2012), of the 1,375,000 reported fires in the United States, 30% were deliberate fires. Similarly, in the United Kingdom, 88,000 cases of primary fire incidents were reported between 2013 and 2014, of which an estimated 25% were related to deliberate firesetting (Department for Communities and Local Government, 2015). Australia also experiences costly damage of up to \$1.62 billion annually that is attributed to deliberate firesetting (Watt, Geritz, Hasan, Harden, & Doley, 2015). The situation in New

Zealand is no different. The New Zealand Fire Service (NZFS) reported having responded to approximately 72,853 emergency incidents from 2014 to 2015. Of these reports, 62% were fire-related. Although what is highlighted are the financial consequences, statistics do not come close to also conveying the impact and loss, both physically and emotionally, in fire-related damage on a community, family or individual.

It is widely reported that adolescents are involved in a significant amount of deliberate firesetting (MacKay, Feldberg, Ward, & Marton, 2012). For example, adolescents are arrested for arson in the United States more than for any other crime (Bowling & Omar, 2014), and almost half of the individuals responsible for deliberate firesetting or arson are under the age of 18 years old (Bowling & Omar, 2014; Mackay et al., 2012). Similarly, in the United Kingdom, 40% of arson incidents are carried out by young people between the age of 10 and 17 years (Lambie & Randell, 2011; MacKay et al., 2012). Furthermore, in New Zealand, Statistics New Zealand (2014) indicated that adolescents aged between 10 and 16 years old were apprehended for 46% of incidents of damage to property due to fire or an explosion in 2014. Additionally, \$13 million in damage was estimated to have been caused by the 532 children and adolescent firesetting participants in a New Zealand study (Lambie & Krynen, 2017). This highlights the importance of targeting this age group in order to significantly reduce the occurrence of deliberate firesetting.

Additionally, it is widely acknowledged that there is a significant level of underreporting of the prevalence of unsafe fire use. Firesetting has a reputation for being a covert behaviour. Therefore, carefully considered self-reported data can be useful in exploring the prevalence. Such studies show deliberately setting fires is not unusual behaviour amongst adolescents, with estimates of between 6.3% and 33% of adolescents having engaged in firesetting (Chen, Arria, & Anthony, 2003; Del Bove, Caprara, Pastorelli, & Paciello, 2008; MacKay, Paglia-boak, Henderson, Marton, & Adlaf, 2009; Martin, Bergen, Richardson, & Roeger, 2004). In addition, a significant proportion of parents have been reported to be unaware of their adolescent's involvement with fire (Del Bove & MacKay, 2011). Furthermore, under-

representation of the extent of unsafe fire behaviours is also attributed to statistics only representing fires that have been responded to by emergency services. Watt et al. (2015) observed that only 17% of fire related incidents resulted in a response from emergency services in their sample. Overall, therefore, a combination of parental unawareness and fire incidents that are not responded to by emergency services likely contribute to under-reporting of a behaviour that as many as a third of adolescents engage in.

There is a long observable history within the literature that attempts to understand firesetting behaviours amongst youth. From the earlier models derived from Freud and studies conducted by Yarnell (1940), which used a psychoanalytical approach to understand unconscious drives to set fires, theories progressed towards developing typologies of firesetting behaviours such as in the work of Fineman (1995) and Kolko and Kazdin (1986). This later underpinned a multifactorial approach to the understanding of deliberate firesetting, via a dynamic behavioural model and social learning model. These models highlighted not only individual characteristics as predictors for potential future firesetting behaviour, but also the influence of the environment.

Currently, the literature could be considered to be relatively broad, where the focus has been on the adolescent population as a whole, instead of furthering our understanding of subgroup differences. This gap in the literature is despite acknowledgment of how heterogeneous adolescent firesetters are (Willis, 2015). More recently, firesetting research has begun to narrow its focus, for example on the location of fire incidents, such as where a school is chosen as a location (Ekbrand & Uhnoo, 2015; Jonsson, Lundqvist, Gell, & Andersson, 2017; Uhnoo, Persson, Ekbrand, & Lindgren, 2015). Such a research focus makes sense, given that the prevalence of deliberate fires by young firesetters in school locations has ranged from 12% to 37.9% (Hickle & Roe-sepowitz, 2010; Jacobson, 1985b; McCardle, Lambie, & Barker-Collo, 2004; Roe-sepowitz & Hickle, 2011). In Uhnoo et al.'s (2015) study of school firesetters, they highlighted the complexity of the subgroup that they argued lies outside of the broader understanding of youth who deliberately set fires. Knowing such a subgroup exists shows

that there is space to develop our understanding of adolescent firesetters further, in order to better prevent the behaviour.

What is further concerning is the direct risk these deliberate fires pose to people, given that they occur in consistently populated areas. Of the limited research that has recorded the locations of fire incidents, school and home are observed to be the most common locations for adolescent firesetters. Deliberately setting a fire at school has been observed to be one of the most common and prevalent targets, ranging from 12% to 37.9% of the total population of adolescent firesetters in individual studies (Hickle & Roe-sepowitz, 2010; McCardle et al., 2004). Similarly, although deliberately setting a fire at home is more commonly attributed to children, not adolescents, within the broader literature, adolescents who deliberately set fires at home have been observed to range from 20% to 44.5% of the total adolescent firesetting population (Jacobson, 1985; McCardle et al., 2004; Roe-sepowitz & Hickle, 2011). Interestingly, Johansson, Mcnamee and Hees (2019) identified New Zealand as having the highest number of school fires per million citizens, followed by Sweden and Denmark. This further highlights the importance of understanding the complexities of location-specific deliberate fires during adolescence.

### **Terminology**

Several different terms are used to identify fire-related behaviour. Historically, these terms have been used interchangeably despite each of them conveying very different aspects of the behaviour. Unfortunately, this inconsistency in the terminology used in literature can lead to research findings being misinterpreted and confusing. More common-language terms that are used to describe unsanctioned firesetting include arson and pyromania. Their familiarity could be attributed to frequent use within mainstream media coverage. The less commonly used terms, such as fire-interest, fire-play, firesetting and, more recently, 'youth misuse of fire', are typically used within the context of academic literature. Below a definition of each term is provided, to prevent the lack of clarity that hampers research and understanding in this field.

*Arson* is used for forensic-legal purposes and is applied when the outcome of a deliberate fire is a criminal conviction (Willis, 2015). According to the New Zealand Crimes Act 1961, arson is separated into a number of categories, where the behaviour is underlined by a person who “intentionally damages by fire or by means of any explosive any immovable property, or any vehicle, ship or aircraft” (New Zealand Crimes Act 1961, s. 267). The term is typically applied in an adult population.

*Pyromania* is used as a psychiatric diagnosis under The American Psychiatric Association's (2013) Diagnostic and Statistical Manual of Mental Disorders (5<sup>th</sup> ed.; DSM-5, p. 476), where the criteria to meet a diagnosis of pyromania include:

- A. Deliberate and purposeful fire setting on more than one occasion.
- B. Tension or affect arousal before the act.
- C. Fascination with, interest in, curiosity about, or attraction to fire and its situational contexts (e.g., paraphernalia, uses, consequences).
- D. Pleasure, gratification, or relief when setting fires or when witnessing or participating in the aftermath.
- E. The fire setting is not done for monetary gain, as an expression of socio-political ideology, to conceal criminal activity, to express anger or vengeance, to improve one's living circumstances, in response to a delusion or hallucination, or as a result of impaired judgement (e.g., in major neurocognitive disorder, intellectual disability [intellectual developmental disorder], substance intoxication).
- F. The fire setting is not better explained by conduct disorder, manic episode, or antisocial personality disorder.

*Fire interest* is reserved for children aged 3 to 5 years and is seen as a normal period of a child's development to ask questions about fire (Gaynor, 1996; Gaynor, 2013). Children can also be seen to convey fire interest in their play, such as imaginary play with fire trucks or cooking (Gaynor, 2013).

*Fire-play* and *fire-starting* are associated with children aged 5 to 9 years old. Fire behaviour is driven by children being experimental and is due to access to ignition material (Gaynor, 1996; Gaynor, 2013). Fire-play is thought to involve a non-specific target followed by behaviours attempting to extinguish the fire (Gaynor, 2002).

*Firesetting* refers to the unsanctioned, intentional setting of a fire, that occurs without supervision (Willis, 2015). Firesetting is more commonly used with adolescents. By the age of 10 years old, it is expected that an understanding of consequences and fire safety rules and risk is established (Fritzon, Dolan, Doley, & Mcewan, 2011; Gaynor, 1996). Thus, children above the age of 10 are believed to make a more planned and conscious decision whether or not to engage in firesetting (Gaynor, 2002).

*Youth misuse of fire (YMF)* is a relatively new term within literature. This term refers to any fire-related behaviour that is directly produced by a person under the age of 17 years old (Pooley & Ferguson, 2017). Thus, the term encapsulates arson, fire-interest, fire-play and firesetting.

The current study focused on firesetting behaviours among adolescents. That is, the research looked at fire usage that was deliberately set by a young person between the ages of 12 and 18 years old. Alternative terms are applied when referencing others' research and the terminology which they used.

### **Gaps in Research**

There is currently very scarce research on exclusively adolescent firesetters, in spite of literature indicating age-specific relationships with fire-related behaviours (Gaynor, 1996; Gaynor, 2002; Jacobson, 1985a; Klein et al., 2008). According to Gaynor (1996), an appropriate relationship with fire in adulthood is a result of a childhood that includes supervised fire activities throughout development. They indicated that activities with fire are a natural part of one's development, and that severity of behaviour changes with age. Fire-interest is observed between the ages of 3 and 5 years old; fire-play between the ages of 5 and 9 years old; and firesetting above the age of 10 years old. By the age of 10, it is expected that the child is able to comprehend the importance of fire safety and risk (Gaynor, 2002).

However, of the studies that include adolescent firesetters, they are typically either grouped into a 'youth' sample, that is not exclusively limited to the ages of 12 to 18 years old, or are included in adult samples. It is an issue that conclusions are made about firesetting behaviours on broad age groups, because they may include aspects of fire-interest or fire-play, which are considered to be a natural part of development (Grolnick, Cole, Laurenitis, & Schwartzman, 1990). This is why the current study had focused specifically on the adolescent age group, in order to gain further insight and understanding of firesetting as a repetitive problematic behaviour.

What is also interesting is that there are no studies that have explicitly looked at adolescent firesetters who deliberately set fires at home. Roe-sepowitz & Hickle (2011) expressed the need for targeted fire-safety intervention, especially when boys in their sample were observed to set fires at their residence. They believed that an adolescent deliberately setting a fire at home, in addition to their history of firesetting behaviours, reflected a higher level of intentional firesetting behaviour. Focusing on at-home adolescent firesetters may potentially highlight a distinct subgroup, especially when there are expectations that most adolescents set fires away from home.

Furthermore, previous literature in New Zealand has not focused on the distinction between adolescents who deliberately set fires at home or at school (Lambie, Randell, Krynen, & Ioane, 2013; McCardle, Lambie, Barker-Collo, 2004). This gap affects the ability to develop specific treatments for this age group in a New Zealand context.

### **Aims and scope**

There is a high prevalence of deliberate firesetting amongst adolescents, which is noted to be widely underreported. As such, this results in not only a substantial economic cost but also holds grave consequences for a community. By acknowledging this damage, supplemented with the limited research available regarding this age group, there is clearly a need for further exploration and understanding in order to provide more targeted interventions. The current study aimed to identify

characteristics in adolescents that predict deliberately set fires at home, compared to those who set fires away from home or at schools.

The scope of the current study looks at adolescents (12 to 18 years old) who have been referred to services because of intentional firesetting. The study did not consider participants involved in accidental firesetting and focused on participants who were directly involved in the deliberate fire and were not spectators.

### **Significance of the study**

One intended outcome of the study is to further our understanding of adolescent firesetting behaviour. Specifically, the intention was to identify characteristics that may differ between adolescents referred for setting a fire at home, to those who deliberately set fires away from home or at school. On a practical level, a second intended outcome was to identify risk factors that could be used for assessment purposes to identify at-risk home or away from home firesetters. Additionally, a third intended outcome was to provide information that could be used to inform future therapeutic interventions.

### **Research question**

- 1) Do adolescents who were referred to the FAIP for firesetting at home differ from adolescents referred to the FAIP for firesetting away from home?
- 2) What are the individual, historical and contextual predictors of adolescents who set fires at home, compared to adolescents who set fires away from home?
- 3) Do adolescents who were referred to the FAIP for firesetting at home differ from adolescents referred to the FAIP for firesetting at school?
- 4) What are the individual, historical and contextual predictors of adolescents who set fires at home, compared to adolescents who were referred for firesetting at school?

## **Structure of the thesis**

The overall structure of the thesis comprises three parts, with each part consisting of several chapters. Part One is composed of four chapters (Chapters One to Four), which introduce the purpose of the study and provide a theoretical background of the topic. Chapter One has relayed the context and significance of the study, and clarified terminology used within the firesetting literature. In Chapter Two, current literature regarding risk factors associated with adolescent firesetting will be reviewed. Chapter Three gives a historical and current understanding of conceptual and theoretical models applied to adolescent firesetting. Finally, Chapter Four details typologies applicable to adolescent firesetters.

Part Two of the thesis encompasses Chapters Five and Six, which discuss the methods used in the analysis and results. Chapter Five considers the population, variables, ethical considerations and method utilised in the study. Chapter Six reports the results derived from the analysis. Results are reported in two sections. The first section reports results from the comparison of adolescents referred for firesetting at home and firesetting away from home. The second section reports comparative results between adolescents referred for firesetting at home and firesetting at school.

Finally, in Part Three, the overall goal is to discuss the results of the analyses and the implications of the research. In Chapter Seven, the results observed between adolescents referred for deliberately setting a fire at home and away from home are discussed. In Chapter Eight, the results observed between adolescents referred for deliberately setting a fire at home and school are considered. Lastly, in Chapter Nine the implications of the study are reviewed, while also speaking to the study's strengths and limitations.

## **Chapter Two: Risk factors associated with adolescent firesetting**

In this chapter, previous research on adolescent firesetters and associated risk factors is reviewed. Risk factors that are discussed will come under four headings: demographic and assessment, individual and environmental, conduct problems and fire-related factors. Demographic and assessment risk factors include age, sex, gender and socio-economic factors. Individual and environmental risk factors include psychopathology, family environment, history of abuse and personality. Risk factors that are of the offending type are covered under conduct problems. Lastly, fire-related risk factors include those that are predominantly associated with the immediate context of the firesetting incident, such as solitary and group firesetting, motivations, method used and feelings felt. The chapter intends to provide an overview of risk factors that have so far been shown to be associated with the adolescent firesetting population, and includes what little literature there is concerning adolescent firesetting in regard to the location of the incident.

### **Demographic and assessment factors**

The following section reviews the literature regarding demographic factors and its association with adolescent firesetting behaviour. Demographic variables that are reviewed include age, gender, ethnicity and socio-economic status. The research review is specific to adolescent literature, unless otherwise specified where, due to the scarcity of literature surrounding adolescents specifically, broader literature is referred to.

#### **Age**

Although fire-related behaviour is observed across all ages, adolescence has been shown to be a period of significant fire involvement (Del Bove et al., 2008; Jacobson, 1985a; Klein et al., 2008). Multiple studies have indicated firesetting behaviours increase during adolescence. In a clinical study of 104 young people aged 0 to 18 years old, fire-related behaviours were shown to have a bimodal age distribution (Jacobson, 1985a). The distribution showed two peaks of fire-related behaviours, the first being an early onset group at the age of 8 years old and a second peak at the age of 13 years old.

Similarly, support for adolescence being identified as a peak age for fire involvement is observed in Klein et al.'s (2008) retrospective juvenile study. Of the 133 participants involved in their study, aged between 3 and 17 years old, two peaks were also observed. However, in contrast to Jacobson's (1985a) study, both peaks were observed within the adolescent age group (12 and 14 years old). Studies outside of the United States also observed adolescence as a peak age for firesetting behaviours. Del Bove et al. (2008) observed a peak in firesetting behaviour between the ages of 12 and 14 years old, in an Italian community school-based population. However, we should remain mindful that the Del Bove et al. (2008) sample excluded those aged below 11 years old, and had only included students between the ages of 12 and 18 years old, so an earlier childhood peak was not tested for.

The location of fire-related behaviours was also observed to change with age. Childhood firesetting is observed to more likely occur at home, while in adolescence, deliberately setting a fire typically occurs at a location outside of the home. In a study of a young population, it was observed that those aged between 11 and 17 years were more likely to have set a fire at school, compared to children aged 3 to 10 years who were more likely to set a fire in their bedroom (Klein et al., 2008). This difference in behaviour was attributed to an increase of independent mobility in adolescence and, therefore, being able to target neighbourhoods and local communities (Klein et al., 2008). However, a limitation of this study is that it is of only juveniles, and does not include a population of firesetters without malicious intent. Similarly, Pooley and Ferguson (2017) observed in their sample of 26,380 fire incidents the YMF at home was characteristic of ages 0 to 5 year olds, in contrast to 13 to 16 year olds who were committing YMF predominantly on public property rather than on residential property.

## **Gender**

Although it is known that both young males and females set fires, historically research has predominantly focused on male firesetting. This is likely due to research identifying a higher prevalence of deliberate firesetting behaviour amongst males than females (Dolan, McEwan, Doley, & Fritzon, 2011), making it challenging to acquire a large enough female sample size to be able to generalise

findings. Early studies such as Jacobson (1985b) identified the over-representation of male deliberate firesetters with a ratio of 5:1, in their clinical sample of 104 young people aged 0 to 18 years. This observation continues in more recent studies that have focused on an older age group.

Multiple studies have identified that adolescent males are 2 to 5 times more likely than females to deliberately set a fire (Bowling & Omar, 2014; Chen et al., 2003; Martin et al., 2004; Tanner, Hasking, & Martin, 2015). Firesetting was observed to be more prevalent amongst adolescent males than adolescent females by 2 to 3 times in Martin et al.'s (2004) self-report community school-based study of 2,596 students. Research studies on a larger scale have observed a similar prevalence of male firesetters (Bowling & Omar, 2014). Bowling and Omar (2014) observed in their analysis of a national survey dataset of 1,158 adolescents aged 11 to 18 that firesetting was reported by approximately 70% fewer females than males and Chen et al.'s (2003) nationally representative adolescent sample of 4,595 respondents (12 to 17 year olds) showed males had 2.5 times greater odds of self-reporting firesetting behaviours in the last six months compared to females. Furthermore, MacKay et al.'s (2009) epidemiological sample of 3,965 students showed that males were also more likely to be overrepresented across all groups designated by the total frequency of past deliberate firesetting behaviours. That is, males were more likely than females to be represented in groups who had set a fire once or twice, 3 to 11 times, or 12 or more times in their lifetime. Similarly, Tanner, Hasking and Martin (2015) conducted a self-report community school study in Australia with 2,356 participants aged between 12 and 18 years, with a focus on co-occurring non-suicidal self-injury (NSSI) and firesetting behaviours. Male adolescents with no NSSI history were 5 times more likely than females to have a history of deliberately setting a fire and those who had histories of both deliberately setting a fire and NSSI were 3.8 times more likely to be male than female.

Given the overrepresentation of males, female firesetters are significantly under-researched. Both historically and currently there is a considerable bias towards male-dominated firesetting research, thus a need to identify gender differences is vital for the field (Root, MacKay, Henderson, Bove, &

Warling, 2008). Of the limited research available, findings suggest that there are significant gender differences amongst adolescent firesetters to warrant gender-specific treatment and assessment. Firstly, Roe-Sepowitz and Hickle (2011) identified in their sample of 331 juveniles, no significant difference in average age between male and female juvenile firesetters, at around 14.4 years. Secondly, they suggested that females engaged in “expressive firesetting in an effort to release internalised tension or express emotional and psychological stress” (p. 285). This impression was drawn from the fact that the females in their sample were more likely to have reported a crisis within the last 12 months; reported greater rates of childhood maltreatment; and had higher rates of suicidal ideation than males. In addition, young male arsonists were observed to be involved in other types of delinquent and antisocial behaviours, more so than young female arsonists.

