

**Predicting risk of repeat
firelighting in young people:
The development and evaluation of
the Behaviour Risk Tool**

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Abstract

Firelighting is not an uncommon behaviour for young people. A review of the relevant literature shows that, fortunately, most young people who light fires, do so because they are curious, and fire safety education intervention is enough to prevent any future firelighting activity. However, a small number have significant psychosocial issues that may contribute to continued firelighting behaviour.

The Juvenile Fire Awareness and Intervention Program (JFAIP) is a fire safety education program established in Victoria, Australia to target active young firelighters. While some young firelighters referred to the program have mental health problems, the JFAIP is not designed for such cases. Thus a need has been identified for a screening questionnaire to identify young people with psychosocial disturbance predictive of ongoing firelighting behaviour, in order to recommend supplementary mental health intervention. The overarching aim of this project was to develop such a screening tool.

The first aim of Study 1 was to evaluate the validity of two internationally established firelighter screening tools, the FEMA Child Risk Survey (CRS) and Family Risk Survey (FRS). The second aim was to explore the fire-specific, family and psychosocial profile of young repeat firelighters and develop a new firelighter screening tool to be subsequently evaluated and compared to the CRS and FRS. Utilising a sample of 61 JFAIP families, data about fire-specific, family and psychosocial characteristics of the young firelighters (5-17 years of age) at the time of their initial pre-intervention interview was collected via the CRS, FRS, Fire Risk Interview and Child Behaviour Checklist. A 12-month follow-up obtained information about continued firelighting activity. Study 1 results indicated that the CRS was unable to distinguish between the groups (repeat and non-repeat), but the FRS demonstrated some utility, accurately detecting 86% of repeat firelighters. However it was overly inclusive, erroneously

predicting that half of the non-repeat firefighters were also at risk. The results also identified significant differences on a number of fire-specific and psychosocial variables between repeat and non-repeat firefighters. The 25 specific items or themes across the four instruments used to collect data demonstrating the greatest differences between the repeat and non-repeat firefighters were combined into a new screening tool, termed the Behaviour Risk Tool (BRT).

Study 2 was designed to measure the validity and reliability of the BRT using new samples. In Part A the BRT was completed by the parent/guardian of 63 young people in the JFAIP (5-17 years of age) at their initial pre-intervention interview. A minimum six month follow up contact determined the presence or absence of repeat firefighting. Results demonstrated the BRT had a sensitivity of 0.8 and specificity of 0.7 at the cut-off score of 57.5. Thus the BRT detected 80% of the repeat firefighters and 70% of the non-repeat firefighters correctly. In Part B, the test-retest reliability and internal consistency of the BRT was assessed. Parents/guardians of 76 children (5-17 years) in the general population completed the questionnaire twice, two weeks apart. The results indicated high repeatability across time ($r=.93$) and high internal consistency (.88-.93) for the BRT. Hence, Study 2 found that the BRT had better sensitivity and specificity than the CRS and FRS and was a reliable questionnaire.

The expectation is that the BRT will be used as a preliminary screening measure in the JFAIP, to identify cases where additional mental health support may be necessary. This is the first such tool to be developed in an Australia context. Furthermore, the JFAIP is the first young firefighter program in Australia to adopt a screening tool of this kind. Ideally the BRT will continue to be used over many years with many families, and continue to be evaluated for effectiveness and further improvements.

Student Declaration

I, Kara Dadswell, declare that the PhD thesis entitled ‘Predicting risk of repeat firelighting in young people: The development and evaluation of the Behaviour Risk Tool’ is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Signature:



Date: 13/08/2018

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List of Abbreviations

ABC	Australian Broadcasting Corporation
ADD	Attention Deficit Disorder
ADHD	Attention Deficit Hyperactivity Disorder
ASEBA	Achenbach System of Empirically Based Assessment
AUC	Area under the curve
BRT	Behaviour Risk Tool
CBCL	Child Behaviour Checklist
CFA	Country Fire Authority
CFI	Children's Firesetting Inventory
CHI	Children's Hostility Inventory
CRS	Juvenile Firesetter Child Risk Survey
DSM	Diagnostic and Statistical Manual of Mental Disorders
FACES III	Family Adaptation and Cohesion Scale
FEMA	Federal Emergency Management Agency, United States Fire Administration
FHS	Fire History Screen
FL	Firelighter
FRI	Firesetting Risk Interview
FRS	Juvenile Firesetter Family Risk Survey
HREC	Human Research Ethics Committee, Victoria University
JFAIP	Juvenile Fire Awareness and Intervention Program
MFB	Metropolitan Fire Brigade
NSW	New South Wales
ROC	Receiver operating characteristic

SPSS	Statistical Package for Social Sciences, Version 22
TAPP-C	The Arson Prevention Program for Children
UK	United Kingdom
US/USA	United States/United States of America
YRF	Youth Report Form

Statement of the Problem

“If you play with fire you get burnt” (Speake, 2015, p. 250). This adage reflects the notion that engaging in dangerous or risky or contentious acts will eventually result in detrimental consequences. When applied to the issue of young people lighting fires, this old saying is literally a reality.

Young people lighting fires poses serious risks to individuals and communities, particularly in Australia. Nationwide, fire services have active programs in place that attempt to prevent and intervene with young firefighter behaviour. The Juvenile Fire Awareness and Intervention Program (JFAIP) in Victoria, Australia, run jointly by the Metropolitan Fire Brigade (MFB) and Country Fire Authority (CFA), is dedicated to reducing and controlling the fire risk behaviour of young people.

The JFAIP is an education-based intervention program that aims to achieve cessation of firelighting in active young firefighters. The program is targeted towards those considered to be more low risk, or straightforward cases, where education intervention is sufficient to eradicate continued firelighting behaviour. The JFAIP acknowledges that they receive referrals for cases that would be considered more high risk and require a multidisciplinary approach to intervention, incorporating mental health services. For over ten years a team of researchers from Victoria University’s discipline of psychology have worked in partnership with the MFB/CFA on a number of research projects, and specifically with the JFAIP. Dr Kate McDonald completed a doctoral thesis in 2010 that highlighted the need for a young firefighter screening tool in the JFAIP that could identify “at-risk” cases, requiring additional mental health intervention. The JFAIP agreed. This project is dedicated to achieving this aim.

Chapters 1 to 3 present a thorough review of the literature relating to young firefighters. Specifically, these chapters highlight the issues, discuss known risk factors,

explain theoretical models of firelighting, review prevention and treatment options, and consider currently available screening measures and processes. Chapter 4 presents the first study of this thesis where two internationally established screening tools were evaluated for their effectiveness with JFAIP cases, and a new screening measure, subsequently titled the Behaviour Risk Tool (BRT), was concurrently developed using pre- and post-JFAIP intervention data from a JFAIP sample. The BRT was then subject to its own evaluation of validity and reliability by examining sensitivity and specificity (assessed over a 6 to 18-month period) and test-retest reliability in the second study of this research, which is presented in chapter 5. Chapter 6 concludes this thesis with a brief summary of the project, an indication of the specific implications of this research, and a discussion of future research directions.

Chapter 1

Fires started by children and adolescents have previously resulted in some devastating consequences and have the potential to do the same in the future. Firelighting is also a current clinical health issue and a social problem. This issue is explained thoroughly in this chapter. The first section defines and clarifies the terminology used in the literature and provides justifications for the key terminology used in this thesis. The second section presents some of the many concerns surrounding the problem, thereby highlighting the overall importance of continued research into young firefighters. More specifically, the negative individual and social consequences of young firefighter behaviour are discussed, along with the known extent of the issue and the difficulties inherent in collecting and interpreting data in this field. Thus, chapter 1 sets some of the foundations for this research thesis by clarifying terminology and establishing the importance of conducting research in this difficult area.

A Current Issue

Firelighting by children and adolescents is a current issue facing communities worldwide, and specifically, Australia. Over the past five years in Australia young people have been responsible for lighting fires with catastrophic consequences. For example, in 2013 five children, one only 11 years old, were charged with lighting some of the most horrific fires that have torn through New South Wales (NSW). Two were reportedly charged with lighting a fire that destroyed property and over 5,000 hectares of bushland (Carter, 2013). In a separate incident, two girls aged 12 and 13 were charged with lighting a grass fire in West Sydney around the same time (Auerbach, 2013). A media statement in February 2015 documented that Western Australian police had reported that 30 out of the 34 people charged with arson causing bushfires that summer were young boys aged between 10 and 17 (“Firebug children and teens charged

in police arson sting,” 2015). In 2016, another eight children all under the age of 12 were caught intentionally starting 20 fires at a property in NSW, which resulted in firefighters battling a 20-acre inferno for over 4 hours (McLauchlan, 2016). Recently, six children aged between 9 and 13 deliberately started a fire at a shopping centre in Queensland causing the evacuation of the entire shopping complex, and \$140,000 worth of damage. The same group of children were believed to be responsible for two other fires set at shopping centres earlier that month (“Juveniles charged over shopping centre fires in Brisbane and Logan,” 2017). A 15-year-old girl was charged for intentionally starting a bushfire during a summer heatwave in Victoria in early 2018. The fire spread across 1.5 kilometres, burned 36 hectares of bushland, and damaged one home (Lord, 2018). This sample of incidents elucidate the seriousness of firelighting behaviour by children and youth in an Australian context.

Defining Key Terminology

Prior to proceeding with a more thorough discussion of the existing literature in this area, it is necessary to define and clarify terminology around fire involvement. Researchers have defined, measured, and discussed the proceeding terms in various ways. Hence, there is variability in what constitutes certain fire-related behaviours between fire departments, legal services, scholars, and the general community. The research literature itself is riddled with discrepant terminology to define fire-related behaviours (Watt, Geritz, Hasan, Harden, & Doley, 2015). The variabilities in the definitions can be problematic when making comparisons and drawing conclusions from previous studies. Fire interest, fireplay/firestarting, and firesetting, in this order, have been described as the anticipated progression pathway of seriousness for a repeat firelighter (Federal Emergency Management Agency, United States Fire Administration [FEMA], 2002). Arson and pyromania are legal and diagnostic terms related to

firelighting. Fire-related terminology is defined, clarified, and discussed below. A summary of, and justification for, the language used in this thesis follows.

Terminology in the Field

Fire Interest

Fire interest refers to a general attentional bias towards fire as demonstrated by certain behaviours such as inquisitiveness about fire, discussions about fire, and wanting to play with fire-related toys (e.g., fire trucks). Generally, it has been discussed in relation to younger children (e.g., aged 3 to 5). It has further been described as an overall curiosity with fire in the absence of engaging in physical fire-related behaviours (FEMA, 2002). The literature uses terms such as curiosity, fascination, and even preoccupation, which all indicate some degree of fire interest, each to a greater or lesser extent. Although Kolko hypothesises that fascination is distinct from curiosity, this has not yet been empirically investigated (McDonald, 2010).

Fireplay/Firestarting

Fireplay is the term used to describe fire experimentation that evolves out of curiosity (Grolnick, Cole, Laurenitis, & Schwartzman, 1990; Kolko, 2001). Fireplay is viewed as more of a progressed fire-related behaviour than pure fire interest because of the physical involvement. It is generally described as motivated by interest and naïvety rather than malice and psychopathology. Fireplay has been used interchangeably with *firestarting* (FEMA, 2002).

Firestarting has been described broadly as an incidence of actual experimentation with incendiaries, but is considered less severe than firesetting (FEMA, 2002). Again, fireplay/firestarting is generally suggested to be performed by younger children motivated by curiosity with little or no intent to cause harm or destruction. It is usually engaged in once or twice using available ignition sources and targets. There is

often an attempt to extinguish the fire or get help if necessary (FEMA, 2002). In fact, some research classified children whose fireplay was limited to acts such as lighting matches and candles as non-firesetters based on the innocent intent (Kolko & Kazdin, 1989a).

Firesetting

Commonly, the description of *firesetting* is qualitatively different from fireplay based on the underlying motivations, persistence and severity of the behaviour. Firesetters are usually described as having a greater intent to cause harm and damage, with more complex driving forces. Generally, firesetting is intentional and planned, directed at a particular target, and involves ignition sources that are flammable, and concealed. Reportedly it is common that there is no attempt to extinguish the fire and often the firesetter will stay and observe the destruction (FEMA, 2002).

However, firesetting is also used to describe deliberate firelighting behaviour where the perpetrator is not arrested or convicted. Often this term is used when: a fire cannot be identified as deliberate, there is limited evidence to support an arson conviction, the perpetrator is unknown, the damage is minimal, or the age of the perpetrator is too young for prosecution (Dickens & Sugarman, 2012). More simply, the term firesetter has been used to describe someone who has intentionally set a fire, irrespective of the outcome, or characteristics of the instigator (Ducat & Ogloff, 2011; Gannon & Pina, 2010). Hence, in some cases, firesetting and fireplay have also been similarly defined as any direct involvement with ignition sources to burn objects without approval or appropriate purpose. Baretto, Boekamp, Armstrong, and Gillen (2004) used the terms firestarting and firesetting interchangeably because both have the potential for dangerous consequences. The authors also asserted that experimentation with matchplay and lighterplay is inherent in both terms. It is apparent that the

overlapping and alternative ways of interpreting these terms can obscure the connections between research studies in this field.

Pyromania

Pyromania is a mental health term used to describe a diagnosable disorder where firelighting is the core behaviour. The term pyromania originated in 1833 out of the term “impulsive incendiarism,” which, at the time, was used to describe a form of insanity characterised by acts of impulsivity in the absence of motive (Mehregany, 1993). Over time, the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) definition of pyromania, and the criteria to meet a diagnosis, has changed. Currently the DSM requires that multiple criteria are met to satisfy a diagnosis, including repeated deliberate firesetting acts that are precipitated by tension and affective arousal and consequential feelings of pleasure, gratification or relief. In addition, a distinct fascination with fire and fire-related situations is necessary. Finally, the firesetting cannot be better explained by another reason (e.g., monetary gain) or diagnosis in the DSM where firesetting is a criterion (e.g., Conduct Disorder) (DSM-5, 2013).

There is a misconception that the majority of firesetters are pyromaniacs. In fact the prevalence of diagnosed pyromania is relatively infrequent and not all firefighters are, or should be, considered pyromaniacs (Johnson & Netherton, 2016). Given the strict criteria that must be met to diagnose pyromania, the rarity of this disorder holds logic (Gannon & Pina, 2010). In fact, some authors question its existence entirely (Stadolnik, 2000). A recent study however, has suggested its occurrence may not be as rare as once thought. This follows a review of four separate studies reporting that between 1% and 6.9% of the samples in the studies examined met the criteria for pyromania (Grant, Schreiber, & Odlaug, 2013). Albeit, it is not common terminology used in relation to young firefighters.

Arson

According to the Australian Institute of Criminology (2004) “*Arson* is the act of intentionally and maliciously destroying or damaging property through the use of fire” (p. 1). Four key elements are fundamental to the definition of arson: (a) a fire must be lit, (b) the fire must have been intended, (c) there must have been associated malice, and (d) property must have been the target of burning. Arson is a legal term used to describe serious intentional firesetting incidents where the perpetrator has been convicted (Dickens & Sugarman, 2012). Very few cases of child and adolescent firelighting are considered to be arson (Grolnick et al., 1990). The firelighting literature referring to young people generally avoids this term.

Recidivism/Recidivist

Recidivism is used often throughout the literature on firelighting, again in somewhat variable ways. The term has been used to define multiple criminal convictions for firelighting incidents, as well as repeat firelighting incidents in the absence of criminal charges or convictions. For example, Lambie, Ioane, Randell, and Seymour (2013) defined recidivism related to firelighting in its true form, specifically, as subsequent convictions of fire-related offences. Conversely, Root, MacKay, Henderson, Del Bove, and Warling (2008) defined firelighting recidivism as “the presence of any unsanctioned fire involvement during the follow up period” (p. 167). Some studies (Brett, 2004) failed entirely to define what constituted firelighting recidivism in their research. The main commonality in all studies referring to recidivists is that they all describe repeated firelighting behaviour in some form. These discrepancies need to be considered when drawing conclusions from the literature in the field.

Juvenile

The term *juvenile* has been used in the firefighting literature to describe children and adolescents of all ages. Furthermore, intervention programs designed specifically to target young firefighter behaviour regularly include the term juvenile in the program's title (see Muller & Stebbins, 2007). It is clear that the term is used to describe the young age or youth of the people engaging in firefighting behaviour. The term juvenile originated out of the legal field to describe a period in which a person's actual age and corresponding expected cognitive maturity is pre-adult. This is described as mitigating culpability to some degree (Steinberg, 2017).

Terminology in this Thesis

As described above, the literature uses fire-related terminology in variable and often overlapping ways. The degree of seriousness and criminality implied in the definitions of fireplay/firestarting, firesetting, recidivism, and juvenile vary. This thesis acknowledges the disparities that exist in the research and literature and notes that caution should be exercised when comparing studies that may use the same term in variable ways, or different terms to describe the same behaviour. For the sake of consistency, the key terminology used throughout this thesis is stated below, including justification for these choices.

Firelighting and Firefighter

The term *firelighting* is employed in this thesis to describe any form of unsanctioned, physical, fire engagement (ranging from simple lighterplay through to more severe and/or destructive firefighting acts). The author believes that this is an impartial and inclusive term used to describe anyone who has intentionally lit an unsanctioned fire without implying severity, criminality, or psychopathology. Accordingly, the term *firefighter* is used to refer to individuals who have engaged in

firelighting. Moreover, the term firefighter will be used to refer to young people engaging with firelighting. When adult firelighting is being referred to it will be specifically stated.

Repeat Firelighting and Repeat Firefighter

Much of the literature refers to repeat firefighters as *recidivists* and describes their continued firelighting behaviour as *recidivism*. The formal definition of a recidivist in the *Oxford Dictionary of English* is “a convicted criminal who reoffends, especially repeatedly” and the term is used to describe serious, ongoing, criminal behaviour (Stevenson, 2010). Accordingly, recidivistic firelighting technically describes a relapse or repeat case of criminal, fire-related offending. However, many of the included behaviours referenced as firelighting recidivism in the literature, and in this study, are not typically considered criminal. The author believes that this term does not always adequately reflect the cohort of young people at the heart of this discussion.

Acknowledging the imperfections in the language, the term *repeat firefighters* is used throughout this thesis to depict young people who repeatedly engage in any form of unsanctioned firelighting behaviour, irrespective of the degree of seriousness. The term *repeat firelighting* is used similarly to describe the behaviour of these aforementioned individuals.

Young People

Generally, the literature on firelighting refers to young people engaged in such activity as “juveniles.” A juvenile, by definition and by law, is a person who is below the age of standard prosecution. The concept also relates to levels of maturity. However, because this term has evolved from the legal field and is frequently associated with juvenile delinquency, it implies a degree of criminality. The term therefore carries a

negative connotation, and while by definition it is appropriate, by social perception it is not reflective of all the young people it has been used to describe. Furthermore, use of the term “juvenile recidivist” to label young people repeatedly involved with unsanctioned firelighting could in fact be damaging psychologically to the individual and have a negative influence on the perceptions of those tasked with providing services and support for them, and the perceptions of the general population. Consequently, this thesis employs the terms “young people” or “children and adolescents” to describe this cohort.

Finally, it is important to acknowledge that “people are not their diagnoses” (DiMillo, 2002, p. 154). References to this population of interest as “juvenile firefighters” implies that the child and the behaviour are one and inseparable. Ideally, a phrase that separates the two, such as “young people who light fires,” is less suggestive in this regard. That said, for the sake of readability and being concise, the phrases “young firefighters” and “young people who light fires” are both employed in this thesis.

Young Firefighter Prevalence

The number of fires set by young people is presumed to be much higher than official, documented figures (presented below) suggest (Baretto et al., 2004). Estimates suggest that for every fire started by a young person that *is* reported, anywhere between two and five instances are not (Baretto et al., 2004). Similarly, Stadolnik (2000) reports that only about 20-25% of young firefighters become known to intervention services. It has been suggested that official figures of arson are inaccurate largely because unsanctioned firelighting is a covert activity, and fires are often undetected, or causes remain unknown (Doley, Fineman, Fritzon, Dolan, & McEwan, 2011). These same issues are likely to exist in the young firefighter literature.

The variability within documented statistics on young firefighters is also significant. This is partially attributable to differences in the operational definitions and methods of measuring firefighting across studies and services (MacKay, Feldberg, Ward, & Marton, 2014). For example, statistics that only measure firefighting that result in prosecution and a guilty verdict (otherwise known as arson) fail to recognise the instances of young people lighting fires that do not result in a criminal conviction. Thus, in terms of reported prevalence, there is a large difference between these arson statistics and statistics that measure firefighting via positive response to a single self-report survey item (e.g., “I have set fires”). It is likely that children are accounting for many more fires than arrest statistics would suggest considering so few young people are actually convicted of arson offences (Grolnick et al., 1990).

The disparity in the reported figures on young firefighters also reflects different sources of data (MacKay et al., 2014). Data collected via self- or parent-report surveys relies heavily on the child’s honesty or the parent’s accurate knowledge of any fire engagement, and subsequently, their preparedness to share that information with investigating parties. False reporting of incidents is unlikely because of the negative connotation connected to firefighting, and the notion that people are prone to the effects of the social desirability bias when self-reporting (Nederhof, 1985; Dickens & Sugarman, 2012). Therefore, statistics derived from child or parent-report are more likely to be an underestimate of the true figure. Additionally, data sourced from formal authority reporting systems such as police records or fire service databases can be equally problematic (Muller, 2009). For example, justice service reporting systems generally only include cases where a young person has been convicted of a fire-related offence, thus discounting those whose fires remain undetected, those who are simply not caught, or those who are caught but are neither charged nor convicted. Likewise,

information from fire service databases will only include information from fires that have been reported and attended to by the fire brigade. Such databases fail to capture cases where official causes were undetermined or fires that were extinguished without the fire brigade in attendance. Furthermore, many deliberately lit fires are attributed to unknown or suspicious causes when there is a level of uncertainty for determining deliberate ignition. This is a reflection of the difficulties inherent in fire investigation and the caution exercised by professionals when making a final determination as to the cause of a fire (Bryant, 2008). It is clear that there are important questions about the accuracy of figures on the prevalence of firelighting by children and adolescents.

Differences in the populations from which statistics have been derived demonstrate further disparity. Much of the data on young firefighters comes from populations of young people connected with mental health services (e.g., in-patient or out-patient clinics) (Stewart & Culver, 1982; Kazdin & Kolko, 1986) or the justice system (Forehand, Wierson, Frame, Kemptom, & Armistead, 1991; Hanson, MacKay-Soroka, Staley, & Poulton, 1994). One criticism this field of research has faced has been the overuse of data from clinical or criminal populations (Mehregany, 1993; Stadolnik, 2000). Data from these samples is valuable in that it provides insight into the young firefighter problem from groups where firefighters are over-represented, but it leaves us with a limited understanding of firelighting in the general population. Furthermore, the bulk of the current understanding of young firefighters has derived from research conducted in the United States of America (USA) on populations of young American firefighters. Other countries have a very limited research portfolio into local young firefighters, including Australia.

The aforementioned points highlight the importance of analysing and interpreting statistics with caution. In reality the true extent of the young firefighter

problem is very difficult to ascertain, but nonetheless, it exists as an important clinical and social concern. Based on the limitations inherent in this area of research it can be assumed that statistics are grossly underestimating the magnitude of the issue (Doley, Dickens, & Gannon, 2015). With this in mind, it is reported that approximately 261,330 deliberately lit fires came to the attention of fire services in the USA between 2010 and 2014. In 34% of cases where charges were laid, the perpetrator was under 18 (Campbell, 2017). Australian data reports that from 2013 to 2014, 101,867 fire incidents were attended to by fire services nationally. This figure consisted of 19% structural fires, 43% landscape fires, and 38% other type fires (e.g., car). Ten percent of the structural fires were attributed to deliberate ignition or were suspected to be deliberately lit, with a further 23% recorded as undetermined or not recorded (Steering Committee for the Review of Government Service Provision, Productivity Commission, Australian Government (SCRGSP), 2015). Children and adolescents are reported as the instigators of more than 40% of deliberate structural fires in the USA (Stadolnik, 2000).