Antisocial behaviours within both gender groups remain a predictive factor for firesetting behaviours. Martin (2004) conducted research with a community sample of 2,596 grade 8 students (average age of 13 years old) and, when comparing firesetters with non-firesetters, found that severe antisocial behaviours were a significant predictor for both males and females to also be firesetters. They also observed that there was a high odds ratio of male firesetters having other antisocial behaviours when compared to male non-firesetters; there was a lower odds ratio of this for females.

### **Ethnicity**

Studies have shown no significant relationship between race and adolescent firesetting (Bowling & Omar, 2014; Chen et al., 2003; Martin et al., 2004; Tanner et al., 2015). In their Australian self-report school community sample of 2,356 participants, Tanner et al. (2015) did not observe any significant relationships between the Aboriginal and Torres Strait Islander population and firesetting, across all focal groups: the control group (no history of firesetting or NSSI), firesetting group (history of firesetting and no history of NSSI), and NSSI group (no history of firesetting and history of NSSI). Furthermore, Bowling and Omar's (2014) normative sample reported that there were no significant differences in the odds of being identified as a firesetter based on race amongst 975 juvenile firesetters.

Additionally, although Chen et al. (2003) did observe Caucasian adolescents to be disproportionately represented (78.2%) in their sample of 4,595 respondents (ages 12 to 17 years), overall ethnicity as a variable was not observed to be a significant predictor for firesetting.

### **Socio-economic status**

There is a scarcity of research specific to the adolescent age group that has recorded socio-economic status and its relationship to firesetting behaviour. Studies thus far have not observed socio-economic status to be significantly related to adolescent firesetting behaviours (Dolan et al., 2011).

### **Psychosocial, emotional and environmental factors**

The following section reviews a range of risk factors that have been observed to be associated with adolescent firesetting. These factors include personality factors, self-harming, psychopathology and maltreatment; namely, a combination of individual characteristics, pre-existing problems and environmental factors that seem to have an effect.

### **Personality**

Studies have attempted to identify whether a cluster of callous, uncaring and unemotional traits (CUT) is associated with adolescent firesetters. Hoerold and Tranah (2014) conducted a study with three adolescent groups - an adolescent group with a history of deliberately setting a fire within the past 12 months, an adolescent group with a history of antisocial behaviour and no history of deliberate firesetting, and a control group of adolescent students with no antisocial or firesetting history. In their study, they observed that adolescent firesetters showed significantly higher mean callousness scores, relative to both the control and non-firesetting antisocial group. In contrast, Watt et al. (2015) observed no significant association between firesetting and callous traits. In their study of 274 offending and non-offending youth, it was only when fire-specific variables were entered into the model, that CUT became significant. High levels of CUT with fire-variables indicated greater frequency of firesetting behaviours. Interestingly, however, similar to Hoerold and Tranah's (2014) study, CUT was not associated with an increase in firesetting behaviour among youth offenders who had higher

antisocial behaviours. It was only the low antisocial behaviour group with high CUT scores that showed a significant relationship with firesetting behaviours.

### **Self-harming**

There have been numerous studies assessing the relationship between behaviours that are directed towards the self when distressed (internalising behaviours) and distress that is expressed towards others and/or objects (externalising behaviours) such as firesetting (Tanner et al., 2015). Internalising behaviours such as self-harming have been associated with firesetting behaviours in adolescents (MacKay et al., 2009; Martin et al., 2004; Moore, Thompson-Pope, & Whited, 1996; Tanner et al., 2015). Moore et al. (1996) conducted a clinical study with 28 male inpatients between 14 and 17 years old who had a history of deliberately setting a fire and compared them to 96 inpatient adolescents who did not have a history of firesetting. Self-injury with no lethal intent was observed to be a significant characteristic of the firesetting group, relative to the non-firesetting group. Moore et al.'s (1996) study further observed suicidal intent to be comparable between the two groups. A similar relationship was observed in a community sample of Grade 8 students (average age of 13 years old), where students with a history of firesetting were more likely to have deliberately self-injured compared to non-firesetters (Martin et al., 2004). However, in contrast to Moore et al.'s (1996) clinical study, the community study observed that the firesetting group were more likely to engage in suicidal thoughts, plans and attempts than their respective non-firesetting comparison group. On the other hand, another community sample of 3,965 adolescents (Mackay et al., 2009), observed both low-frequency and high-frequency firesetters had suicidal intent.

To further understand the relationship between internalising and externalising behaviours, NSSI has also been researched. The Tanner et al. (2015) study with a large school community study in Australia collected data from a variety of self-report questionnaires from 2,637 participants aged between 12 to 18 years old. Interestingly, of the participants who had a history of NSSI, just over half also reported firesetting behaviours no more than twice in their lifetime, and over a fifth reported

repetitive firesetting behaviours greater than twice in their lifetime. Furthermore, they observed that the use of non-productive coping strategies, and poor use of productive strategies, were associated with the repetitive firesetting group. This observation is important given that the finding was identified outside of a clinical or offending population. Although NSSI and firesetting behaviours may be distinct, they appear to function similarly. That is, they may be a reaction to an environmental stressor where perhaps a limited range of adaptive strategies are in the young person's repertoire. Of those who engaged in both NSSI and firesetting behaviours, what was predictive of this group was being male, having experienced a higher number of adverse life events and displaying poor emotional self-regulation skills.

### **Psychopathology**

MacKay et al. (2012) reported that adolescents who deliberately set fires are a heterogeneous group. One of the more salient contributing factors in firesetting was psychological or psychopathological disturbances. The authors find it interesting, therefore, that firesetting adolescents are directed to a fire department education programme (rather than a clinical treatment service), as though psychopathology is not a factor for the average adolescent firesetter (MacKay et al., 2009). Clinical studies, such as that by Moore et al. (1996), observed that adolescents who had a history of deliberately setting a fire scored higher in three clinical scales (psychasthenia, schizophrenia, mania) relative to adolescents without a history of firesetting. They also scored highly in eight content scales: depression, alienation, bizarre mentation, anger, conduct problems, family problems, school problems, and negative treatment indicators. In this study, the authors suggested that the adolescents' internal distress could be reflected in their firesetting behaviour, given the lack of fire-play being reported. A limitation of the study, however, was that the dates of the deliberate fires were unknown - it was not clear whether these fire incidents had occurred during adolescence.

Martin et al. (2004) observed in their large community sample of 2,596 Grade 8 students (average 13 years old) that depressive symptomology and hopelessness were significantly associated

with adolescents who deliberately set fires compared to non-firesetters. Furthermore, MacKay et al.'s (2009) epidemiological sample of 3,965 adolescents, from ages 11 to 19 years old, identified an interesting relationship between psychological distress and frequency of deliberately setting a fire in the last 12 months. Adolescents were measured for psychological distress via the General Health Questionnaire, which assesses depressed affect, anxiety, and issues with social functioning in the past three weeks. Low-frequency firesetters were more likely to report elevated psychological distress when compared to non-firesetters. High-frequency firesetters were observed to have a similar relationship with non-firesetters, however they showed the largest relative risk ratio to non-firesetters in their reported rates of elevated psychological distress. Additionally, high-frequency firesetters were also observed in all other risk indicators such as suicidal intent, illicit drugs, and cannabis use to have the largest relative risk to the control group. The study concluded that increases in psychopathology contribute to the severity of firesetting behaviour, and the researchers therefore advocated for interventions for young firesetters that incorporated mental health services.

### **Maltreatment**

Having a history of maltreatment is one of several psychosocial risk factors that have been shown to increase the severity of youth firesetting behaviour, that is likely mediated by emotional and behavioural problems (Root et al., 2008). However, there is limited evidence to suggest this relationship with adolescents specifically, given that studies have used mixed age groups. Of the research available, maltreatment remains a significant factor observed in adolescent firesetters. Moore et al. (1996) observed in their study of adolescents from an inpatient unit that they were more likely to have a history of sexual abuse when compared to the non-firesetting group. This was also observed within a community sample of 2,596 13-year-old firesetters, where they were more likely to have a history of sexual abuse and physical abuse than their non-firesetting peers (Martin et al., 2004). Furthermore, MacKay's et al.'s (2009) study of 3,965 adolescents observed that those in the most severe firesetting group were more likely to report having had child welfare involvement compared to those who had never deliberately set a fire in their lifetime.

## **Behavioural and conduct risk factors**

### **Conduct**

Earlier studies identified youth firesetters were more likely to have been diagnosed with conduct disorder, when compared to a non-firesetting population (Kuhnley, Hendren, & Quilan, 1982). However, the issue that arose from this was whether firesetting behaviour was a unique behaviour exhibited by a population diagnosed with conduct disorder, or whether firesetting behaviour was a general conduct disorder symptom. Though a large majority of firesetters met the criteria for conduct disorder, it was important to determine whether there were distinct risk factors that separated firesetters from the broader non-firesetting conduct problem youth (Kazdin & Kolko, 1986). In an attempt to observe whether there are characteristics unique to firesetters, Forehand, Frame and Armistead (1991) conducted a study of 36 incarcerated adolescent delinquents who met the criteria for conduct disorder and divided them into three groups: firesetting group, non-firesetting high conduct group, and non-firesetting low conduct group. What they observed was that the firesetting group and non-firesetting highly conduct-disordered groups did not differ across the three Child Behavior Checklist (CBCL) scales measuring withdrawal, aggression and delinquency, but were distinct from the low conduct-disordered group within all three scales. Accordingly, the study suggests firesetters are in “advance on the antisocial trajectory” (p. 127) and are comparable with non-firesetters with similar conduct disorder symptoms. Given that both groups (firesetting and high conduct group) showed scores that were distinct scores from those of non-firesetting, low conduct groups, deliberately setting a fire was not considered problematic in itself; instead, they argued, it was the number of conduct disorder symptoms that should be of concern.

Similarly, Stickle and Blechman (2002) found that, amongst juvenile offenders showing a general pattern of antisocial behaviour under a three-factor model, firesetters and non-firesetters were not significantly distinguishable. They too concluded that the total number of antisocial behaviours was a potential indicator for firesetting behaviours, and that the young person’s measure of aggression was also a potential factor.

## **Antisocial behaviour**

Firesetters are observed to engage in a broader range of antisocial behaviours than young people who are non-firesetters do (Del Bove et al., 2008; MacKay et al., 2009; Martin et al., 2004). For example, from a community sample of 2,596 adolescents (average age 13 years old) who had self-reported more than 7 antisocial acts (according to the DSM-IV guidelines for conduct disorder), adolescent firesetters were more likely to have reported more than 10 antisocial acts (Martin et al., 2004). Furthermore, after logistic regression, the final model indicated that the strongest predictor of firesetting behaviours was showing serious antisocial behaviour (more than 7 antisocial acts). Adolescent males with that high level of antisocial behaviour showed 7 times greater odds of firesetting behaviour when compared to a low-level antisocial group (fewer than 7 antisocial acts). Adolescent females showed a similarly positive relationship whereby those with serious antisocial behaviour had a 3 to 5 times increased likelihood of engaging in firesetting activities when compared to females in the low antisocial behaviour group (fewer than 7 antisocial acts).

Similarly, the MacKay et al. (2009) community study of 3,965 adolescents looked at their engagement in delinquent behaviours within the last 12 months. The study identified delinquent behaviours such as (but not limited to) being involved in vandalised property, theft of goods, selling and exchanging drugs, physical assault or carrying a weapon. Of those who were identified as high-frequency firesetters (have deliberately set a fire more than 3 times in the last 12 months), 40% also reported enacting some form of delinquent behaviour. In contrast, of those adolescents who had engaged in firesetting behaviour just once or twice within the last 12 months, only 19% also reported having engaged in delinquent behaviours. This decreasing pattern of engagement of delinquent behaviours continues in their 'desisters' group (adolescents with a history of deliberately setting a fire, but who had not done so at all in the past 12 months) and adolescents with no history of deliberately setting a fire, with 9% and 3% respectively reporting having engaged in delinquent behaviours.

Curiously, in the Watt et al. (2015) study of 138 adolescent juvenile firesetting offenders, antisocial behaviour was not predictive of unsanctioned firesetting, once fire-specific variables were entered into their statistical model. Fire-specific variables included fire-related affect and fire interest and preoccupation. In their study, fire-related affect was the only significant predictor to identify participants who had lit three or more fires, in both community and juvenile offender populations, when compared to a non-firesetting population. They concluded that the observed relationship of experiencing positive, fire-related affect could be linked to emotional disorders, and firesetting may reflect a strategy to deal with dysthymic or negative emotions.

### **ADHD and attention**

Firesetters have been associated with also meeting diagnostic criteria for attention-deficit hyperactivity disorder (ADHD). However, it is the impulsivity that is associated with ADHD that is thought to mediate the interaction (Bowling & Omar, 2014). A study by Bowling & Omar (2014) analysed 1,158 adolescents within a normative data sample from a national survey. They had observed adolescent firesetters, when compared to adolescent non-firesetters, exhibited greater levels of inattention, hyperactivity and symptoms of ADHD. It was suggested that these associations were most likely underpinned by poor decision-making; namely, that elevated inattention and ADHD symptoms are factors that disrupt appropriate cognitive appraisal. This may explain why parents consistently had identified ADHD symptoms as factors in their adolescent's firesetting behaviour, while the adolescents themselves reported that they were either "bored" or "didn't think" (p. 53) at the time of the fire incident.

In their sample of 64 adolescents, Hoerold and Tranah (2014) identified that high impulsivity was predictive of being in the firesetting group when compared to their control group. However, impulsivity was not able to differentiate between adolescent firesetters and their antisocial counterparts with no history of firesetting. Tanner et al. (2015) further recognised that repetitive firesetting behaviours were not only related to low behavioural inhibition, but could also reflect very

limited coping strategies. These studies are therefore reiterating the complexity of interactions between risk factors that inform firesetting behaviours amongst adolescents.

## **Fire-specific factors**

### **Fire history**

A history of fire-related behaviours was seen to be one of the strongest predictors of firesetting behaviours in a recent meta-analysis (Perks, Watt, Fritzon, & Doley, 2019). However, studies included in the meta-analysis predominantly involved mixed age groups, rather than adolescent-specific research. Of the studies that have focused on the adolescent age group, a history of fire-related behaviours has been observed to be a predictor for future firesetting. Del Bove's et al. (2008) school community sample of 567 youth between the ages of 11 and 18 years old showed that, at the initial assessment, youth who had reported engaging in firesetting activity were more likely to have reported having re-engaged at least once in deliberately setting a fire at the time of the follow-up. Recidivist firesetters in this study were shown to have more severe externalising and internalising difficulties at the initial assessment, compared to non-recidivist firesetters. Being able to identify past involvement in unsanctioned fires is vital within an evaluative setting, it however does not necessarily provide additional information as to why any given young person chooses to deliberately set an object alight (Kennedy, Vale, Khan, & McAnaney, 2006).

### **Motivation**

Motivation for fire-related behaviours have historically been used as an avenue to categorise youth firesetting behaviour across different age groups. As such, some motives more than others are recognised to be more dominant in certain age groups. Fun, boredom, curiosity, peer pressure, anger and revenge are the more commonly reported motivations reported by adolescent firesetters (Saunders & Awad, 1991; Walsh & Lambie, 2013; Watt et al., 2015).

In a qualitative study conducted by Walsh and Lambie (2013) of 18 adolescents between the ages of 10 to 16 years old, 78% of participants reported more than one motivation theme. When

prompted, 67% reported boredom, 55% reported anger, 50% reported experimenting and 50% reported peer pressure. Walsh and Lambie (2013) acknowledged that experimenting is traditionally observed amongst young children, however, they suggested that experimentation is likely not a motivation that is alone sufficient to drive firesetting, but is likely to co-occur with other risk variables. Furthermore, others have suggested that adolescence is a time of increased experimentation, and a time of testing out boundaries and structure, so an increase in firesetting in this age group would be expected (Pinsonneault, 2002; Stadolnik, 2000).

Peer influence has also been reported as a defining motivator of adolescent firesetters, characteristically more so than for children involved in fire-related behaviours aged 10 years and below (Gaynor & Hatcher, 1987; Wooden & Berkey, 1984). Elements of seeking peer appreciation could be a contributing factor in adolescent firesetting. Chen et al. (2003) nationally representative sample survey of 4,595 respondents found that adolescent firesetters were more likely to feel rejected by their peers. As the level of measured peer rejection increased, so did the likelihood of being associated with adolescent firesetting. Adolescents who had reported feeling medium to high levels of peer rejection were more likely to have recently set a deliberate fire than were adolescents who reported lower levels of peer rejection. Adolescents who reported a high level of peer rejection were 14.5 times more likely to have recently engaged in firesetting behaviour when compared to peers with low levels of peer rejection. This indicates that peer recognition is a critical component to be mindful of with adolescent firesetters.

Moving away from the broader literature on youth firesetting, Uhnou et al. (2015) focused on 60 cases of a subgroup of juveniles who had deliberately set a fire at school. The study identified six distinct types of motives behind school fires: play vandalism, vindictive vandalism, psychiatric problem, obstructing school activities, destroying evidence of school burglary, and school fire as a side effect. Play vandalism, having a psychiatric problem, and obstructing school activities were observed to be the most common, with all three motives combined making up 80% of the total motives reported.

Each motive in some way was associated with a distinct characteristic. For example, firesetters motivated by 'play vandalism' typically had no association with the school targeted. Deliberate firesetting appeared to be opportunistic, whereby the act itself appeared to coincide with the perpetrator recognising the environmental possibility. These firesetters often described the incident as "just to have fun" and the actions typically occurred in a group. In contrast, where the actions were driven by 'psychiatric problems', there was evidence of internal emotional drives that were related to emotional dysregulation and the firesetting was often associated with acting alone. The study highlights that the subgroup of at-school firesetters encompasses a variety of behaviours and motivations, features that can often be overlooked when firesetting research only looks at the behaviour more broadly.

### **Group and solitary firesetting**

Research into firesetting behaviours with peers is rarely conducted and appears to be just assumed in the context of peer pressure research (Uhnoo, 2015). Yet, firesetting in groups is observed to be more frequent amongst adolescents than with adults and children (Santtila, Hakkanen, Alison, & Whyte, 2003; Stewart & Culver, 1982). Studies have observed that between 50% and 80% of adolescent firesetting occurs in a group (McCardle et al., 2004; Roe-sepowitz & Hickle, 2011). Given its prevalence, deliberately setting a fire in a group may reflect elements of positive reinforcement or be associated with repetitive firesetting behaviours (Gaynor, 1996).

Furthermore, conducting oneself in a group could reflect motives of seeking to establish a relationship or maintaining a positive status with peers in the group (Warr, 2002). This was apparent in Uhnoo's (2015) study, where there were cases conveying elements of social bonding against a common enemy. Furthermore, ideas around appreciation of peers and feelings of acceptance are particular social exchanges that are likely occurring in unique ways developmentally within the adolescent age group.

Uhnoo (2015) analysed 60 judicial juvenile arsonist cases (median age 16 years old) with the aim of identifying the social organisation of co-offending juvenile arsonists. The research identified that

co-offending occurred in two phases, the first being the 'Planning and Preparatory' phase and the second being the 'Execution' phase. Each phase encompassed multiple roles a person can inhabit. These roles are considered dynamic, and therefore a person is able to inhabit more than one role. The young person who enacts the firesetting has the most active role in the second phase, but the 'firesetter' in the group is not always the person who instigated the idea in the first planning phase. An adolescent who is the firesetter in the group may have been selected due to having the least amount of power or ability to resist peer pressure. Uhnnoo's (2015) study highlights that, other than the practicality of having additional members to assist in the act of firesetting, there are also social elements to consider. These elements may include needing support and encouragement or being reinforced by achieving companionship or status amongst peers (Uhnnoo, 2015). This work highlights how complex the dynamics are in group firesetting.

Although there is a large portion of adolescents who set fires in a group, attention should also be focused on solitary firesetters. Very little research has been undertaken to compare solitary and group firesetting adolescents. Hickie and Roe-Sepowitz (2010) conducted a study that looked at characteristics of 114 female adolescents engaging in solitary or group firesetting. The study identified that 40% of the population had acted alone, and the remainder acted in a group. They identified that solitary firesetters were significantly more likely to have come from a dysfunctional environment, had a history of moving around multiple residences, had relatively little to no contact with their parent/s and were more likely to have been in crisis at the time of the incident. Moreover, McCardle et al. (2004) observed that solitary firesetters were associated with showing greater social isolative behaviours and thought problems, and were more likely to report anger as their motivation. The literature indicates distinct differences in firesetters who conduct firesetting either in a group or alone, and who may therefore require different treatment approaches (Hickie & Roe-Sepowitz, 2010; McCardle et al, 2004; Uhnnoo, 2015).

## **Accelerants**

Literature indicates that the use of accelerants could indicate the severity of firesetting (Pollinger et al, 2005). In Pollinger et al.'s (2005) study with 47 juvenile firesetters between the ages of 12 and 18 years of age, from both residential and outpatient populations, they observed that accelerant use in firesetting was associated with severity of firesetting. That is, accelerant use was correlated with increased frequency of setting fires.

## **Emotions**

Studies have looked into emotions experienced after setting a fire and various emotions have been identified amongst adolescent firesetters. In a study of 50 adolescents who had been involved in firesetting between the ages of 12 and 18 years old (McCardle et al., 2004), almost half of the population reported experiencing positive feelings after the incident, with feeling excited (26%) and happy (13%) being the two most common positive responses. In contrast, feeling scared (26%) and worried (19%) were the two most common negative feelings reported. Interestingly, adolescents who were identified as recidivist firesetters were predicted by their not feeling scared after the incident and reporting positive feelings towards firesetting. In contrast, first-time firesetters reported feeling scared. Similarly, Watt et al. (2015) conducted a study with 274 adolescents aged 12 to 19 years old, comparing juvenile offenders to adolescents from the community. They observed fire-related affect was a significant predictor of the frequency of firesetting behaviour for both groups. Juvenile offenders who reported positive feelings post-firesetting showed more frequent engagement in deliberate firesetting behaviours than did adolescents with no history of firesetting. For this reason, highlighting emotions post-firesetting could be an essential risk factor to monitor when predicting the risk of recidivism.

## **Summary of Chapter Two**

There are a wide range of potential risk factors that are associated with adolescent firesetters. The literature shows that both individual and environmental factors are essential to consider (Fineman, 1995; Kolko & Kazdin, 1986; Kolko, 2000; Slavkin & Fineman, 2000). Fire-specific risk factors are equally

critical to providing a context of the incident. However, research has focused predominantly on the broader adolescent firesetting population and, as Willis (2015) notes, it is likely that if research were to focus on different subgroups, we would begin to see these subgroups identified with distinct contextualising factors, that could then be better targeted for treatment and prevention. We have begun to see this distinction in Uhnou et al.'s (2015) study of at-school firesetters. It is therefore hoped that the present study will identify distinct risk factors associated with adolescent firesetters based on the location of the fire incident for which they were referred.

## Chapter Three: Theoretical models

Throughout the 20<sup>th</sup> century, a psychodynamic understanding and formulation was the most pervasive in conceptualising firesetting behaviour (Bowling & Omar, 2014). Momentum for a different perspective started to build in the late 1970s, where the analysis of adolescent firesetting incorporated multiple aspects of a child's life beyond internal, psychodynamic drives. There was a shift toward the consideration of both individual characteristics and environmental factors concerning firesetting and recidivism. Experts today lean towards a multi-variable model to best explain the complex nature of adolescent firesetting (Mackay et al., 2012). This chapter will focus on reviewing these contemporary models – namely, the dynamic-behavioural model and the tentative risk model – as they are considered the most appropriate in understanding the study population of adolescents. In addition, criminological theory – specifically, Routine Activity Theory (RAT) and Crime Pattern Theory (CPT) – will also be reviewed, given the recent application of these theories to a subgroup of adolescent school firesetters. These models have integrated many of the risk factors that have been described in the previous chapter.

### **Dynamic-behavioural model**

The dynamic-behavioural model was initially developed by Fineman (1980) and later refined in Fineman (1995). The model looks at the behaviour of firesetting as part of a bigger picture and takes into consideration the impact of multiple factors both historical, present and immediate:

The dynamic-behavioural formulation views firesetting as an interaction between dynamic historical factors that predispose the firesetter toward a variety of maladaptive and antisocial acts, historical environmental factors that have taught and reinforced firesetting as acceptable, and immediate environmental contingencies that encourage the firesetting behaviour. (Fineman et al., 2000, p. 18).

The model looks at historical factors that may have predisposed an adolescent towards antisocial behaviours, and considers environmental factors that may endorse certain behaviours through modelling. The model also appreciates the immediate environmental contingencies that may act as a reinforcement for firesetting. Fineman (1995) acknowledges the potential influence of internal and external reinforcers. External reinforcement could be in the form of monetary gain, while internal reinforcement could be cognitive factors such as peer admiration.

The model not only formulates firesetting behaviours but also identifies independent variables that may potentially predict the occurrence of the behaviour. The model incorporates three psychological determinants: personality and individual characteristics, family and social circumstances, and immediate environmental conditions. Individual characteristics include factors such as demography, motives, affect and psychiatric factors. The social context of the individual includes family, peers and social factors. Lastly, environmental conditions are similar to those examined in a functional analysis; that is, an appreciation of the events that transpired prior, during and after the firesetting behaviour (Fineman, 1995). The interaction of these factors is also crucial in understanding firesetting behaviours. The model allows for understanding the firesetting behaviour itself, while also reminding us of environmental factors that may reinforce the behaviour. In saying that, it can be concluded that no two firesetting incidents are the same; a distressed adolescent who deliberately sets a fire at home can be viewed differently to one that is set amongst a group of peers.

### **Tentative risk model**

Albert Bandura's social learning theory was originally proposed in the 1970s, and Kolko and Kazdin (1986) incorporated this theory into their juvenile firesetting model, called the 'tentative risk model'. Social learning theory has the premise that one's behaviour is learnt by observing others, thereby suggesting behaviours like firesetting are environmentally influenced. Furthermore, behaviours are assessed as to how reinforcement, either intrinsic or external, could play a role in increasing or

decreasing behaviour. Acknowledging potential intrinsic and external reinforcers requires practitioners to look beyond an individual and also examine situational factors (Bowling & Omar, 2014).

Kolko and Kazdin (1986) conceptualised a model that encompasses three dominant domains, these being learning experiences and cues, personal repertoires, and parent and family influences and stressors. It was proposed that the three major domains may increase the likelihood of risk of firesetting behaviour. Kolko and Kazdin (1986) argued that fire-play could be a behaviour that is developmentally normal in youth and youth firesetters. The model, however, directed focus on potential factors to be further researched in order to provide insight into what differentiates a young person who ceases firesetting behaviour from a young person who persists in such behaviour, and potentially persists into adulthood. The model may also be used to discriminate subtypes within firesetters in general.

Under the domain of 'learning experience and cues', the model is broken down into three main factors: early modelling (vicarious) experiences; early interests and direct experiences; and availability of adult models and incendiary materials. Here the model acknowledges or brings attention to exposure at a very young age which may influence a child to exhibit firesetting behaviours later. Fire-related behaviours could be influenced by early modelling of parental occupations such as being a firefighter or exposure to child abuse or aggression. Moreover, early interest in fire could be developed by observing how others interact with fire (such as cigarette smoking) and availability of flammable materials (such as cigarette lighters) as factors to be considered.

The second domain is referred to as the 'personal repertoire', which is then broken down into cognitive components, behavioural components and motivational components. The cognitive component considers one's capacity for awareness of the dangers of fire and knowledge of fire-safety skills. The behavioural component is split into two parts – interpersonal ineffectiveness/skill deficits and covert antisocial behaviours. The first part acknowledges the potential for the deficits in social interaction skills to inform difficulties in problem-solving with socially appropriate strategies, such as an inability to express themselves appropriately when angry. The second part of the behavioural

component is covert antisocial behaviours, which takes into consideration a young person's history of other concealed antisocial behaviours. Lastly, the motivational component includes motives for setting fires such as curiosity and anger. Such motives are understood to also be reactionary to a stressful situation or fascination with fire that leads to excitement.

Lastly, the third domain takes into consideration parental and family influences and stressors. Within the domain, there are four parts: limited supervision monitoring, parental distance and un-involvement, parental pathology and limitations, and stressful external events. This domain looks at the different facets of parental involvement within the child's care that may impact on future firesetting behaviours. The domain appreciates the home environment in which the young person is situated.

Much like the dynamic-behavioural model, the tentative risk model encompasses similar themes with an appreciation of how multiple factors can impact on a child's development towards persistent firesetting behaviours. Kolko and Kazdin (1986) understood that while these factors have been notably associated with firesetting, some factors may be more influential than others. Both models allow for the potential to differentiate firesetters into subgroups.

### **Criminological theories**

The models mentioned above have been vital in directing future research to sift through potential risk factors associated with firesetting. In addition, criminological theories that have been relatively rarely utilised in relation to firesetters could add value to this doctoral research on location and adolescent firesetters. Criminological 'opportunity theories', such as RAT and CPT, may prove useful to supplement the above models and understanding of adolescent firesetting, especially given that RAT and CPT address why a particular target is chosen and how the offender's opportunity influences offending. Adolescence is a transition towards greater autonomy and therefore greater opportunities to be in places where offending may be possible, so being mindful of these aspects is vital.

## **Opportunity theory**

Criminological theories have been identified as falling into two groups – theories that explicitly focus on the offender and theories that are more concerned with the event itself (Eck & Weisburd, 2015). Opportunity theories such as RAT and CPT are focused on the latter. Where behaviour is understood as a pattern that lies within spatial and temporal space, such theories have been used to explain why different forms of illegal behaviour can be observed to have their own distinct patterns of location and temporal space, whether it is the time of the day or month or year.

## **Routine activity theory**

RAT was heavily influenced by the Hawley (1950) theory of human ecology and was developed by Cohen and Felson (1979). It postulates that the opportunity for deviant events to happen lies within a person's daily routine. Criminal behaviours occur in the intersection of time and space with three minimal elements: a motivated offender, suitable targets, and the absence of capable guardians against a violation. The theory suggests that merely changing one's routine activities can significantly alter one's convergence of time and space, and this is enough to increase one's opportunities for deviant behaviours to occur. The routine activity approach looks at both macro and micro levels. The macro-level appreciates the organisation of larger structures, such as the community and society where things like the structure of work is a factor (Felson, 2000). The structure of everyday living at a macro-level subsequently influences, at a micro-level, certain events to coincide and create an opportunity for deviant behaviours to happen (Felson, 2000). A motivated offender can be anyone who has the potential to offend at any given time. A target is considered suitable when the offender perceives the target as accessible. While a capable guardian does not necessarily mean a police figure or a family member, a guardian according to the model is recognised as a person whose presence or proximity discourage deviant behaviours (Felson, 2017). Although the approach itself was initially designed to understand predatory violations, more recently Pooley and Ferguson (2017) applied the approach further to understand YMF.

## Crime pattern theory

CPT acknowledges patterns of crime are underlined by the fluid relationship a person has with their environment. CPT incorporates RAT theoretical principles and further extends the theory by suggesting that, by establishing daily routine activities over time, a person develops awareness of space that could present opportunities for deviant behaviour. CPT is a model that could be utilised to provide some insight as to why deviant behaviour like firesetting occurs at a specific location. In detail, the theory postulates that a person's daily routine will encompass a series of activity nodes, which are areas that are regularly visited such as home, school and work, and by routinely attending these nodes, a typical route or pathway is established between these nodes (Brantingham, Brantingham, & Andresen, 2016). Both nodes and pathways are considered to be *activity space*, while *awareness space* is referred to as space within visual range of *activity space*. It is this *activity space* – nodes and pathways between nodes – in which deviant behaviours are likely to occur (Brantingham & Brantingham, 1993). With age, nodes and pathways change and, consequently, *awareness space* does too, typically becoming broader.

Age is a factor that can also limit the range of targets available, both spatially and temporally. For example, an adolescent's activity space would be typically more restricted than that of an adult. An adolescent's *awareness space* could predominantly be one that encompasses pathways between home and school. Inevitably, awareness expands when children develop, and exponentially grows once they can drive or use public transport independently (Brantingham & Brantingham, 1993). In addition to nodes and pathways, a decision is required to engage in deviant behaviour. This decision is informed by an appraisal process that uses what Brantingham and Brantingham (1993) refer to as a *crime template*. A *crime template* is built on cues that the offender has internalised, which inform them that the location and target are suitable. The offender's expectations of the reactions from others can also inform the crime template.

Historically, both models have been operationalised to understand burglary. More recently, Pooley and Ferguson (2017) applied both theoretical frameworks to young people who have engaged

in YMF. Both models can be used to help explain why firesetting occurs in a specific location. RAT may provide or guide understanding of the context that creates a location to be more vulnerable than others, while CPT could be used to inform why certain areas are chosen.

### **Criminology theories applied to adolescent firesetting**

Application of both models has been shown to provide an understanding of adolescent firesetting behaviours relative to age group. Both RAT and CPT consider the intersection of time and space and how that affords the opportunity for deviant behaviour. Both models then imply that a change in routine can increase potential targets. It would be expected as a child develops over time, their routine will change, conveying an increase in potential targets that are age-specific. By applying the model, it is then expected that the convergence of space and time would change through the ages. This behaviour change is observed in the research of Pooley and Ferguson (2017), which indicated that the majority of the 13 to 16 year olds (71%) in their study engaged in YMF on public property, whereas the YMF behaviours of 0 to 5 year olds were predominantly (88%) conducted on residential property. The research showed the contrast between age-specific targets, where the expanded awareness spaces of adolescents were away from home, while the major node of children was still the home.

Furthermore, for adolescents, unstructured time is spent typically less at home and more away from home, which forms new nodes and pathways. This also supports the notion that YMF would occur in environments in which unstructured time is practised. As expected, temporal changes in YMF were also observed over the different age groups - that is, when unstructured time was available, YMF was expected to occur. For example, firesetters aged between 6 and 12 years misused fire in a temporal cluster between 3pm and 5pm; namely, after-school time. In contrast, firesetters between the ages of 13 and 16 years showed a temporal cluster between 4pm and midnight, a time that may better reflect the autonomy and unstructured time of an adolescent.

When looking at a suitable target, YMF appears to coincide with RAT and CPT expectations. A projection based on RAT would be that incendiary materials will be different across each age group,

and combustible materials and devices will be naturally what is accessible during their daily routine. Applying CPT would lead us to expect that the targets chosen are within one's awareness space. Resources used across the different age groups coincided with what would be available within their awareness space, while also within environments that they would be most acquainted with. Matches and lighters were the most common form of incendiary resources within all groups, thus supporting the notion of using what is most accessible within their awareness space. Targets appeared to somewhat coincide with expectations. Household items such as apparel, curtains and furniture were observed to be a large portion of what 0 to 5 age group would target as combustible material. As the age group increased, vegetation material formed the majority of targets, which makes sense if we were to consider a youth's typical routine away from and back to home. YMF therefore coincided within their expected awareness space. However, within their study, the researchers observed that the youngest group had overall the most complex and diverse range of incendiary devices and combustible material, which would be contrary to previous literature, and potentially suggests that one's age-related capability may not be a major contributing factor towards target variability.

### **Summary of Chapter Three**

This chapter reviewed theoretical models applicable to understanding adolescent firesetting behaviours. The first part of the chapter focused on models that appreciated how multifaceted firesetting behaviour is. The dynamic-behavioural model and tentative risk model indicated the need to look beyond the individual and consider the impact that the environment has. As a result, both models have indicated potential risk factors for adolescent firesetting. The second part of the chapter recognised the recent appreciation of criminological approaches in adolescent firesetting literature. The use of RAT and CPT expanded our understanding of the influences of age-specific convergence of time and space. Placing much focus on the context in which it occurs, criminological theories can prove to be beneficial in providing an understanding as to why particular locations are identified as the source of the ignition of the fire. Hence, for the purposes of this doctoral study on firesetter location, a criminological theory may help us to understand why a particular location was chosen, and a

multifactorial model assist us in identifying potential risk factors associated with adolescents referred for deliberately setting a fire at home, away from home, or at school. By being mindful of a range of models in the study, further insight on not only the convergence of time and space but also the elements that the individuals themselves bring into a specific point in time may be gained.

## Chapter Four: Typology

Adolescent firesetters are a heterogeneous group. Literature has attempted to identify subgroups which were categorised either by their motivation or associated risk factors (Kolko, 2002; Santilla, Häkkänen, Alison & Whyte, 2003; Slavkin & Fineman, 2000). It is important to be able to identify potential subgroups within this population and understand their differences in order to accurately account for future risk and inform treatment catered to their specific needs. There is a long history of the development of typologies for firesetting, this includes work dating back to Lewis and Yarnell (1951). The following section looks at the literature on the adolescent age group specifically, in order to support the potential subgroups that the present research may encounter.

### Dynamic-behavioural model

Fineman's (1995) classification of firesetters according to the dynamic-behavioural model were made in consideration of three main factors: the individual's history, historical environmental factors, and immediate environmental factors. Fineman's (1995) typologies were created with consideration of the person's motivation at the time of the fire incident, the target and future outlook. The typologies were categorised into two main domains: non-pathological firesetters and pathological firesetters. A total of six typologies were developed: *curiosity type*, *cry-for-help type*, *delinquent type*, *severely disturbed type*, *cognitively impaired type* and *sociocultural type*. The categories were formed based on psychological state, the target of firesetting and the prognosis (Slavkin & Fineman, 2000). Typologies were developed with an understanding that the categories were not mutually exclusive, given that a firesetter can have more than one motive.

*Curiosity (or accidental) type* is the only subtype that falls under the non-pathological domain. This type is considered to be the most common among children, typically between the ages of 5 and 10 years old (Slavkin & Fineman, 2000). The act of firesetting is predominantly driven by experimenting without full comprehension of the consequences of their actions. The purpose of the fire is witnessing the flame itself or the changes that occur in the object, with no intention to cause harm (Fineman,

1995). Psychopathology is typically not associated with children in this group; however, attentional issues could be a factor. Furthermore, this group is less associated with a dysfunctional family environment (Lambie & Randell, 2011). Although considered to be non-pathological, this group continues to have the potential to cause significant harm and damage.

Under the pathological firesetters domain, five distinct types of firesetters were developed - cry-for-help type, delinquent type, severely disturbed type, cognitively impaired type and sociocultural type (Slavkin & Fineman, 2000). The *cry-for-help type* is reported to be observed across all ages. Characteristically, the firesetting is carried out by children who consciously or subconsciously desire the attention of another (Fineman, 1995). The desire can stem from an intrapersonal issue (e.g., depression) or interpersonal problem (e.g., parental separation) that they are experiencing. Recidivism is expected in this population if not treated appropriately. This type is also considered to be responsive to treatment.

*Delinquent type* is typically associated with youth between the ages of 11 and 15 (Slavkin & Fineman, 2000). For this group, firesetting is considered to be a behaviour in addition to aggression and conduct problems, such as being involved in vandalism and hate crimes, while also being associated with showing minimal empathy. Firesetting is typically directed towards property and rarely towards harming other people. This group is characterised as showing the most considerable amount of deviance and behavioural dysfunction (Slavkin & Fineman, 2000).

*Severely disturbed type* is a subtype that is observed relatively infrequently compared to the other classifications (Slavkin & Fineman, 2000). Those associated with this type may show paranoia and psychotic features, where the fire is the dominant fixation in their presentation. Firesetting behaviours are postulated to be driven by sensory reinforcement; therefore, the sensory properties of fire are more alluring in this group. Additionally, self-harm has also been associated with this group, whereby fire functions as a method to hurt themselves or complete suicide. Prognosis is dependent on the strength of the relationship of fire to their intrapsychic life.

*Cognitively impaired type* is a subtype which encompasses youth with developmental disabilities, severe learning disabilities, fetal alcohol syndrome or organic impairment (Slavkin & Fineman, 2000). This subtype acknowledges impulse control impairment as a potential factor for youth in this group to engage in firesetting behaviour. Self-harm via fire is relatively uncommon in this subtype, with targets generally directed at a property.