Extrapolating from these statistics and assuming that 40% of the deliberately lit structural fires in Australia (where potentially between 10-33% of all structural fires were deliberately lit) were lit by children or adolescents, calculations suggest that possibly between 770 and 2,555 structural fires attended by the Australian fire services from 2013 to 2014 may have been deliberately lit by children or adolescents.

Furthermore, up to 60,000 bushfires are reported each year in Australia (Bushfire Cooperative Research Centre and Australasian Fire and Emergency Service Authorities Council, 2010). Potentially 50% of bushfires are a direct result of deliberate ignition (Muller, 2009). The available evidence suggests that approximately one third (31%) of people that deliberately start bushfires in Australia are children and adolescents (Muller, 2008). Using these statistics, over 9,000 Australian bushfires are possibly the result of

deliberate ignition by children or adolescents annually. These figures highlight the potential widespread extent of the problem.

The reported rates of young people lighting fires worldwide differ substantially due to the methodological differences previously discussed. Kolko and Kazdin (1988a) reported the prevalence of firelighting to be 35% for in-patients and 19% for out-patients at a child psychiatric clinic in the USA. In an Australian sample of both offending and non-offending youth, 67% and 38% respectively admitted to lighting an object on fire at least once (Watt et al., 2015). Dadds and Fraser (2006) studied a community population of 4 to 9-year-olds in Australia and found 5% had engaged in some form of fire or match play as reported by the parent/carer informant. Similarly, 6% of a community sample of 12 to 17-year-olds in the USA self-reported lighting a fire within the past 6 months (Chen, Arria, & Anthony, 2003). A large study of over 43,000 people in a nationally representative sample of the general population in the USA concluded the lifetime prevalence of firesetting to be 1.7% for males and 0.4% for females. This was based on respondents' answers to the question "In your entire life did you ever start a fire on purpose to destroy someone else's property or just to see it burn?" (Hoertel, Le Strat, Schuster, & Limosin, 2011). It should be noted that this study was conducted with adults who were retrospectively reporting their past behaviour. Thus, the lower reported rate here could be reflective of the respondents vague memory or the specific type of psychopathology (antisocial behaviour; pyromania) underlying the intent of the fire in the question. Del Bove, Caprara, Pastorelli, and Paciello (2008) found that 29% of the Italian youth in their study responded positively to the broad question "I have set fires." However, whether or not the youth studied were referring to unsanctioned firelighting or appropriate, supervised firelighting cannot be known. Nonetheless, MacKay, Paglia-Boak, Henderson, Marton, and Adlaf (2009) found a

similar prevalence. Twenty-seven percent of the adolescents in their Canadian study responded that in the past twelve months they had in fact set something on fire that they were not supposed to, and a total of 68% reported the same across their lifetime. These figures illuminate the disparity in the reported rates of firelighting across sample types, methods of measuring firelighting around the world, and the potential degree of the problem present within different populations.

Young Repeat Firelighter Prevalence

In many instances young people who begin firelighting continue with this behaviour and thus become repeat firelighters. Some persist even after they have been detected, reprimanded and/or following intervention. Empirical estimates of repeat firelighting are relatively rare (McDonald, 2010). The collection of this information requires a prospective and longitudinal research design. Thus, repeat firelighting has been measured over a period as short as 6-months (Kolko, Watson & Faust, 1991) with the inherent assumption that most repeat firelighting behaviour will continue to occur within this time. Some studies (Lambie et al., 2013) have measured continued firelighting behaviour over ten years.

Consequently, there is wide variability reported in the rates of repeated firelighting, particularly within forensic samples. A high (95%) recidivism rate was reported among a sample of offending males charged with a fire-related offence in Toronto, Canada (Hanson et al., 1994). Repo and Virkkunen (1997) found that one third of their forensic sample from Finland were charged with arson again within an average 7-year follow-up period. In Florida, USA, almost 15% of the males in a sample of adolescents charged with arson had previously been charged with an arson-related offence (Roe-Sepowitz & Hickie, 2011). In an Australian study, over one quarter of a non-offending sample of adolescents admitted to setting fire to an object more than

three times, while more than 40% of an offending sample of adolescents reported the same (Watt et al., 2015). However, it should be noted that this was a retrospective study and it is unknown if anyone other than the young person had knowledge of the fires. Hence, possibly no detection leading to intervention or reprimand occurred. It can only be hypothesised that some form of intervention (e.g., educational or mental health) would have altered these figures. In a 10-year longitudinal follow-up study of participants in the New Zealand Fire Awareness and Intervention Program, only 2% recidivism was found for fire-related offences. However the rate of other types of further offending was quite high (59%) (Lambie et al., 2013). Stewart and Culver (1982) found 23% of participants admitted to a psychiatric unit in the USA with a firelighting history (excluding matchplay), set further fires after discharge. A similar rate (26%) in Ontario, Canada, was found after a brief firelighting intervention was provided at an out-patient psychiatric clinic (MacKay, Henderson, Del Bove, Marton Warling, & Root, 2006).

Although there remains some variability, statistics within community samples are somewhat more consistent. In Italy, a reported 15% of firelighters in a community sample continued to engage in at least one incident of fire-related behaviour within a 2 to 6-year follow-up period (Del Bove et al., 2008). In Australia, a 29% repeat firelighting rate of at least one incident was reported after brief educational intervention. However an additional 30% of participants were unable to be contacted for follow-up and therefore no information about their firelighting status post intervention was available (Adler, Nunn, Northam, Lebnan, & Ross, 1994). More recently, a 31% rate of repeat firelighting was found at a 12-month follow-up after participants received a similar targeted Australian fire safety education intervention (McDonald, 2010). In terms of arsonists of all ages the most frequently accepted rate of repeated offending is

about one third (Ducat & Ogloff, 2011). These prevalence rates, albeit with possible inaccuracies, combined with the potential devastation that fires can cause, demonstrate the importance of focusing attention on this issue.

Costs of Firelighting

Firelighting caused by young people results in significant costs and consequences. In terms of costs, the financial expense associated with fires is well-recognised. Similarly, accurate estimates of monetary costs are questionable, but the available data and its limitations are detailed here. Fortunately less common, but still apparent, is the cost of human life or injury due to fire. The figures relating to injury and death are presented in this section along with a discussion of other potential “costs” of fire that are virtually impossible to quantify (e.g., psychological trauma).

Financial

Fires in general, many of which are known to be deliberately lit by young people, constitute a financial burden resulting in a range of direct and indirect expenses (Ashe, McAneney, & Pitman, 2009). For example, these expenses include, but are not limited to the cost of resources devoted to attending, extinguishing and cleaning-up after fires, replacing lost and damaged property, lost income, and costs related to healthcare, the justice system, and other relevant government department services.

Unfortunately there are a number of limitations to providing an accurate representation of the true expenditure related to deliberate firelighting. Primarily, as mentioned earlier, many deliberately lit fires are unknown or unreported and therefore any associated financial costs cannot be documented. Furthermore, the indirect costs associated with these fires are far more difficult to calculate as they can be wide-ranging and continue to accumulate over a prolonged period of time (e.g., income loss or

medical costs from sustained injuries or associated psychological trauma). Finally, the nature of information collected, how it is recorded, and what data is considered important, varies from country to country, state to state, and service to service, making it difficult to combine and/or compare data (Haines, Lambie & Seymour, 2006; Bryant, 2008).

Nonetheless, deliberately lit fires have been shown to be expensive worldwide. In 2005, structural loss alone from deliberate fires is reported per annum on average to cost \$777 million in the USA, \$33 million in New Zealand, and \$155 million in Australia (Haines et al., 2006). Other sources estimate the total cost of arson in Australia to be around \$1.35 billion (Smith, Jorna, Sweeney, & Fuller, 2014). Although the financial burden specifically relating to firelighting by young people in Australia is unknown, extrapolating from Muller's (2008) juvenile arson figure of 22% estimates that young firefighters cost Australia approximately \$297 million per annum. The financial burden of fire, while still relatively unclear, is therefore high. The ultimate cost of fire however, is human life.

Injury and Death

The effects of fire can be devastating and result in significant social costs, specifically, injury and death. The risk of injury through fireplay and firelighting is noteworthy. Fire is difficult to control once established and has the potential to get out of hand quickly. It is estimated that 1,310 injuries are sustained annually by members of the general public as a result of deliberately lit fires in the USA (Campbell, 2017). Death caused by deliberately lit fires is by far the greatest "cost" of all. Data collected in the UK between 1986 and 1996 concluded that, on average, two people lost their lives every week due to intentionally lit fires (Ducat & Ogloff, 2011). More recent data collected suggests that this average figure has decreased (Haines et al., 2006), although

this data only includes structural fires. In 1999 the National Fire Protection Association reported that 600 deaths per annum in the USA are attributable to fires lit by young people. Comparable Australian data does not exist (Ducat & Ogloff, 2011).

Other Costs

Fires can result in repercussions beyond financial and direct physical costs. The individual psychosocial ramifications resulting from injuries sustained in fires can be devastating. Such impacts include, for example, absence from work, loss of income, caregiver burden, and loss of social capital. Psychological effects, and in particular, post-traumatic stress symptoms are common for people injured in fires. However, research has identified that even people who are involved in a fire incident, but not injured, can also experience the effects of post-traumatic stress (Schneider et al., 2012).

It is clear that the true cost of fires, regardless of cause, is extremely difficult to calculate. Breaking down further the “costs” specific to deliberately lit fires, and further again, to the “costs” attributed purely to fires deliberately lit by young people, is virtually impossible. However, as discussed below, firelighting by young people has links to adult firelighting, so irrespective of whether deliberately lit fires are the result of intentional adult or child actions, there is still a critical need to target and effectively treat firelighting behaviour in childhood and adolescence.

Precursor for Adult Arson

Research has found that many of the risk characteristics associated with adult arsonists are the same for young firefighters. A logical explanation for the overlap of characteristics is that the firelighting behaviour exhibited in adults probably started in childhood and continued (Ducat & Ogloff, 2011). This is not to say that all, or even most, children who light fires will continue with this behaviour as adults (Fineman, 1995). In fact, some researchers (Lambie et al., 2013) have found that children and

adolescents who light fires are unlikely to become adult arsonists. In essence, the lack of prospective research that has followed the progression or cessation of firelighting from childhood through to adolescence and into adulthood, makes it difficult to understand any lifetime developmental pathway that may exist (Doley et al., 2015). Nonetheless, retrospective research describes a relationship between adults lighting fire and the commencement of firelighting in childhood or adolescence (Fineman, 1995). The suggestion that adult arson develops along a pathway from childhood firelighting into adult arson holds logic. Indeed it has been asserted that it is uncommon to find an adult arsonist whose firelighting began in adulthood (Fineman, 1995). Kolko and Kazdin (1992) have claimed that there are similarities in the reasons why children and adults light fires, suggesting that what is known about adults could be cautiously applied to understand children. This is a valuable idea given that, historically, more research has focused on adult firelighting/arson than young firefighters. In addition, the study by Lambie et al. (2013) highlighted that while most young people do not grow-up to become arsonists, they often do continue on an antisocial path, which is still problematic for society.

Precursor for other Antisocial Behaviours

Many young people who set fires also engage in other types of antisocial behaviour (Del Bove & MacKay, 2011). Firelighting has shown to be a significant predictor of future criminal behaviour. Evidence suggests that child and adolescent firelighting is in many cases a precursor for future offending, and in particular, violent offending behaviour (Becker, Stuewig, Herrera, & McCloskey, 2004). One longitudinal study conducted in the USA over a 10-year period found that children classified as firefighters between the ages of 6 and 12 were nearly four times more likely to be referred to the courts within the following decade, and nearly five times more likely to

be charged with a violent offence than those not reported as child firefighters (Becker et al., 2004). A recent New Zealand study found that 59% of young people charged with a fire-related offence were charged with another offence (largely unrelated to fire) within a 10-year follow-up period (Lambie et al., 2013). Similarly, Repo and Virkkunen (1997) found that 73% of the criminal sample in their study committed a further offence within 7 years (only one third of which was arson). These findings suggest that prolonged firefighting behaviour is uncommon and young firefighters are more likely to cease firefighting and advance to other antisocial behaviour if they do not take a more positive path.

Risk in the Australian Environment

Australia has a large proportion of land perfect for a bushfire to become established. Therefore, increased bushfire risk is inherent in this country (Ducat & Ogloff, 2011). In fact, Australia is the most fire-prone country in the world (Bryant, 2008). However, only a small percentage of bushfires are attributed to natural causes. This indicates that humans, whether on purpose or by accident, play a significant role in the establishment of bushfires (Willis, 2005). Furthermore, the lines separating rural and urban living have become blurred as built-up residential townships are established on the fringes of the countryside. These fringe locations attract the most bushfire risk (Lohm & Davis, 2015). This is particularly relevant given that the majority (approximately 60-65%) of the cases of young people who became known to the fire services for fireplay or firefighting in Victoria between 2015 and 2016, came from areas classified as the jurisdiction of the CFA, which are inclusive of rural and rural fringe locations (M. T., JFAIP. (2017, November 2). [Personal communication]).

The Australian Institute of Criminology reported an average of 54,000 bushfires for 2006-2007 year (SCRGSP, 2008). Thirteen percent of bushfires are known to have

been deliberately lit, but it is suggested that, in reality, this figure could be as high as 50%, with over one third of bushfires recorded as suspicious (Muller, 2009). Young firefighters are suspected to contribute significantly to this figure with approximately 1 in 3 of those charged with arson in Australia being under 18 (Muller, 2008). Given that many young people are rarely convicted of arson (Grolnick et al., 1990), many more bushfires could likely be attributed to them.

Summary

The evidence presented in this chapter highlights the significant impact that young firefighter behaviour has had on society. Notwithstanding the obstacles that researchers and service providers face in determining the true extent of the issue, the data that is available suggests that fires lit by young people have caused, and have the potential to cause, substantial loss and devastation. Both the human and non-human costs, and the likelihood of future problematic behaviour having an impact on the wider community, necessitates further research in this area with a focus on prevention and dissipation. It is apparent that there is a relatively limited literature in the area of young firefighters in general (Stadolnik, 2000). The magnitude of this problem, and the comparative shortage of research, clearly demonstrates a need for more empirical investigation in this area to further understanding of young firefighters and their behaviour. The next chapter explores the literature relating to the known characteristics and profiles of young firefighters and possible theoretical explanations for their behaviour. It concludes with a discussion of firefighter typologies.

Chapter 2

Firefighter Characteristics, Theories, Typologies, and Risk

The first section of this chapter reviews the literature regarding known characteristics, correlates, and risk factors of firefighters. It focusses on those that are linked to the risk of continued problematic firefighting behaviour. The subsequent section provides an overview of the theoretical explanations of firefighting, and a discussion of how they have developed over time. Finally, the last section discusses existing theoretically-driven and empirically-derived typologies of firefighters that differentiate them into sub-categories, and how these typologies relate to risk of continued firefighting behaviour.

Characteristics of Young Firefighters

Research has focused on identifying key characteristics of young people who light fires in an attempt to understand them, predict their behaviour, and inform their management. A number of demographic, fire-specific, family, environmental, and psychosocial variables have been explored in relation to young firefighters, some of which have been linked to persistent and more problematic firefighting behaviour. These variables are discussed in detail below.

Demographic Variables

Age and Development

The prevalence of firefighting, which was covered in chapter 1, demonstrates that it is not rare for young people to interact with fire. Some researchers have considered it to be relatively normal for a young child to show an interest in fire, and engage in fireplay (Sakheim, Vigdor, Gordon, & Helprin, 1985), and for adolescents to experiment with more complex fire-related materials (Pooley & Ferguson, 2017). One study reported that, among the general community, childhood firefighting was perceived

to be a developmentally normal behaviour for a child, but not for an adult, and at some point prior to adulthood unsanctioned firelighting is expected to cease (Perrin-Wallqvist & Norlander, 2003). Conversely, there are some experts who argue that firelighting is not a normal part of a child's development and there could be a danger in normalising its presence during this period (Pinsonneault, 2002). This behaviour may or may not be part of typical development, but nonetheless it is common.

Children and adolescents of all ages have been found to light fires (Stadolnik, 2000). A recent study analysing data of more than 26,000 cases of fire attributed to young people (birth to 16 years of age) known to the fire services in New South Wales (NSW), over a 10-year period, determined that the two most common age groups lighting fire were 6 to 12 years (16.9%) and 13 to 16 years (52%). MacKay, Paglia-Boak, Henderson, Marton, and Adlaf (2009) found relatively equal portions of early and late onset of firelighting in their study of 1,119 firefighters, who admitted to lighting at least one unsanctioned fire in the past. Interestingly, the portion of participants that indicated they were of a young age when they lit their first fire were over-represented in the group with a more extensive history of firelighting incidents (three or more). In contrast, it has been found that while younger children make up the majority of young firefighters, older children are at greatest risk of repeat firelighting (Kolko & Kazdin, 1994). This fact is inherent in the risk typologies detailed later in this chapter, which describe low risk firefighters as young, naïve firefighters and high risk firefighters as antisocially-driven older youth (Federal Emergency Management Agency, United States Fire Administration [FEMA], 2002).

Age has not generally been shown to be a useful predictor of firelighting behaviour (Lambie & Randell, 2011; Stadolnik, 2000). However, research suggests that age and developmental processes are related to types of fires and firefighters (Howell

Bowling, Merrick, & Omar, 2013). In general, pre-school and primary school-age children who start fires are often described as fire curious and as naïve to the dangerous consequences of fire. For younger children, the elements of fire itself, such as the colour and movement, are intriguing. In addition, the perceived “control” a child has over the fire adds a further layer of appeal (Pinsonneault, 2002). Generally, children will have experienced positive outcomes in their previous encounters with fire, which potentially serves to reinforce firelighting behaviour (Pinsonneault, 2002; Pollack-Nelson, Faranda, Porth, & Lim, 2006). For example, lighting and blowing out birthday candles, watching parents cook dinner on a gas stove, and observing firewood burning for heat, are common and appropriate everyday fire-related activities viewed by children. These activities may stimulate interest in a child and inspire them to experiment with firelighting. Unfortunately, a child’s understanding of fire is limited and they have insufficient cognitive maturity to evaluate the seriousness of a situation (Stadolnik, 2000). Knowledge of what types of materials burn, how quickly fire can spread, and how to extinguish a fire effectively, is largely absent for young pre-school or early school-aged children (Pollack-Nelson et al., 2006; Stadolnik, 2000). In fact, many adults cannot accurately estimate how long a fire will take to grow (Fridolf & Nilsson, 2011) and therefore, children cannot be expected to know. Younger children playing with fire out of curiosity are especially dangerous because they tend to conceal it (Stadolnik, 2000). This is most likely out of fear of getting in trouble. Interestingly, as children generally light fires covertly, it seems that, to some extent, they understand that it is unsanctioned but do not have the cognitive ability to appreciate the magnitude of the potential consequences (Pollack-Nelson et al., 2006). Furthermore, as children develop, they have an increased need to demonstrate mastery over their environment and show adults that they are capable of independence (Pinsonneault, 2002). Therefore,

in the event that fire-related experimentation gets out of hand, children may not raise an alarm immediately out of fear of being perceived as incompetent, which can further exacerbate the destruction a fire can cause when not detected quickly (Pinsonneault, 2002). Hence, younger children typically set fires that are more dangerous in terms of injury and death (Stadolnik, 2000), particularly for themselves and/or family when the fire is lit inside a residence. They may also use fire as a means of coping with emotional turmoil by attempting to exert control over it (Pinsonneault, 2002). This indicates an underlying level of psychopathology in the motive that may require targeted mental health intervention.

The literature describes changing motivations behind firelighting as children develop into adolescents (Stadolnik, 2000). Society considers adolescents to be developmentally capable of understanding the distinction between right and wrong behaviour. Adolescents tend to set more fires in the community with their peers (FEMA, 2012; Pinsonneault, 2002). Often schools and rubbish bins are targeted in the evening hours using ignition sources that are more complex and versatile than what is expected from younger children (Stadolnik, 2000). Adolescents tend to cause fires that result in more damage to property and financial loss (Stadolnik, 2000). Of young people responsible for bushfires, adolescents are reported to be the main perpetrators (Muller, 2008). This is most likely because they have more parental freedom and ability to explore further away from the residential home. Engaging in antisocial behaviour in general has also been reported as a typical part of adolescent development in the process of identity formation (Moffit, 2006). At a more severe level, antisocial behaviour marked by significant psychosocial disturbances underlying firelighting activity, points to the need for mental health services to aid in dissipation of continued firelighting.

Irrespective of these observed age and developmental differences, it has been suggested that there is currently no clear empirical evidence to determine that there is a difference in terms of psychopathological underpinnings between younger and older children and adolescents who light fires (Lambie & Randell, 2011). More recent research has shown that age was not an important variable in distinguishing between low, moderate, and high risk firelighters (Del Bove & MacKay, 2011). The literature is consistent with this lack of distinction, discussing children and adolescent firelighters together as one group, but more research into age differences is warranted as this will have implications on treatment

Sex

Apart from males clearly outnumbering females in firelighting engagement, it is unclear if there are sex differences in the firelighting behaviour of young people, or the profiles of male and female firelighters. However, males are generally over-represented in populations of antisocial individuals in general (Alegria, Blanco, Petry, Skodol, Liu, Grant, & Hasin, 2013), and firelighting behaviour is no exception. Due to this disparity, research into potential sex differences is somewhat limited. The male to female ratio of young firelighters has been reported as high as 9:1 (Muller, 2008). Other studies (Chen, Arria, & Anthony, 2003; Martin, Bergen, Richardson, Roeger, & Allison, 2004; Roe-Sepowitz & Hickle, 2011) have not reported such a large disparity between the sexes, but nonetheless, males are still predominate compared to females in terms of firelighting. Interestingly, research does point to an increase in female participation in firelighting during the period of adolescence (Stadolnik, 2000). This could indicate a specific type of driving force for females during this time that warrants further exploration.

Due to the rarity of young female firefighters, limited (if any) empirical research exists regarding their profile. Hence most of the knowledge in the field has derived from populations of young child and adolescent males. Nonetheless, based on clinical judgement, female firefighters have been described as more severely disturbed than their male counterparts (Fineman, 1995). Fineman expected that there would be an increase in the occurrence of female firefighters as time progressed due to societal changes in the Western world promoting assertiveness in women. This does not appear to have been borne out, as recent studies have reported similar portion splits to the long held 85-90% male and 10-15% female firefighter frequencies (Lambie & Krynen, 2017). A more specific focus on the underlying motivations for young female firefighters is essential. In particular, more empirical evidence of similarities or differences between young male and female firefighters is critical, given that currently females are assessed and targeted based on models developed overwhelmingly on a male population.

Fire-specific Factors

Fire Interest and Curiosity

Fire interest, as previously defined, relates to varying degrees of attentional bias for fire and fire-related stimuli (FEMA, 2002), and is implied in other terms employed in the literature (e.g., curiosity, fascination, preoccupation). Fire interest has been identified as a precursor for actual firefighting behaviour and it is attributed as the primary motive for two thirds of fires lit by children. It is generally described in relation to younger pre-school and early school-aged children (FEMA, 2002), but has been noted as relevant for older child and adolescent firefighters as well (Pinsonneault, 2002). Recently, it was suggested that fire interest can be assumed to be part of the motive behind all deliberately lit fires (Pooley & Ferguson, 2017).