Lastly, the *sociocultural type* is a subtype that is driven by seeking approval from an antisocial group (Slavkin & Fineman, 2000). Such firesetters are believed to want to avoid harming others; however, their actions are more associated with causing large damage to property. This subgroup is considered to be responsive to treatment.

Of the six subtypes, four are considered to be more commonly acknowledged and used to inform practice (Kolko, 2002); namely, curiosity type, cry-for-help type, delinquent type and severely disturbed type.

### **Action systems model**

The actions system model was originally developed by Canter and Fritzon (1998) and was another approach used to classify arsonists. The original study was first implemented on a broad arson population, that included young people and adults. Santtila et al. (2003) later applied the model specifically to a juvenile population aged 6 to 17 years. Their findings ultimately suggested that, structurally, the Canter and Fritzon (1998) model could be used with the juvenile firesetting population. The model differentiates arsonists by considering two facets (Canter & Fritzon, 1998). The first facet pays attention to the locus of effect, whether it was person-oriented or an object-oriented target. A person-oriented target includes self and others, while an object-oriented target is concerned with a property, such as businesses, public buildings, or schools. The second facet places emphasis on motivation as the source of arson, which is broadly categorised as either expressive or instrumental. An expressive source is considered to be arson that is driven from within that arises from the need to express emotions, whereas an instrumental source has elements of achieving a measurable goal. As a

result, the combination of the two facets creates four subtypes of arson: *expressive-person*, *instrumental-person*, *expressive-object*, and *instrumental-object*.

An expressive act that is towards a person (*expressive-person*) is considered an attack that is aimed inwards, thought to have stemmed from trying to manage inner tension caused by anxiety or depression. In contrast, instrumental acts that are aimed towards a person (*instrumental-person*) are where the attack is aimed outwards and towards another person with a specific purpose, such as revenge. When a deliberate fire is categorised as expressive and the target is an object (*expressive-target*), it is considered to be as an act of release, of inner tension and distress. Lastly, fire acts which are instrumental and directed at an object (*instrumental-object*) are considered to be an attempt to obtain some benefit from the change of the object; for example, this could include the concealment of a burglary. Interestingly, the instrumental-object type was significantly correlated with juvenile offenders (Canter & Fritzon, 1998).

In an adolescent population, Santtila et al. (2003) argued that the expressive-person subtype, comprising the variables of the expressive self and endangering others, was typically driven by an attempt at emotion regulation or as a means of seeking help. Curiously, firesetting at home and institutions were also observed to be associated with this subgroup, but this was most likely related to the fact that for many, their 'home' was an 'institution' as they were in state care. The characteristics of this subtype were associated with not living with their parents at the time of the offence, not being known to local authorities, being institutionalised, female, and having a history of a psychiatric diagnosis of depression, personality or conduct disorder. Unlike Canter and Fritzon's (1998) observation, juveniles within this group reported that a witness was not present, such as an ex-partner, and acute suicidal thoughts were also more prominent within this age group, in contrast to Canter and Fritzon's (1998) study.

With the instrumental-person subtype, the theme of firesetting is in response to an external event, and could be driven by revenge. Santtila et al. (2003) observed this subtype to be associated

with deliberately setting a fire in a group, planning and use of accelerant. Interestingly, firesetting at school was related to this subtype. The study further characterised this subtype to have a background consistent with criminality, that is, having a previous history of offending and antisocial behaviour.

With regards to the expressive-object subtype, the study observed that typical targets were cars, random objects, residences and businesses. Given that this subtype was related to having a history of firesetting, it was presumed that these young people had a high interest in fire or fire was reinforced by the emotional regulation experienced. Furthermore, background characteristics included a psychiatric diagnosis of a personality disorder, and not living with their parents, characteristics similar to the expressive-person subtype. However, this subtype was associated with a specific gender (female) and was related to a history of firesetting. This subtype potentially reflects a strategy of emotional regulation directed more outwardly.

Lastly, those classified in the instrumental-object subtype were characteristically more likely to have been males, living at home, and with a history of conduct problems. They were also more likely to have a history of firesetting and were presumed to offend in groups, characteristically influenced by peer pressure, and mainly opportunistic in their firesetting behaviour. Those in this subtype were considered to be the most antisocial group, as shown by being associated with convictions of theft, burglary and criminal damage.

The majority of the population was made up of the instrumental-person and instrumental-object subtypes, which made up 35% and 50% of the population respectively. The expressive-object subtype made up 29% of the population, while expressive-person was the least common, making up 14% of the population. Interestingly, expressive themes were seen to be more likely related to psychopathology, while instrumental themes appeared to have elements of antisocial and criminal history. What is also interesting is the acknowledgement of locations, whereby home firesetting was related to the expressive-object subtype, while locations such as schools, businesses and public buildings were related to instrumental themes. However, caution should be taken in looking at these

results, given that the population was derived from an offending population, rather than a community sample.

### **Del Bove typology**

The typologies so far described were not derived primarily from empirical research, and are considered to be more theoretical (Vreeland & Waller, 1978). As well, they are quite heavily based on motivation, and it is infrequent to observe a firesetter with just one motivation (Del Bove & MacKay, 2011; Prins, 2002). Due to this limitation, Del Bove and Mackay (2011) instigated a study via a cluster analysis of juvenile firesetters. They argued that previous research had only considered univariable relationships, rather than the potential relationships between multiple variables. The study by Del Bove and MacKay (2011) looked at two groups of variable domains: fire-specific and general, plus individual and environmental variables. They took the position that firesetting behaviour is a reflection of a child's entire biopsychosocial environment and therefore the action in itself is determined by a multitude of factors occurring together. The study concluded with three clusters of juvenile firesetting: *conventional-limited*, *home-instability-moderate*, and *multi-risk persistent*. Each classification showed not only distinct levels of severity between them but also differences in all the variable domains of fire-specific and general plus individual and environmental variables.

The *conventional-limited* cluster made up 38% of the firesetting population, was characterised as the least severe in firesetting behaviours, and also showed the fewest individual and environmental risk factors. This was reflected in the lowest number of total fire incidents amongst this cluster, which had the oldest age of fire onset (9 years old), and showed the least amount of curiosity and interest, out of the three clusters. Furthermore, a minority of this group (just under 20%) reported an antisocial motivation and a large proportion of them reported feelings of remorse. Youth categorised in this cluster showed relatively minimal exposure to abuse, and the majority (60%) did not have child welfare involvement. Additionally, they were less likely to have had previous involvement with mental health services and less likely to have a history of involvement with the police than all other clusters. They also

showed the least amount of social skills deficit, attentional difficulties and externalising behaviours. Interestingly, this cluster was observed to show fewer internalising problems compared to the home-instability-moderate and multi-risk-persistent clusters. This cluster also showed fewer developmental issues when compared to the multi-risk-persistent cluster, but not in contrast to the home-instability-moderate cluster.

In contrast, those in the second cluster, *home-instability-moderate*, were observed to have more severe issues than did those in the conventional-limited group, but not as severe as those in the multi-risk persistent cluster. This cluster was observed to have a total number of fire episodes that was relatively more than the conventional-limited cluster, and less than the multi-risk persistent cluster, and, similarly, the age of first onset of firesetting behaviour was observed to be younger than conventional-limited, but not younger than multi-risk persistent. Young people in this cluster were observed to more likely have been experiencing a stressor prior to the referred fire incident than were those in either the conventional-limited or multi-risk persistent clusters. Furthermore, in consideration of individual and environmental factors, just over a third in this cluster showed antisocial motivation and reported remorse. Moreover, this cluster had the least amount of parental involvement when compared to all clusters. Those in this cluster had been in contact with mental health services at an age younger than conventional-limited but older than multi-risk persistent, and were more likely to currently be involved in mental health services than were those in the conventional-limited cluster. This group was identified to have the highest percentage who had experienced exposure to abuse (75%), while also all youth in this cluster had been in contact with child welfare. This group had greater difficulties than the conventional-limited group in areas of social relationships, attention and externalising behaviours, but fewer than did those in the multi-risk-persistent cluster. It is suggested that the risk of engaging in firesetting behaviours is related to insufficient parenting and modelled behaviours, in combination with individual and environmental factors. Given that stressors were significantly present prior to the fire incidents, alongside a substantial history of abuse, firesetting for this group may indicate a maladaptive means of trying to regulate distressing emotions.

Lastly, the third cluster, *multi-risk-persistent*, was observed to be the most severe in firesetting behaviours. This group was identified as having the highest frequency of firesetting incidents, and having the youngest onset of firesetting behaviour out of all the clusters. Furthermore, the cluster was associated with scoring the highest in fire interest and curiosity. This group also showed the largest percentage for reporting antisocial behaviours. Intriguingly, this group reported a higher percentage of remorse than did those in the home-instability-moderate cluster, but not greater than conventional-limited. With regards to individual and environmental variables, this cluster had greater parental involvement than did the home-instability-moderate cluster. Moreover, the majority (97%) had had contact with child welfare; however, none had been placed in institutional care. This group also showed the highest deficits in social skills, attention and externalising behaviours. Curiously, this cluster did not convey significantly greater internalising problems than the home-instability-moderate group. This cluster was more likely to be involved in mental health services currently than the conventional-limited group. Overall, the features of those in the multi-risk persistent cluster are relatively in keeping with previous literature on behavioural issues like conduct disorder (Kuhnley et al., 1982; Stickle & Blechman, 2002).

#### **Summary of Chapter Four**

All typologies mentioned above have their strengths and weaknesses. Of the first two described (dynamic-behavioural and action systems model), both are observed to be more theoretical than empirically driven. However, they do show promise in that they consider the context of the fire incident, specifically the location in which it occurred. In the action systems model, there appears to be an expressive subtype that is more emotionally driven and is related to home firesetting and psychopathology. The instrumental subtypes generally have more of an antisocial background and are linked to public buildings and schools as targets. The strength of the Del Bove and MacKay (2011) classifications is in their empirical design, identifying two high-risk subtypes: the home-instability-moderate subtype, where deliberately set fires could be in the context of distress, and the multi-risk-persistent subtype which is based on disruptive behaviour problems. They too suggest that two

different etiological pathways operate for these high-risk clusters, one associated with environmental stressors, and another that is more behavioural, with disruptive and antisocial behaviour issues. The typology literature is helpful in that it provides further insight into the potential subtypes that can be observed when given the time to conduct empirical research, particularly in the adolescent firesetting population.

## Chapter Five: Method

### Research design

The present study was split into two series and used a between-group design, with a quantitative methodology. The first series of the analysis was a comparison between adolescents referred for deliberately setting a fire at home (at-home group) and deliberate fires that occurred away from home (away-from-home group). The second series of the analysis was a comparison between adolescents referred for deliberately setting a fire at home (at-home group) and deliberate fires that happened at school (at-school group). The data were collected from a more extensive study, with each dataset coded categorically, and each part analysed via chi-square tests and subsequently logistic regression.

### Data collection

Data collected for the present study were derived from a project conducted for the Fire and Emergency New Zealand (FENZ, formerly known as the New Zealand Fire Service) by Lambie et al. (2013). The project was commissioned and approved by the FENZ and subsequently gained ethical approval from the University of Auckland Human Subjects Ethics Committee (No. 7792). Researchers were given access to data collected by the FENZ, the New Zealand Police National Intelligence Agency database (NIA) and Oranga Tamariki Ministry for Children (formerly known as the Child Youth and Family Service) case management system known as Care and Protection, Youth Justice, Residential and Adoption Services (CYRAS). From the pool of the New Zealand Fire Awareness Intervention Programme (FAIP) participants, researchers matched their names and respective birth dates to be searched within NIA and CYRAS.

Researchers were provided data from the FENZ of children and adolescents who had been referred to the FAIP intervention programme between 2003 and 2007. Children and adolescents who were referred to the FAIP underwent an interview process conducted by FAIP staff that entailed an interview with a standardised questionnaire. The child or adolescent and their respective parent or caregiver who attended the interview respond to the questionnaire. The dataset acquired in the Lambie

et al. (2013) report was information collected during the FAIP interview and was sourced from the FENZ annual national child database.

Oranga Tamariki Ministry for Children, formerly known as Child Youth and Family service (CYF), is New Zealand's statutory care and protection agency for young people. The researchers sourced information regarding care and protection, and placement files from the Oranga Tamariki case management system, CYRAS. Information sourced from CYRAS were history of victimisation, a record of placement in care, sexualised behaviour and exposure to domestic violence. Care and protection, and placement files were thoroughly reviewed by two researchers at the time of the study, identifying and recording whether or not the variables of interest were present within each respective participant according to a predetermined set of criteria. In analysing interrater agreement of the collected data, an excellent range was denoted by Cohen's Kappa values all larger than 0.75. Data was coded by a key research assistant.

Data regarding a person's current or historical involvement with the police were derived from the NIA database, which was provided by the New Zealand Police Counties Manukau Community Services Team and its Research and Ethics Subject Committee. The New Zealand Police provided offending histories of participants dated from their birth until the data collection point in 2012. More specifically, the date of offence, offence type, offence outcome and custody of a participant were derived from the NIA. Data concerning offending histories were also sourced from both youth and adult records.

Data utilised in this doctoral study were sourced from information provided by the FENZ, NIA, CYRAS, and the larger FAIP study.

### **Variables used in this study**

Variables focused on in this study were considered to be plausible risk factors for firesetting behaviours amongst adolescents. Risk factors were categorised into four categories: demographic and

assessment, individual and environmental, conduct problems, and fire-related. Table 1 depicts a general overview of the origins of the data used for each respective risk factor.

**Demographic and assessment risk factors.** Within this category, data were sourced from the FAIP interview process, which included the use of a standardised questionnaire. Risk factors that fall under this category were *age* at the time of being referred to FAIP, *gender*, *ethnicity*, *current residence* and *deprivation score*. The current residence was defined by whether the individual was currently residing at the time of assessment at a private home, institution or an alternative living situation. For this study, *deprivation score* was split into two categories, top 40% and lower 60%. Deprivation score followed the NZDep2006 measure, which measures the regional deprivation of each adolescent's immediate area using a weighted average of nine dimensions of deprivation from 8 variables (Income, Owned home, Support, Employment, Qualifications, Living space, Communication and Transport) used to measure socio-economic status (Salmond, Crampton, & Atkinson, 2007). Accordingly, scores ranged from 1 to 10, where 10 indicates the highest level of deprivation. The top 40% were considered to be adolescents whose deprivation scores fell between 7 and 10 (most deprived), and lower 60% pertained to scores between 1 and 6 (less deprived).

**Individual and environmental risk factors.** Within this category, the majority of data was sourced from the FAIP interview process. The following risk factors were derived strictly from the FAIP interview questionnaire: *Psychiatric diagnosis history*, which was a response to the question, "Has the client ever been given a psychiatric diagnosis?" and *Psychosocial and/or emotional problems*, which was a response to the question, "Does the client have any of the following problems: Hyperactivity; Poor concentration; Depression; Self-harm behaviours; Anger; Anxiety (fear or worry a lot); Learning difficulties?"

The risk factor *experienced abuse and/or neglect* was developed by joining data from FAIP and the CYRAS database. This risk factor included any recorded incidents of physical victimisation, sexual abuse victimisation and/or neglect. The procedure of collating information from two sources was to ensure the accuracy of the data collected and reduce the possibility of underreporting of victimisation

(for example, where a parent or adolescent may not have wished to mention sexual abuse in the face-to-face FAIP interview, but such abuse was clearly documented in the CYRAS file from notifications and actions reported at the time, so could be added to the study dataset).

The information regarding the risk factor of *child welfare agency involvement* and *domestic violence* were derived from the CYRAS database. The risk factor *domestic violence* incorporates violence that occurred in the home environment, with both direct and indirect involvement of the respective participants noted. “Violence” under this risk factor included physical and property damage, but excluded verbal violence.

**Conduct problems risk factors.** The risk factor *conduct problems* was comprised of data from the FAIP in reply to the question, “Has the client been involved in any of the following behaviours: stealing; stealing by confrontation; burglaries; often bullies; threatens or intimidates others; often initiates physical fights; has used a weapon that can cause serious physical harm to others; has been physically cruel to people; has been physically cruel to animals; vandalism/violence towards property; tagging; group offending; often lies; running away from home; drug abuse; alcohol abuse; has broken into someone else’s house; truancy; has sexually offended. Response options were yes or no.

Data regarding the risk factor *previously offended* were derived from the New Zealand Police Database NIA. The risk factor was defined as having any offence that was committed before entering the FAIP intervention.

**Fire-related risk factors.** Within this category, data were sourced from the FAIP interview questionnaire. Risk factors that fall under this category are *history of inappropriate fire use*, which reflects the young person’s response to how many times they have used fire inappropriately. Five motivations (*antisocial, attention, boredom, experimentation, peer pressure*) were recorded, which were indicated by their response to various questions regarding their reason(s) for setting a fire. *Destruction of property intended* was ascertained from questioning the young person as to whether the destruction of property was intended in the firesetting incident they had been referred for. *Firesetting occurred in a group* refers to whether the client was in a group at the time of the referred firesetting

incident. Risk factor *accelerant used* referred to whether or not an accelerant was applied in the firesetting incident. Lastly, the risk factor *negative feelings* reflects whether the young person acknowledged feelings of being ashamed or scared at the time of the incident.

**Table 1**

*Source of information for risk factor variables*

Variable	Source
<b>Demographic and assessment risk factors</b>	
Age	FAIP
Gender	FAIP
Ethnicity	FAIP
Deprivation	FAIP
<b>Individual and environmental risk factors</b>	
Psychiatric diagnosis history	FAIP
Psychosocial and/or emotional problems	FAIP
Experienced abuse and/or neglect	FAIP cross-checked with CRYRAS
Child welfare agency involvement	CYRAS
Domestic violence	CYRAS
<b>Conduct problems risk factors</b>	
Conduct problems	FAIP
Previously offended	NIA cross-checked with CYRAS
<b>Fire-related risk factors</b>	
History of inappropriate fire use	FAIP
Motivation	FAIP
Destruction of property intended	FAIP
Firesetting occurred in a group	FAIP
Accelerant used	FAIP
Negative feelings	FAIP

## **The population of the study**

The population of the study was derived from a larger study of children and adolescents who were referred to the FAIP for setting fires between 1 July 2003 to June 2007 ( $N = 2696$ ).

## **Data preparation**

For the purposes of the present study, of the 2696 individuals that were referred for the FAIP intervention programme, 981 participants met the criteria for the first series of the analysis - deliberate firesetting that occurred at home and deliberate firesetting that occurred away from home. The participants that were excluded from the report ( $n = 1715$ ) were outside the adolescent age range of 12 to 18 years old at the time of the referred incident, with insufficient information, missing data, a referral to FAIP for issues other than direct engagement in fire, or for accidental fire setting. Separation of participants into two comparison groups - adolescents referred for deliberately setting a fire at home ( $n = 161$ ) and away from home ( $n = 820$ ) - was determined by referral information indicating Yes or No to whether the referred fire incident occurred at home.

For the second series of the analysis the two comparison groups were adolescents referred for deliberately setting a fire at home and at school. The at home group remained unchanged from the first series analysis ( $n = 161$ ). In contrast, the at school group ( $n = 355$ ) was a subgroup derived from the away from home group observed in the first series of analysis. That is, the additional criterion, that the young person was referred for a deliberate firesetting at school, was applied to the away from home group observed in the first series of analysis. This was determined by referral information indicating Yes that the deliberate fire had occurred at school. Subsequently, the sample reduced to 516 participants in total.

## **Ethical consideration**

Privacy and confidentiality were maintained in the present study. The dataset used did not include any identifying information. The researcher was unaware of any personal information pertaining to the participants and had no ability to identify them. Subsequently, results within the

study do not contain any identifying information.

### **Data analysis**

Data analysis was conducted in two series. The first series looked at between-group differences among adolescents referred for deliberately setting a fire at home or away from home ( $n = 981$ ). A similar analysis was conducted in the second series of analysis, between adolescents referred for deliberately setting a fire at home or at school ( $n = 516$ ). For each series, a chi-square test was conducted, followed by logistic regression analysis. Software used for statistical analysis were JMP version 14 and SAS version 9.4.

**Chi-square test.** General and fire-related risk factors pertained to binary responses; accordingly, a chi-square test was appropriate. This decision was further supported, given that the study aimed to identify the relationship of such variables to the respective groups. A  $p$ -value of  $< .05$  in this study was considered to show statistical significance. For variables that did not show statistical significance, odds ratios were not calculated. Odds ratios are accompanied with 95% confidence intervals.

However, caution is advised in interpreting relationships observed via a chi-square test, given that the data outputs individual variable relationships with groups, without controlling for other variables in a model; that is, the data output of the relationship between variable and outcome is unadjusted.

**Logistic regression.** In creating a model, logistic regression was fitted to inform which risk factor was predictive of home firesetting in both Part One and Part Two of the analysis. Given that the dependent variable has a dichotomous outcome, a binary logistic regression was utilised. Peng, Lee, & Ingersoll (2002, p. 4) stated: "Logistic regression is well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical predictor variables".

Risk factors that had met statistical significance ( $p < .05$ ), via a chi-square test, were subsequently entered into a statistical model, which aimed to fit a model with a reduction that provided

an improved understanding of the data while additionally establishing numerical stability (Maxwell, 2018).

To find a logistic regression model with the best combination of the significant risk factors, a model selection process was used. A forward, backward or stepwise method is commonly used (Bursac, Gauss, Williams, & Hosmer, 2008). The current study used a stepwise selection. In contrast to a forward selection process, a stepwise selection process involves the effects of a variable that has been entered to not always remain in the model. Thus, with each forward selection of risk factors that are entered into the model, depending on the effect the risk factor has in a given model, there is the potential of elimination of an effect via one or more backwards elimination steps. The stepwise selection process ceases to continue when no additional effect occurs with the addition of a risk factor into the model, or when the effect of an immediately entered risk factor into the model is the only effect removed following backwards elimination steps (Bursac et al., 2008). During the stepwise selection process, gender, ethnicity and deprivation score were treated as control variables.

The final logistic regression model, from the stepwise model selection, was further assessed using a receiver operating characteristics assessment (ROC). The area under the ROC (AUROC) curve is a measure to assess the ability of the fitted model to discriminate between true cases from true non-cases (Hosmer Jr, Lemeshow, & Sturdivant, 2013; Kleinbaum, Dietz, Gail, Klein, & Klein, 2010). This measure ranges from 0.5 to 1.0 where, if an AUROC curve was 0.5, it would suggest a model has no discrimination ability; an AUROC curve of  $0.5 \leq \text{AUROC} < 0.7$  is considered to show poor discrimination; an AUROC curve of  $0.7 \leq \text{AUROC} < 0.8$  is considered acceptable discrimination; an AUROC curve of  $0.8 \leq \text{AUROC} < 0.9$  is considered to be excellent discrimination; and an AUROC curve of  $\geq 0.9$  is considered to show outstanding discrimination ability (Hosmer Jr et al., 2013).

Finally, odds ratios of each significant risk factor were estimated from the final logistic regression model.

## Chapter Six: Results

### Analysis Series One: At-home vs. Away-from-home

**Demographic and assessment risk factors.** Overall frequency and proportions of demographic variables can be seen in Table 2. Within this sample, the majority of the population identified as male, making up 88.8% ( $n = 871$ ) of the overall sample population. Those who identified as female made up 11.2% ( $n = 110$ ) of the overall sample population.

**Table 2**

*Demographic and assessment risk factors: Overall frequency and proportion of adolescents referred for deliberate firesetting at home and away from home ( $N = 981$ )*

Risk factors	<i>n</i>	%
Gender		
Male	871	88.8
Female	110	11.2
Ethnicity		
Māori	215	22.3
Pacific	42	4.4
Asian	8	0.8
NZ European	692	71.7
Other	7	0.7
Deprivation score		
Top 40%	437	46.9
Lower 60%	494	53.1
Current Residence		
Institution or other	75	7.7
Home	905	92.3

With regards to ethnicity, the majority (71.7%) of participants identified as NZ European, followed by Māori and Pacific, making up 22.3% and 4.4% of the total population sample respectively.

Asian and Other made up a relatively small portion of the sample, with 0.8%, and 0.7% representation. Due to low counts, ethnicity was collapsed to two groups, *Māori and Pacific*, and *non-Māori and non-Pacific*, which comprised NZ European (71.7%), Asian (0.8%) and Other (0.7%). The collapse of ethnicities is a potential limitation of the study, but is common in NZ social science research with a distinction between Māori and non-Māori often used to focus on social deprivation.

Participants in the *top 40%* in deprivation score made up 46.9% of the total population and those in the *lower 60%* made up the remainder 53.1%. The top 40% were considered to be adolescents whose deprivation scores fell between 7 and 10 (most deprived), and the lower 60% reflects scores between 1 and 6 (less deprived). Lastly, under *current residence*, the majority of participants (92.3%) indicated that they were currently staying at home, while 7.7% of adolescents indicated that their current residence was in an institution or other place (Table 2).

**Individual and environmental risk factors.** As seen in Table 3, of the adolescents who participated in the study, the majority (72.8%) reported having no prior history of a psychiatric diagnosis.

**Table 3**

*Individual and environmental risk factors: Overall frequency and proportion of adolescents referred for deliberate firesetting at home and away from home (N = 981)*

<b>Risk Factors</b>	<b><i>n</i></b>	<b>%</b>
Psychiatric diagnosis history		
Yes	267	27.2
No	714	72.8
Psychosocial and/or emotional difficulties		
Yes	551	56.2
No	430	43.8
Experienced abuse and/or neglect		
Yes	361	37
No	615	63
Child welfare agency involvement		
Yes	432	44.2
No	546	55.8
Domestic violence		
Yes	153	15.7
No	822	84.3

Just over half of the participants (56.2%) were identified as either currently or historically having had psychosocial and/or emotional difficulties. With regards to a history of abuse, 63% identified not having had a history of abuse. The child welfare agency was identified to have been involved with the care of 55.8% of the participants, but the majority of participants (84.3%) reported not having been exposed to domestic violence (Table 3).

**Conduct problem risk factors.** As can be seen in Table 4, of the adolescents who had participated in the study, the majority indicated that they had had a history of conduct problems and had previously offended, making up 69.6% and 53.1% of the population respectively.

**Table 4**

*Conduct problems risk factors: Overall frequency and proportion of adolescents referred for deliberate firesetting at home and away from home (N = 981)*

<b>Risk Factors</b>	<b>n</b>	<b>%</b>
Conduct problems		
Yes	683	69.6
No	298	30.4
Previously offended		
Yes	521	53.1
No	460	46.9

**Fire-related risk factors.** Overall frequency and proportions of fire-specific variables are depicted in Table 5. Of the participants in this study, 61.2% indicated that they had misused fire more than once in their history, and conversely, 38.8% reported that the referred firesetting incident was their first. With regards to reported motivation for firesetting, the majority of the overall population denied antisocial (92.3%), attention (94.9%), boredom (60.7%), experimentation (81%) and peer pressure (84.4%) to be motivators. Also, a vast majority (83.5%) denied that there was any intent for the destruction of property. Furthermore, 84.5% of the overall population indicated that firesetting

occurred in a group. The majority of the total population indicated that no accelerant was used (68.2%) and reported experiencing no negative feelings (59.4%).

**Table 5**

*Fire-related risk factors: Overall frequency and proportion of adolescents referred for deliberate firesetting at home and away from home (N = 981)*

<b>Risk factors</b>	<b><i>n</i></b>	<b>%</b>
History of inappropriate fire use		
More than once	572	61.2
First time	363	38.8
Motivation		
Antisocial as a motivation		
Yes	76	7.7
No	905	92.3
Attention as a motivation		
Yes	50	5.1
No	930	94.9
Boredom as a motivation		
Yes	385	39.3
No	595	60.7
Experimentation as a motivation		
Yes	186	19.0
No	794	81.0
Peer pressure as a motivation		
Yes	153	15.6
No	827	84.4
Destruction of property intended		
Yes	162	16.5
No	819	83.5
Firesetting occurred in a group		
Yes	829	84.5
No	152	15.5
Accelerant used		
Yes	312	31.8
No	668	68.2
Negative feelings		
Yes	398	40.6
No	583	59.4

**Chi-square test.** Chi-square test were conducted to analyse whether risk factors were significantly associated with the location of the referred fire incident (adolescents referred for deliberately setting a fire at home, or away from home).

**Demographic and assessment risk factors.** As shown in Table 6, the risk factors *ethnicity* ( $p = .01$ ) and *current residence* ( $p < .03$ ) showed a significant difference between deliberate firesetting that occurred at home and away from home. Adolescents who identified as either Māori or Pacific showed lower odds of being associated with deliberate firesetting that occurred at home compared to firesetting that occurred away from home ( $OR = 0.55$ ).

**Table 6**

*Chi-square test results of demographic and assessment risk factors: Deliberate firesetting at home and away from home*

Risk factors	Home <i>n</i> (%)	Away from home <i>n</i> (%)	OR (95%CI)	<i>p</i> -value
<b>Total</b>	161 (16.4)	820 (83.6)		
<b>Gender</b>				
Male	149 (92.5)	722 (88.0)		0.1
Female	12 (7.5)	98 (12.0)		
<b>Ethnicity</b>				
Māori and Pacific	28 (17.9)	229 (28.4)	0.55 (0.36-0.86)	.01
Non-Māori and Non-Pacific	128 (82.1)	579 (71.7)		
<b>Deprivation</b>				
Top 40%	69 (44.5)	368 (47.4)		0.5
Lower 60%	86 (55.5)	408 (52.6)		
<b>Current residence</b>				
Institution or other	19 (11.8)	56 (6.8)	1.8 (1.05-3.16)	.03
Home	142 (88.2)	763 (93.2)		

In contrast, adolescents who identified they were currently residing at an institution or other place showed 1.8 times greater odds of having been referred for deliberately setting a fire at home,

than did adolescents referred for firesetting that occurred away from home. Chi-square tests also indicated gender ( $p = .1$ ) and deprivation scores ( $p = .5$ ) were not significantly associated with the location of the fire incident (Table 6).

**Individual and environmental risk factors.** As shown in Table 7, an adolescent who had a history of being given a *psychiatric diagnosis* ( $p < .001$ ), who had *psychosocial and/or emotional difficulties* ( $p < .001$ ), *child welfare agency involvement* ( $p < .001$ ), or a history of *domestic violence* ( $p = .03$ ) had risk factors identified to be significantly associated with the location of the referred fire incident. Adolescents with a *psychiatric diagnosis* ( $OR = 3.0$ ), *psychosocial and/or emotional difficulties* ( $OR = 2.1$ ), *child welfare agency involvement* ( $OR = 1.8$ ), or who had experienced *domestic violence* ( $OR = 1.6$ ) showed greater odds of having been referred for deliberately setting a fire at home, compared to fires lit away from home. There was no significant association with the risk factor *experienced abuse and/or neglect* ( $p = .053$ ) and the location of the referred firesetting incident.

**Table 7**

*Chi-square test results of individual and environmental risk factors: Deliberate firesetting at home and away from home*

Risk factors	Home <i>n</i> (%)	Away from home <i>n</i> (%)	OR (95% CI)	<i>p</i> -value
<b>Total</b>	161 (16.4)	820 (83.6)		
<b>Psychiatric diagnosis history</b>				
Yes	77 (46.2)	190 (23.2)	3.0(2.1-4.3)	< .001
No	84 (53.8)	630 (76.8)		
<b>Psychosocial and/or emotional difficulties</b>				
Yes	114 (70.8)	437 (53.3)	2.1(1.5-3.1)	< .001
No	47 (29.2)	383 (46.7)		
<b>Experienced abuse and/or neglect</b>				
Yes	70 (43.8)	291 (35.7)		.053
No	90 (56.3)	525 (64.3)		
<b>Child welfare agency involvement</b>				
Yes	90 (55.9)	342 (41.9)	1.8(1.3-2.5)	0.001
No	71 (44.1)	475 (58.1)		
<b>Domestic violence</b>				
Yes	34 (21.3)	119 (14.6)	1.6(1.03-2.42)	.03
No	126 (78.8)	696 (85.4)		

**Conduct problems risk factors.** As shown in Table 8, *previous offending* ( $p < .001$ ) was significantly associated with the location of the referred firesetting incident. The odds of adolescents who had a history of previous offending being referred for firesetting that occurred at home ( $OR = 0.3$ ), were less when compared to the away-from-home group.

No significant associations between reported history of conduct problems and the location of the fire incident were observed ( $p > 0.2$ ).

**Table 8**

*Chi-square test results of conduct problem risk factors: Deliberate firesetting at home and away from home.*

Risk factors	Home <i>n</i> (%)	Away from home <i>n</i> (%)	OR (95% CI)	<i>p</i> -value
<b>Total</b>	161 (16.4)	820 (83.6)		
<b>Conduct problems</b>				
Yes	119 (73.9)	564 (68.8)		0.2
No	42 (26.1)	256 (31.2)		
<b>Previously offended</b>				
Yes	51 (31.7)	470 (57.3)	0.3(0.2-0.5)	< .001
No	110 (68.3)	350 (42.7)		

**Fire-related risk factors.** As shown in Table 9, the chi-square test of fire-specific risk factors identified that a history of using fire inappropriately had a very strong significant ( $p < .001$ ) association with the location of the referred fire incident. Adolescents who reported a history of inappropriate use of fire more than once showed 2.9 times greater odds of being referred for firesetting at home than away from home.

Furthermore, two types of motivations were identified to be statistically significant, these being *experimentation* ( $p < .001$ ) and *peer pressure* ( $p < .001$ ), indicating that the odds of an adolescent being driven by *experimentation* as a motivator was 2.2 times greater amongst those referred for firesetting

**Table 9**

*Chi-square test results of fire-related risk factors: Deliberate firesetting at home and away from home*

<b>Risk factors</b>	<b>Home n (%)</b>	<b>Away from home n (%)</b>	<b>OR (95% CI)</b>	<b>p-value</b>
<b>Total</b>	161 (16.4)	820 (83.6)		
<b>History of inappropriate fire use</b>			2.9(1.9-4.4)	< .001
More than once	122 (79.7)	450 (57.5)		
First time	31 (20.3)	332 (42.5)		
<b>Motivation</b>				
<b>Antisocial as a motivation</b>				0.3
Yes	16 (9.9)	60 (7.3)		
No	145 (90.1)	760 (92.7)		
<b>Attention as a motivation</b>				0.8
Yes	9 (5.6)	41 (5.0)		
No	152 (94.4)	778 (95.0)		
<b>Boredom as a motivation</b>				0.7
Yes	61 (37.9)	324 (39.6)		
No	100 (62.1)	495 (60.4)		
<b>Experimentation as a motivation</b>			2.2(1.5-3.2)	< .001
Yes	49 (30.4)	137 (16.7)		
No	112 (69.6)	682 (83.3)		
<b>Peer pressure as a motivation</b>			0.3(0.2-0.6)	< .001
Yes	10 (6.3)	143 (17.5)		
No	151 (93.8)	676 (82.5)		
<b>Destruction of property intended</b>			0.5(0.3-0.9)	.03
Yes	17 (10.6)	145 (17.7)		
No	144 (89.4)	675 (82.3)		
<b>Firesetting occurred in a group</b>			0.08(0.05-0.1)	< .001
Yes	76 (47.2)	753 (91.9)		
No	85 (52.8)	67 (8.2)		
<b>Accelerant used</b>				0.55
Yes	48 (29.8)	264 (32.2)		
No	113 (70.2)	555 (67.8)		
<b>Negative feelings</b>			0.6(0.4-0.8)	0.001
Yes	47 (29.2)	351 (42.8)		
No	114 (70.8)	469 (57.2)		

that occurred at home than the away-from-home group. In contrast, adolescents who reported to have been motivated by *peer pressure* had lesser odds of being associated with deliberate firesetting that occurred at home, compared to the away-from-home group ( $OR = 0.3$ ).

*Destruction of property intended* was also observed to have been significant ( $p = .03$ ). With an odds ratio of 0.5, adolescents who reported intention to destroy property showed lesser odds of having been referred for firesetting that occurred at home, compared to those in the away-from-home group. Additionally, an adolescent who was a part of a group at the time of the incident was significantly ( $p < .001$ ) associated with the location of the referral incident. Specifically, adolescents who were reported to have been in a group at the time of the incident showed lesser odds of having been associated with firesetting that occurred at home, compared to away from home ( $OR = .08$ ).

Adolescents who reported having experienced negative feelings during the incident had less odds of being associated with firesetting that occurred at home than incidents away from home ( $OR = 0.6$ ;  $p = .001$ ).

There was no significant association ( $p = 0.55$ ) between an accelerant being used and the location of the referred fire incident.

### **Logistic Regression: Deliberate firesetting that occurred at home and away from home**

**Analysis of variance.** As shown in Table 10, after the stepwise variable selection, variables that were not selected into the model were *destruction of property intended*, *child welfare agency involvement*, *current residence*, *psychosocial/emotional difficulties*, and *domestic violence*. The only exception of variables that remained in the model and did not show statistical significance were the control variables of *gender* and *deprivation score*. Variables that remained in the model, thus showing statistical significance, were the control variable *ethnicity* ( $p = .0012$ ), *firesetting occurred in a group* ( $p < .001$ ), *previously offended* ( $p < .001$ ), *experimentation as a motivation* ( $p < .001$ ), *history of*

*inappropriate fire use* ( $p = .0027$ ), *psychiatric diagnosis history* ( $p = .0035$ ), *negative feelings* ( $p = .0182$ ), and *peer pressure as a motivation* ( $p = .0389$ ).

**Table 10**

*ANOVA table of final logistic regression model after the stepwise model selection with controlled variables: Deliberate firesetting at home and away from home*

<b>Variable</b>	<b>df</b>	<b>Wald Chi-Square</b>	<b>p-value</b>
<i>Gender*</i>	1	0.8904	0.3454
<i>Deprivation score*</i>	1	0.0534	0.8173
<i>Ethnicity*</i>	1	10.5224	.0012
<i>Firesetting occurred in a group</i>	1	106.2444	< .001
<i>Previously offended</i>	1	26.3252	< .001
<i>Experimentation as a motivation</i>	1	13.6371	< .001
<i>History of inappropriate use of fire</i>	1	9.0334	0.0027
<i>History of psychiatric diagnosis</i>	1	8.5047	0.0035
<i>Negative feelings</i>	1	5.5786	0.0182
<i>Peer pressure as a motivation</i>	1	4.2651	0.0389

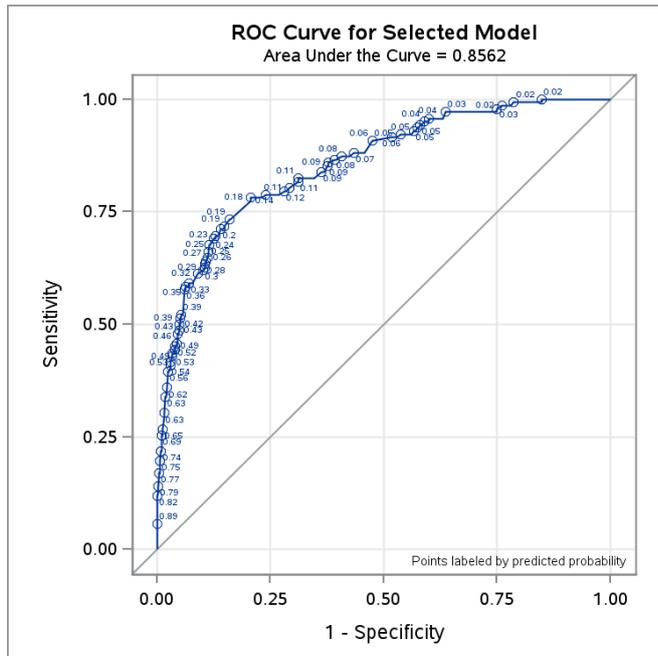
\*Control variables.