Fire interest has also been identified as a key risk factor for ongoing firefighting behaviour (Del Bove & MacKay, 2011). A number of studies have found increased interest in fire and preoccupation with fire to be significant factors for predicting repeat firefighters and the severity of their firefighting behaviour (Watt, Geritz, Hasan, Harden, & Doley, 2015; Bailey, Smith, & Dolan, 2001; Kolko & Kazdin, 1994). Even when controlling for other prominent firefighting predictors (e.g., antisocial tendencies), increased fire interest has been shown to be a key element in firefighting severity and persistence (MacKay, Henderson, Del Bove, Marton, Warling, & Root, 2006). Furthermore, excitement by fire, which encompasses interest, has been identified as one of the strongest variables in a predictive equation for severe firefighting (Sakheim, Osborn, & Abrams, 1991). Recently, it was empirically demonstrated in a Stroop-style experiment that firefighters were more distracted by fire-related stimuli than non-firefighters, inferring that they have a particular attentional bias and interest towards fire. Remarkably, this study found that fire-related attentional bias was negatively correlated with self-reported fire interest. Basically, self-reported fire interest was unable to differentiate between firefighters and non-firefighting controls, but the firefighter group performed worse on a fire-related Stroop task (Gallagher-Duffy, MacKay, Duffy, Sullivan-Thomas, & Peterson-Badali, 2009). This indicates that there is some utility in using methods for assessing fire interest other than self-report that may tap into subconscious fire interest within individuals, or fire interest that individuals are unwilling to disclose (Hoerold & Tranah, 2014; Gallagher-Duffy et al., 2009).

Interestingly, despite the strong evidence suggesting that fire interest is related to future and severe firefighting, it has been implied in established typologies and risk assessment models (discussed later in this chapter) that curious firefighters are the group at least risk of continued firefighting (FEMA, 2002). Thus firefighting interest,

curiosity, and fascination may have been precariously ignored as a critical feature of an “at-risk” firefighter (MacKay et al., 2006). Furthermore, researchers have suggested that curiosity-driven firefighting is possibly the most dangerous due to probable coexisting ignorance towards the potential consequences (Stadolnik, 2000). Therefore, assessing fire interest and feelings of stimulation related to firefighting experiences appears to be significant for detecting firefighters at risk of causing great devastation (Watt et al., 2015). Perhaps self-report measures are insufficiently valid and assessment should focus more on sophisticated methods such as measuring underlying implicit attentional biases. In light of this more recent evidence, further research in the area of fire interest is warranted.

Early Onset of Firefighting and Greater Past Involvement

More frequent firefighting engagement has shown to be linked to a younger age of firefighting onset (Hoerold & Tranah, 2014). Both early onset and frequent involvement with firefighting behaviours have demonstrated predictive capability for detecting repeat episode firefighters (McCardle, Lambie, & Barker-Collo, 2004). Past firefighting behaviour has demonstrated to be predictive of repeat firefighting (Kolko, Bridge, Day, & Kazdin, 2001). In an American study of firefighters aged between 6 and 17 years, over one quarter of the sample reported having engaged in their first firefighting incident before age 6. A similar portion reported repeat firefighting during the eighteen-month follow-up period. However, it is unclear if this was the same group that had early onset involvement (MacKay et al., 2006). To further support early onset as a risk factor, frequent firefighting was identified as more common among young people who first became involved with firefighting at a young age (< 10 years) (MacKay et al., 2009).

Firefighters responsible for severe firelighting incidents have also been more readily described as having an extensive history of fire involvement (Hanson, MacKay-Soroka, Staley, & Poulton, 1994). Additionally, greater past involvement has been identified as a strong predictor of severe firelighting (Sakheim & Osborn, 1999) and repeated firelighting behaviour (Kennedy, Vale, Khan, & McAnaney, 2006). Research has also demonstrated that children and adolescents with the most extensive histories of fire involvement progressively become more resourceful in their firelighting activities (Del Bove & MacKay, 2011). This indicates that firelighting behaviour generally starts with basic activities (e.g., lighterplay) and becomes increasingly more sophisticated and versatile (e.g., sparkler bombs, grass fires) as these behaviours form part of the child's developing behavioural repertoire. It is clear that early preventative measures are fundamental to a reduction in prevalence of young firefighters and the incidence of more problematic firelighting behaviour.

Knowledge of Fire Safety and Competency with Fire

Limited research exists surrounding the role of fire safety knowledge and fire competency in preventing or promoting firelighting behaviour. In the past, children and parents have displayed deficiencies in fire safety knowledge and skills. Specifically, children have demonstrated a limited ability to correctly identify combustible items and an inadequate understanding of how to appropriately respond in a fire emergency (Kafry, 1980). Poor knowledge of fire safety has been associated with repeat firelighting. McDonald (2010) found that repeat firefighters had significantly less pre- and post-intervention fire safety skills in comparison to non-repeat firefighters. Kolko and Kazdin (1986) discussed the connection between firelighting behaviours and limited fire safety skills and competency as part of a model (discussed later in this chapter) that explains and predicts firelighting. However, this construct was later tested

by the authors (Kolko & Kazdin, 1989a) and it was found not to be associated with any meaningful differences between firefighters and non-firefighters. Promisingly, a group fire safety and prevention skills training program was able to increase fire safety knowledge and reduce firefighting behaviour in already active firefighters (Kolko, Watson, & Faust, 1991). It should be noted that fire safety knowledge and fire competency are different concepts. Specifically, if effective, fire safety knowledge should result in a reduction of fire risk behaviour. In contrast, while fire competency is not overly well defined in the literature, it could potentially infer more capability in using fire which may promote increased use. This specific area has received limited empirical attention with regards to repeat firefighters and should be considered in future.

Exposure to Influential Models and Access to Fire-related Materials

One of the most critical ways children learn how to behave appropriately is by observing the behaviour of their key adult role models (Eisenberg & Fabes, 1998). Firefighters have been found to have greater exposure to family members who are interested in fire (Kolko & Kazdin, 1989a, 1989b). Jackson, Glass, and Hope (1987) reported on early research that found firefighters had been exposed to more fire-related activities in their lives prior to their own firefighting engagement. For example, father figures of firefighters have reportedly often been employed in fire-related roles (e.g., firefighters) or firefighters themselves reside in more rural settings where fire is regularly used for legitimate purposes. These environmental influences may serve to promote a child's involvement with fire. Furthermore, inappropriate fire use by family role models can have a negative influence on the firefighting behaviour of young people (Slavkin & Fineman, 2000).

Currently, with the increase in technology and use of the Internet, young people have access to content of all genres, including firefighting paraphernalia. YouTube is

the most popular source of online videos for young people and it is loaded with unregulated content (Romer, Jamieson, Hall Jamieson, Jones, & Sherr, 2017). A simple search of YouTube on 4 April 2017 using the phrase “kids lighting fire” resulted in approximately 1,020,000 results. The first page of results alone included a video entitled “dumb kids almost start forest fire,” and consisted of 2.5 minutes of footage of three young boys, presumably under 12 years of age, lighting a small grass fire in parkland that quickly spread out of their control. Some of the other videos that appeared on the first page of results were titled: “Lighting random stuff on fire,” “Kid lights hand on fire,” “Funny video: Kid lights his hair on fire,” “Lighting some leaves on fire AND THEN,” and “William goes psycho and burns car over Xbox.” Collectively, these six videos had been viewed almost 680,000 times. This content, and that of a similar nature, is readily available to all young people with Internet access and the ability to use an Internet browser to search for material of interest. Such media exposure has been described as a source of deviant influence and learning. The importance of adult supervision around Internet use and behaviour is stressed as essential for known firelighting young people (Thomas, MacKay, & Salsbury, 2012).

Recently, Lambie, Randell, and McDowell (2014) explored the role of the copycat phenomenon in firelighting, in particular, how this applies to young easily-influenced adolescents. The basic premise of criminal copycat behaviour is that in the absence of exposure to media content regarding a specific criminal act, the copycat would have either not have committed any crime at all, or would not have used the exposed method to commit their crime. Given the extent to which the firelighting behaviour of others is viewable and somewhat celebrated in an online setting that is overpopulated with young people, it is probable there will be an increase in fire-risk behaviour. While the extent to which copycat firelighting is actually a problem is

unknown, it could be expected that with such a rapid increase in available and unregulated Internet content that this will become more of a problem over time.

Therefore, more research focus into the influence online media has on young peoples firelighting interest and behavior is critical here.

Availability of Incendiaries

Firelighting activity is facilitated by the availability of fire-related materials and the absence of parental monitoring (Kolko & Kazdin, 1986; Cox-Jones, Lubetsky, Fultz, & Kolko, 1990). This is particularly relevant for younger children. The industry regulations relating to the operating mechanisms of lighters have been adapted over the years, resulting in lighters becoming “child resistant” (Smith, Greene, & Singh, 2002). Emphasis has also been placed on educating caregivers about the importance of ensuring incendiary materials are kept out of reach of children (Pollack-Nelson et al., 2006). The improved safety standards of ignition sources has reportedly resulted in a significant reduction in fires started by young children specifically (Smith et al., 2002).

However, the absence of easily accessible fire-related materials does not necessarily mean that firelighting will not occur (Kolko & Kazdin, 1986). Improved safety measures have not completely solved the problem as child-resistant lighters are not childproof, and children can seek out hidden ignition sources. One study found that 73% of the children in the sample aged under 7 years used lighters to start fires, and the remaining 27% used matches. Over 60% of parents in this study reported that their child had sought the incendiaries from locations considered to be out of reach (e.g., on top of a fridge; Pollack-Nelson et al., 2006). This suggests that some children are capable of working child-proof lighters and can actively seek out the resources required to engage in firelighting. This is significant because parents may believe their attempts to prevent access to incendiaries are sufficient and/or that their child will not be able to operate a

child-resistant ignition source. Additionally, child-resistant lighters do not have a prohibiting impact on functionality for older children and adolescents. Antisocial adolescents, some of whom are firefighters, are reported to commonly be carrying their own lighters the majority of the time (Hoerold & Tranah, 2014).

Easy access to ignition sources may aid in the firelighting activity, and in some cases, may be one of the factors that plants the seed to light a fire. However, young people, including young children, who have the intention of engaging in fire activity have been found to be resourceful in locating the materials they need. This indicates that hiding ignition sources from young people is important, particularly for younger children, but it is equally important to consider that this is not sufficient to prevent a child from lighting a fire if that is their intention.

Family and Environmental Factors

Peer Influence, Delinquent Friends, and Boredom

Firelighting often occurs with an accomplice, particularly with regards to adolescent firefighters (Bailey et al., 2001; McCardle et al., 2004). Affiliation with peers and social support from relatable others is highly valued by young people during adolescence (Steinberg & Morris, 2001). Consequently, adolescents are vulnerable to peer influence. Positive and neutral reactions from peers for firelighting behaviour has been found to increase the risk of future firelighting behaviour three-fold (Kolko & Kazdin, 1994). Peer pressure has also been identified as a commonly reported motivation by young firefighters (Bailey et al., 2001; Lambie, Ioane, Randell, and Seymour, 2013; Walsh & Lambie, 2013). Fireplay and experimentation in the absence of “something better to do” has been reported as the most common motive for firelighting by a group of young adults who retrospectively explained their own firelighting experience in childhood and adolescence (Perrin-Wallqvist & Norlander,

2003). Similarly, in a longitudinal study of young firefighters, the main reasons reported for the original firefighting behaviour was experimentation and boredom (Lambie et al., 2013). A positive correlation between popularity and antisocial behaviour in adolescents has been identified (Moffit, 2006). One study found that over half of the males and nearly two thirds of the females charged with arson were among a group of peers when they committed the crime (Roe-Sepowitz & Hickle, 2011). Furthermore, associating with antisocial friends is a common feature linked to those described as “juvenile arsonists” (Roe-Sepowitz & Hickle, 2011). How this relates to repeated firefighting after intervention remains an open question.

Parental Supervision

Parental supervision reduces the incidence of accidents, injury, and death (Morrongiello & Schell, 2010). Parents often regard the bedroom, family room, and playroom to be the “safest” areas for children to play alone (Pollack-Nelson et al., 2006). However, research has found that the bedroom is the most common location where pre-school children start fires while unsupervised (Hall, 2010; Pollack-Nelson et al., 2006). The bedroom increases the risk of detrimental consequences because the child is in a confined space with the fire and the caregiver may be unaware of its existence until the fire is uncontrollable. It has been found that younger firefighters experience minimal parental supervision in their home environment (Roe-Sepowitz & Hickle, 2011). Low parental monitoring has also been reported by adolescent firefighters with a history of multiple firefighting incidents (MacKay et al., 2009). Furthermore, non-firefighting children partially attribute their lack of fire involvement to adequate supervision practices from their parents (Perrin-Wallqvist & Norlander, 2003). Based on this evidence, it is clear that supervision can play a role in firefighting behaviours.

Disciplinary Measures

In order to reduce or eradicate negative child behaviours, disciplinary actions are necessary (Flaskerud, 2011). In its 1994 policy on effective discipline, the American Academy of Pediatrics advocates positive reinforcement for desired behaviours and consequences for negative behaviours. In addition, the policy states that corporal punitive punishment is ineffective in attending to problem behaviour and has potential undesirable long term consequences. The academy advocates that enforcing time-out and/or removing privileges is most effective, provided that these methods are imposed consistently and clearly so that the child understands that the consequence relates to the undesired behaviour. Punishment in the form of verbal and physical reprimand are considered less effective. Verbal criticism focuses attention on the child, which may act as reinforcement for the behaviour. Physical punishment models violent behaviours and has been linked to increased future aggressiveness in childhood and adulthood (Taylor, Manganello, Lee, & Rice, 2010; Flaskerud, 2011).

Firelighting, being an unsanctioned behaviour, calls for some form of disciplinary consequence to highlight disapproval of these actions for the child. Research regarding an association between firelighting and discipline largely suggests that firelighters tend to receive discipline that sits at either extreme of the disciplinary continuum. For example, firelighters are generally either harshly punished with physical or punitive measures, or the behaviour is ignored and not disciplined at all. Studies have shown that persistent firelighters are more likely to be subjected to harsher, physical, punitive, and less appropriate disciplining techniques from their parents than non-firelighters (McCarty & McMahan, 2005; McDonald, 2010). An older study reported that some parents burnt their children as punishment for their firelighting behaviour (Ritvo, Shanok, & Lewis, 1983). On the other hand, young firelighters have also

reported receiving no discipline from their parents for their firelighting, positively checking the survey item “my parents didn’t say anything to me” (Kolko & Kazdin, 1994). Research has also found that children who anticipated consequences from parents for any firelighting behaviour were less likely to become involved (Grolnick, Cole, Laurenitis, & Schwartzman, 1990). Similarly, non-firelighting children partially attributed their lack of engagement to parental forbiddance (Perrin-Wallqvist & Norlander, 2003). This evidence suggests that appropriate discipline (e.g., time-out or removal of privileges) is likely to be more beneficial for altering firelighting behaviour, but is rarely exercised by parents of repeat firelighters.

Family Functioning and Relationships

Family stability is predictive of positive psychosocial adjustment and life outcomes. Conversely, family instability and abuse in childhood is linked with increased psychosocial disturbance, behavioural issues, and negative life outcomes (Fomby & Cherlin, 2007). Repeat firelighters have been found to experience limited parental care and family dysfunction (Martin et al., 2004; McCarty & McMahon, 2005; Kolko & Kazdin, 1990). Specifically, firelighters are exposed to greater dysfunction and hostility in the marital relations of their parents and they themselves have more strained relationships with their parents (McCarty & McMahon, 2005; Kolko & Kazdin, 1990). Kazdin and Kolko (1986) found that the parents of firelighters experienced less marital satisfaction and cohesion and displayed less affection towards each other. Frequently, young people who light fires reside with a single biological parent (Kosky & Silburn, 1984) and come from low socio-economic circumstances (Root, MacKay, Henderson, Del Bove, & Warling, 2008). Additionally, the family is usually involved with social services (MacKay et al., 2006) or the child resides in a welfare facility (Del Bove & MacKay, 2011). A recent study found that firelighters commonly experience family

instability (e.g., multiple changes in living arrangements including location and family members, recent parental separation, or divorce; Roe-Sepowitz & Hickie, 2011) and that firelighting often occurs immediately following a family stressor, particularly in youth with a history of maltreatment (Root et al., 2008).

Frequent and persistent firelighters are more likely to have experienced parental maltreatment. Specifically, a history of either physical, sexual, or neglectful abuse is apparent (Root et al., 2008; Bailey et al., 2001; Martin et al., 2004). Children who witness domestic violence in the home are 2.5 times more likely to set fires than children residing in non-violent environments (Becker, Stuewig, Herrera, & McCloskey, 2004). In a series of research studies, Sakheim and colleagues (1985, 1986, 1999) found that anger and hostility towards the mother for experiences of rejection, neglect, and abandonment were predictive of severe firelighting behaviours. Similarly, anger at fathers for previous abuse and abandonment was also linked to severe firelighting behaviour (Sakheim, 1985, 1986). In this vein, firelighting has been described as a symbolic method for expressing anger and releasing tension (Jackson, Glass, & Hope, 1987). Fineman (1995) suggested that poor parental models could prevent a child from developing an adequate ability to be assertive. This deficit in assertiveness could potentially explain the inability to appropriately express disapproval, hence young people may project their aggression onto the source indirectly, using fire to cause destruction and release tension. There is a clear paucity of empirical research exploring the role of family dynamics and functioning that needs to be addressed.

Parental Psychopathology

Parental psychopathology has been associated with firelighters (Kazdin & Kolko, 1986; Kolko & Kazdin, 1990; Regehr & Glancy, 1991). Increased parental stress

has been linked to firelighting behaviour in a community sample of young children (aged 4 to 9 years) (Dadds & Fraser, 2006). Persistence of firelighting has also been linked to heightened parental depressive symptoms (McCarty & McMahon, 2005). Maternal depression in particular has shown to be more apparent for mothers of firefighters than non-firefighters (Kazdin & Kolko, 1986). Stewart and Culver (1982) found a high prevalence of psychiatric disorders among the parents of firefighters in their study. However, it was reported that this was more related to Conduct Disorder than firelighting specifically. They described similar findings in earlier work where young people with unsocialised aggressive Conduct Disorder were more likely to have fathers who were antisocial and alcoholics. Another study (Becker et al., 2004) found that young children aged under 12 residing with poor male role models who harmed animals and consumed large quantities of alcohol, were more likely to set fires than those not exposed to this type of undesirable adult behaviour. Interestingly, frequent alcohol use by male caregivers was not associated with firelighting. This suggests that the negative impact of parental alcohol consumption on child behaviour is most problematic when the volume of alcohol is high, but not when a limited amount is consumed on a regular basis.

Child Psychopathological Factors

Impulsivity, Hyperactivity, and Attention Deficit Hyperactivity Disorder

At the centre of Attention Deficit Hyperactivity Disorder (ADHD) is a presence of inattention, hyperactivity, and impulsivity (Merrell, Sayal, Tymms, & Kasim, 2017). ADHD and impulsive behaviour have been associated with firelighting (Kafry, 1980). A diagnosis of ADHD has been associated with male firelighting adolescents in particular (Roe-Sepowitz & Hickle, 2011). A study of 182 young people referred to a juvenile fire

intervention program for firelighting reported that 11% had a diagnosis of Attention Deficit Disorder (ADD)/ADHD (Lambie et al., 2013). This is more than double the 3-5% prevalence reported for school-age children worldwide (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007; Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015).

Similarly, numerous symptoms of ADHD were significantly associated with firelighting in young people aged 6 to 12 years living in circumstances of domestic violence (Becker et al., 2004). Hyperactive behaviours have been identified as more prominent in young firelighting psychiatric patients when compared to their non-firelighting counterparts (Kolko, Kazdin & Meyer, 1985). Psychiatric interviews have also found that anger and impulsivity are associated with firefighters (Bailey et al., 2001).

Impulsivity was the only variable among the child characteristics, which distinguished persisting firefighters from desisting firefighters in a normative sample of youth (McCarty & McMahon, 2005). Similarly in another study, impulsivity was the only variable discriminating between firefighters, other antisocial youth, and general school controls (Hoerold & Tranah, 2014). Impulsivity has been shown to be a good predictor of firelighting severity (Sakheim et al., 1991). Young firefighters have recently been found to score in the clinical level for hyperactivity/inattention difficulties in a study of children and adolescents aged 6 to 17 (Lambie & Krynen, 2017). Particularly concerning is when a strong interest or fascination with fire is coupled with elements of impulsivity and inattention (Thomas, Ayoub, Rosenberg, Robert, & Meyer, 2004).

Research findings have pointed to the importance of including hyperactive and impulsive qualities in future firelighting risk evaluations (Dadds & Fraser, 2006; Kolko & Kazdin, 1991a).

Poor Social Skills

A few studies have reported that firefighters demonstrate limited social skills. Poor social judgment and decreased ability to anticipate social outcomes have been linked to severe firefighters (Sakheim et al., 1985, 1991). Lowenstein (2001) listed social skills deficits and poor interpersonal relationships as characteristic of both young firefighters and adult arsonists. Aggression coupled with social rejection and shyness increased the risk of firefighting significantly (Chen et al., 2003). Non-aggressive firefighters have reported significantly more social problems than their non-firefighting, but aggressive, counterparts (Del Bove, Caprara, Pastorelli, & Paciello, 2008). Kolko and Kazdin (1990) attributed deficits in firefighter interpersonal development to poor parenting styles. A follow-up study revealed firefighters possessed lower levels of assertiveness, sociability, and social skills (Kolko & Kazdin, 1991a). Nonetheless, there is a lack of current empirical studies that has looked directly at the relationship between poor social skills and firefighting in young people. There is more evidence around this from studying adult firefighters.

Externalising Behaviours

Repeat firefighters have displayed increased levels of externalising symptoms (Del Bove et al., 2008). Drug use has been demonstrated among young firefighters, particularly the adolescent cohort. Adolescent firefighters with a history of multiple firefighting episodes have been found more likely to report engagement in recreational drug use compared to non-firefighters (MacKay et al., 2009). Firesetters in a study of young people referred to an adolescent forensic service were also more likely to have a history of substance abuse, particularly alcohol (Bailey et al., 2001). The regular use of at least three illicit drugs and engagement in other risk-taking behaviours has been linked to the firefighting behaviour of high school students (Martin et al., 2004).

However, Roe-Sepowitz and Hickle (2011) explored the relationship between drug use and juvenile arson and found there to be no connection.

Extreme antisocial behaviours are reportedly related to adolescent firelighting behaviour in the general community (Martin et al., 2004). Numerous studies demonstrate more extreme externalising symptoms are present in more severe young firelighters (Kafry, 1980; Kolko & Kazdin, 1991a; Del Bove & MacKay, 2011). In an Australian-based study, antisocial youth were more likely to engage in firelighting behaviour than those with less antisocial engagement (Watt et al., 2015). Similarly, MacKay et al. (2006) found that an increase in antisocial behaviour as measured by the Child Behaviour Checklist (CBCL) externalising scale was positively correlated with an increase in the severity and persistence of juvenile offender firelighting behaviour. For example, one study found that the juvenile firelighters in their sample displayed a greater degree, and frequency, of aggressive and antisocial tendencies compared to non-firelighting offenders (Stickle & Blechman, 2002). Firelighters have also rated higher on scales measuring covert antisocial behaviour (Kolko & Kazdin, 1991a). Firelighting has been described as an antisocial behaviour that generally coexists with other antisocial activities rather than in isolation (Sakheim et al., 1985).

Anger has been self-reported as one of the key motivations for firelighting by over half of the participants in a sample of 10 to 16-year-old males (Walsh & Lambie, 2013). Revenge has also been reported as a motivation for firelighters (Bailey et al., 2001). Furthermore, severe firelighters have been shown to have aggressive fantasies of revenge with sadistic or destructive content (Sakheim & Osborn, 1999), and experience rage in response to perceived insults (Sakheim et al., 1985, 1986;). Sakheim et al. (1985) reported that firelighters are less able to verbalise their anger and instead act out with rage. In a large sample of almost 4,500 adolescents from the USA, it was found

that aggression was the variable most strongly related to firelighting, with the risk of firelighting being eight times higher for those with high levels of aggression compared to non-aggressive respondents (Chen et al., 2003). Cruelty to animals and young children has previously been identified as a predictor of severe firelighting (Sakheim et al., 1991). Additionally, firefighters have demonstrated high levels of hostility in the months leading up to their firelighting offence (Bailey et al., 2001).