**Receiver Operating Characteristics.** The fitted model observed a 0.86 measure for the area under the ROC (Figure 1). This indicates that the fitted model is considered to show excellent accuracy,

indicating an 86% chance that those who set fires at home will be associated with the predictor variables.

**Figure 1**

*ROC: Deliberate firesetting at home and away from home with the inclusion of controlled variables*



**Odds ratios.** Odds ratio can be viewed in Table 11. Adolescents who were identified as *non-Māori and non-Pacific* were shown to have 2.7 times greater odds of being referred for firesetting that occurred at home than away from home. Those who *set fires alone* were also shown to have 13.2 times greater odds of being associated with firesetting that occurred at home, relative to away from home referrals. The risk factor *previously offended* showed that adolescents with no previous offending history had 3.4 times greater odds of being associated with firesetting at home than deliberate fires away from home. Adolescents who reported *experimentation* as a motivation had 2.62 times greater odds of being associated with firesetting at home, than away from home, and those with a *history of inappropriate use of fire* had 2.23 times greater odds of firesetting at home, than away from home. Also, having a history of a *psychiatric diagnosis* showed 2 times greater odds of being associated with adolescents referred for firesetting that occurred at home, than away from home. Adolescents who reported not experiencing *negative feelings* at the time of the fire incident were shown to have 1.79

times greater odds of being associated with firesetting that occurred at home, than away from home. Lastly, adolescents who identified *peer pressure* as not a motivator showed 2.39 times greater odds of being associated with firesetting at home than deliberate fires away from home.

**Table 11**

*Deliberate firesetting at home and away from home final logistic regression model: Odds ratios with at home group as reference group of significant risk factors that underwent a stepwise model selection with controlled risk factors gender, deprivation score and ethnicity*

Variable	Comparisons	OR (95% CI)
Ethnicity*	Non-Māori and Non-Pacific vs Māori and Pacific	2.7 (1.48-4.92)
Firesetting in a group	Solitary firesetting vs Firesetting in a group	13.2 (8.09-21.6)
Previously offended	No previous offences vs Previously offended	3.4 (2.13-5.43)
Experimentation as a motivation	Experimentation as motivation vs Experimentation not motivation	2.62 (1.57-4.36)
History of inappropriate use of fire	More than once vs First time	2.23 (1.32-3.77)
Psychiatric diagnosis history	Having a psychiatric diagnosis history vs No psychiatric diagnosis history	2.00 (1.25-3.17)
Negative feelings	Did not experience negative feelings vs Experienced negative feelings	1.79 (1.1-2.89)
Peer pressure as a motivation	Peer pressure not motivation vs Peer pressure as motivation	2.39 (1.05-5.47)

\*Control variable.

## Analysis Series Two: At-home vs. At-school

**Demographic and assessment risk factors.** As shown in Table 12, within this sample, the majority of the participants identified as male (87.8%) with the remainder 12.2% of participant identifying as female. The largest ethnic population was observed to be NZ European, making up 72.5% of the total population, followed by Māori and Pacific, making up 21.3% and 4.6% of the population respectively, while Asian (1%) and Other (0.6%) ethnic groups made up a smaller portion of the sample. Due to low counts, ethnic group was collapsed into two groups, these being Māori and Pacific, and non-Māori and non-Pacific.

**Table 12**

*Demographic and assessment risk factors: Overall frequency and proportion of adolescents referred for deliberate firesetting at home and school (N = 516)*

Risk factors	<i>n</i>	%
Gender		
Male	453	87.8
Female	63	12.2
Ethnicity		
Māori	108	21.3
Pacific	23	4.6
Asian	5	1
NZ European	367	72.5
Other	3	0.6
Deprivation		
Top 40%	230	47.2
Lower 60%	257	52.8
Current Residence		
Institution or other	42	8.2
Home	473	91.8

Just over half (52.8%) of participants fell in the lower 60% of deprivation scores (less deprived), and 47.2% of the population were in the top 40% of deprivation scores (most deprived). Additionally, almost all (91.8%) of the adolescents in this sample currently resided at home, while 8.2% of the adolescents indicated that they resided in an institution or other place (Table 12).

**Individual and environmental risk factors.** Within this sample, 30% of participants reported not ever having been diagnosed with a psychiatric disorder; thus, the majority (70%) had a history of being diagnosed with some form of psychiatric disorder (Table 13). Furthermore, the majority (60%) of the population reported to currently have some form of psychosocial and/or emotional difficulty. In regards to whether the participants had experienced abuse, the majority (61.2%) reported they had not and most (84.2%) also did not appear to have a history of exposure to domestic violence. Lastly, just over half (54%) of the participants had had child welfare involvement at some point in their lives.

**Table 13**

*Individual and environmental risk factors: Overall frequency and proportion of adolescents referred for deliberate firesetting at home and school (N = 516)*

<b>Risk factors</b>	<b><i>n</i></b>	<b>%</b>
Psychiatric diagnosis history		
Yes	155	30.0
No	361	70.0
Psychosocial and/or emotional difficulties		
Yes	310	60.0
No	206	40.0
Experienced abuse and/or neglect		
Yes	199	38.8
No	314	61.2
Child welfare agency involvement		
Yes	237	46.0
No	278	54.0
Domestic violence		
Yes	81	15.8
No	432	84.2

**Conduct problems risk factors.** Within this sample, the majority (71.1%) of adolescents were identified to have had conduct problems (Table 14). Just over half (57.2%) did not have a history of previous offending. With regards to previous offending severity, roughly a third (33.9%) of adolescents in the sample had a history of moderate offending, followed by those with minor (4.8%) or severe offences (4.1%).

**Table 14**

*Conduct problem risk factors: Overall frequency and proportion of adolescents referred for deliberate firesetting at home and school (N = 516)*

<b>Risk factors</b>	<b><i>n</i></b>	<b>%</b>
Conduct problems		
Yes	367	71.1
No	149	28.9
Previously Offended		
Yes	221	42.8
No	295	57.2

**Fire-related risk factors.** As shown in Table 15, within this sample, 64.7% of adolescents were identified to have used fire inappropriately more than once in their lifetime. In contrast, just over a third (35.3%) of the adolescents in the sample reported that it was their first time of using fire inappropriately. Of the motivations that were recorded (antisocial, attention, boredom, experimentation, and peer pressure), overall the majority of the participants denied having been motivated by antisocial reasons (90.5%), attention (94.0%), boredom (62.9%), experimentation (78.6%), or peer pressure (83.9%). Predominantly, most of the adolescents (86.4%) indicated that they did not intend the destruction of property. Of the adolescents who participated, 76.7% of the sample indicated they had been in a group at the time of the incident. The majority of the sample (67.6%) reported that they did not use an accelerant at the time of the referred incident. Furthermore, 63.2% denied experiencing negative feelings at the time of the incident.

**Table 15**

*Fire-related risk factors: Overall frequency and proportion of adolescents referred for deliberate firesetting at home and school (N = 516)*

<b>Risk factors</b>	<b><i>n</i></b>	<b>%</b>
History of inappropriate fire use		
More than once	317	64.7
First time	173	35.3
Motivation		
Antisocial as a motivation		
Yes	49	9.5
No	467	90.5
Attention as a motivation		
Yes	31	6.0
No	484	94.0
Boredom as a motivation		
Yes	191	37.1
No	324	62.9
Experimentation as a motivation		
Yes	110	21.4
No	405	78.6
Peer pressure as a motivation		
Yes	83	16.1
No	432	83.9
Destruction of property intended		
Yes	70	13.6
No	446	86.4
Firesetting occurred in a group		
Yes	396	76.7
No	120	23.3
Accelerant used		
Yes	167	32.4
No	349	67.6
Negative feelings		
Yes	190	36.8
No	326	63.2

**Chi-square test.** Chi-square tests were conducted to analyse whether risk factors were significantly associated with the location of the fire incident (at home or at school).

**Demographic variables.** Chi-square test results of demographic and assessment risk factors indicated three significant risk factors associated with the location of referred firesetting incident: *current residence* ( $p = .04$ ), *gender* ( $p = .03$ ) and *ethnicity* ( $p = .007$ ) (Table 16). No significant association between deprivation scores ( $p = .41$ ) and location of fire incident was observed.

**Table 16**

*Chi-square test results of demographic and assessment risk factors: Deliberate firesetting at home and school*

Risk factors	Home <i>n</i> (%)	School <i>n</i> (%)	OR (95%CI)	<i>p</i> -value
<b>Total</b>	161 (31.2)	355 (68.8)		
<b>Gender</b>				
Male	149 (92.5)	304 (85.6)	2.1(1.1-4.0)	0.03
Female	12 (7.5)	51 (14.4)		
<b>Ethnicity</b>				
Māori and Pacific	28(17.9)	103 (29.4)	0.52(0.33-0.84)	0.007
Non-Māori and Non-Pacific	128 (82.1)	247 (70.6)		
<b>Deprivation score</b>				
Top 40%	69 (44.5)	161 (48.5)		0.41
Lower 60%	86 (55.5)	171 (51.5)		
<b>Current residence</b>				
Institution or other	19 (11.8)	23 (6.5)	1.9 (1.0-3.6)	0.04
Home	142 (88.2)	331 (93.5)		

Of the risk factors that were observed to be significant, odds ratio indicated adolescents who resided in an institution or other place currently, had odds 1.9 times greater of being associated with adolescents referred for firesetting that occurred at home, rather than at school. In regards to gender, adolescents who identified as male showed 2.1 times greater odds of being associated with firesetting that occurred at home, than at school. The variable *ethnicity* was collapsed into two categories (Māori

and Pacific; and non-Māori and non-Pacific) due to low cell count. For *ethnicity*, it was observed that participants who had identified as Māori or Pacific were less likely to be associated with firesetting that occurred at home, compared to those referred for firesetting at school ( $OR = 0.52$ ).

**Psychosocial, emotional and environmental risk factors.** Of the five psychosocial, emotional and environmental risk factors assessed in this study, four variables were identified to be significantly associated with the location of the referred fire incident (Table 17). These risk factors were *psychiatric diagnosis ever* ( $p < .001$ ), *psychosocial and/or emotional difficulties* ( $p = .001$ ), *child welfare agency involvement* ( $p = .002$ ) and *domestic violence* ( $p = .02$ ). In contrast, the risk factor *experienced abuse and/or neglect* ( $p = .12$ ) was not observed to be significantly associated with the location of the referred fire incident.

Of the risk factors that showed significant associations with the location of the referred fire incident, odds ratios indicated that adolescents who had had a history of a psychiatric diagnosis had 3.3 times greater odds of being referred for firesetting at home, compared to adolescents who had been referred for firesetting at school. Adolescents who had had psychosocial and/or emotional difficulties also showed 2 times greater odds of being associated with firesetting at home compared to at school. Similarly, adolescents who were recorded as having had child welfare involvement showed 1.8 times greater odds of being associated with firesetting at home, compared to the at-school group. Lastly, adolescents who had had a history of domestic violence showed 1.8 times greater odds of being associated with firesetting at home compared to at school (Table 17).

### **Conduct problem risk factors**

Of the two conduct problem risk factors, *previously offended* ( $p = .001$ ) was the only risk factor that was identified to be significantly associated with the location of the referred fire incident (Table 18). The variable *conduct problems* ( $p = .4$ ) was not significantly associated with the location of the referred fire incident. Adolescents who had a history of *previous offending* were less likely to have been referred for fire setting at home when compared to at-school firesetting ( $OR = 0.5$ ) (Table 18).

**Table 17**

*Chi-square test results of individual and environmental risk factors: Deliberate firesetting at home and school*

Risk factors	Home n (%)	School n (%)	OR (95% CI)	p-value
<b>Total</b>	161 (31.2)	355 (68.8)		
<b>Psychiatric diagnosis history</b>				
Yes	77 (47.8)	78 (22)	3.3(2.2-4.8)	< .001
No	84 (52.2)	277 (78)		
<b>Psychosocial and/or emotional difficulties</b>				
Yes	114 (70.8)	196 (55.2)	2.0(1.3-2.9)	.001
No	47 (29.20)	159 (44.8)		
<b>Experienced abuse and/or neglect</b>				
Yes	70 (43.8)	129 (36.5)		0.12
No	90 (56.2)	224 (63.5)		
<b>Child welfare agency Involvement</b>				
Yes	90 (55.9)	147 (41.5)	1.8(1.2-2.6)	0.002
No	71 (44.1)	207 (58.5)		
<b>Domestic violence</b>				
Yes	34 (21.2)	47 (13.3)	1.8(1.1-2.9)	.02
No	126 (78.8)	306 (86.7)		

**Table 18**

*Chi-square test results of conduct problems risk factors: Deliberate firesetting at home and school*

Risk factors	Home n (%)	School n (%)	OR (95% CI)	p-value
<b>Total</b>	161 (31.2)	355 (68.8)		
<b>Conduct problems</b>				
Yes	119 (73.9)	248 (69.9)		0.4
No	42 (26.1)	107 (30.1)		
<b>Previously offended</b>				
Yes	51 (31.7)	170 (47.9)	0.5(0.3-0.7)	0.001
No	110 (68.3)	185 (52.1)		

## Fire specific risk factors

Of the ten fire-specific risk factors, five were identified as being significantly associated with the location of the referred fire incident as shown in Table 19. These variables were *history of inappropriate use of fire* ( $p < .001$ ), *experimentation as a motivation* ( $p = .001$ ), *peer pressure as a motivation* ( $p < .001$ ), *firesetting occurred in a group* ( $p < .001$ ), and *negative feelings* ( $p = .02$ ). In contrast, the risk factors *antisocial as a motivation* ( $p = .82$ ), *attention as a motivation* ( $p = .78$ ), *boredom as motivation* ( $p = 0.80$ ), *destruction of property intended* ( $p = .18$ ), and *accelerant used* ( $p = .4$ ) were not observed to be significantly associated with the location of the referred fire incident.

Of the variables that were observed to be significantly associated with the location of the referred fire incident, odds ratios indicated that adolescents who reported having used fire inappropriately more than once showed 2.9 times greater odds of being referred for firesetting at home, compared to firesetting at school. Similarly, adolescents who identified experimentation as a motivation for their firesetting showed greater odds by 2.1 times to have been referred for firesetting at home, compared to the at-school group.

In contrast, adolescents who identified peer pressure as a motivation ( $OR = 0.3$ ), who were a part of a group at the time of incident ( $OR = 0.1$ ), or experienced negative feelings at the time of incident ( $OR = 0.6$ ) were less likely to be associated with a referral for firesetting at home, compared to at-school firesetting referrals (Table 19).

## Logistic regression: Deliberate firesetting that occurred at home and at school

**Analysis of variance.** As shown in Table 20, risk factors that remained statistically significant, and therefore observed to be independent of other factors, were *firesetting occurred in a group* ( $p < .001$ ), *experimentation as a motivator* ( $p < .001$ ), *history of inappropriate use of fire* ( $p = .001$ ), *previously offended* ( $p = .0022$ ), *ethnicity* ( $p = .0066$ ), *peer pressure as a motivator* ( $p = .0102$ ) and *history of psychiatric diagnosis* ( $p = .0203$ ).

**Table 19**

*Chi-square test results of fire-related risk factors: Deliberate firesetting at home and school*

<b>Fire specific risk factors</b>	<b>Home n (%)</b>	<b>School n (%)</b>	<b>OR (95% CI)</b>	<b>p-value</b>
<b>Total</b>	161 (31.2)	355 (68.8)		
<b>History of inappropriate fire use</b>				
More than once	122 (79.7)	195(57.9)	2.9(1.8-4.5)	< .001
First time	31 (20.3)	142 (42.1)		
<b>Motivation</b>				
<b>Antisocial as motivation</b>				
Yes	16 (9.9)	33 (9.3)		0.82
No	145 (90.1)	322 (90.7)		
<b>Attention as a motivation</b>				
Yes	9 (5.6)	22 (6.2)		0.78
No	152 (94.4)	332 (93.8)		
<b>Boredom as a motivation</b>				
Yes	61 (37.9)	130 (36.7)		0.80
No	100 (62.1)	224 (63.3)		
<b>Experimentation as a motivation</b>				
Yes	49 (30.4)	61 (17.2)	2.1(1.4-3.2)	.001
No	112 (69.6)	293 (82.8)		
<b>Peer pressure as a motivation</b>				
Yes	10 (6.2)	73 (20.6)	0.3(0.1-0.5)	< .001
No	151 (93.8)	281 (79.4)		
<b>Destruction of property intended</b>				
Yes	17 (10.6)	53 (14.9)		0.18
No	144 (89.4)	302 (85.1)		
<b>Firesetting occurred in a group</b>				
Yes	76 (47.2)	320 (90.1)	0.1(0.1-0.2)	< .001
No	85 (52.8)	35 (9.9)		
<b>Accelerant used</b>				
Yes	48 (29.8)	119 (33.5)		0.4
No	113 (70.2)	236 (66.5)		
<b>Negative feelings</b>				
Yes	47 (29.2)	143 (40.3)	0.6(0.4-0.9)	.02
No	114 (70.8)	212 (59.7)		

**Table 20**

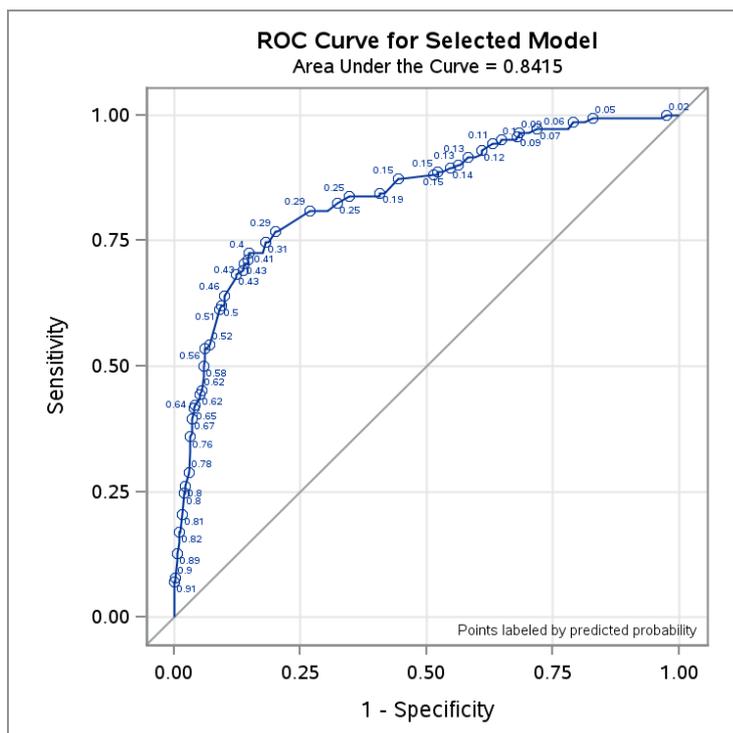
*ANOVA table of final logistic regression model after the stepwise model selection with controlled variables: Deliberate firesetting at home and school*

Variable	df	Wald Chi-Square	p-value
Gender*	1	1.0299	0.3102
Deprivation score*	1	0.0142	0.9052
Ethnicity*	1	7.3765	.0066
Firesetting occurred in a group	1	64.9687	< .001
Experimentation as a motivation	1	10.2554	< .001
History of inappropriate use of fire	1	10.7913	.0010
Previously offended	1	9.3933	.0022
Peer pressure as a motivation	1	6.5950	.0102
History of psychiatric diagnosis	1	5.3823	.0203

\*Control variables.

**Figure 2**

*ROC: Deliberate firesetting at home and school with the inclusion of controlled variables*



**Receiver Operating Characteristic.** For the data, the area under the ROC curve is 0.84 (Figure 2, above). This measure indicates that the fitted model displayed excellent accuracy and suggests an 84% chance that those who set fires at home will be associated with the predictor variable.