Firelighting young people are more likely to have a diagnosis of Conduct Disorder than their non-firelighting counterparts who have also sought mental health services for psychological issues (Kolko & Kazdin, 1988a). In a study of juvenile firefighters referred to adolescent forensic services, the most common associated diagnosis was Conduct Disorder (Bailey et al., 2001). One study reported that 65% of their out-patient sample was diagnosed with Conduct Disorder (Heath, Hardesty, Goldfine, & Walker, 1985). In a large sample of children aged 6 to 12 years from violent homes, diagnosed Conduct Disorder was apparent for approximately 31% of the firefighters compared to only 7% of their non-firelighting peers (Becker et al., 2004). A recent study has also found Conduct Disorder symptoms to be significant for firefighters presenting to a fire service intervention program (Lambie & Krynen, 2017). It is apparent that the presence of Conduct Disorder is an identified risk factor for firelighting behaviour.

These findings provide evidence for the theoretical notion that firelighting is associated with an early onset, and progression, of serious and versatile antisocial behaviours. It is clear that there is some relationship between Conduct Disorder and firelighting. Intuitively, this makes sense given the fact that firelighting is one of the potential criterion to meet a diagnosis of this disorder. However, not all firefighters have Conduct Disorder, and not all of those with Conduct Disorder are firefighters (MacKay

et al., 2012) . Research has demonstrated that even when controlling for Conduct Disorder, firefighters were still three times more likely to be referred to the courts for an offence, and 3.3 times more likely to be referred for a violent offence in particular (Becker et al., 2004). This indicates that Conduct Disorder alone is not enough to explain severe firefighting behaviour. Therefore, it is important to distinguish the factors that set firefighters apart from other young people with Conduct Disorder (Kazdin & Kolko, 1986). Conduct Disorder behaviours are generally regarded as explicitly antisocial. Given that firefighting is most commonly a covert behaviour, it is worth highlighting that firefighters demonstrate behaviour that is distinct from traditional overt Conduct Disorder behaviour. Hence, some experts suggest that firefighting should also be classified as separate from the typical traditional Conduct Disorder (Chen et al., 2003). It has been argued that firefighters with a diagnosis of Conduct Disorder display a more severe degree of Conduct Disorder behaviours. Hence, this combination appears to depict a more severe type of Conduct Disorder that can be distinguished from Conduct Disorder without firefighting. More empirical research assessing more specific comparison groups, such as antisocial adolescents or those diagnosed with Conduct Disorder with an absence of fire lighting, is warranted.

Internalising Problems

Compared with externalising behaviours, the association between internalising issues (e.g., depression, withdrawal, anxiety) and firefighters has been given limited attention. Some past research has found that firefighters rarely experienced internalising symptoms (Heath et al., 1985). In a sample of young psychiatric in-patients, out-patients, and non-patients, those who had a history of firesetting were less likely to have a diagnosis of major depression (Kolko & Kazdin, 1991a). Similarly, Lambie and Krynen (2017) reported that firefighters were at lower risk for clinical emotional

problems. However, on inspection, this finding did not apply to the 11 to 13-year-old age bracket based on parent-report (Lambie & Krynen, 2017). In contrast, firefighters have scored higher than non-firefighters on internalising scales (Kolko & Kazdin, 1991a). Furthermore, depression has also been identified as one of the three most common diagnoses associated with firefighters (Nishi-Strattner, Kopet, & Erdberg, 2001 as cited in Kolko, Nishi-Strattner, Wilcox & Kopet, 2002), along with a number of depressive symptoms and hopelessness (Becker et al., 2004; Martin et al., 2004). Del Bove et al. (2008) also found heightened internalising symptoms were relevant to repeat firefighters in their study. Repeat firefighters in comparison to non-firefighters have reported increased psychological distress (MacKay et al., 2009). More specifically, suicidal behaviours including suicidal thoughts, plans, threats, and attempts at suicide and self-harm have also been found in firefighting youth (Martin et al., 2004).

Internalising symptoms are often found to coexist with externalising symptoms (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999). Therefore, as externalising symptoms are commonly associated with firefighters, it is logical that they could also be experiencing issues with internalised problems. Del Bove et al. (2008) found that repeat firefighters displayed heightened degrees of both internalising and externalising problems. Stadolnik (2000) discussed the importance of assessors evaluating the child or adolescent's emotional functioning because firefighting behaviour is often related to, or coexists with, experiences of negative emotions (painful, lonely, anxious, depressed, angry, fearful), and these emotions may serve to maintain firefighting behaviour.

Roe-Sepowitz and Hickle (2011) reported that Post-Traumatic Stress Disorder and internalising issues such as depression and anxiety have been associated with female delinquency in general. Their specific study identified that a history of running away and suicide ideation were found predominantly in female firefighters when

compared to male firefighters. Firelighting attributed to emotional expression resulting from depression and anxiety, and the need to release built-up emotional tension, was found to be more apparent for female firefighters than males (Santtila et al., 2003). Similar qualitative differences have also been identified in male and female adult arsonists. For example, emotionally-driven motives for, and targets of, firesetting have been found particularly applicable to female arsonists in a mixed sample of adolescents (26.7%) and adults (Bourget & Bradford, 1989). A potential need for differentiated interventions for female and male firefighters has been indicated (Roe-Sepowitz & Hickie, 2011). There is a clear disparity in the amount of research looking in to externalising versus internalising factors that contribute to firelighting behaviour. Given the apparent impact of internalising issues, and the coexistence of these with externalising problems, more thorough research into the role each plays is indicated.

Summary of Firefighter Characteristics

The reviewed literature revealed a number of factors that may contribute to persistent firelighting behaviour. Fire-specific factors including increased curiosity, history with fire, and greater exposure to role models with fire-related materials are linked to repeated firefighter behaviour. Poorer family functioning and parenting practices have also been related to repeat firefighters. Significantly, individual psychosocial disturbances including social problems and externalising, internalising, and impulsive, hyperactive behaviours and symptoms, are characteristic of more problematic firefighters. It is clear that more problematic firefighters have some specific factors relevant to their profile. Research has clearly identified certain characteristics that are unique to, or more predominant in, the firelighting cohort and a number of theoretical models have been developed as a result. Overall, repeat firefighters are

expected to show differences in relation to fire-specific, family, and psychosocial variables compared to desisting firefighters.

Theories of Firelighting

Theoretical views that may explain firelighting have evolved over time. Theories underpinning firelighting aetiology have followed a similar pattern to the evolution of psychological schools of thought in general. Early theories favoured a psychoanalytic focus until behaviourism made its mark, and social learning theory emerged to explain firelighting. More recently, multifactorial models in keeping with the biopsychosocial approach to understanding firelighting have held sway.

Historical Overview and Single Factor Theories

Historically, the focus on firelighting was purely on punishment. The aetiology and treatment of behaviour associated with firelighting was largely ignored (Stadolnik, 2000). Moreover, early theories of firelighting did not focus on young firefighters specifically (Sakheim et al., 1985). In 1820, firelighting with an impulsive element was described as a distinct form of insanity and labelled “impulsive incendiarism,” and subsequently, “monomaniac incendiare” and “pyromania” in 1833 (Mehregany, 1993). At that time, there was much debate around the use of the term pyromania as it was a legal defence for arson. Consequently, conflict as to whether firelighting should be considered a medical or a legal issue resulted, and the view that the behaviour was criminal prevailed for some time (Stadolnik, 2000).

Approximately four decades later, Wilhelm Steckle shifted the focus of firelighting causation back towards psychopathology, theorising that pyromania stems from delays in sexual development (Stadolnik, 2000). In 1932, Sigmund Freud followed with his psychoanalytic theory. He suggested that firelighting behaviour was a result of

a urethral or oral-fixated sexual drive, and that firelighting was linked to enuresis (Gannon & Pina, 2010). Freud's early theory of firelighting has been resoundingly influential and problematic in the assessment of young firefighters. The prevailing consequence of Freud's view is that some professionals in their assessments may assume sexual dysfunction inevitably coexists in firefighters, and in cases where it is present, it is presumed to be causally related to the firelighting behaviour (Fineman, 1995). Additional psychoanalytic explanations for firelighting have been described as drawing on other instinctual drives such as aggression (Sakheim et al., 1985). However, theories developed through a psychodynamic lens have generally failed to obtain empirical support (Gannon & Pina, 2010).

The introduction of social learning theory brought about a new line of thought to explain firelighting. Social learning theory proposes that firelighting behaviour develops through fundamental social learning principals of reinforcement and modelling (Gannon, 2015; Gannon & Pina, 2010). The sensory properties associated with a lit fire have been suggested as sensually rewarding, resulting in positive reinforcement which serves to promote the continuation of firelighting (Vreeland & Levin, 1980). Additionally, learning can occur vicariously through modelling, meaning that a child does not necessarily have to experience the reinforcement themselves, but rather they can learn through the observed experience of others (Gannon, 2015). Support for this theory is demonstrated in research reporting that firefighters often have role models in fire-related occupations (e.g., firefighters), and reside in rural areas where sanctioned fire use is more apparent in everyday living (Jackson et al., 1987). There is a lack of recent research with similar examples to support the applicability of social learning theory to explain firelighting in this respect.

Social learning theory further contends that firelighting can occur in response to the inadequate development of social skills and deficiencies in coping with aggression (Vreeland & Levin, 1980). This theory proposes that the firelighting act itself allows the individual to feel a sense of control or mastery over their environment, and enables them to avoid resolving interpersonal conflicts directly (Stadolnik, 2000). In this vein, firelighting has been linked to poor interpersonal development and exposure to aggressive modelling (Glancy, Spiers, Pitt, & Dvoskin, 2003). Basically, firelighting is described as being used as a tool for emotional regulation to stabilise negative affect in response to psychological stressors. As highlighted in the section on internalising issues, more research into this line of thought is needed.

Some researchers have offered an alternative view having suggested that firelighting is simply another antisocial behaviour that sits at the higher end of the antisocial continuum (Forehand, Wierson, Frame, Kemptom, & Armistead, 1991; Stickle & Blechman, 2002). Firelighting has been conceptualised as part of an early pathway into a future of significant problematic antisocial behaviours (Del Bove et al., 2008). It is reported that in 1972, Wolford conducted a study comparing incarcerated arsonists and non-arsonists and concluded that firelighters have a psychopathological profile similar to that of other offenders (Vreeland & Levin, 1980). This notion is fitting with research that identifies firelighting among an array of other antisocial behaviours engaged in by delinquents. All of the aforementioned theories likely hold utility in explaining firelighting behaviour to some extent, and have received varying degrees of evidential support. They are however, all single factor theories that fail to account for any complex interactions of variables. More recently, researchers have explored the phenomenon of firelighting from an interactional psychosocial perspective.

Current Multifactorial Theories

The previous single factor explanations have received criticism for being too basic, and for failing to consider the complexities and multiple variables that interact to promote and maintain firelighting behaviour (Gannon & Pina, 2010). Two of the most influential multifactorial models used to explain firelighting are Fineman's (1980) dynamic-behavioural model and Kolko and Kazdin's (1986) social learning model.

Fineman's (1980) Dynamic-behavioural Model of Firelighting. Fineman (1980) was one of the first to incorporate multiple psychosocial elements into his dynamic-behavioural model of firelighting. The dynamic-behavioural model was constructed from a fusion of literature and observations from experts in the field working with firefighters. Fineman (1980) provided the following explanation for firelighting:

Firesetting behaviour can be viewed as an interaction between dynamic historical factors which predispose a child toward a variety of antisocial acts, historical environmental contingencies which teach a child to play with fire, and immediate environmental contingencies which motivate the fire setting act. (p. 488)

This multivariable approach defines and enables measurement of factors related to firelighting, including individual characteristics, features of the family and social environment, and current life circumstances. Basically, this model suggests that individual factors of the child, dynamics of their family, and the stability of the environment they live in, predispose a child to firelighting risk. If this is combined with an immediate life stressor, the child may be at greater risk of engaging in firelighting activity. Fineman (1995) believes that understanding the underlying mechanisms initiating the firelighting behaviour, and the psychosocial factors perpetuating it, is at the core of successful intervention and the eradication of problematic firelighting behaviour.

Kolko and Kazdin's (1986) Social-learning Model of Firelighting. Shortly after Fineman's multifactor model was published, Kolko and Kazdin (1986) conceptualised a social-learning model of firelighting behaviour similarly informed by research evidence of risk factors and correlates, and anecdotal experiences of field experts. There are three overarching domains in this model, each made-up of sub-factors that contribute to promote firelighting behaviour: learning experiences and cues, personal repertoire, and parent and family influences and stresses.

Learning experiences and cues. The "learning experiences and cues" domain focusses on social learning principles of modelling and reinforcement, and includes three sub-domains directly related to early life experiences with fire-related stimuli: *early modelling/vicarious learning*; *early interest and direct experience* and; *availability of adult role models and incendiary materials*. The *early modelling/vicarious learning* sub-domain was informed by research evidence suggesting that the observation of influential role models engaging in fire-related activity at a young age inspired similar fire involvement in young people. The *early interest and direct experience* sub-domain is based on the idea that fire interest and fireplay are common for typically developing young children (Kolko & Kazdin, 1986). It is well established that fire interest is likely to precede fireplay (FEMA, 2002). Once fireplay is enacted, it is possible that these direct experiences, particularly if they are viewed as positive by the child, result in firelighting becoming part of the child's behavioural repertoire and could play a role in explaining persistent firelighting behaviour. Finally, the *availability of adult role models and incendiary materials* sub-domain evolved from the idea that situational access to incendiary materials, and the immediate presence of adult role models using fire, could set the stage for firelighting activity (Kolko & Kazdin, 1986).

Personal repertoire. The “personal repertoire” domain focusses on *cognitive, behavioral and motivational components* relevant to the child and firefighting. The *cognitive element* emphasises the risk associated with limited fire awareness and fire safety skills. Limited competence and knowledge around materials that burn and how to appropriately respond in a fire emergency is associated with increased risk of firefighting. A child’s limited ability to understand the inherent dangers of firefighting could partially explain continued firefighting engagement. The *behavioural components* domain includes both interpersonal ineffectiveness and skills deficits, and covert antisocial tendencies. Deficiencies in interpersonal competence have been demonstrated as common among firefighters (Jackson et al., 1987). This group have displayed limited social skills and are believed to lack the ability to attend to interpersonal conflicts appropriately, resulting in socially deviate behaviours such as firefighting. It is also suggested that firefighters are more inclined to engage in covert antisocial activities, particularly in the absence of adequate parental supervision. For example, firefighting is related to property destruction, stealing, lying, running away from home, and truancy (Kolko & Kazdin, 1986). The *motivational component* of this domain focusses on the forces underlying firefighting behaviour. The motivating factors provide some indication of the degree of psychopathology in the behaviour and potential risk of continued engagement. Firefighter motivations exist along a continuum with naïve firefighting (e.g., curiosity) sitting at the lower extreme end, and more pathological firefighting at the other (Kolko & Kazdin, 1986).

Parent and Family Influences and Stressors. The “parent and family influences and stressors” domain reflects the critical influence parenting practices, upbringing, and life stressors have on a child’s firefighting behaviour. The included sub-domain of *limited supervision and monitoring* is based on evidence that suggests that young people

who light fires often come from homes where limited parental supervision and monitoring is evident. The next component takes *parental distance and un-involvement* into consideration. The absence of parental figures, fathers in particular, and distant parents, especially mothers, have been identified as part of the family dynamics young firefighters often experience. *Parental pathology and limitations* are also described in the model (e.g., alcohol abuse, schizophrenia or psychosis, antisocial behaviour, depression, and intellectual impairment) and has been described as relevant for antisocial youth in general. Similarly, many young firefighters have been subject to poor parenting skills, personality problems, and emotional limitations of their parents. Finally, *stressful external events* concludes this domain. A link between recent stressful life events and firefighting has been established. Stressful life events, such as parental divorce, the introduction of a step-parent, death, etc., have been identified as probable precipitating circumstances influencing firefighting behaviour (Kolko & Kazdin, 1986).

Kolko and Kazdin's (1986) model represents the broad range of domains and components that can contribute to firefighting behaviour. This multivariable model highlights the complex interaction of factors that promote firefighting behaviour. It does however, fail to recognise the clear connection between problematic firefighting activity and overt antisocial, externalising behaviours (e.g., aggressive tendencies, conduct problems) and deficiencies in impulse control noted earlier in this chapter. Similarly, it does not factor in the possible role of peer influence. While this model fails to capture some potentially important aspects, it is nonetheless useful for understanding the behaviour of some young firefighters.

Firefighter Typologies

Firefighting typologies are subtly different from firefighting theories (Gannon, 2015). Their purpose is to classify a heterogeneous group, all engaging in the same

behaviour, into different sub-categories. Segregation is usually defined by the assumed motive of the firefighter. However, there has been some debate around the difficulty in classifying young people who light fire, and it has been argued that categorisation should be based on a combination of motive, underlying features, frequency, and severity of the fire (Walsh & Lambie, 2013). Motivations are not necessarily clear to the firefighter themselves (Perrin-Wallqvist & Norlander, 2003). Furthermore, multiple motivations could be applicable to any given fire, and a repeat firefighter may have a different motivation, or a combination of motivations, for each new fire (Walsh & Lambie, 2013). Young people are motivated to engage with firefighting for an array of reasons that seem to lie somewhere on a continuum from boredom, curiosity, and attention seeking to heightened psychopathology and malicious intent (MacKay, Feldberg, Ward, & Marton, 2014). Attempting to simplify the complexity surrounding firefighting behaviour through classification potentially serves to reduce the accuracy and credibility of typologies (Stadolnik, 2000). However, the purpose of typologies is to play a role in informing suitable interventions that can attend to the root of the problem. Researchers have attempted to overcome the multitude of inherent difficulties in classifying young firefighters and determined a few classification systems to assist in identifying risk and inform treatment (Fineman, 1980, 1995; Kolko & Kazdin, 1991b; Swaffer & Hollin, 1995).

Theory-driven Typologies

Young firefighters have long been classified into four main categories increasing in severity (Stadolnik, 2000). In ascending order, these four types of firefighters are described as: those who play with matches/lighters, those who light fire as a cry for help, those who are delinquents, and those who are severely disturbed. One expert in the field (Fineman, 1995) has added and adapted this model over the years, but largely

these four categories still exist. The following four sub-sections describe these categories. It is important to highlight the theoretical nature of the development of these typologies, and the necessity for more empirical research to assess their validity.

Curious firelighter. Curious firelighters (also known as matchplayers, fireplayers, or non-pathological firelighters) are generally described as younger children (< 10 years) and naïve to the dangers and potential consequences associated with their firelighting (Fineman, 1995). Their behaviour is motivated by the resultant visual appeal of fire properties and the subsequent changes to the target object that occur during incineration. Curious-type firelighters are described as the least malicious. However, their fires often cause the most damage and devastation, particularly within the home. The covertness of their firelighting activity, combined with a lack of knowledge about how fire works, and the associated consequences of out of control fires, means this type of firelighter is innocently very dangerous (Stadolnik, 2000). These firelighters generally set fires within the residential home or backyard, often in the wardrobe or somewhere hidden. Most commonly, fires are lit before or after school with standard household ignition sources (e.g., lighters) and general household items (e.g., paper, toys, etc.). Usually this behaviour is isolated to a single incident if adequate supervision and educational intervention occurs (Stadolnik, 2000; FEMA, 2002). This group consists mostly of very young boys (90%) aged between 3 and 7 years who often have impulse control problems (e.g., ADHD) and behave defiantly. These children are generally very active, require constant stimulation, and learn best through active participation. They are too young to appreciate the dangerousness of their behaviour, but show remorse for their actions (Stadolnik, 2000). This group often resides in an environment where they have easy access to incendiaries, often because their parents are smokers. These children largely come from single-parent homes and supervision is

lax. Parents have insufficient positive behavioural management skills and tend to use punishment as the only method to reprimand undesirable behaviour. Parents often also lack a basic understanding or appreciation for fire safety (Stadolnik, 2000).

Crisis firelighter. The crisis firelighter (also known as cry for help, troubled, or angry firelighter) is typically either consciously or subconsciously trying to outwardly project and elucidate an internalised or interpersonal issue (e.g., symptoms of depression, physical, emotional or sexual abuse, domestic violence, etc.; Fineman, 1995). Fires set by young people experiencing an internal crisis often have some sort of symbolic meaning. The time, location, target object, and patterns of firelighting behaviour can hold significant value for the firelighter's message. Generally, the aim of these fires is not to harm anyone, but rather, to draw attention to their inner battles (Stadolnik, 2000; Fineman, 1995). These young people are usually male (75-85 %) and aged between 6 and 12 years. Previous fire interest and incidents are not necessarily common. These individuals tend to lack social skills and the ability to verbalise their emotions. A history of abuse is common for this firelighter type. Generally, they fail to show remorse and they lack understanding of the consequences of their behaviour (Stadolnik, 2000). There is no specific demographic nor socio-economic background characteristics of this group. Often their fires are a result of an experience of a crisis or stressor in their family environment (e.g., abuse, death, separation or divorce, domestic violence, unemployment, change in residential location) and the child is not equipped with the appropriate tools for resilience. A crisis can be a single incident or ongoing issue within the home. There is an element of obtaining mastery over the environment in which the firelighting serves to motivate the individual (Stadolnik, 2000).

Delinquent firelighter. This group of young firelighters exhibit little to no remorse or empathy for lighting fire but their intent is not usually to cause harm

(Fineman, 1995). Generally, a delinquent firelighter in adolescence exhibits forms of aggression, antisocial behaviours, and conduct problems (Stadolnik, 2000). Fires usually occur outside and away from the child's residence (e.g., school, abandoned buildings, vehicles, etc.). Fires are set to vandalise public property or damage the property of a specific target. Fires are also associated with peer pressure, influence, and group think. A more sophisticated and dangerous array of accelerants and fuels are used by delinquent firelighters (Stadolnik, 2000). This group of firelighters are older children and adolescents (aged 10 to 17 years) and has the most female involvement (25-30%). A lack of age-appropriate social and interpersonal skills is apparent. Frequently, there is a diagnosis of Oppositional Defiant Disorder or Conduct Disorder, or more pronounced and advanced criminal and antisocial behaviours, usually with earlier onset. Problems in school and behavioural difficulties are common. There is also a relative lack of appreciation for the consequences of their behaviour for themselves and others. Often they have a history of abuse and maltreatment (Stadolnik, 2000; FEMA, 2002). Frequently, the parents of delinquent firelighters are substance abusers involved in criminal offending, and are either victims or perpetrators of domestic violence. Parenting styles experienced by this group tend to be highly rigid and rely largely on punitive punishment measures, but also lack consistency (Stadolnik, 2000).

Severely disturbed firelighter. The severely disturbed firelighter type includes the sensory reinforcement controlled type, sometimes known as the pathological type. This group is sensually rewarded by aspects of the fire that promote repeated firelighting. Pyromaniacs are considered part of this group, and people, including young people, rarely (< 2%) fall into this category (Fineman, 1995; FEMA, 2002). Severely disturbed firelighters light multiple fires in covert isolation. Often their firelighting will follow a ritualistic pattern and fire is described by them with human-like qualities (e.g.,

dancing flames, soothing; Stadolnik, 2000; FEMA, 2002). This group is generally adolescent males with a history of multiple deficits (cognitive, neurological, and emotional). They are characteristically affected by disorders of thought including paranoia, hallucinations, and delusions. Limited problem solving abilities, social skills deficits, and poor interpersonal relationships are apparent. Often these firefighters have been subjected to abuse. Commonly, there is a history of fascination with fire and using firefighting as a coping mechanism. Severely disturbed firefighters require intensive mental health treatment beyond what an educational intervention can offer (Stadolnik, 2000; FEMA, 2002). Severely disturbed firefighters come from chaotic, violent, and abusive homes and have parents with multiple deficiencies and a history of mental illness (Stadolnik, 2000).

Empirically-derived Typologies

Del Bove and MacKay (2011) used statistical analyses to develop a classification system for young firefighters according to behaviours and risk factors, in the only empirical study of its kind. Their findings support some of the aforementioned sub-categories of firefighters (e.g., crisis, disturbed, and severe firefighters) but challenge others (e.g., curious firefighters). The authors suggested that the promotion of future firefighting is the result of the complex interaction between poor parenting practices and maladaptive family environments, and other individual and environmental factors. This multitude of factors supports the conceptualisation of firefighting from the biopsychosocial perspective (Del Bove & MacKay, 2011). The following three classifications were determined: Conventional-limited type, Home-instability-moderate type, and Multi-risk Persistent type.

Conventional-limited. The Conventional-limited type firefighter describes individuals who demonstrated the least risk. More specifically, they displayed low

levels of firelighting characteristics and minimal individual and environmental risk factors. They had a history of three or four previous fire incidents. The age of firelighting onset and any prior mental health contact was around 9 years old. Two thirds had previous contact with mental health services and one third was linked in with welfare services (Del Bove & MacKay, 2011).

Home-instability-moderate. The Home-instability-moderate type describes individuals who had a greater history of fire involvement, earlier age of onset, displayed a greater interest in fire, and had experience with a wider range of ignition sources and targets of fire than those in the Conventional-limited firefighter group. They also demonstrated increased social deficits, attentional problems, and externalising behaviours in comparison to the Conventional-limited group. They were subjected to limited parental involvement and three quarters had experienced some form of abuse. Overwhelmingly, this group was involved with social services (Del Bove & MacKay, 2011).

Multi-risk Persistent. The Multi-risk Persistent type was categorised as having the most problematic firelighting characteristics. They had the most extensive history with fire activities, the youngest age of onset (e.g., 5 years), highest interest in fire, and the most experience with a wide range of ignition sources and target objects. Almost half had an antisocial drive and less than half expressed remorse for their behaviour. Clinical levels of problems with social skills, attention, and externalising behaviours were present (Del Bove & MacKay, 2011).

Risk Categorisation

Categorising firefighters through typology enables a structured approach to identifying risk and treatment needs. Experts in this field have made progress in conceptualising and understanding firelighting behaviour in a systematic way. However,

complete categorisation may never fully be achieved considering the complexities that surround young firefighting behaviour. Researchers have acknowledged this inherent limitation (Stadolnik, 2000). However, determining some form of classification system is important for understanding and informing appropriate treatment regimes. The development of typologies lays the foundation for the corresponding development of risk assessment tools that can be used to operationalise these categories and assist in providing effective prevention and intervention pathways (Del Bove & MacKay, 2011). Fineman (1995) highlighted that the ultimate purpose of typologies should be to identify risk and assess the likelihood of repeat firefighting behaviour.

The *Juvenile Firesetter Intervention Handbook* (FEMA, 2002), which is used by many juvenile firefighter programs in the USA to guide intervention, draws on the aforementioned theory-driven firefighter typologies to determine risk. The risk levels of little, definite, and extreme reflect the likelihood of repeated firefighting, and the severity of firefighting behaviour. The little risk category resembles the curiosity firefighter typology, and the definite risk category is inclusive of the crisis and delinquent sub-types. Finally, the extreme risk category is in line with the severely disturbed firefighter (FEMA, 2002). However, the three empirically derived sub-types of firefighters presented by Del Bove and MacKay (2011) challenge some of the previous assumptions made around typologies and associated risk. Specifically, the Conventional-limited firefighter has the least interest in fire and correspondingly presents the lowest risk of repeated firefighting behaviour. In fact, the sub-groups with the most fire interest and curiosity (e.g., Home-instability-moderate and Multi-risk Persistent) have the highest risk for continued firefighting activity. This contradicts the earlier assumption that the curious firefighter has the lowest risk of future firefighting behaviour. Furthermore, in previous models, younger children were considered at the

lower end of the risk continuum. In contrast, this more recent typology demonstrates that young children were found in the higher risk categories as frequently as in the lower risk categories (Del Bove & MacKay, 2011). It is evident that more empirical investigation into firefighter sub-types would be valuable.

Summary

Firefighter characteristics, theories, and typologies are all intertwined. The variables associated with firefighter profiles were used to inform the currently accepted multifactorial models that explain how firefighting behaviour is promoted and maintained. Separating firefighters into typologies enables clearer distinctions between the common types of firefighter profiles that are available. These typologies are informed by theory and serve to inform potential risk for future problematic firefighting behaviour. Young firefighter behaviour is problematic irrespective of the intent or the outcome, and requires intervention. Intervention needs will vary depending on the type of firefighter and the motivating forces resulting in their firefighting. Different prevention and intervention programs are available and are more or less suitable to the different typologies of firefighters. Hence, identifying the correct typology soon after firefighting has been identified in order to quickly inform appropriate intervention strategies is crucial. The next chapter reviews firefighting prevention and intervention initiatives and screening processes that assist in directing firefighters to a suitable treatment path.

Chapter 3

Prevention and Intervention

The first part of this chapter presents a review of the literature regarding prevention and intervention models and programs aimed at young firefighters. Subsequently, screening measures that help inform suitable treatment methods are reviewed. Finally, to conclude the literature review chapters, the last section provides a description of the firefighter prevention and intervention programs used in Australia, with a specific focus on Victoria.

Worldwide there are numerous proactive and reactive programs in place to combat the issue of firefighting by young people. Different treatments have been noted as more suitable for particular types of firefighters. Fire safety education has been suggested for low risk, naïve-type firefighters (e.g., those unlikely to continue firefighting after educational intervention). Mental health intervention has been recommended as suitable for more high risk, psychopathological firefighters (e.g., those at higher risk of repeat firefighting activity) because the aetiology is complex (Sakheim & Osborn, 1999). Providing firefighters with the incorrect intervention is not likely to attend to the issue effectively and waste valuable time and tangible resources. In addition, Fritzon, Dolan, Doley, and McEwan (2011) point out that there is a possibility of inadvertently perpetuating the issue if the wrong intervention approach is used. Hence, a screening process prior to any intervention to determine firefighter type and corresponding treatment needs is pertinent. Unfortunately, limited empirical tools are available for screening firefighters. Field experts have sought to fill this gap and few screening measures have been established. However, most of these measures have been developed with theoretical underpinnings or from anecdotal evidence from the field,

and only a few have been empirically derived. In addition, empirical evaluation of the screening tools to establish evidence of effectiveness is lacking.

Treatment

The literature largely describes four main strategic approaches to the issue of young people lighting fires: primary prevention education, secondary fire safety education intervention targeted towards known firefighters, mental health intervention, and combination multidisciplinary programs. More specifically, primary prevention education is a proactive attempt to preclude potential firelighting behaviour. However, once a young person has been identified as “at-risk” for firelighting, or becomes involved in firelighting, the two general approaches to treating the behaviour are: fire service-delivered fire education and awareness intervention, and mental health treatment (Fritzon et al., 2011). Some internationally established programs are a multiagency combination of fire, mental health, and other relevant services concerned with young firefighters. Research has advocated for this approach as best practice (Baretto, Boekamp, Armstrong, & Gillen, 2004; Henderson, MacKay, & Peterson-Badali, 2010).

Primary Prevention Education

The aim of primary fire safety education is the prevention of any fire risk behaviour and resultant negative outcomes of fires. Basic fire safety education is an important, cost-effective, and proactive measure to prevent firelighting by young impressionable school-age children. This type of prevention education generally occurs in the primary school setting and involves local firefighters delivering the program to students usually on a one-off basis. These programs predominantly focus on fire safety and appropriate responses in fire emergencies (Dougherty, Pucci, Hemmila, Wahl, Wang, & Arbabi, 2007).

Unfortunately, as is demonstrated by the prevalence of firelighting by young people, this approach is not enough to curb the behaviour for all. In addition, it has been reported that basic school fire safety programs are not effective for targeting already active young firefighters (Franklin, Pucci, Arbabi, Brandt, Wahl, & Taheri, 2002). Interestingly, 70% of parents of children who had previously engaged with firelighting perceived that their child knew the dangers of playing with fire, and half believed that their child had received some form of education about fire danger at school or day care (Pollack-Nelson, Faranda, Porth, & Lim, 2006), yet these children still engaged in firelighting activity. Prevention is a necessary endeavour, but alone, it is clearly not sufficient to deal with the young firefighter issue.

Fire Safety Education and Awareness Intervention

Fire safety educational intervention programs are generally offered to young people in response to identified engagement with firelighting activity. These programs act as both a preventive measure for future firelighting behaviour and a reactive response to the young firefighter issue. The most utilised model of service delivery for intervention targeted at known firefighters is fire safety education provided by fire service professionals (Federal Emergency Management Agency, United States Fire Administration [FEMA], 2002). Generally the fire services deploy specially trained firefighters to provide the educational services to young people. These programs usually occur in the child's home, over a limited number of sessions, using resources appropriate to the varying ages and levels of maturity of the children participating. The content of educational intervention revolves around fire safe behaviour and fire danger by teaching: fire safety skills, the dangers of firelighting, practical knowledge and competency around fire recognition, how to respond in an emergency, and safe fire use (Palmer, Caulfield, & Hollin, 2007). Secondary intervention may also include some

basic social and behavioural modification techniques, and/or have a specific referral pathway into mental health services, but the education is fire-specific and the main goal is to reduce firelighting activity rather than to modify the child's general behaviour (Muller & Stebbins, 2007). Teaching parents about the dangers of child firelighting and offering support for relevant parenting strategies to increase fire safety in the home are also considered important steps in the process for reducing repeat firelighting rates (Sakheim, Osborn, & Abrams, 1991). This aspect is also included in many firefighter intervention programs (Palmer et al., 2005).

Fire education intervention programs are common, but only limited empirical research has evaluated the outcome success of these programs for young firefighters. There is debate among scholars about the impact of fire education. Grolnick et al., (1990) concluded that increased fire safety knowledge was not related to a decrease in firelighting activity. Conflicting views around the direction of effect for teaching children to use fire appropriately and allowing them some responsibility with it have been highlighted (McDonald, 2010). However, Stadolik (2000) suggests that increasing a child's interest and engagement in firelighting by imparting knowledge of fire with them is a myth. The possibility of increasing fire interest has not been specifically investigated, but the positive utility of these intervention approaches has been demonstrated to some extent (Palmer et al., 2007).

Palmer et al., (2007) stated that in 1983 the Federal Emergency Management Agency assessed the effectiveness of a number of juvenile firefighter intervention programs in North America. They reported rate of repeat firelighting after 11 months was only 1.25%. Similarly, the same authors reported a low 2.1% repeat firelighting rate after an educational intervention program was provided by Broward County Florida's Juvenile Firesetter Prevention Network. Unfortunately, the absence of control groups in

these studies makes it difficult to ascertain if the low repeat firelighting rate is actually a reflection of the utility of the programs (Palmer et al., 2007). Kolko, Watson and Faust (1991) found evidence for the effectiveness of fire safety skills training by comparing the repeat firelighting rates of psychiatric inpatient firelighters who had received skills training with those who were only subjected to basic one-on-one fire awareness discussions. The fire safety skills group subsequently demonstrated significantly less fire-related play and increased fire safety knowledge, and their parents reported significantly less continued firelighting in comparison to the group who only had the fire awareness discussion. Viewing with caution, anecdotal evidence from fire service intervention programs generally report successful outcomes, but it is clear that more extensive research is needed to support this

However, evidence suggests that fire-safety education delivered by the fire service has limited effectiveness for intervening with young people marked by significant behavioural or emotional disturbance (Baretto et al., 2004). The literature reports that around 1 in 3 young firelighters are experiencing psychosocial disturbance and would benefit from receiving mental health support (FEMA, 2002). Due to the presumed prevalence of comorbid psychological dysfunction (e.g., 30-40%) that exists among young firelighters engaging with fire service educational intervention programs, risk assessments are often conducted and mental health referrals are made as appropriate (Adler, Nunn, Northam, Lebnan, & Ross, 1994; Bumpass, Brix, & Preston, 1985; Kolko, 1988; Henderson et al., 2010).

Psychosocial Intervention

Over time, the extent of the clinical complexity involved in firelighting by young people has become clearer (DiMillo, 2002). As aforementioned research has identified, over one third of fires lit by young people are likely to be the result of

significant behavioural and/or emotional problems requiring mental health attention (FEMA, 2002). Young firefighters who are most at-risk of continuing firefighting behaviour are often found to have heightened psychopathology. Mental health intervention is necessary to target the underlying issues that may be manifesting in firefighting behaviour (Sakheim & Osborn, 1999). These young people are more likely to know, to some extent, that their actions are dangerous, but their driving force is psychopathological in nature and therefore fire safety education alone is unlikely to be effective.

Henderson, MacKay and Peterson-Badali (2010) indicate a few mental health professionals have established clinical programs designed to attend to fire-specific factors and general behavioural/emotional and family issues related to firefighting behaviour explicitly. Specialist mental health protocols for firefighters are rare. This is possibly a consequence of a range of factors. Firstly, a lack of coherent theoretical understanding for firefighters and firefighting behaviour make standardised treatment methods difficult to determine. Furthermore, firefighting is often viewed as a sub-behaviour of a more primary clinical problem. This suggests that in order to treat the symptom (the firefighting) the root of the problem (the clinical issue) needs to be addressed (Stadolnik, 2000), which may be different across cases. This suggests that specific expertise in treating firefighters may not actually be necessary. In addition, and from a logistical perspective, the widespread geographical distribution of clients impacts on a mental health practitioner's ability to specialise in treating firefighters per se. For example, repeat firefighters are likely to come from various locations, even within a country or state, and therefore specialists could receive referrals for clients separated by great distances, physically impacting their ability to provide their expertise to all the necessary candidates.

Predominantly, the reported clinical treatments for young firefighters in the literature are psychosocial interventions that attend to the psychological and social factors related to firefighting. More specifically, cognitive-behavioural treatments and social skills training are used (Stadolnik, 2000). Kazdin and Weisz (1998) proposed that parental management is also central to effectively target young people with externalising behavioural problems in general. Historically, behavioural interventions for firefighters involved satiation practices and adverse consequences. For example, Hardesty and Gayton (2002) described a case where a young boy was subjected to a method of “overcorrection” to eradicate his firefighting behaviour. This technique involved him repeatedly lighting a sheet of paper in a glass and extinguishing it with water while reciting dangerous facts about fire and fire safety knowledge. Adler et al. (1994) included a similar technique in their study. Firefighters were tasked with instructing parents to supervise repetitive firefighting across an 8-week period, reducing in frequency over the course of time. The young people were told by their parents/carers to light a fire in a small vessel, and subsequently extinguish it and clean up any remnants to their parent/carer’s satisfaction. In addition, on days when no firefighting was scheduled, parents/carers were required to ask their child if they felt like lighting a fire. If they responded positively (e.g., yes) they would then impose an ad hoc firefighting/extinguishing session as described above (Adler et al., 1994). It has been reported that Wolff (1984) used a satiation technique to dispel the firefighting behaviour of a young 7-year-old boy residing in an institutional setting. He was treated with one hundred 30-minute sessions of consistent match lighting in an attempt to reach a point of satisfaction capacity (Hardesty & Gayton, 2002). While some of these studies reported successful outcomes, the inclusion of physical firefighting in intervention is questionable considering there is the potential for it to serve as a reinforcing mechanism

and promote future firelighting behaviour (Sharp, Blaakman, Cole, & Cole, 2006). This approach appears to have since been abandoned by modern programs, at least for those described in the literature. In other cases, children were made to watch videos of other children lighting fires and experiencing negative consequences, or parents were instructed to impose chore-related punishments when fire-related materials were found in their child's possession (Hardesty & Gayton, 2002).

The cognitive-behavioural technique of graphing has also been used as a method for altering firelighting behaviour. The graphing technique visually sequences external stresses, behaviours, and feelings on a line graph. It is believed that this visual representation will enable self-identification of the relationship between feelings and behaviour. This awareness is anticipated to open-up avenues for reactive behaviour modification to eliminate future firelighting activity (Bumpass, Fagelman, & Brix, 1983). In the USA, the Dallas Fire Department piloted this intervention strategy and found promising outcomes. Over a period of follow-up from 6 months to 8 years, only 1 of the 150 young firefighters who completed the program repeated firelighting, and the rate of deliberately lit fires in Dallas at the time reduced by almost one third (Bumpass et al., 1985). However, techniques such as satiation and graphing are more suitable for use by trained mental health professionals (Adler et al., 1994).

Similarly, cognitive-behavioural skills training has been used to curb firelighting behaviour by teaching strategies to more appropriately channel expressions of anger and emotional arousal. The Community Alternatives to Commitment Hazards program in Oregon, USA, is a targeted psychosocial intervention for juvenile firefighters charged with first and second degree arson. The program specially focusses on coping skills, anger management, and assertiveness training. It proved effective for 93% of the young clients. Furthermore, two thirds had not reengaged in any other form of offending at 12-

month follow-up (Schwartzman, Stambaugh, & Kimball, 1998). Family therapy that focuses on equipping parents with behavioural management strategies and effective parenting practices has also been used to address firelighting more broadly (Cox-Jones, Lubetsky, Fultz, & Kolko, 1990). Research has identified value in all of these approaches, whether it be fire-specific education or psychosocial in nature. This further highlights the heterogeneity of the young firefighter cohort as these approaches are each designed to target very different types of young firefighters (e.g., education programs for low risk, naïve cases and mental health treatment for high risk, psychopathological cases).

Collaborative Approach

A collaborative approach to any intervention program entails the involvement of multiple relevant services with specific expertise for attending to a particular concern. The utility of collaborative models of service for community issues in general has been stressed (Bahora, Hanafi, Chien, & Compton, 2008). Recently, it was argued by various researchers and practitioners that the model of best practice for dealing with young firefighters involves collaborative coordination of the multiple relevant services (Baretto et al., 2004; MacKay, Feldberg, Ward & Marton, 2012; Henderson et al., 2010). In particular, the necessity for greater collaboration between fire service personnel and mental health professionals has been identified and echoed by a number of researchers in the field over several decades (MacKay et al., 2012; Roe-Sepowitz & Hickle, 2011).

The multiagency collaborative approach is consistent with multifactor theories of firelighting, as the behaviour is believed to stem from a complex interaction of fire-specific, general behavioural, and environmental variables (Fineman, 1995; Kolko & Kazdin, 1986). This approach enables specific attention to be given to the competing demands of the issue from the relevant experts. The theoretical notion of the

collaborative approach is appealing, but a number of barriers to the model's success in reality have been identified. Unfortunately, multidisciplinary firelighting intervention programs as a whole are rare. According to Henderson et al., (2010) the rarity of these programs can be attributed to a number of factors including: a lack of funding, a lack of cohesion and congruence in ideas, different approaches and expertise between the various services (e.g., mental health professionals, fire services profession), a lack of respect for the knowledge collaborators hold, and conflict in core values between the services.

As multidisciplinary programs are a concerted effort by multiple professions, the reality is that more people need to be paid for such work. Therefore, a service of this quality is ultimately more expensive than services provided by a standalone organisation. Decisions around who is responsible for funding this type of program are ambiguous. In fact, unless governments are prepared to support this type of effort financially, then it is unlikely that this model will be used in many places.

Fire services and the mental health profession are also distinctly different in a number of ways (Henderson et al., 2010). For example, fire services have been described as paramilitaristic organisations with clear hierarchical chains of command, where tradition is valued and change is resisted. Fire service personnel have strong intraagency connections with common understandings of protocols, equipment, and philosophies. Fire services are accustomed to attending to situations immediately, quickly, and with clear outcomes. Mental health services on the other hand often work in multidisciplinary teams and attend to patient needs over a long period of time, in a multitude of ways, and without clear and concrete goals in the interim (Henderson et al., 2010). The primary aims, methods, and core values of these services are vastly different, and this could impede successful interagency relations. Furthermore,

expecting an equal level of engagement from all services is likely to be unrealistic for most communities (DiMillo, 2002). The absence of programs based on the model is reflective of these barriers. However, the few multidisciplinary programs that do exist worldwide have demonstrated some positive utility.

Both cognitive-behavioural techniques and fire safety education have proven utility in reducing repeat firelighting behaviour (Kolko, 2001). Adler et al. (1994) empirically reviewed the effectiveness of four types of intervention by randomly assigning 138 firefighters aged 5 to 16 years to one of four intervention conditions (*home-control*, *home-experimental*, *specialist-control*, *specialist-experimental*). The specialist groups (n = 97) consisted of firefighters who, on triage, met the criteria for more severe “pathological” firelighting (e.g., planned and destructive intent behind firelighting, demonstrated significant emotional and/or behavioural problems on the Child Behaviour Checklist (CBCL), and/or family dysfunction on the Family Adaptation and Cohesion Scale (FACES III)). The remaining, less severe, firefighters were allocated to the home group (n = 41). This resulted in the more high risk firefighters receiving psychological and psychiatric support, and the lower risk firefighters being subjected to fire safety education and some psychosocial behavioural modification techniques. All groups received a fire safety educational pamphlet. The *home-control* group (n = 19) received the fire safety educational pamphlet alone. The *home-experimental* group (n = 22) were also subjected to two or three home visits from a firefighter implementing the following four techniques into the intervention: fire safety education, a behavioural satiation technique, instructions for parents to subject their children to negative consequences for any future firelighting behaviour, and the graphing technique. The *specialist-control* group (n = 48) were given a referral to a “Firefighter’s Clinic” where psychological and psychiatric assessments and treatments

were administered as required (but no home fire safety education visits). Finally, the *specialist-experimental* group (n = 49) were provided with the firefighters home intervention program and the Firelighters Clinic referral. At 1-year follow-up, a significant decrease in the frequency and severity of firesetting was apparent for all treatment conditions. These findings did not lend support for any one specific type of intervention approach. However, the more serious firelighters showed less of an improvement over time than the less serious firelighters. This could indicate that the complexity of their psychological disturbance warranted more intensive psychological intervention over a longer period of time. Furthermore, there was higher rate of drop-out among the more serious firelighting group compared to the less serious firelighting group, making it difficult to ascertain the impact that those participants' outcomes would have had on the results. Adler et al. interpreted these findings to mean that the multicomponent intervention was unnecessary because it was not found to be any more effective than the fire safety education package provided at the firefighter home visit. However, the firelighters were triaged at intake according to their existing levels of psychological disturbance, and those with heightened levels were automatically offered mental health assessment and treatment. Therefore, these findings could actually reflect the effectiveness of the early triage process in directing young firelighters towards the most suitable treatment option for their needs. Had this group only been subject to fire safety education, the rate of repeat firelighting may have been higher.

The Trauma Burn Outreach Prevention Program is a multicomponent program conducted in Michigan, USA, which was developed in response to the alarming number of child hospital admissions for burns. The program's primary focus was the medical and social consequences of firelighting. Educational nurses, trauma surgeons, social workers, and firefighters collaboratively conducted a 1-day program. One of the few

experimental studies that looked at the outcome effect of a multidisciplinary approach to firefighter treatment was conducted on this program (Franklin et al., 2002). This study found impressive support for this type of approach in reducing repeated firefighting with only 1 out of 132 children reportedly continuing firefighting at follow-up. More striking support for this approach was evident in the 36% of known firefighters in the control group that had not received the intervention and had continued firefighting at follow-up.

Another multiagency program developed by local fire and health services in a concerted effort to combine effective fire safety education and psychosocial interventions was the Bradley Fire Safe Families Program (Baretto et al., 2004). The program aimed to promote positive outcomes for all young people known to be lighting fires while functioning with minimal financial, time, and resource burden for both families and service professionals. The program was developed on a best practice model that the authors determined from a review of existing collaborative programs (Baretto et al., 2004). However, there has been no published evidence to date reporting the effectiveness of the program in obtaining its intended outcomes.

Similarly, in Massachusetts, USA, a state-wide coalition for the juvenile firefighter program exists called The River Valley Juvenile Fire Intervention Program's Firesetter Intervention Response and Education. This multiagency program uses a combination of pre-established standardised assessment tools to evaluate client needs (e.g., Child Behaviour Checklist and Youth Report Form). The program incorporates all information from interviews conducted with young firefighters and their families into a state-wide database. At the time it was anticipated that a more specifically designed screening measure would be developed based on information in the system (DiMillo, 2002), but this has not yet come to fruition. The program has a low reported repeat

firelighting rate of only 4%, demonstrating the utility of a collaborative effort by key services (FEMA, 2012), but no controlled longitudinal evaluations have been published.