**Table 21**

*Deliberate firesetting at home and school final logistic regression model: Odds ratios with at home group as reference group of significant risk factors that underwent a stepwise model selection with controlled risk factors gender, deprivation score and ethnicity*

Variable	Comparison group	OR (95% CI)
Ethnicity*	Non-Māori and Non-Pacific vs Māori and Pacific	2.54 (1.30, 4.96)
Firesetting occurred in a group	Solitary firesetting vs Firesetting occurred in a group	10.18 (5.79, 17.91)
Experimentation as a motivation	Experimentation as a motivation vs Experimentation not a motivation	2.59 (1.446, 4.626)
History of inappropriate use of fire	More than once vs First time	2.68 (1.487, 4.811)
Previously offended	No previous offence vs previously offended	2.26 (1.342, 3.815)
Peer pressure as a motivation	Peer pressure not motivation vs peer pressure as a motivation	3.09 (1.306, 7.289)
Psychiatric diagnosis history	Has a psychiatric diagnosis history vs no psychiatric diagnosis history	1.87 (1.10,3.18)

\*Control variables.

**Odds ratio.** *Firesetting that occurred in a group* showed the largest odds ratio, with adolescents who identified as having not been a part of a group at the time of incident were observed to have odds

of 10.18 times greater of being associated with firesetting at home than the at-school firesetting group (Table 21). This is followed by the risk factor *peer pressure as motivation*. Adolescents who reported peer pressure as not a form of motivation had 3.09 times greater odds of being linked to firesetting at home, relative to firesetting at school. Furthermore, adolescents who had no history of previous offending ( $OR = 2.6$ ), who identified as non-Māori or non-Pacific ( $OR = 2.54$ ), who reported motivation for fire incident was due to experimenting ( $OR = 2.59$ ), who had a history of using fire inappropriately more than once ( $OR = 2.69$ ), or who had a psychiatric history of being diagnosed ( $OR = 1.87$ ) had greater odds of being associated with adolescents being referred for firesetting at home, compared to the at-school group.

## Chapter Seven: Discussion At-home vs. Away-from-home firesetters

### Introduction

The current study analysed responses from a semi-structured interview with adolescents referred to the New Zealand Fire Prevention Programme for deliberately setting a fire. The study aimed to i) identify whether adolescents who had deliberately set a fire at home differed from adolescents who had deliberately set a fire away from home, especially at a school, and ii) identify predictors across four categories of risk factors - demographic, individual and environmental, conduct problems, and fire-related.

The data were analysed in two parts, with each individual part having undergone two different methods of data analysis: descriptive statistics and a logistic regression. The first part of the analysis involved the comparison between adolescents referred for deliberately firesetting at home or away from home. The second part of the analysis focused on the comparison between adolescents referred for deliberately firesetting at home or at school. Given the order of the analysis, discussion of the findings is presented in two sections. The initial discussion focuses on findings related to adolescents referred for deliberately firesetting at home or away from home. The further discussion (Chapter Eight) explores the findings comparing adolescents referred for deliberately firesetting at home or at school.

The purpose of this section is to discuss the results of the study and how they relate to previous literature regarding adolescents who deliberately set fires.

### Overview of results

This is the first study to explore significant risk factors associated with the location of adolescent firesetting. In the final model, with the inclusion of controlled variables (gender, deprivation score and ethnicity), several significant risk factors were identified; namely, to whether or not firesetting took place with peers; whether the young person did or did not have a history of offending, a history of inappropriate use of fire, and/or a history of psychiatric diagnosis; whether they

experienced negative feelings or did not; whether their motivations were experimentation or peer pressure; and what their ethnicity was.

Adolescents referred for deliberately setting a fire away from home, relative to adolescents referred for deliberately setting a fire at home, showed higher odds of being associated with a range of risk factors. These risk factors were: being in a group at the time of firesetting incident; having a history of offending; firesetting that was not motivated by experimentation; reporting that it was their first inappropriate fire use; that they were observed not to have a history of a psychiatric diagnosis; reported experiencing negative feelings of being either scared or ashamed or both; that the firesetting was motivated by peer pressure; and that they identified as either Māori or Pacific.

Conversely, adolescents referred for deliberate firesetting at home, when compared to adolescents referred for firesetting away from home, showed greater odds of being alone at the time of the firesetting incident; having no history of offending; that the firesetting was more likely to be motivated by experimentation; that they had a history of inappropriate use of fire; that they were more likely to have a history of a psychiatric diagnosis; denied experiencing negative feelings; denied firesetting to have been motivated by peer pressure; and identified as being either non-Māori or non-Pacific.

### **Is there a difference between at-home and away-from-home firesetters?**

The first aim of the study was to identify whether adolescents who set fires at home differed on a variety of risk factors when compared to adolescents who set fires away from home. The current study indicates that there were differences between the two groups. Given the literature, it should come as no surprise to observe adolescent firesetting away from home (Hickle & Roe-sepowitz, 2010; Klein et al., 2008; Pooley & Ferguson, 2017). As depicted in Pooley and Ferguson's (2017) study, setting fires away from home was characteristic of adolescent firesetters, when compared to younger age groups. The study understood the change in behaviour over time with the application of the RAT and CPT, where the youth's misuse of fire was observed to coincide with the intersection of contextual

elements, that included age-dependent routines, lack of supervision, and one's activity and awareness spaces. Adolescents, as an age-group, possess unique developmental characteristics, that theoretically inform potential targets they are likely to set alight. These include increased autonomy at this age, which can influence routines outside of the home; for instance, the capacity to go to school without a guardian or fewer restrictions imposed on unstructured time. This, in turn, expands their activity and awareness spaces of potential targets and therefore increases opportunities for covert misbehaviours such as firesetting, if motivated. These opportunities also further expand, once they are able to drive. Thus, the characteristics of adolescents who are associated with setting fires away from home in the current study are in line with expectations of the broader literature on adolescent firesetters.

However, the study has potentially identified a subgroup within adolescent firesetters, given that significant differences between adolescent firesetters based on location were observed - that is, between adolescents referred for firesetting at home, and those referred for firesetting away from home. According to the RAT and CPT theories, the occurrence of unsanctioned fire is largely dependent on the awareness of space that the perpetrator has. The availability of space over time is formed through one's daily routines, where both the locations of activity (e.g., home) and the route between these activity spaces (e.g., from home to school) encompass potential targets. Then, perhaps, adolescents referred for setting a fire at home reflect a subgroup of adolescent firesetters who have limited places where they feel able to prompt an unsanctioned fire. Additionally, there is a possibility that adolescents who set fires at home may also indicate a subgroup who have a different relationship to fire or the function of fire is different, compared to adolescents who set fires away from home. Santtila et al. (2003) described juveniles who set fires at home as carrying out an attack on themselves and further categorised them as an expressive-person type - that is, these firesetters are driven internally, and fire use is a strategy to relieve distress or satisfy personal needs. Adolescents who set fires away from home potentially reflect a population that is familiar within the broader understanding of adolescent firesetting. In contrast, adolescents referred for firesetting at home are a subgroup that is less recognised within the literature. The current study shows evidence of factors that influence

firesetting behaviour that diverge from the broader adolescent firesetting literature. The findings are therefore novel. Because there are not yet equivalent comparisons in adolescent firesetting literature, the following discussion is exploratory, drawing on themes in the existing literature and pointing to the need for further research.

### **Predictors**

Willis (2015) suspected that if research were to focus on different subgroups, we would begin to see these subgroups being identified with their own contextualising factors. The present study is in keeping with Willis's (2015) assumption, by observing multiple significant risk factors associated with adolescent firesetters depending on where they had set the fire, such as being in a group at the time of the fire incident. Firesetting amongst peers showed the largest odds ratio ( $OR = 13.2$ ) in the present study. Adolescents referred for setting a fire away from home were more likely to have instigated the fire in a group, relative to adolescents referred for setting a fire at home. Although setting a fire in a group is one of the more defining characteristics of adolescents who deliberately set fires (Santtila, Hakkanen, et al., 2003; Stewart & Culver, 1982), it is, however, unique to have identified an association between group firesetting and the location of the fire incident. The relationship between adolescents deliberately setting a fire away from home, and in the company of peers, could appear to be more developmentally in keeping with expectations of this age group.

Pooley and Ferguson (2017) not only observed fires instigated away from the homes of the adolescent firesetters, but they also identified age-specific opportunities for intentional fires to occur. In their study, the majority of misuse of fire coincided within age-specific unstructured time. Developmentally unstructured time changes as one's autonomy and social activity matures. For example, a temporal cluster for adolescents (13 to 16 years old) in their population to engage in misuse of fire was between the hours of 4:00 pm and midnight. In contrast, children aged between 6 and 12 years old had a temporal cluster between 3:00 pm and 5:00 pm. Both age groups are using the unstructured and unsupervised time after school hours; however, the adolescent group use

unstructured time later in the day. Therefore, this highlights how developmental changes influence firesetting behaviour.

With the addition of a growing awareness of space that extends outside of the home environment in adolescence (Corry, 2002; Dolan et al., 2011), and it being developmentally normal for adolescents to conduct themselves in a peer group, which could be assumed to typically occur within unstructured time, it could be argued that a combination of one's ability to be away from home, coupled with developmentally appropriate peer socialising, would partially account for this observed relationship in adolescents who set fires away from home.

In comparison, setting fires at home solitarily would appear to be rather surprising, given an expected increase in targets, opportunities and socialising during adolescence. Setting fires alone at home could possibly reflect home to be an environment in which they spend most of their unstructured time or a limited awareness of other space they can access. Juveniles who set fires alone are associated with being more socially withdrawn, which may further inform the occurrence of firesetting at home alone (McCardle et al., 2004). Potentially by being more socially isolative, they are less likely to be socialising outside of the home. In any case, the decision to set a fire is complicated and other contextual factors are likely to be involved (Kolko, Wilcox, Nishi-Strattner, & Kopet, 2002). In a study by Hickle and Roe-sepowitz (2010), they found that juveniles who set fires alone were more likely to have reported being in a crisis at the time of the incident. Additionally, lone firesetters were identified to be more easily upset, in comparison to juveniles who had deliberately set a fire with their peers. With the findings of Hickle and Roe-sepowitz (2010) in mind, it may suggest that the adolescents referred for setting a fire at home in our study may have set the fire due to intrinsically motivated reasons that might be related to family discord or distress.

The findings of the current study suggest the adolescents referred for setting fires away from home are reminiscent of Fineman's (1995) subtype of 'delinquent firesetters'. Delinquent firesetters are considered to set fires within a group and are especially influenced by peer-oriented motives

(Fineman, 1995; Hickle & Roe-sepowitz, 2010; Kolko, 2002). Our study not only identified adolescents referred for setting fires away from home to be associated with setting a fire in a group, but they were also more likely to have been motivated by peer pressure. This association with peer pressure could be understood as developmentally expected, given the increase in awareness of their social status and typical social interactions in adolescence. As such, reported peer pressure amongst adolescent firesetters is common and committing to setting a fire during adolescence requires some form of support, encouragement or being allured by their peers, which assists them in committing to the action (Uhnoo et al., 2015). This additional support could be required because the adolescent who instigated the firesetting is not always the person who introduced the idea or is even the most motivated to deliberately set the fire (Uhnoo, 2015). What could be gained for the adolescents who set fires under peer pressure are elements of status-conferring and establishing relationships with their peers (Slavkin & Fineman, 2000; Warr, 2002). Upholding these relationships could be particularly important, given that adolescent firesetters have been found to be particularly sensitive towards peer rejection. However, it could also be possible that the adolescent who actioned the firesetting inhabits a status within their respective peer group of less power, and therefore they are more easily pressured (Chen et al., 2003; Uhnoo, 2015). Our study may therefore show evidence that fires that occur away from home are more likely to be motivated by an external source, relative to firesetting that occurs at home.

Rarely is there a single motive behind firesetting (Walsh & Lambie, 2013). Despite this, the present study may show evidence for internal and external motives as a predictor of location of adolescent firesetting. In addition to independently observing solitary firesetting to be predictive of adolescents setting a fire at home, this adolescent group was also significantly more likely to have been motivated by experimentation. Although deliberate firesetting driven by experimentation in this age group is not a novel finding (Pinsonneault, 2002; Stadolnik, 2000), it is interesting that a significant contrast of motivations between the two adolescent groups is observed. Potentially this indicates that when firesetting occurs at home, it is more likely to be associated with an internal drive, rather than from an external source such as peer pressure, as observed in the away-from-home group. Possibly at

the time of the incident, adolescents who had set a fire at home were unable or lacked sufficient coping strategies to satisfy internal needs with more adaptive behaviours. In contrast, given that adolescents referred for setting a fire away from home were more likely to have been motivated by peer pressure, that may reflect limitations in their ability to navigate social dynamics.

The significant risk factors discussed so far reflect the immediate situational context of each respective firesetting location. Fires that were lit away from home were more likely to happen in a group setting and be motivated by peer pressure, while fires that happened at home were more likely to be prompted alone and driven by experimentation. Knowing these differences provides some potentially vital insights and understanding of the immediate influences of the two respective firesetting locations. To further develop our understanding of deliberate firesetting by adolescents, it is essential to equally consider pre-existing problems as a risk factor (Hickle & Roe-sepowitz, 2010). For example, previous offences and antisocial behaviours are two of the strongest predictors of firesetting behaviour. This study found that, relative to adolescents referred for setting a fire at home, adolescents referred for setting a fire away from home were significantly more likely to show a history of offending. This observation is consistent with the broader literature of firesetting amongst adolescents. Multiple studies show firesetting adolescent offenders, compared to either non-firesetting adolescent offenders and non-offending samples, showed more significant involvement in antisocial behaviours or higher conduct disorder symptoms (Forehand et al., 1991; Watt et al., 2015). As a result, the act of firesetting amongst adolescents is considered to reflect an advanced degree of antisocial behaviours, rather than being a specific antisocial phenomenon (Forehand et al., 1991). Once again, adolescents referred for setting a fire away from home are reminiscent of the subtype of delinquent firesetters who also are observed to have a history of antisocial and criminal acts, and may be more inclined towards antisocial behaviours. Perhaps adolescents setting fires away from home reflects more of a general antisocial pattern of behaviour, rather than a specific attraction towards setting fires.

Although the current population of adolescents referred for setting a fire away from home are

beginning to appear in keeping with the general adolescent firesetting literature, the same cannot be said of our at-home group. Adolescents referred for setting a fire at home were less likely to show a history of offending, relative to adolescents referred for setting a fire away from home. Thus, the at-home group does not appear to have the same advanced antisocial trajectory that other researchers have mentioned. The study may show evidence that adolescents who do set fires at home are less antisocial or have a different relationship with firesetting that lies outside of generalised antisocial behaviour.

There is potential further evidence to suggest that each respective group does indeed reflect a different relationship with firesetting, as indicated in the risk factor history of inappropriate use of fire. Adolescents referred for setting fires away from home were also more likely to have reported that the referred fire incident was their first firesetting, which provides support for this group of adolescents to reflect a more general antisocial behaviour pattern, rather than an affinity towards firesetting behaviour explicitly.

In contrast, adolescents referred for setting fires at home were less likely to have a prior history of offending and more likely to report a history of deliberate firesetting, which may indicate that the adolescents who had set a fire at home have an affinity towards setting fires specifically, that lies outside general antisocial behaviour. Studies have associated fire interest with recidivism (MacKay et al., 2006). Furthermore, a higher frequency of deliberate firesetting behaviours has been associated with psychopathology (MacKay et al., 2009), potentially indicating that firesetting for some could have been used as a strategy to meet personal needs, or as a means of emotional expression for others, or to overcome distress. An alternative interpretation of the results is that it is possible adolescents referred for setting a fire at home, given their lack of offending history, were perhaps more forthcoming about their firesetting behaviours, whereas adolescents referred for setting a fire away from home were potentially more hesitant in reporting their history of fire-related behaviours, given that they were more likely to have a history of offending. Perhaps their potential hesitancy was attributed to a concern

about any consequences that may ensue if they revealed their fire use history.

In addition to observing that adolescents referred for setting a fire away from home to be more likely associated with a history of offending and being motivated by peer pressure, they were also less likely to have a psychiatric history, compared to adolescents referred for setting a fire at home. This relationship may further signal that firesetting away from home could be more motivated by antisocial behaviour, as opposed to having its origins in more complex psychological problems.

Conversely, adolescents referred for setting fires at home were observed to more likely have a history of a psychiatric diagnosis. In Santtila et al.'s (2003) study, youth firesetting at home was believed to represent an attack on one's self rather than an attack directed at the object per se. They further concluded that youth setting fires at home best fitted the subtype of 'expressive-person' action. Similar to the present study, an 'expressive-person' subtype in the Santtila et al. (2003) study was also related to having a psychiatric history. In the broader literature concerning adolescents who deliberately set fires, firesetting has been viewed mainly as a behavioural issue (Del Bove et al., 2008; MacKay et al., 2009; Martin et al., 2004). In comparison to research regarding behavioural issues, there is relatively less research that has focused on the role of psychopathology in adolescent firesetting (MacKay et al., 2009; Moore et al., 1996). In spite of this literature gap, Moore et al. (1996) recognised the potential of psychopathology and the inner turmoil preceding the fire incident. Thus, the observed relationship between adolescents referred for setting a fire at home and a history of psychiatric diagnosis may suggest evidence of a likelihood of poor emotional and psychological coping skills.

In our study, adolescents referred for firesetting away from home were more likely to have reported having experienced negative feelings of being 'scared' and 'ashamed' at the time of the incident, compared to the at-home group. It could be argued that these feelings were unsurprising, given that this group also reported having used fire inappropriately for the first time, so they are conveying appropriate feelings towards a dangerous behaviour that they have just experienced.

Curiously, adolescents who were referred for setting a fire at home were more likely to deny having experienced negative feelings. McCardle et al. (2004) observed that, within their adolescent firesetting study, recidivism in firesetting was predicted by the adolescent's absence of fear after the incident. Their findings may supplement our observations, given that adolescents referred for firesetting at home were also recidivist in our study, predicted by having a history of inappropriate fire use.

With regards to ethnicity, adolescents referred for setting a fire at home were more likely to have identified as non-Māori and non-Pacific, whereas adolescents referred for setting a fire away from home were more likely to have identified as Māori or Pacific. Previous studies regarding ethnicity have shown mixed results of an association between adolescent firesetting and ethnicity (Bowling & Omar, 2014; Chen et al., 2003; Tanner et al., 2015). Interpreting the significance of ethnicity is outside the scope of this study, and will require future research to articulate the reasons for this (including complex factors related to the social determinants of youth offending, socio-economic factors, the enduring effects of migration, colonisation, cultural disenfranchisement and structural racism). In saying that, it is also a strength of this research to have identified a potential correlation between ethnicity and adolescent firesetting that warrants further investigation.

### **Summary of Chapter Seven**

As many researchers have indicated, the decision to set a fire, and the ability to do so, are multifaceted - firesetting is less about a one-to-one interaction between risk factor and behaviour, but rather an intersection of multiple risk factors coming together. The current findings indicate distinct and predictive characteristics for the two firesetting groups. Adolescents referred for setting fires away from home resembled or appeared familiar from the broader research about adolescent firesetters, where the characteristics of the group were more consistent with a narrative of the act of setting fires being more behaviourally driven. In contrast, the characteristics associated with adolescents who had set fires at home are less understood in the literature. This group showed an increased persistent

relationship with deliberately setting fires, with attributes that could suggest setting a fire was a response to an internal psychological motivation. Given that there is no equivalent research to support our findings, much of the discussion is exploratory and requires more research to further elucidate our insights. Such research could be extremely valuable in more precisely targeting and helping those most at risk of a future of dangerously recidivist deliberate firesetting driven by their internal distress.

## Chapter Eight: Discussion At-home vs. At-school firesetters

### Introduction

The purpose of this section is to discuss the results and how they relate to previous research regarding adolescents who deliberately set fires. Part Two of the analysis is similar to that of Part One in that the analysis utilised two methods - descriptive statistics and logistic regression. In contrast to Part One, however, group comparison was conducted between adolescents referred for deliberately setting a fire at home and those who set a deliberate fire at school. The study analysed responses from a semi-structured interview with adolescents who were referred to the New Zealand Fire Prevention Programme for deliberate fire lighting. The aims were first to identify whether adolescents who had set a fire at home differed from adolescents who had set a fire away from home, and more specifically who had set a fire at school, and secondly, to identify predictors across four categories of risk factors - demographic, individual and environmental, conduct problems, and fire-related.