The Arson Prevention Program for Children (TAPP-C) is another one of the few collaborative intervention services mentioned in research publications where multiple agencies work together to collectively target the issue of young people lighting fires (Henderson et al., 2010). The program's main aim is to attend to child firelighting behaviour via standardised assessment and intervention processes. This program enables all children and their families to receive fire safety education and checks by fire service personnel, and simultaneous mental health assessment and treatment. The program incorporates elements of fire education, parental management training, and cognitive-behavioural therapy. Initial findings for the TAPP-C intervention suggest it is an effective program for young firefighters. Through fire safety education and mental health referrals based on risk assessments, TAPP-C was reported as beneficial for three quarters of the young people it served as evidenced in 18-month follow-up evaluations (MacKay, Henderson, Del Bove, Marton, Warling & Root, 2006).

Summary of Treatment Approaches

Preventative fire safety education is an important community initiative. However, as described, it is not the sole solution for reducing the rate of young people lighting fires. Fire service-led secondary intervention programs, appropriately focus on providing more targeted fire safety education to known firefighters. Similarly, some young firefighters require mental health services to treat underlying psychosocial issues. The multiagency approach has promising utility as fire service personnel and mental health professionals can offer their individual expertise (Henderson et al., 2010). The evidence suggests that this model is able to cater best to the varying needs of clients referred. Unfortunately, this approach requires substantial funding, commitment,

flexibility, and collaboration between different organisations, which make this approach uncommon. Hence, it is clear why most regions use a single agency approach. This does not discount the fact that young people lighting fires are a heterogeneous group and require different services between, and within, them to be treated effectively. With single agency approaches being the most commonly found, it is imperative that there are referral processes in place to link the young people in need of intervention with other services. In order to determine suitable treatment and intervention needs, services should have a screening process to inform these decisions objectively.

Fire Service Screening Tools

It is vital that all young people who have been involved in fireplay or firelighting activity, irrespective of the motive, are treated with some form of intervention to stop the behaviour. The important question to answer in the early stage of identifying firelighting activity and triage is, which type of intervention is most appropriate for the individual involved? It is suggested that parents are more likely to refer their child to fire services than a mental health provider for firelighting behaviour (Pierce & Hardesty, 1997) and that fire services themselves are often the first to detect young firelighters (McCarty & McMahan, 2005). Therefore, in the majority of cases, the fire service is the first point of professional contact for many young people lighting fires (Kolko, 1988; McCarty & McMahan, 2005). With programs targeting young firelighters generally using a disconnected single agency approach to intervention, completing risk assessments to refer firelighters to separate, relevant, services is imperative to holistically attend to the issue. The responsibility of assessing the degree of problematic firelighting behaviour in each case is largely given to the fire service personnel tasked with dealing with them (DiMillo, 2002).

Therefore, the importance of arming fire service professionals with an effective screening process to identify firefighters and families in need of mental health intervention has long been raised (Pierce & Hardesty, 1997). However, there is currently an absence of standardised processes for screening risk in some young firefighter intervention programs. The process of screening referrals for risk of continued firefighting and identifying key treatment needs in the most efficient and sufficient way is not well understood. Fireplay and firefighting, irrespective of the intent, can be equally dangerous activities. The size of the fire is not necessarily reflective of the type of firefighter or the motive. For example, the consequences of a child playing with a box of matches or a lighter in their bedroom can be just as devastating as a group of children lighting some dry grass in parklands for fun, or a child lighting property out of anger. It is clear that young people who are naïvely lighting fires could cause catastrophic damage, but innocuous reasons driving the behaviour do not necessarily suggest there is a need for any mental health intervention. Likewise, a young person with pathological motivations for firefighting may light a fire that does not fully take-off, or may be caught while the fire is either inactive or still controllable. Therefore, the degree of damage is minimal, yet the motivating factors underlying the behaviour indicate the need for mental health support. Hence, the relationship between firefighter disturbance and the severity of firefighting consequences is not linear. Thus, assessing the degree of problematic firefighting based on the consequences or outcomes of the fire can lead to inaccurate estimations of the risk (Stadolnik, 2000). Therefore, assessing future risk on this basis is not suitable.

Some young firefighter programs internationally use screenings in their practice. However, the validity and reliability of some of these tools is questionable. It has been suggested that fire service personnel are not well-equipped with the resources and skills

necessary for assessing the mental health needs of children and families (Pierce & Hardesty, 1997; Henderson et al., 2010). Additionally, it is not within the fire services' expertise to assess and diagnose mental health problems. Clinical-style assessments involve collecting a substantial degree of personal information from clients and it is necessary to build a degree of rapport to obtain it. Furthermore, interviewing skills are not a primary part of the professional role performed by fire practitioners who provide educational intervention to known young firefighters, and it is a skill that needs to be developed through experience and training (DiMillo, 2002). Hence, fire service personnel should not be tasked with clinically assessing young firefighters using interviews. In addition, some of the tools are extensive, placing a significant burden on parents and practitioners to complete them. Screening tools that these professionals are expected to administer should be relatively simple and easy to use. In addition, some standardised psychological assessments need to be purchased, which may not be feasible for some fire services. The availability of a tool that is congruent with the skills and expertise of fire service personnel (MacKay et al., 2012), and cost- and time-effective is indicated, but not yet apparent.

DiMillo (2002) has discussed the importance of a manual to accompany any firefighter screening tool and has advocated that it include: a clear rationale for each item, a description of firefighter typologies, the corresponding interventions most appropriate for each, and a description of clearly defined roles and responsibilities of both the fire service educators and mental health professionals. It is important for fire services to be informed about the purpose and use of a screening tool. Clear knowledge of the referral pathways and processes based on screening tool outcomes for fire service professionals is also fundamental for effective practice.

Mental Health Service Assessment Tools

Mental health professionals worldwide are providing services to young people who have a history of firefighting, whether they are aware of it or not. The extent to which professionals in the mental health field use fire-specific assessment measures to evaluate firefighting behaviour is relatively unknown. Developed measures specifically targeted for use by mental health professionals are designed to elicit fire-specific and general environmental and behavioural information associated with firefighting activity. This is intended to provide context around the child's firefighting behaviour. In a clinical setting it is not the intention of these tools to be used in isolation or to diagnose, but rather they are to be used as a basis for assessment and in conjunction with various other psychological assessments (DiMillo, 2002). Therefore, these tools are designed for use in clinical settings and not by fire services.

MacKay et al. (2012) detail a number of measures developed specifically for use with young firefighters. A number of the fire-specific assessment tools they highlighted were described as intended for use by mental health professionals: Fire History Screen (FHS; Kolko & Kazdin, 1988b), Firesetting Risk Interview (FRI; Kolko & Kazdin, 1989a), Children's Firesetting Inventory (CFI; Kolko & Kazdin, 1989b), Fire Incident Analysis (Kolko & Kazdin, 1991b; 1994), Fire Involvement Interview (Henderson, MacKay & Peterson-Badali, 2006), Fire Attraction and Interest Scale (Kolko & Kazdin, 1992), Fire Interest Questionnaire (MacKay, Henderson, Del Bove, Marton, Warling, & Root, 2006), Fire Involvement Risk Evaluator (MacKay & Henderson, 2009; Del Bove & MacKay, 2011 as cited in MacKay et al., 2012), and the Firesetting Risk Assessment Tool for Youth (Stadolnik, 2000 as cited in MacKay et al., 2012). Kolko, Nishi-Strattner, Wilcox and Kopet (2002) report a number of clinically useful tools that are not fire-specific that can assess some potential underlying family, environmental and

psychosocial constructs that have shown to be related to more problematic firefighters (e.g., The Caretaker Self-Efficacy Scale, FACES III, The Parent-Child Conflict Tactics Scale, The Family Environment Scale, CBCL, Children's Hostility Inventory [CHI], and The Child and Adolescent Functional Assessment Scale).

Overall, the progression of research and implementation of firefighter programs and assessment measures in this field have largely been established in the USA and enabled by various funding bodies providing financial support (e.g., United States [US] Fire Administration, Oregon State Legislature; DiMillo, 2002). Throughout this process, assessment measures and risk interviews have been developed, usually by either the fire services, mental health professionals or collaboratively, and have generally been established for use by a specific user (e.g., fire service providers or mental health clinicians). The methods used to develop firefighter screening measures are quite varied with some being more empirically derived than others. Most of the assessment tools that exist in this field have become established from a theoretical basis. Fewer known screening measures have been statistically informed. In addition, few of these measures have been empirically evaluated for their reliability and validity. The proceeding sections discuss some known existing screening tools recommended or used to assess young firefighters.

The Juvenile Firesetter Child and Family Risk Surveys

In 1975 Kenneth Fineman headed a task committee that developed the first known screening measure specifically for use by fire service and mental health professionals to assess the extent of issues with firefighting. The Interviewing and Counselling Juvenile Firesetters diagnostic and interview tool was eventually published by the FEMA in 1979 (Hardesty & Gayton, 2002). This prompted the US Fire Administration to provide substantial funding, which resulted in the development of the

original three-volume set of *Juvenile Firesetter Handbooks* over the following decade. These handbooks aimed to guide fire service personnel in the screening process for young firesetters using the Comprehensive Fire Risk Assessment. The basic premise is that the responses to the interview questions can be scored, and the overall score will correspond to a risk category (little, definite and extreme) that will inform intervention. The risk levels reflect the likelihood of repeated firelighting and the severity of firelighting behaviour (FEMA, 2002). Each risk category has a recommended intervention attached. Educational intervention is suggested as the appropriate intervention for those deemed little risk. The little risk category resembles the curiosity firelighter typology previously described (refer to Chapter 2). A combination of education and mental health intervention is recommended for anyone screened as definite risk. The definite risk category is inclusive of troubled and delinquent young people and aligns with the cry for help and delinquent typologies. Standalone mental health intervention only is advised as the most suitable intervention for all those considered to be at extreme risk. The extreme risk category fits in line with the severely disturbed firelighter. Developments in knowledge overtime have resulted in an integrated single volume *Juvenile Firesetter Intervention Handbook* (FEMA, 2002). This current version is further intended to guide fire services in the development of effective juvenile firesetter intervention programs in a more simple way. The handbook includes the brief Juvenile Firesetter Child and Family Risk Surveys (CRS and FRS) and the lengthier Comprehensive Fire Risk Evaluation.

The CRS and FRS were developed by Moynihan and Flesher (1998) after it was determined that fire services needed a more parsimonious method for assessing fire risk to inform appropriate intervention than Fineman's original Comprehensive Fire Risk Assessment (DiMillo, 2002). In addition to being a complex and exhaustive tool,

statistical limitations of the original Comprehensive Fire Risk Assessment were identified. Firstly, the rationale behind the weightings assigned to each item was unclear. Secondly, some items were replicated across the included sub-tools, yet they still contributed individually to the overall score. This, in effect, increased their value in the total risk score. Finally, the Comprehensive Fire Risk Assessment was considered to be so exhaustive that any problem behaviour that was captured was likely to increase the severity of risk (Moynihan & Flesher, 1998). In this sense, it did not necessarily add any value above and beyond any previously established and normed general behavioural risk measures. The early FEMA tools were reportedly assessed by Slavkin in 2000 (DiMillo, 2002) and were found to have limited reliability, which in turn means they ultimately lacked validity.

Therefore, the CRS and FRS were subsequently developed with a thorough statistical process. This consisted of factor and correlation analyses to reduce the number of items, followed by regression techniques to establish numerical weightings associated with each question, and statistical procedures to determine appropriate cut-off values to classify risk. The underlying aim was to develop a more objective and succinct measure of firelighting risk than the previous foundational tools available, which were largely theoretically-driven (DiMillo, 2002). A comprehensive description of the CRS and FRS is given in the method section of this research (Chapter 4). The CRS and FRS are yet to have their psychometric properties evaluated and their predictive capability is yet to be determined empirically.

The early FEMA tools were criticised for their complexity (DiMillo, 2002) and for the emphasis they placed on firefighters to be good interviewers and assessors. The redeveloped tools attempted to address this issue by aiming to be more user-friendly, and created a system that involved asking questions, tallying scores, and then

recommending a suitable intervention. However, the simpler version has also caused problems for the administering firefighters in instances where questions were not answered as intended and ultimately necessitated the firefighter to provide some observational and qualitative information (DiMillo, 2002). The FEMA tools, despite their imperfections and unfounded assumptions, have provided fire services in the USA with tangible measures that allow fire service personnel to attend to the issue of firefighter assessment in absence of other options (MacKay et al., 2012). Further empirical investigation into their utility is warranted.

The Children and Fire – A Bad Match Screening Tool

The Children and Fire – A Bad Match screening tool was developed by DiMillo and Hardesty (1996). The authors of the tool and operators of the Portland Juvenile Firesetter Program developed the tool based on their systematic interviews with approximately 1,000 referred cases, in the absence of a formalised screening tool. The tool was designed with rural and urban townships, and their volunteer fire service personnel, in mind. These volunteer personnel deliver the program's services infrequently, potentially only once or twice annually, and therefore the opportunity to practice interviewing skills in this setting is limited (DiMillo, 2002).

The interview tool is made up of the Family Information section and the Child Interview section each comprising of 50 and 54 questions respectively. The Family Information section probes information about the child and their family. The Child Interview section elicits information about the child, their environment, the fire incident, and behavioural reinforcers. Accompanying the tool is a manual that includes a description of the rationale behind each item, the known firefighter typologies, the recommended corresponding intervention for each typology, and a risk assessment tool. The idea is that the fire service personnel will be able to administer the tool with ease

and an adequate understanding of the purpose of each item. The information drawn from the tool will allow the practitioner to determine the typology of the firefighter and inform the recommended corresponding intervention. The level of repeated firefighting risk is also identifiable according to the associated Risk Assessment Scale (DiMillo, 2002).

The screening process is described as simple, and easy to understand and administer (DiMillo, 2002). This tool was designed to cater for the competing demands of firefighters' expertise, their limited involvement with young firefighter cases, and the need for a preliminary screening process to effectively determine treatment needs. It is conservative in that it is concerned primarily with the child's safety in relation to fire. However, according to DiMillo (2002), the Children and Fire – A Bad Match screening tool is more effective for assessing younger firefighters than older ones. In addition, with over 100 questions, it would be time-laden. There appears to be no published literature evaluating the tool's psychometric properties.

Juvenile with Fire Screening Tool

According to DiMillo (2002), the Juvenile with Fire Screening Tool was developed for use by fire service professionals in Oregon, USA, to screen young firefighters. This is an initial step in the process of determining treatment options that aims to dispel unsafe fire behaviours. This screening tool enables fire service personnel to determine if the young firefighter only requires the fire safety education services that they provide, or if they need to refer the firefighter to other community services to conduct more comprehensive psychosocial assessments and/or clinical evaluations by trained mental health professionals. The accompanying manual explains that the Juvenile with Fire Screening Tool is merely a preliminary step in the evaluation process, and it is not a risk inventory or a tool to predict repeat firefighting.

The Juvenile with Fire Screening Tool is statistically-driven from research on 130 young firefighter assessments using Fineman's original Comprehensive Fire Risk Assessment. This information was cross-checked with a group of mental health professionals with experiential knowledge of clinical cases of young firefighters. The Juvenile with Fire Screening Tool is made up of three separate elements: a youth interview, a parent interview, and a parent checklist. The youth interview consists of 11 fire-related and three non-fire-related questions. The non-fire-related questions probe information about school, peers, and recent family crises. The parent interview is made up of 10 questions designed to elicit information about past firefighting activity, child behaviour, and home fire safety practices. Each item provides a primary question and up to eight optional supplementary questions that promote the discovery of more rich information to aid in the scoring process. For example, to explore recent family crises in the youth interview, item K asks: "Has the family experienced any kind of crisis in the past six months?" The additional questions for this item are: "Tell me about home; do you like being home? Is there anything about home that you don't like? Has anything happened to you at home in the last six months that upsets you? Is there anything different at home lately?" All items across the three elements of these tools are scored on a range from 1-3 (1 = normative behaviour). The individual item scores are tallied and possible scores can range from 14-42 on the youth interview and 10-30 on the parent interview. A score between 14-19 on the youth interview and 10-15 on the parent interview is indicative of a need for fire safety education for the child and family. Scores between 20-42 and 16-30 on the youth and parent interview respectively suggest a need for referral to other community agencies for further assessment and evaluation. All cases however, receive the fire safety education provided by the fire service. In

addition, scores of 3 on three specific items on the youth interview indicate the child must be automatically referred for a crisis evaluation (DiMillo, 2002).

The parent checklist is a self-report questionnaire for parents made up of 27 statements that describe fire-specific and general behavioural and environmental factors. These are believed to be risk factors that suggest a need for collaboration with other community services. The parent is able to provide yes/no/sometimes responses to each statement. For example, the first item states: “My son or daughter has set more than one fire or has played with matches more than once.” No follow up questions are required for the parent checklist. The scoring procedure and subsequent treatment needs based on the Parent Checklist is unclear (DiMillo, 2002).

The benefits of this tool is that it was empirically developed based on statistical analyses of previous firefighter cases. The total scoring process is simple (once each item has been attributed a score) with individual item scores tallied for the total. It further provides a systematic process for screening, and enables identification of the potential need to involve other services. It is unclear from the manual which specific services the fire service professionals are supposed to refer children to, and referrals are likely to be dependent on the location of the fire service and the child’s residence. In addition, the fire service professionals are expected to be comfortable conducting these interviews that elicit very personal and contentious information. They are also expected to subjectively rate the degree of seriousness for each item’s response. This assumes they are skilled in building rapport and in making clinical-style judgements about the seriousness of these issues in order to make an appropriate rating. Furthermore, some of the supplementary questions appear interrogational. DiMillo (2002) reports that a limitation of the Juvenile with Fire Screening Tool is that it is aimed more towards

adolescent youth than younger children. There is no published research that has assessed the Juvenile with Fire Screening Tool's psychometric properties.

Strengths & Difficulties Questionnaire

Recently, Lambie and Krynen (2017) proposed that the Strengths and Difficulties Questionnaire (Goodman, 1997) is a useful measure for fire services to screen for mental health issues to aid in the process of referral from fire services to psychotherapy. The Strengths and Difficulties Questionnaire is a 25-item general measure of both positive and negative behavioural, social, and emotional functioning, similar to the CBCL. It assesses five separate domains: emotional problems, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviour. Research has found support for these five domains as separate constructs (Hawes & Dadds, 2004; Seward, Bayliss, Stallman & Ohan, 2018). Concurrent validity shows that the Strengths and Difficulties Questionnaire relates well to other similar behavioural, social, and emotional tools (e.g., CBCL) and has distinguishing capabilities between those receiving and not receiving treatment for mental health (Goodman, Ford, Simmons, Gatward, & Meltzer, 2003; Meiloo et al., 2012). Satisfactory internal consistency has been noted for the Strengths and Difficulties Questionnaire in multiple studies (Meiloo et al., 2012; Goodman, Meltzer, & Bailey, 1998). The Strengths and Difficulties Questionnaire is a copyrighted tool, but it is free to access and use by community services provided the service is free to clients. Furthermore, the client burden of the tool is relatively low, taking about 5-10 minutes to complete. The measure can be completed by parents or teachers of young people aged 4-16, and an equivalent version is available for young people aged 11-16 to self-report.

Australia's Approach

In Australia, fire safety education is the only intervention specifically targeted towards young people lighting fire (Fritzon et al., 2011). Muller and Stebbins (2007) presented a list of all the juvenile fire education programs in Australia. At that time, every state in Australia had some form of fire safety education intervention program in place that targeted known young people lighting fires. Since then, some of these programs appear to have been abandoned. Table 1 below, which has been adapted from Muller & Stebbins (2007) with the addition of the final column, provides an overview of juvenile fire education programs in Australia and their status.

Table 1

Secondary Juvenile Fire Intervention Programs in Australia

Program	Acronym	State	Current status
Juvenile Fire Awareness and Intervention Program	JFAIP	Australian Capital Territory	Inactive/unknown
Intervention and Fire Awareness Program	IFAP	New South Wales	Active
Juvenile Fire Awareness and Intervention Program	JFAIP	Northern Territory	Active
Fight Fire Fascination	FFF	Queensland	Active
Juvenile Arson Offenders Program	JAOP	Queensland	Inactive/unknown
Juvenile Firelighters Intervention Program	J-FLIP	South Australia	Active
Juvenile Fire Lighter Intervention Program	JFLIP	Tasmania	Active
Juvenile Fire Awareness and Intervention Program	JFAIP	Victoria	Active
Juvenile and Family Fire Awareness	JAFFA	Western Australia	Active

Note. Current status is based on available information from each state's fire service website as at December 2017.

Muller and Stebbins (2007) report that these programs share a number of similarities. They largely offer home-based fire safety education provided by a specially trained firefighter to educate their clientele. The programs are targeted towards children and adolescents who have been referred for firelighting involvement. These programs also report some connection with external services, such as mental health and juvenile justice. Victoria's Juvenile Fire Awareness and Intervention Program (JFAIP) is the prototype model on which a number of the other programs in Australia based their services (Muller & Stebbins, 2007). However, as each state independently developed and operates their own program, and demands of the young firefighter problem vary across states, differences in operational practices inevitably exist. For example, The Fight Fire Fascination program in QLD is described as conceptualized from the Victorian (JFAIP), but extensively adapted to meet the needs of the geographical conditions in QLD. Furthermore, this program endorses their own philosophical approach, but specifics on this were not made clear (Muller & Stebbins, 2007).

Victoria's Primary Prevention Education – Fire Ed.

In Victoria, Australian fire safety education in the school system is the primary proactive measure used by the fire authorities to prevent firelighting behaviour by young people. Victoria's primary firelighting prevention approach is the Fire Ed for Preps program targeting children at the beginning of primary school. Firefighters deliver the program to prep children in the school classroom. The aim is to provide children with a basic understanding of fire safety and see firefighters as positive community role models. The program is delivered to over 600 Victorian schools each year. The Fire Ed for Upper Primary program can also be delivered to students in grades

5 and 6. This is a more age-appropriate version of the original Fire Ed for Preps and incorporates education about fire science (Metropolitan Fire Brigade, n.d.)

Victoria's Secondary Intervention – Juvenile Fire Awareness and Intervention Program

The Juvenile Fire Awareness and Intervention Program (JFAIP) was established in Victoria in 1988. The alarming number of young people playing with, or lighting, fire at the time, and the frequency of child hospital admissions for burns, prompted the development of the intervention program. The program's establishment was a combined effort by the Metropolitan Fire Brigade (MFB) and the Royal Children's Hospital. Since then, the JFAIP has continued to develop and has welcomed research on its effectiveness (e.g., Adler et al., 1994; McDonald, 2010; Kurt, 2014).

The delivery methods of the program may have evolved over time, but the overarching aim is to reduce the rate of young people lighting fire, in turn increasing individual and community safety. Initially, the program used a number of strategies to achieve this outcome. Techniques including fire safety education, satiation, graphing, and parenting skills training were used (Adler et al., 1994). Subsequent to the research of Adler et al., only the fire safety education component remains. Currently the JFAIP endeavours to deliver fire safety education, and provide relevant knowledge to young people known to have lit or played with fire and their families (McDonald, 2010).

Across Victoria, 87 active firefighters (as of August 2017) have been employed and trained specifically as JFAIP practitioners. These firefighters deliver fire safety education using resources appropriate for the different ages and developmental stages of their clientele. The program uses an array of resources including videos, pictures, books, etc. to ensure young people learn to respect the proper uses of fire and understand the potential consequences of inappropriate engagement with fire. The

JFAIP receives referrals from various sources including local fire services, parent/carers, schools, and police (Kurt, 2014). The program responds to between 100 and 200 referred cases each calendar year. Anecdotal evidence from the program's coordinators suggests that the amount of young people with possible comorbid psychopathology contributing to firelighting has increased overtime. The trained JFAIP practitioners are well-equipped to intervene with low risk curious-type firelighters, but the program is not designed to target underlying mental health issues. Currently, there is no screening tool used in any juvenile fire program in Australia. However, this has been identified as one area for improvement (McDonald, 2010).

Summary

The target audiences for prevention and treatment programs are different. Prevention is targeted towards non-firelighting children. Fire safety and awareness education is aimed at young people who have established firelighting activity, and have a limited understanding of fire danger and fire safety without concerning psychopathology. Mental health intervention is intended to assist in treating psychosocial disturbances manifesting in firelighting. As previously noted, children lighting fires could broadly fall into the non-pathological low risk category or the pathological high risk category, suggesting a clear need for different intervention services where a multiagency approach is not available. In Australia, it is the case that services relevant for firelighters are standalone providers, and no multi-collaborative program has been established. The JFAIP is well prepared to intervene with young people who fit the limited fire awareness category, in the absence of significant psychosocial issues. The program is not designed as the sole treatment provider for young people lighting fires who have mental health concerns. This highlights the critical

need for a filtering process to aid the program's service professionals in objectively offering a referral onto mental health care providers where necessary.

As discussed in this review, some juvenile firefighter programs internationally have developed, and are utilising, screening measures in their programs. These tools enable the fire services to make objective decisions about treatment needs.

Notwithstanding their merits, these tools have some notable limitations. In sum, the Children and Fire – A Bad Match measure is a lengthy interview aimed at the younger cohort of firefighters. The Juvenile with Fire Screening Tool is targeted more towards adolescent firefighters and inherently assumes that fire service personnel are skilled interviewers and can make clinical style judgements about responses to personal questions. Furthermore, the corresponding manual has ambiguity around specific referral pathways. Similarly, in some cases the CRS and FRS require the practitioner to subjectively add qualitative information about individual cases, again implying that they are skilled to do so. Finally, none of these tools have been psychometrically tested and therefore assumptions about their effectiveness are anecdotal and currently empirically unfounded.

Fire services in Australia that deliver young firefighter programs, and which are considering the implementation of a formal early intervention screening process, should reflect on the limitations of these pre-existing tools. In addition, any tool used in an Australian context should be empirically developed and/or evaluated using Australian-based evidence. The two studies in this thesis (chapters 4 and 5) are focused on attending to this issue.

Chapter 4

Study 1: Distinguishing between Repeat and Non-repeat Firefighters: Evaluating Pre-existing Screening Tools and Developing a New Firefighter Screening Tool

In light of the literature reviewed, it is clear that young people lighting fires in Australia, and worldwide, is a serious issue with potentially disastrous and devastating outcomes. The literature has indicated that young people light fires for an array of reasons. Some of these reasons are described as relatively innocuous and intervention in the form of fire safety education will sufficiently eradicate further behaviour of a similar nature. These cases are considered to be low risk for persistent and problematic firelighting behaviour (Federal Emergency Management Agency, United States Fire Administration [FEMA], 2002). However, it has been highlighted that some firelighting young people are driven by more psychopathological forces and intervention needs to also target the underlying psychological and psychosocial factors that may promote continued firelighting activity. These cases are considered to be high risk for ongoing firelighting behaviour (FEMA, 2002). Fortunately, research has identified that the majority (approximately 60-70%) of firefighters are considered low risk, with approximately one third assumed to be high risk (FEMA, 2002). This distinction, and consequent variability in the type of intervention needs, calls for a preliminary filtering process prior to proceeding with intervention.

The Juvenile Fire Awareness and Intervention Program (JFAIP) is an education-based program (Muller, 2009) designed to target the majority of cases. The program does not proclaim to provide mental health treatment or target mental health issues, but they receive referrals that are suited to this type of treatment nonetheless. Referral to the JFAIP provides opportunity for cases with psychosocial issues to be identified and referred to mental health providers for assessment and treatment, as has been

encouraged (McCarty & McMahon, 2005). Therefore this service should be equipped with a screening measure to assist in the process of recognising potential risk and determining the best course of action accordingly. Currently, the JFAIP does not use a screening tool to assess the “type” of firefighter they are providing their services to, or measure the risk of repeat firefighting that could justify a referral to mental health services (McDonald, 2010). Currently, as per standard practice, those referred to the JFAIP are provided with fire safety education and intervention only (unless other services are sought by the families on their own accord). An empirically designed valid and reliable screening tool could measure the risk of repeated firefighting for all of these young people, and enable justified referrals to mental health services where necessary, and if effective, subsequently reduce the rate of repeat firefighting. The fire service-specific screening tools described in the previous chapter generally have this exact intention, but either have theoretical underpinnings and/or are yet to be empirically evaluated. In addition, some of the pre-established screening measures have been criticised for their complexity, intrusiveness, and clinical focus, making them difficult for fire service professionals to administer and assess (DiMillo, 2002).

Therefore, the overall aim of this research thesis was to identify or develop a valid screening tool that could be implemented into the JFAIP. The predictive capability of the pre-existing FEMA instruments, specifically the Juvenile Firesetter Child and Family Risk Surveys (CRS and FRS; Moynihan & Flesher, 1998) reviewed in chapter 3, were assessed as part of this study to determine if these tools were able to distinguish between the cases who benefited from the JFAIP intervention (e.g., low risk cases where fire safety education worked) and those who did not (e.g., high risk psychopathological cases requiring supplementary mental health intervention). The design of this study sought to allow for the outcome that the CRS and FRS may not be

the most effective discriminators of low and high risk cases. Thus the CRS and FRS were supplemented with other questionnaire materials to provide the ability to develop a new screening measure based on a Victorian JFAIP sample that possibly provided better discrimination between high and low risk cases. Ideally, such a new screening measure would also address the limitations of the pre-existing screening tools (e.g., empirically informed, brief, aimed at the whole age cohort (6 to 17 years), does not require practitioners to be skilled interviewers or make clinical-style judgements). As discussed below, an array of existing measures (including the CRS and FRS, as well as the Fire Risk Interview, and Child Behaviour Checklist [CBCL]) were used to determine appropriate items for a new screening tool, the effectiveness of which was evaluated with a new sample of JFAIP clientele in study 2 of this thesis). The tool that demonstrated the most utility would be recommended to the JFAIP for their pre-intervention process (e.g., either the CRS and FRS, or the newly developed tool) with the purpose of aiding their endeavour to screen cases who should also receive mental health assessment and treatment.

In order to achieve this aim, the rate of repeat firelighting in the JFAIP needed to be determined. The predictive validity of the CRS and FRS was assessed to determine how accurately these tools could predict repeat firelighters in the JFAIP. The overall profile of fire-specific, family, and psychosocial factors related to repeat firelighters that were distinct from non-repeat firelighters, was explored. Finally, a brief tool consisting of items demonstrating the greatest differences between the repeat and non-repeat firelighters was derived. Study 2 (chapter 5) then evaluated and compared the effectiveness of the new screening tool against the CRS and FRS.

Drawing on understandings from the reviewed literature it was expected that:

- one third of the sample would be repeat firelighters post-JFAIP intervention;

- the CRS and FRS would demonstrate utility for detecting repeat firefighters;
- neither age nor sex would be a distinguishing factor between repeat and non-repeat firefighters;
- differences would be apparent between the repeat and non-repeat firefighters on fire-specific variables. Specifically, compared to the non-repeat group, the group who continued to light fires would demonstrate:
 - increased curiosity and interest in fire;
 - increased past involvement and interest in fire-related activities; and
 - exposure to peer/family models interested in fire and/or engaging in fire-related activity (e.g., smoking, playing with matches/lighters);
- no directional hypotheses for how knowledge and competency would relate to repeat firefighters were set;
- differences would be apparent between the repeat and non-repeat firefighters on family variables. In comparison to the non-repeat firefighters, the repeat firefighters would be more likely to demonstrate:
 - poor family relationships and conflict;
 - parental absence;
 - ongoing family problems; and
 - receiving harsh discipline or no discipline for undesirable behaviour;
- differences would be found between the repeat and non-repeat firefighters on child psychosocial variables. In comparison to the non-repeat firefighters, the repeat firefighters would be more likely to demonstrate:
 - impulse control/attention problems;

- social problems;
- externalising problems; and
- internalising problems.

Method

The data collection for this study occurred in two stages (pre-JFAIP intervention and 12-month post-JFAIP follow-up). Information relating to each child and adolescent's fire-specific behaviour, family functioning, and psychosocial aspects was sourced in stage one, pre-intervention. Stage two involved a 12-month post-intervention follow-up with each case to determine the presence or absence of repeat firelighting.

Participants

Participants were recruited through their involvement with the JFAIP. Data was collected at two time-points (pre- and post-intervention) from families referred to the JFAIP between December 2010 and April 2013. During the 2.5-year period 346 cases were referred to the JFAIP. Of these, 33 were classified as no action cases where the program was never delivered (e.g., practitioners were unable to contact family to organise delivery of the program). In total, the JFAIP provided their services to 313 cases. The JFAIP coordinator telephoned each case pre-intervention, explained the research, and asked parents/carers to consider participating. A total of 169 cases initially agreed to participate and were sent the stage one pre-intervention research pack. A total of 71 families completed and returned the stage one questionnaires. Ten participants did not complete the post-intervention 12-month follow-up research pack despite several attempts to contact each participant. Thus, the final sample consisted of a total of 61 cases ($M = 55$, $F = 6$) with complete pre- and post-intervention data. Ages ranged from 5 to 17 years ($M = 10.9$, $SD = 3.3$).

Materials

A number of pre-established and specifically developed measures were utilised in both stages of this study. A description and justification for each is outlined below. In stage one (pre-intervention) a series of questionnaires and relevant supporting documents were completed in the period around the time of the first JFAIP contact session. In stage two (post-intervention) follow-up questionnaires and supporting documents were sent to families 12 months after their JFAIP sessions were completed.

Stage One: Pre-intervention

The Juvenile Firesetter Child and Family Risk Surveys. The Juvenile Firesetter Child and Family Risk Surveys (CRS and FRS; Moynihan & Flesher, 1998) (Appendix A & B) were chosen for this study because they are pre-established screening tools currently used internationally by fire service professionals to make justified referrals to appropriate mental health services dependent on the young person's level of risk. Based on the outcome of this research, it was possible that the JFAIP would formally adopt the screening measures used in this project into their intervention process. Therefore, as this project was a collaborative partnership with the JFAIP, the coordinators of the program were consulted, in conjunction with the program practitioners, about which of the pre-existing measures would be used. The CRS and FRS were selected because of their relative simplicity and limited intrusiveness. The program's practitioners were very clear that they did not want to ask questions of the clients that were invasive or, in their view, interrogative. The tools were also brief and would not place too much burden on the clients. Consequently, it was decided that the CRS and FRS were the most appropriate of the pre-existing screening tools available. The items on these tools that did not contribute to the overall score were omitted.

because they added no value and were considered invasive (e.g., one sought information about possible abuse history) (refer to Chapter 3).

The CRS and FRS are used by fire service professionals in the USA as screening tools for fire service education programs in contact with young firefighters. These tools are used to determine the young person's risk of ongoing firefighting behaviour and need for additional support from mental health services to inform treatment pathways (refer to chapter 3). The CRS is administered by the fire practitioner directly to each young person. It contains 14 questions relating to the child or adolescent's own interpretation of their family dynamics (e.g., "Do you fight or argue with your mother?"), general behaviour (e.g., "When you are asked to do something do you usually do it?"), history of firesetting (e.g., "Besides this fireplay or firesetting incident, how many others times have you played with fire, including matches or lighters, or set something on fire?"), most recent fire incident (e.g., "Where did you set the fire?") and specific fire interest (e.g., "Do you like to look at fire for long periods of time?"). In contrast, the FRS is designed for the parent/carer to complete. It contains seven questions relating to the primary carer's perspective of their child's curiosity about fire (e.g., "If you had to describe his/her curiosity about fire, would you say it was absent, mild, moderate or extreme?"), impulsive conditions (e.g., "Has he/she been diagnosed with any impulse control conditions such as Attention Deficit Disorder (ADD) or Attention Deficit Disorder with Hyperactivity (ADHD)?"), antisocial behaviours (e.g., "Has he/she ever shoplifted?") and any history of firesetting behaviour (e.g., "Besides this fireplay or firesetting incident, how many others times has he/she played with fire, including matches or lighters, or set something on fire?"). While the FRS implies that the tool measures family constructs relevant to the family, it does not include any

variables relating to the family. The items on the FRS reflect the child's fire-specific and general behaviour from the perspective of the parent/guardian.

Possible responses to the questions (for both the CRS and FRS) are categorical and have corresponding numerical weight-values based on their degree of association with repeat firelighting, which was determined by Moynihan and Flesher (1998) in statistical regression analyses. The quantitative responses from both surveys are scored separately, and the young person is classified according to their risk of repeat firelighting on each (e.g., little, definite or extreme risk). In the young firelighter programs in the USA, children categorised as being at little risk (FRS scores < 429, CRS scores < 511) on both surveys are deemed suitable for fire safety education only. Young people classified as definite risk on at least one of the surveys (FRS scores 429 to 457, CRS scores 511 to 540), are given fire safety education and a mental health referral. Those found to be at extreme risk on either or both surveys (FRS scores > 457, CRS scores > 540) are not eligible for fire safety education and are referred on for mental health intervention only. However, the reliability and validity of both of these measures were yet to be assessed, and this formed the basis of one area of exploration in this study. Given they had not yet been subject to empirical evaluation, the CRS and FRS (completed pre-intervention) were not used in this study to make recommendations for mental health services for young people who scored in the greater risk categories.

Brief Agency Contact History. The Brief Agency Contact History (Appendix C) was developed specifically for this project. The purpose of collecting this information was to enable researchers to gain a description of the young person's level of prior engagement with mental health services. Parents/carers were asked to report which type (if any) of mental health professional the child had been in contact with, along with age of contact and number of sessions engaged in.

Firesetting Risk Interview (Kolko, 1989a). The FRS and CRS include some fire-specific questions covering this construct, but not in length. Therefore, the Firesetting Risk Interview (FRI) (Appendix D) was chosen for this study because it was designed to measure fire-specific variables with known association to repeat firefighters. It was anticipated that the theme of some of these items would be adopted to develop the new, brief firefighter screening tool.

The FRI was originally developed for use in a clinical setting to highlight fire-specific elements, in conjunction with other psychosocial functioning that might have implications for treatment needs (Kolko et al., 2002). The intention of the original tool is to give the clinician an understanding of the child's fire risk, determine intervention needs, and provide a way of measuring improvement after intervention. The two methods of interpreting scores on the original tool that have been described, require the treating professional to make a clinical judgement based on how the scores appear in comparison to normative data, or where the score sits in relation to the possible range of scores (Kolko et al., 2002). However, the JFAIP is seeking a tool that is simple, non-intrusive, and easy to administer and score that will enable them to make a judgement about probable mental health needs. Given the clinical nature of the original tool, this study only extracted the seven fire-specific scales for use here, and therefore would not be scored using the methods described by Kolko et al. (2002).

The seven scales consisted of 41 items assessing factors known to be associated specifically with fire risk behaviour and repeat firefighting. Thirty six items were scored on a 5-point Likert scale representing the degree or frequency of a behaviour or experience. Five questions relating to early experiences with fire were assessed with a dichotomous yes/no format. The general themes, number of items, and score range of each scale are:

- curiosity about fire (e.g., “How curious is he/she about fire?”), 7 items, score range 7 to 35;
- knowledge of fire safety (e.g., “To what extent does he/she know how to use matches and lighters correctly?”), 5 items, score range 5 to 25;
- fire skill/competence (e.g., “To what extent does he/she know what to do if something catches fire suddenly?”), 5 items, score range 5 to 25;
- complaints/concerns about fire behaviour (e.g., “How often do you worry about him/her playing with fire when he/she is left unattended?”), 3 items, score range 3 to 15;
- exposure to peer/family models (e.g., “How often is there cigarette or pipe smoking in your home?”), 13 items, score range 13 to 65;
- involvement in fire related activities (e.g., “How many times has your child left burn marks on things in your home?”), 3 items, score range 3 to 15; and
- early experiences with fire (e.g., “Were there any smokers living in your home more than one year ago?”), 5 items, dichotomous yes (1)/no (0) format, score range 0 to 5.

The FRI has been subject to tests of reliability and validity in previous studies and demonstrated good internal consistency and predictive validity (Kolko & Kazdin, 1989a; Kolko & Kazdin, 1992). The six Likert-type scales used in the FRI demonstrated variable internal consistency in this study with Cronbach’s Alpha values ranging from .47 to .90. The Complaints Scale produced the lowest alpha, while the other five scales produced good Cronbach’s alpha levels between .71 and .90.

The Child Behaviour Checklist. Firelighting has been associated with a number of child behavioural and emotional variables. Therefore incorporating questions reflecting these variables into a new screening tool was anticipated. The Child

Behaviour Checklist (CBCL) (Appendix E) was chosen for this study because it is the most robust tool available to assess general child and adolescent psychopathology, which has shown to be related to repeat firefighters. The intention was that behaviours that were identified as relevant to repeat firefighters would be made into questions that reflected the theme of these behaviours in the new screening tool.

The CBCL was developed and refined by Thomas Achenbach and associates for the Achenbach System of Empirically Based Assessment (ASEBA). On the basis of parent-report the CBCL assesses several problems in psychopathology. The CBCL consists of 120 Likert-type items in which parents are asked to best describe how true each statement is of their child's behaviour in the past 6 months and rated as *not true* (0), *somewhat or sometimes true* (1), and *very true or often true* (2). These items assess the child's behavioural and emotional state (normal, borderline, or clinical) by scoring them across a variety of broad-band syndrome scales (internalising, externalising, and total problems), narrow-band syndrome scales (aggressive behaviour, attention problems, anxiety problems, withdrawn/depressed, somatic complaints, social problems, thought problems, rule breaking problems and other problems), and DSM-oriented scales (affective problems, anxiety problems, somatic problems, attention deficit/hyperactivity problems, oppositional defiant problems and conduct problems). Raw scores on the CBCL are converted to T-scores for each scale and fall somewhere on a continuum demonstrating the extent of deviance (or not) from normality with three ranges (normal, borderline, and clinical). The CBCL classifies broad-band T-scores < 60 in the normal range, 60 to 63 in the borderline range and > 63 in the clinical range. Narrow-band and DSM-oriented T-scores consider a score < 65 to be in the normal range, 65 to 69 borderline and > 69 in the clinical range.

Internal consistency has been reported as good (between .8 and .94). Convergent and predictive validity across various samples of children has also been demonstrated (Achenbach & Rescorla, 2001). In this study the Cronbach's alpha for the whole 120-item CBCL was .97, demonstrating strong internal consistency.

Stage Two: Post-intervention

The Fire History Screen. The Fire History Screen (FHS) (Kolko & Kazdin, 1988b) (Appendix F) was chosen because it has been shown to be a useful measure of firelighting behaviour (Dadds & Fraser, 2006). Originally the tool was developed as a measure of correspondence between child- and parent-report of fire behaviour. For the purposes of this research, only the parent was administered the FHS.

The FHS was developed by Kolko and Kazdin to provide a structured approach to collecting information on firesetting history. The tool is targeted towards professionals involved with potential firefighters, other than fire services, such as schools, justice services, and mental health professionals. The 13-item tool was adapted for this study to assess repeat firelighting/matchplay. The questionnaire elicits information relating to recent firelighting behaviour (within the past 12 months post-JFAIP intervention), including matchplay and firelighting incidents. The severity and frequency of the incidents are captured.

Past research has found there to be agreement between the parent and child informants (Kolko, Bridge, Day, & Kazdin, 2001). It is clearly stated that this is not a screening measure to inform intervention services or targets for intervention. In this study, the information from this tool would be used to determine the presence or absence of repeat firelighting and separate the firefighters into repeat and non-repeat firefighters for analyses of group differences.

For the purpose of this study, repeat firefighters were classified as anyone who had continued to engage in matchplay and/or firefighting within the 12-month period post-JFAIP intervention. This classification is consistent with that used by McDonald (2010) whose study also utilised a JFAIP sample. The author justified the inclusion of matchplay and firefighting as overall repeat firefighting because both activities have potentially dangerous consequences, and the JFAIP's aim is for all children to become fire-safe in all circumstances. Ongoing interest in fire was assessed on the FHS, but a positive response to this item was not considered repeat firefighting behaviour because of the lack of physical involvement.

The Questionnaire about Mental Health Services. The Questionnaire about Mental Health Services (Appendix G) was developed specifically for this project. The questionnaire was designed to elicit information about the professional mental health services available to families in Victoria to explore if, and how they target firefighting behaviour specifically. The 11-item questionnaire was completed by the parent/carer and probed information about mental health contact during the 12-month period post-JFAIP intervention. Qualitative responses were expected to provide a broad overview of the types of issues children seeking mental health services are presenting with and the approaches treating professionals are using.

The Questionnaire for the Counsellor or Mental Health Professional. The Questionnaire for the Counsellor or Mental Health Professional (Appendix H) was developed with the intention of gaining a broad understanding of the nature of mental health services some children and adolescents who light fire receive. The questions were designed to elicit information regarding the length of contact the professional has had with the child, the child's level of engagement in the sessions, the nature of the child's initial presenting problems, any diagnoses attached to the child, the treatment

approaches used with the child, and if the firelighting behaviour was or was not a specific focus of the intervention approach.

Ten families permitted the researcher to make contact with the child's mental health professional to whom questionnaires were sent, but none were subsequently returned.

Procedure

Ethics approval. Appropriate approval from Victoria University's Human Research Ethics Committee (HREC) was sought and granted for this project in 2010 (HRETH 10/192). A further extension was granted due to unforeseen delays in data collection. A final application (HRE14-203) was approved by HREC in 2014 for the analysis of this data and the collection of new data for the subsequent study 2.

Data collection: stage one (pre-intervention). The JFAIP state coordinator directly contacted all parents/carers of cases referred to the program via telephone between December 2010 and April 2013. The JFAIP state coordinator briefly informed all carers about the research and asked them to consider participating during that initial telephone contact. All parents/carers who verbally agreed were sent the stage one research pack containing the following:

- introduction letter to participants 1 (Appendix I);
- information to parents of children/adolescents involved in research document (Appendix J);
- directions to parents of children/adolescents involved in research document (Appendix K);
- consent form for parents and children/adolescents involved in research Part A (Appendix L);
- Brief Agency Contact History (Appendix C);

- FRS (Appendix B);
- FRI (Appendix D);
- Child Behaviour Checklist (Appendix E); and
- a copy of the CRS that would be administered to the child at first intervention (Appendix A).

The series of questionnaires in stage one relevant to the parent/carer were expected to take approximately 45 minutes to complete. The participants completed the relevant consent form and series of questionnaires and returned them to the author via reply-paid envelope. As this study has a post-intervention phase, the completed questionnaires were not anonymous.

During their first interview session with the JFAIP practitioner, the CRS was administered to children or adolescents of consenting parents/carers. The practitioner read aloud the questions and the young people responded to them in the presence of their parent/carer. The CRS took approximately 10 to 15 minutes to complete. The practitioner forwarded the completed CRS to the researcher via the JFAIP coordinator. For their participation in stage one of the research, participants were sent a \$10 Coles/Myer gift card and appreciation letter (Appendix M) to compensate them for their time.

Data collection: stage two (post-intervention). In the twelfth month after the JFAIP intervention sessions had been completed, the post-intervention follow-up was conducted (e.g., JFAIP intervention in October 2011 and follow-up in October 2012). The stage two research pack was posted to the participating parent/carer and contained the following documents:

- introduction letter to participants 2 (Appendix N);

- information to parents of children/adolescents involved in research document 2 (Appendix O);
- consent form for participants involved in research Part B (Appendix P);
- consent to contact the mental health professional (Appendix R)
- Fire History Screen (Appendix F); and
- The Questionnaire about Mental Health Services (for parents to complete) (Appendix G).

The content of stage two was expected to take about 25 minutes to complete.

Parents returned the completed documents via reply-paid envelope directly to the author at Victoria University. Where appropriate consent was given by the parent/carer to contact mental health professionals, the latter were sent:

- the Questionnaire for Counsellors or Mental Health Professional (Appendix H);
- a copy of the appropriate certification from the parent/carer to contact the mental health professional (Appendix R); and
- information to the mental health professional involved in the research brief (Appendix R), and a reply-paid envelope.