### Overview of results

This is the first study to observe significant risk factors associated with the location of adolescent firesetting in terms of differences between choosing home as a location or choosing school instead. In the final model, with the inclusion of controlled variables (gender, deprivation score and ethnicity), several significant risk factors were identified. These risk factors were: setting a fire in the company of others, having a history of offending, experimentation as being a motivation for setting the fire, a history of inappropriate use of fire, having a history of psychiatric diagnosis, peer pressure as motivation to set the fire and, finally, ethnicity.

Adolescents referred for deliberately setting a fire at school, relative to adolescents referred for deliberately setting a fire at home, showed higher odds of being associated with a range of risk factors. These risk factors were being in a group at the time of firesetting incident; having a history of offending; that the firesetting was not motivated by experimentation; they reported it was their first time of inappropriate fire use; they were observed not to have a history of psychiatric diagnosis; their

firesetting was motivated by peer pressure; and they identified their ethnicity as being either Māori or Pacific.

In contrast, adolescents referred for deliberate firesetting at home, when compared to adolescents referred for firesetting at school, showed higher odds of being alone at the time of firesetting incident; of showing no history of offending; of reporting that they were motivated by experimentation; had a history of inappropriate use of fire; a history of psychiatric diagnosis; denied that their firesetting was motivated by peer pressure; and identified their ethnicity to be either non-Māori or non-Pacific.

### **Is there a difference between at-home and at-school firesetters?**

The first aim of the study was to identify whether adolescents who had set a fire at home differed on a range of risk factors when compared to adolescents who had set a fire at school. The present study would suggest that there are distinct differences between the two populations. Home and school should be of no surprise as potential targets for deliberate firesetting, given that these are locations adolescents will typically inhabit most of the time (Willis, 2015). As depicted in Pooley and Ferguson's (2017) study, deliberately setting fires in locations outside of the home are characteristic of adolescent firesetters. According to their study, YMF in locations outside of the home in adolescence could be understood with consideration of the RAT and CPT models. Briefly, according to the models, YMF happens when there is an intersection of contextual variables, such as when being motivated and unsupervised coincides with one's routine and awareness of space. It is therefore expected that because, developmentally over time, a child's routine and autonomy changes, so too does the behaviour of misusing fire, if motivated. Hence, a motivated adolescent setting fires in locations outside from home makes developmental sense, given that they have greater access to and awareness of space. For example, by going to school, the route from home to school expands their awareness of potential targets and subsequently increases opportunities for covert misbehaviours. It would also make sense

that opportunities for deviant behaviours, such as deliberately setting fires, would further increase if the young person is able to drive.

School is a unique location given that, for adolescents, school is typically a location that is accessed if formally enrolled during school hours. Outside of school hours, adolescents can access school grounds whether or not they are enrolled. Therefore, opportunities to set a fire in this location are somewhat varied, and this is reflected in school firesetting occurring in and out of school hours, by both students and non-students of the respective school (Ekbrand & Uhnoo, 2015). The current adolescent population referred for firesetting at school is in keeping with the broader understanding of adolescents who deliberately set fires.

However, the present study observed significant differences between adolescents referred for deliberately setting a fire in two distinct locations - setting a fire at home or at school. It is somewhat unexpected for an adolescent to set a fire at home, given that firesetting away from home is characteristic of this age group. The CPT model acknowledges that a fire target coincides with a motivated perpetrator's space of activity and its surroundings. Perhaps the population of adolescents who had set fires at home reflect a population of adolescent firesetters who, at the time, found the home to be the most appropriate location to set a fire or who had limited access to environments outside of the home (Gaynor, 2002). Alternatively, adolescents who had set fires at home may represent a subgroup of adolescent firesetters for whom fire serves a different function, compared to adolescents referred for deliberately setting a fire at school. As noted, Santtila et al. (2003) interpreted juveniles setting fires at home as an attack on themselves rather than on the objects or targets they chose. They further categorised juveniles who had set fires at home as likely to belong to the expressive-person subtype according to Fineman's (1995) typology, conveying that the act of firesetting is driven internally and fire use is a strategy to relieve distress or satisfy personal needs. It could be hypothesised that adolescents referred for setting fire at school are potentially a population that is familiar within the broader understanding of firesetting, while adolescents referred for setting a fire at home are a

group less frequently recognised. This makes our findings novel, and because there have been no previous studies, the following discussion is exploratory and linked as far as possible to relevant literature.

### **Predictors**

In Part Two of the analysis, setting a fire in the company of peers was predictive of adolescents referred for setting a fire at school. That is, relative to adolescents referred for setting a fire at home, adolescents who had set a fire at school were more likely to have done so in a group. This observed relationship is consistent within the limited literature on school firesetting, that adolescent school fires are more often than not set in a group (Ekbrand & Uhnöo, 2015). Although firesetting in a group is not unusual in this age group (Uhnöo et al., 2015), it is, however, a novel observation for the risk factor to inform the location of the fire. It is also not so surprising that deliberate firesetting by adolescents at school, compared to adolescents firesetting at home, is more likely to occur in a group, given that it is more probable during school hours for an adolescent to be surrounded by their peers than when at home. If motivated to set a fire, the convergence of unstructured time during or after school, familiarity with the school grounds and being with peers would increase the likelihood of a young person setting a fire at school in a group.

Developmentally, adolescence is marked as a period where social status and its management is influential. Staff from the very schools who have observed adolescents setting fire on school grounds recognised the contributions group dynamics can make in encouraging firesetting for different reasons, whether it be an activity they can do together or something they do to impress their peers (Persson & Uhnöo, 2019). Additionally, students believed that setting fires at school is best understood as behaviour one does in a group. If done alone, students reported having the impression that the young person who set the fire is mentally unwell (Lilja, 2020; Persson & Uhnöo, 2019). Setting a fire at school is more likely to occur in a group setting, and could be externally motivated (Lilja, 2020).

Additionally, deliberate fires set by adolescents at school can occur during both school hours and after hours, and are not necessarily carried out by an enrolled student. Unfortunately, the collected data does not specify the time nor the relationship the adolescent has with the school. It is also essential to consider the possibility that a proportion of the fires occurred after school-hours and were potentially set by a non-student. The occurrence of after-hours firesetting at school could be understood from a developmental approach, in that, typically, adolescents have a combination of increased autonomy and unstructured time after school that allow them to access a school after hours. During unstructured times in adolescence, it would also be typical to use this time with peers.

Interestingly, in contrast to adolescents referred for setting a fire at school, at-home firesetters were more likely to set a fire alone. In accordance with the RAT and CPT models, this is possibly by virtue of having a limited range of nodes and pathways or that this population feels most comfortable setting a fire at home (Pooley & Ferguson, 2017; Willis, 2015). By being at home, there is a reduced likelihood of being surrounded by peers.

There is also a possibility that setting a fire alone reflects an internally driven motive, as opposed to the suspected impression management that is suggested to occur in a group setting. Deliberately setting a fire alone may not be predictive of home firesetting per se, but may indicate a strategy to satisfy personal needs or resolve distress. Teachers report that adolescents who set fires at school alone were known to "not be doing well", or were "lost" or "frustrated" (Persson & Uhnöo, 2019, p. 188). Additionally, deliberately setting a fire alone is more likely to have occurred while in a crisis (Persson & Uhnöo, 2019). Potentially, the relationship of adolescents referred for setting a fire at home and solitary firesetting is related to experiencing some form of crisis at home.

Even though it is unlikely for a singular motivation to be behind an adolescent deliberately setting a fire, identifying motivations is a way to gain some insight into the immediate context of the firesetting incident. The present study potentially highlights evidence to support how understanding external and internal drives may help predict the location of firesetting. In the present study, a

deliberate fire that was motivated by peer pressure was observed to be a predictor for school firesetting. Peer pressure as a motivation for setting fires is well-known within the literature of adolescent firesetters (Gaynor & Hatcher, 1987; Wooden & Berkey, 1984). The study may indicate elements of status-conferring and relationship-building behind the firesetting behaviour for adolescents referred for setting a fire at school, more so than adolescents referred for setting a fire at home.

Furthermore, within the broader adolescent firesetting research adolescent, firesetters have been found to be more sensitive to rejection (Chen et al., 2003). Moreover, the subtype referred to as delinquent firesetters are more likely to be influenced by peers (Fineman, 1995). Given that adolescence is a developmental time where social status is of great importance, adolescents are understandably more vulnerable to peer pressure. Understanding these social dynamics may then support the idea that firesetting at school is linked to external sources of motivation. Being more exposed to social groups, by virtue of being at school, is likely to increase the chance of peer-pressured deviant behaviours such as firesetting, relative to being at home.

In contrast, deliberate fires by adolescents referred for setting a fire at home appear to be more internally driven. Young people who deliberately light fires at home were more likely to have reported experimentation as a motivation, relative to school firesetters. Although the association of experimentation and adolescent firesetting is not uncommon, it is, however, novel for it to be potentially an indicator of home as the likely location of the deliberate firesetting. What this finding indicates is that there may be distinct reasons and motivations associated with the location in which firesetting occurs. Previous typology research has suggested that different drives are associated with different targets. For example, Santtila et al. (2003) observed instrumental motives to be related to deliberate fires located at institutions and businesses, while more internalised motives were associated with firesetting at home.

There is further evidence in the present study to suggest that at-school firesetting by adolescents is more likely to be behaviourally driven, in that adolescents referred for setting a fire at

school were more likely to show a history of offending, relative to at-home firesetters. This finding is in keeping with the broader literature that has consistently shown adolescent firesetters to showcase a history of delinquent behaviours (Del Bove et al., 2008; MacKay et al., 2009; Martin et al., 2004). This association is further supported by recent at-school firesetting literature (Persson & Uhnöo, 2019). Adolescents who had set fires at school have been reported by staff to be students who were more likely to involve themselves in testing social boundaries and to already have a history of antisocial behaviours (Persson & Uhnöo, 2019). Such studies highlight that adolescent firesetting is not necessarily mutually exclusive of conduct problems. Therefore, deliberate firesetting at school by adolescents is more likely to be a consequence of antisocial behaviour, rather than having a specific relationship to the act of firesetting itself.

On the other hand, the firesetting behaviour instigated by adolescents referred for deliberately setting a fire at home is potentially unlikely to reflect general antisocial behaviour, given that at-home adolescents are less likely to show a history of offending relative to at-school firesetters. This study proposes that adolescents referred for setting fires at home potentially have a different relationship to firesetting than do at-school firesetters.

This notion of a distinct relationship towards setting fire itself could be reflected in the relationship both groups have with the risk factor 'history of inappropriate fire use'. In addition to having a history of offending as a predictor for at-school adolescent firesetting, at-school adolescent firesetters were less likely to report a history of inappropriate fire use. That is, adolescents referred for setting fire at school were more likely to report that the fire incident for which they had been referred was their first attempt to set an unsanctioned fire. Again, this may indicate that this population does not show a persistent relationship with firesetting itself, but rather one with delinquent behaviours.

In contrast, the study indicates that adolescents who set fires at home have a different relationship with the behaviour; namely, that having a history of inappropriate fire use is predictive of home firesetting. What this may suggest is that adolescents who deliberately light fires at home are

more experienced and have a preference for the action of firesetting itself. Further research is needed to draw these conclusions definitively.

Interestingly, in addition to being more likely to have a history of offending and less likely to have lit previous fires, at-school firesetters were also less likely to have a psychiatric history compared to at-home firesetters. This may further signal that firesetting at school is related to delinquency rather than having an affinity to set fires explicitly.

Conversely, adolescents referred for setting fires at home were identified to more likely have a history of a psychiatric diagnosis. This relationship is in keeping with Santtila's et al. (2003) study, which, as aforementioned, observed firesetting at home to be a representation of an attack on one's self, the type of internal distress and dysregulation that may also lead to meeting criteria for a psychiatric diagnosis. Those who had set fires at home were categorised in the Santtila et al. (2003) study to be associated with a specific subgroup of firesetters, the expressive-person subtype, who were also characterised as having a psychiatric history. Thus, the observed relationship between at-home adolescent firesetters and a history of psychiatric diagnosis may indicate evidence for high levels of internalised distress and trauma, and a lack of skills to cope with the associated distressing thoughts and feelings, that results in seeking some sort of emotional release by deliberately setting a fire.

With regards to ethnicity, firesetters at home were more likely to have identified as non-Māori and non-Pacific, whereas firesetters at school were more likely to have identified as Māori and Pacific. Previous studies regarding ethnicity have found mixed results, both indicating for and against an association of firesetting to ethnicity (Bowling & Omar, 2014; Chen et al., 2003; Tanner et al., 2015). The identification of ethnicity as a predictor for the location of a firesetting incident is, to the best of the researcher's knowledge, a novel finding. However, interpreting this result will require future research to elucidate.

## Summary of Chapter Eight

The current study attempted to identify whether adolescents referred for setting a fire at home differed from adolescents referred for setting a fire at school, alongside various plausible risk factors. As discussed, there are significant risk factors associated with each respective group. Such findings portray the possibility of two distinct subgroups, one that is familiar in the broader literature on adolescent firesetters, while the other is relatively less understood. Adolescents referred for firesetting at school appeared to fit the profile of a delinquent firesetter, one who has a history of antisocial behaviour, which may indicate deliberate firesetting as a behavioural byproduct. Conversely, adolescents referred for setting a fire at home may reflect a subtype of adolescent firesetters who have a higher affinity with the act of lighting fires itself and, furthermore, where the function of deliberately setting a fire serves to meet a personal need, rather than being externally driven by the environment. The present study is in keeping with research indicating that the act of deliberately setting a fire in an adolescent population is multifaceted. Given that there is no equivalent research yet to support our findings, our exploratory discussion requires future research to support its observations further.

## Chapter Nine: Concluding the research

### The strengths of the research

Firstly, this study focused on an age group that is often overlooked and integrated into a much broader population of the firesetting literature. The findings are specific to an age group – adolescents - who have been consistently observed to be responsible for a large proportion of firesetting incidents. This research has several strengths, most notably the large population sample size used. Having a large and rigorous sample allows for greater ability to generalise findings. Also, a broad range of risk factors was applied to the sample. The benefit of such an approach provides the ability to assess the interaction of risk factors with firesetting behaviour in multiple domains, relationships that span both personal and environmental influences. Lastly, the data collected is of a New Zealand population. Hence findings are able to be interpreted as specific to a New Zealand context. This is extremely important given that the vast majority of literature surrounding adolescent firesetting lies outside of New Zealand. In having a New Zealand-specific population, it also allows for the opportunity to observe whether the relationship between adolescents and firesetting is comparable or consistent with international literature.

### The limitations of the research

This research had several limitations. The present study was a post-collection research design, collated retrospectively. Although this method allowed us to obtain a significant amount of data that had been collected in a standardised fashion, the method, however, thwarts the ability to orientate or include questions to coincide or supplement theoretical models and expectations. Key variables that would be ideally incorporated into the structure of the interview in future would be identifying and measuring frequently used and accessed activity spaces of each individual adolescent referred to the FAIP, in order to gain insight of one's routine and therefore awareness of space for opportunities for deviant behaviours. Furthermore the time of the fire incident (including, for example, whether it was within or outside of school hours and whether by an enrolled student of the school, or by a formerly enrolled or never-enrolled student) and whether a guardian was in close proximity (which could indicate intentions to harm that person or alternatively, the positive, preventative effects of having a

guardian nearby). Such variables are important because they provide further context of the fire incident to confirm our hypothesised links with criminological theories about location.

Studies have indicated that reports can differ notably in regard to motivation when the question itself is prompted or unprompted. Not being able to mitigate for this issue could have been a limitation in our study, given that two motivation variables were observed to be predictive. Research in this area would benefit from a prospective approach to more qualitatively explore motivation.

Additionally, a limitation to the study is that the population used was a purposive sample - the population of adolescents who deliberately set fires was acquired from a fire prevention intervention programme, showing the participants had either been in contact with police or who had been caught by a person. Accordingly, the data obtained are of a population where either the fire was uncontrolled enough to warrant police involvement or a population that was to an extent potentially supervised enough to have been caught. It is therefore critical to be mindful of interpreting results from such a sample because it does not encompass all types of adolescent firesetters. That is, the study had not incorporated a population of adolescents who deliberately set fires, where they have either been involved in controlled or more covert incidents of deliberate firesetting.

Lastly, the research was limited in addressing the significance of ethnicity. Future studies could include a cultural group that would lead in the creation of the research that would be appropriate to address ethnicity. A kaupapa Māori approach would be better in addressing and creating research specific for Māori, and research with Pacific and other ethnicities should be likewise appropriately culturally led.

### **Agenda for further research**

Given the present study's results and limitations, there are multiple avenues for future research. Firstly, this is the first study which has attempted to identify whether there is a significant difference between adolescent firesetters who set fires at home and away from home. Several implications for research have come about given the results observed in our findings. Highlighting significant risk factors

associated with distinct locations, whether it be home, school, or away from home, points to the importance of further research to explore subgroups within the general adolescent firesetting population. The study supports the understanding of adolescent firesetting as a complex behaviour, that requires research to step away from observations of only the broader adolescent firesetting population. Given a broad range of immediate contextual factors, individual pre-existing factors and environmental factors emerged as potential predictors for the respective adolescent firesetting groups. This suggests that the choice of location of firesetting is reflective of a unique dynamic of multiple factors intersecting with one another. This unique dynamic may encourage future studies to consider the location of firesetting in itself as being an important variable and to make conscious efforts to identify the location of the fire incident in future research. Future research should aim to identify whether the current findings are replicable.

Future research could also look into conducting a more qualitative, nuanced exploration with firesetters at home, away from home or at school, in order to gain further insight into the motives associated with the different locations. More deeply exploring firesetting at home, in particular, would be important, given little research has been undertaken on this topic, and given that there could be a higher risk that recidivist careers of firesetting may stem from this population.

Furthermore, it may be beneficial to explore group firesetting. The present study identified deliberately setting a fire alone and setting a fire with peers to be predictive of at-home firesetting and away-from-home firesetting, respectively. Uhnou (2015) identified co-offending and different roles, thus potentially similar roles are re-enacted in a New Zealand population. It would be useful to explore how peer structures operate in terms of the characteristics of those at risk of instigating a group firesetting activity, or who may be coerced to light the fire or to cover it up, and how internal and external fears and conflicts are dealt with. This may also provide further insight into whether deliberately setting a fire at home is indeed driven by an internalised conflict, and how to address this.

## Implications

The findings have implications for future intervention practice. Appreciating the potential for distinct subgroups, related to a broad range of risk factors that span across individual, environmental and historical domains, calls for a more holistic approach in engaging with adolescent firesetters. Given that there is potential evidence to suggest distinct risk factors associated with a specific location, interventions customised accordingly would be valuable. For example, firesetters who have set fire at home may do well in developing coping skills to meet emotional needs, with the possibility of further support from the mental health community. Away-from-home and at-school adolescent firesetters may benefit from a programme which addresses social pressures from peers and antisocial behaviour, as opposed to specifically targeting firesetting in and of itself.

Furthermore, schools have a responsibility to maintain a safe environment, this includes identifying at-risk young people. Given the potential health risk to other students and financial impact deliberate firesetting at school can have, staff are reasonably expected to not only identify risk but to provide appropriate interventions. The relationship of risk factors with at-school deliberate fires could be used by staff in assessing risk or developing educational programmes to address adolescent firesetting.

Lastly, consideration of mental health service involvement is potentially necessary for the adolescent firesetting population, and perhaps particularly for those involved in deliberate fires at home. The present study identified that adolescents referred for deliberately setting fires at home, may reflect a subgroup of adolescent firesetters that is driven by internal conflict. This assumption was developed with the group's significant association with having a psychiatric history, solitarily setting a fire (often more than once) and potentially social isolation. Setting fires at home may be a marker of internalised and pathological firesetting that communicates a level of distress requiring interventions unlike those required by the more typical, antisocial and peer-led firesetting of other adolescents. What

might “home” mean, when a young person acts, often repeatedly, to destroy it with fire? This study indicates we must do more to find out.

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