Once the completed documents for stage two were received, participants were sent a \$20 Coles/Myer gift card and letter of appreciation (Appendix S) to acknowledge their final contribution to the research.

Data analysis. The data collected was stored securely in raw hard-copy form at Victoria University. An electronic database containing corresponding raw information was kept on Victoria University's secure research drive. Data was thoroughly checked and cleaned before analyses were conducted. All statistical analyses were conducted

using the Statistical Package for Social Sciences, Version 22 (SPSS). The assumptions for each analysis were checked and accounted for via the methods described in Table 2.

The rate of repeated firelighting and general demographic information for the repeat and non-repeat firefighters was explored through descriptive statistics and inferential statistics investigating differences. Subsequently, the distinguishing capability of the FRS and CRS was investigated by identifying the sensitivity and specificity of each tool. Sensitivity reflects the extent to which a screening measure can accurately predict true positives (e.g., detects a repeat firefighter). Specificity represents the measurement’s ability to accurately predict true negatives (e.g., classifies non-repeat firefighter as such). The data was further explored for associations between repeat firefighters on the variables of interest using chi-square test of independence and independent samples t-test comparisons to determine differences between repeat and non-repeat firefighters.

Table 2

Assumptions and Methods for Checking Data for Analyses in Study 1

Assumptions	Method for checking	Method for violations where necessary
Chi-square test of contingencies		
Independent cases	Research design	
Categorical data	Research design: variables with more than 2 categories were collapsed where possible	
Cases per cell above 5	Inspection of cross tabulations table	Report Fisher’s Exact Probability (Pallant, 2016)
Sample size		Likelihood ratio is reported as suggested when sample size is small (Field, 2009)
Independent samples <i>t</i> -tests		

Assumptions	Method for checking	Method for violations where necessary
Interval data	Research design	
Independent cases	Research design	
Normality	Visual examination of histogram Visual examination of <i>p</i> -plots Skewness and Kurtosis values between -3 and 3	Equivalent non-parametric test (Pallant, 2016)
Homogeneity of variance	Levene's test for equality of variance	Interpret equal variances not assumed output (Pallant, 2016)

Results

Results will first demonstrate the rate of repeat firelighting behaviour present in the JFAIP sample 12 months post-intervention. Differences in sex, age, and use of mental health services is also presented.

Rate of Repeat Firelighting

The fire-related activity of the sample within the 12-month period post-JFAIP intervention was captured through assessing frequencies. This data is summarised below in Table 3.

Table 3

Frequency (Percentages and Ratios) of Fire-related Activity of Repeat Firelighters and Non-repeat Firelighters within 12 Months Post-JFAIP Intervention (N = 61)

	n	%	Ongoing fire interest	Repeat firelighter behaviours		
				Matchplay alone	Firelighting alone	Matchplay & firelighting
Repeat firelighters	20	32.8% (20/61)	65% (13/20)	35% (7/20)	40% (8/20)	25% (5/20)
Non-repeat firelighters	41	67.2% (41/61)	9.8% (4/41)			

Overall, as seen in Table 3, repeat firelighting behaviour was present in one third of the participants post-intervention. The remaining two thirds of the sample had ceased any physical involvement with inappropriate fire-related activities after the JFAIP intervention. Two thirds of those continuing with fire behaviour were actually lighting items, with the remaining one third described as having played with matches and lighters without specific ignition.

Demographics: Age and Sex

The demographic information relating to repeat and non-repeat firelighters is displayed in Table 4.

Table 4

Sex, Age and Prior Mental Health Contact of Non-repeat and Repeat Firefighters (N = 61)

	Non-repeat firefighter <i>n</i> = 41	Repeat firefighter <i>n</i> = 20
Sex		
Male	92.7% (38/55)	85% (17/55)
Female	7.3% (3/6)	15% (3/6)
Age		
Mean	10.8 years	11.2 years
Standard Deviation	3.4 years	3.0 years
Range	5 to 17 years	6 to 17 years
Age group*		
Younger (5 to 11 years)	53.7%	45%
Older (12 to 17 years)	46.3%	55%
Prior mental health support**		
Yes	46.3%	60%
No	53.7%	40%
Post mental health support***		
Yes	29.0%	66.7%
No	71%	33.3%

Note. *This age split will be used to explore any differences that may exist between repeat and non-repeat firefighters in later analyses related to the development of a repeat firefighter screening tool, as it is in line with the age split in the CBCL. The CBCL indicates that certain behavioural and emotional aspects are more likely to be seen within one of the two age brackets and potentially necessitates the development of two separate age-specific screening tools. **Prior mental health support refers to any mental health services sought prior to the fire-related incident resulting in JFAIP referral. ***Post mental health support refers to any mental health services sought within 12 months of the conclusion of the JFAIP intervention.

Table 4 illustrates that repeat and non-repeat firelighting children and adolescents ranged from 5 to 17 years of age, with no significant difference in the mean age between the groups, $t = .36 (59), p = .72, CI [-1.48 - 2.12]$. The sample could be split evenly into two separate groups of younger and older children and adolescents with the former falling between 5 and 11 years of age, and the latter 12 to 17 years of age. A chi-square test of contingencies ($\alpha = .05$) showed that age group was not significantly related to repeat firelighting status, $\chi^2(1) = .40, p = .53$.

When investigating the relationships between sex and firelighting, Fisher's Exact Probability statistic ($\alpha < .05$) was reported in place of the chi-square test of contingencies because the low number of female participants resulted in violation of the assumption of expected cell counts above 5. In both groups (repeat and non-repeat firefighters) there were more male participants than females with an approximate ratio of 9:1. There was no significant relationship between sex and firefighter status post-intervention, Fisher's Exact Test, $p = .38$, two-tailed. However, it should be cautioned that of the six females in the sample, 50% became repeat firefighters. The rate of repeat firelighting for the male group was less at 30%. The limited number of female participants may have had an impact on the lack of statistical differences between males and females. There were more repeat firefighters utilising mental health services both before and after the firelighting incident that led to their JFAIP referral.

Discriminant Ability of the Juvenile Firesetter Child and Family Risk Surveys

The ability of the CRS and FRS to distinguish between repeat and non-repeat firefighters was assessed initially through independent samples t -tests to compare their total pre-intervention scores on these surveys. The results are presented in Table 5.

Table 5

Descriptive Statistics and Independent Samples t-tests Comparing the Total Scores of Repeat Firefighters and Non-repeat Firefighters on the CRS and FRS

	Firefighter status	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	95% CI
Family Risk Survey	Repeat	20	658.10	237.12		
	Non-repeat	40	431.78	231.13	3.55**	[98.54 – 354.11]
Child Risk Survey	Repeat	18	577.61	284.46		
	Non-repeat	41	479.66	215.51	1.46	[-36.90 – 232.80]

Note. The *n* differs between the CRS and FRS because some cases had incomplete data.
***p* < .01.

As presented in Table 5, the independent sample *t*-test showed a significant difference between repeat firefighters and non-repeat firefighters on the FRS. The total score on the parent-reported FRS was significantly higher for the repeat firefighter group than the non-repeat firefighter group. No significant differences were observed in the total score on the child self-report CRS.

The predictive validity of the FRS was explored by determining its sensitivity and specificity. The FRS demonstrated a sensitivity rate of 85% and specificity of 52.5%, meaning that it correctly identified 85% of repeat firefighters, but could only recognise a future non-repeat firefighter just over half of the time and over-classified young people as at-risk for future repeat firefighting. The CRS was sensitive to only 61.1% of repeat firefighters, and only 58.5% specific in accurately detecting a non-repeat firefighter. The raw scores, risk category according to the FRS and CRS,

associated treatment recommendation, and actual firelighting status at follow-up, are presented in Table 6.

Table 6

Raw Scores, Risk Category, and Treatment Recommendation according to the CRS and FRS

Case	FRS Risk category	CRS Risk category	Treatment recommendation	Actual repeat firelighting
1	Extreme	Extreme	Mental health referral only	No
2	Little	Little	Fire safety education	Yes
3	Little	Little	Fire safety education	Yes
4	Little	Extreme	Mental health referral only	No
5	Little	Little	Fire safety education	No
6	Extreme	Extreme	Mental health referral only	Yes
7	Extreme	Extreme	Mental health referral only	Yes
8	Extreme	Little	Mental health referral only	Yes
9	Extreme	Extreme	Mental health referral only	No
10	Extreme	Extreme	Mental health referral only	Yes
11	Extreme	Definite	Mental health referral only	No
12	Extreme	Extreme	Mental health referral only	No
13	Extreme	Extreme	Mental health referral only	Yes
14	Extreme	Little	Mental health referral only	No
15*	Definite	Little	Fire safety education + mental health referral*	No

Case	FRS Risk category	CRS Risk category	Treatment recommendation	Actual repeat firelighting
16	Extreme	Extreme	Mental health referral only	Yes
17	Little	Little	Fire safety education	No
18	Little	Little	Fire safety education	No
19	Extreme	Extreme	Mental health referral only	No
20	Extreme	Extreme	Mental health referral only	Yes
21	Extreme	Extreme	Mental health referral only	Yes
22	Little	Little	Fire safety education	No
23**		Little	Fire safety education	No
24	Little	Little	Fire safety education	No
25	Extreme	Extreme	Mental health referral only	No
26	Little	Little	Fire safety education	No
27	Little	Extreme	Mental health referral only	No
28	Little	Little	Fire safety education	No
29	Extreme	Extreme	Mental health referral only	Yes
30	Extreme	Little	Mental health referral only	Yes
31	Extreme	Extreme	Mental health referral only	No
32	Extreme	Extreme	Mental health referral only	No
33	Extreme	Little	Mental health referral only	No
34	Little	Little	Fire safety education	No
35	Little	Little	Fire safety education	Yes

Case	FRS Risk category	CRS Risk category	Treatment recommendation	Actual repeat firelighting
36	Little	Little	Fire safety education	No
37	Definite	Extreme	Mental health referral only	Yes
38	Little	Little	Fire safety education	No
39	Extreme	Little	Mental health referral only	Yes
40	Little	Little	Fire safety education	No
41	Little	Little	Fire safety education	No
42	Extreme	Little	Mental health referral only	No
43	Extreme	Extreme	Mental health referral only	No
44	Little	Little	Fire safety education	No
45	Little	Little	Fire safety education	No
46	Definite	Extreme	Mental health referral only	No
47	Extreme	Extreme	Mental health referral only	Yes
48*	Definite		Fire safety education + mental health referral	Yes
49	Extreme	Extreme	Mental health referral only	Yes
50	Extreme	Extreme	Mental health referral only	No
51	Definite	Extreme	Mental health referral only	No
52	Extreme	Little	Mental health referral only	No
53	Little	Little	Fire safety education	No
54	Definite	Extreme	Mental health referral only	No

Case	FRS Risk category	CRS Risk category	Treatment recommendation	Actual repeat firelighting
55	Little	Extreme	Mental health referral only	No
56	Extreme	Little	Mental health referral only	Yes
57	Little	Extreme	Mental health referral only	No
58**	Extreme		Mental health referral only	Yes
59	Little	Little	Fire safety education	No
60	Little	Little	Fire safety education	No
61	Extreme	Little	Mental health referral only	No

Note. Standard recommendations for risk according to the CRS and FRS are: little risk = fire safety education only, definite risk = fire safety education and mental health referral, extreme risk = mental health intervention only (not eligible for fire safety education).

*Suitable candidates to receive both fire safety education and a mental health referral according to the recommended treatment methods corresponding to the definite risk category in the CRS and FRS. **Data only available for one of the CRS or FRS.

As can be seen from the information in Table 6, according to the FRS 24 young people (40%) were categorised as low risk, 6 (10%) were classified as definite risk, and 30 (50%) were deemed extreme risk. Based on the same standard recommendations for risk, according to the CRS 31 (51%) cases were considered to be low risk, only 1 was deemed definite risk, while 28 (46%) fell in the extreme category. With the determination of treatment based on the result of both tools (unless data was only available for one), 21 cases (34.4%) would have been considered as low risk and given the fire safety education program, 2 cases would have been deemed definite risk (3.3%) and therefore suitable to receive fire safety education and a mental health referral, and 38 cases (62.3%) would have been determined as extreme risk and not eligible for fire safety education and only mental health referral.

Profiling Repeat and Non-repeat Firefighters

In order to identify factors that related specifically to the repeat firefighters in the JFAIP sample, an exploration of the different profiles between the repeat and non-repeat firefighters was firstly conducted on the fire-specific, psychosocial, and family variables measured on the FRI, CRS, FRS, and CBCL.

Fire-specific variables. Independent samples *t*-tests comparing group differences between the repeat and non-repeat firefighters were conducted on the continuous fire-specific variables. The question of whether to apply Bonferroni corrections given the multiple *t*-tests carried out on the fire specific variables was carefully considered. This needed to be balanced with the fact that the sample size for the current study was relatively small. The chance of making a Type I error is elevated with multiple comparisons, however the chance of making a Type II error is elevated by applying Bonferroni corrections in a small sample (Gravetter & Wallnau, 2015). Given the exploratory nature of this study the decision was balanced in favour of avoiding Type II error, and therefore Bonferroni corrections were not applied. Hence, caution should be exercised when considering the robustness of the comparisons to withstand Type I error in the absence of Bonferroni corrections. The average Likert-score (range 1 to 5, except experience scale 0 to 1) for each scale was used to compare means rather than the scale totals because a number of participants failed to answer one or more items within each scale, and therefore it was considered that the summarised total scale scores may not accurately reflect the true scores. Table 7 shows the results of the independent samples *t*-test comparisons for repeat firefighters and non-repeat firefighters.

Table 7

Descriptive Statistics and Independent Samples t-test Comparisons of Repeat Firefighters and Non-repeat Firefighters on Continuous Fire-specific Variables

Fire-specific variable by firefighter status	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	95% CI
Number of past fires (parent)					
Repeat	20	4.85	1.76		
Non-repeat	41	2.88	1.93	3.86**	[.95, 2.99]
FRI-involvement scale					
Repeat	20	2.68	.94		
Non-repeat	41	1.87	.88	3.29**	[.32, 1.30]
FRI-early experience scale					
Repeat	20	.59	.27		
Non-repeat	41	.42	.28	2.15*	[.01, .32]
FRI-competency/skill scale					
Repeat	20	2.62	.74		
Non-repeat	41	3.05	.80	-2.05*	[-.86, -.01]
FRI-curiosity scale					
Repeat	20	2.77	.89		
Non-repeat	41	2.26	.99	1.96	[-.01, 1.03]
FRI-knowledge scale					
Repeat	20	3.40	.75		
Non-repeat	41	3.62	.79	-1.06	[-.65, .20]
FRI-complaints scale					
Repeat	20	2.40	.82		
Non-repeat	41	1.97	.79	1.94	[-.03, .87]
FRI-exposure scale					
Repeat	20	1.72	.44		
Non-repeat	41	1.80	.48	-.65	[-.34, .17]
Number of past fires (child)					
Repeat	18	3.44	2.75		
Non-repeat	39	2.77	1.95	1.06	[-.60, 1.95]

Note. Missing responses not shown. * $p < .05$. ** $p < .01$.

Of the young people who continued to physically engage with fire, two-thirds were described as interested in fire by their parent/carer. Only 1 in 10 non-repeat firelighters was reported to have the same fire interest. As displayed in Table 7 a clearly significant difference was found between the parent-report of the number of past fires lit by the repeat firelighter group and non-repeat firelighter group. Parents of repeat firelighters reported a greater number of past fires than the parents of non-repeat firelighters. Conversely, no difference in the number of past fires reported by the child were apparent between the two groups. Repeat firelighters were reported to have significantly more involvement and experience with fire, and less competency and skill with fire than non-repeat firelighters. Although not statistically significant at $p < .05$, trends ($p = .054$ and $.058$) that approached significance were found with the repeat firelighter group scoring higher for complaints (reflecting concerns from parents or others about the child's general and fire-specific behaviour) and curiosity.

Family variables. The dichotomous family and parent variables were analysed with chi-square tests of independence. Four of the variables (positive relationship with siblings, positive relationship with mother, argue with mother, and appropriate consequences for firelighting) originally had between 4 and 6 response categories that were collapsed into two to enable analysis of a dichotomous variable. Fisher's exact statistic was used to assess significance where the cell count was below 5. The results of the chi-square tests of independence are presented in Table 8.

Table 8

Descriptive Statistics and Chi-square Analyses for Repeat Firefighters and Non-repeat Firefighters on Dichotomous Family and Parent Variables

		Repeat firefighter		χ^2
		Yes (n = 20)	No (n = 41)	
Positive relationship with siblings	Yes	13	37	Fisher's exact statistic not significant
	No	4	2	
Positive relationship with mother	Yes	17	36	Fisher's exact statistic not significant
	No	1	3	
Argues with mother	Rarely/sometimes	17	35	Fisher's exact statistic not significant
	Usually/always	1	4	
Contact with father	Yes	9	25	1.57
	No	9	12	
Ongoing problems in family	Yes	6	15	.06
	No	12	26	
Appropriate consequences for firefighting	Yes	6	22	1.97
	No	13	18	

Note. Missing responses not shown.

As shown in Table 8, none of the variables were found to be significantly associated with repeat firefighters and therefore no odds ratios were subsequently calculated.

Behavioural and psychosocial variables. Differences between the repeat and non-repeat firefighters for the continuous behavioural and psychosocial syndrome

scales, and DSM-oriented scales on the CBCL, were explored via independent samples *t*-tests. The results are illustrated in Table 9.

Table 9

Descriptive Statistics and Independent Samples t-test Comparisons of Repeat

Firefighters and Non-repeat Firefighters on Continuous Emotional/Behavioural

Variables

CBCL syndrome scales by firefighter status	<i>n</i>	<i>M</i>	<i>SD</i>	Range	<i>t</i>	95% CI
Internalising						
Repeat	20	62.00	11.71	Borderline	2.69**	[2.14, 14.64]
Non-repeat	41	53.61	11.32	Normal		
Anxious/depressed						
Repeat	20	62.15	9.80	Normal	2.84**	[1.93, 11.88]
Non-repeat	41	55.24	6.69	Normal		
Withdrawn/depressed						
Repeat	20	65.00	11.19	Borderline	2.53*	[1.47, 12.58]
Non-repeat	41	57.98	9.66	Normal		
Externalising						
Repeat	20	67.60	11.93	Clinical	2.34*	[1.14, 14.79]
Non-repeat	41	59.63	12.78	Normal		
Rule breaking behaviour						
Repeat	20	68.70	8.89	Borderline	2.17*	[.45, 10.81]
Non-repeat	41	63.07	9.77	Normal		
Aggressive behaviour						
Repeat	20	68.65	14.35	Borderline	2.49*	[1.67, 15.34]
Non-repeat	41	60.15	11.55	Normal		

CBCL syndrome scales by firefighter status	<i>n</i>	<i>M</i>	<i>SD</i>	Range	<i>t</i>	95% CI
Social problems						
Repeat	20	64.60	11.26	Borderline	2.45*	[.69, 11.78]
Non-repeat	41	58.37	9.59	Normal		
Total problems						
Repeat	20	64.90	12.27	Clinical	2.13*	[.43, 13.96]
Non-repeat	41	57.71	12.45	Normal		
Somatic complaints						
Repeat	20	58.85	8.72	Normal	1.56	[-.87, 6.96]
Non-repeat	41	55.80	6.31	Normal		
Thought problems						
Repeat	20	63.00	11.84	Normal	1.24	[-2.17, 9.29]
Non-repeat	41	59.44	9.80	Normal		
Attention problems						
Repeat	20	63.95	11.28	Normal	1.08	[-2.76, 9.21]
Non-repeat	41	60.73	10.82	Normal		
DSM-oriented scales						
Anxiety problems						
Repeat	20	62.20	8.82	Normal	3.18**	[2.43, 10.70]
Non-repeat	41	55.63	6.91	Normal		
Conduct problems						
Repeat	20	71.30	10.87	Clinical	2.57*	[1.70, 13.73]
Non-repeat	41	63.59	11.08	Normal		
Affective problems						
Repeat	20	64.10	10.55	Normal	2.21*	[.57, 11.44]
Non-repeat	41	58.10	9.67	Normal		
Oppositional defiant						
Repeat	20	65.20	9.81	Borderline	2.20*	[.51, 10.81]
Non-repeat	41	59.54	9.25	Normal		

DSM-oriented scales by firefighter status	<i>n</i>	<i>M</i>	<i>SD</i>	Range	<i>t</i>	95% CI
Somatic problems						
Repeat	20	57.35	9.73	Normal	1.22	[-1.99, 7.86]
Non-repeat	41	54.41	6.53	Normal		
ADHD problems						
Repeat	20	61.80	9.13	Normal	1.43	[-1.33, 7.90]
Non-repeat	41	58.51	8.12	Normal		

Note. The Externalising Scale, Rule Breaking Behaviour Scale and Conduct Problems Scale include the item 'set fires'. * $p < .05$. ** $p < .01$.

Some significant differences between the repeat and non-repeat groups can be seen in Table 9. Repeat firefighters were found to score significantly higher for internalising problems (including the anxious/depressed and withdrawn/depressed scales), have significantly more social problems and problematic externalising behaviours (including aggression and rule breaking behaviour), and significantly more total problems than their non-repeat firefighter counterparts. On the DSM-oriented scales the repeat firefighter group were also found to score significantly higher on anxiety, affective, oppositional defiant, and conduct problems.

Chi-square tests of independence were conducted to explore associations between some specific behavioural variables and firefighting status at follow-up. None of the dichotomous child-specific behavioural variables reported by the child or parent displayed in Table 10 were found to be significantly related with repeat firefighters.

Table 10

Summary of Chi-square Analyses for Repeat Firefighters and Non-repeat Firefighters on Dichotomous Child-specific Behavioural Variables Reported by Child or Parent

Behavioural and psychosocial variables		Repeat firefighter		χ^2
		Yes (n = 20)	No (n = 41)	
Generally obeys	Yes	13	27	.01
	No	6	13	
Lies a lot	Yes	6	14	.04
	No	13	27	
History of hurting others	No	10	17	1.24
	Yes	6	20	
Stealing/shoplifting	Yes	9	17	.42
	No	6	17	
Diagnosed impulse control	Yes	8	11	.95
	No	12	29	
Trouble outside of school	Yes	4	9	.03
	No	16	32	

Note. Missing responses not shown.

Exploration of Individual Items

Given the exploratory nature of this study and to ensure important distinguishing items that were embedded within larger non-significant scales were not lost, individual item analyses were conducted on all the items from the CRS, FRS, FRI and CBCL to determine where differences between repeat and non-repeat firefighters may lie.

Categorical items. Where a dependent variable was dichotomous, categorical predictor items were explored through chi-square tests of independence to determine items with significantly different responses between the repeat firefighters and non-repeat firefighters. Where possible and appropriate, categorical predictor variables with more than two levels were collapsed to become dichotomous. The two assumptions that guide a chi-square test for independence are independent cases, and observed or expected counts greater than 5 cases. Items that violated the second assumption but produced significant results using the Fisher exact statistic (Field, 2009) were retained for exploratory purposes and were evaluated further in the subsequent study.

All 120 items on the CBCL, eight items from the CRS, six items from FRS, and five items from the FRI, were subject to chi-square test of independence analyses to determine if any differences existed between repeat and non-repeat firefighters. The items from the CBCL were scored on a 3-point Likert scale (0 = not true, 1 = sometimes true, 3 = always true) and initially explored with a three-way chi-square test of independence. The “sometimes true” and “always true” categories were then collapsed together allowing for a further series of 2x2 contingency tests. Three items from the CRS and four items (e.g., responses to the item “How curious is your child about fire?”) from the FRS with more than two possible categorical responses (e.g., absent, mild, moderate, extreme) were combined to become dichotomous (e.g., absent/mild and moderate/extreme).

The CBCL is normed differently for children and adolescents aged 6 to 11 and 12 to 18. Therefore it is possible that young people who light fires in these two age brackets could be qualitatively different in some behavioural and emotional aspects. For this reason the decision was made to conduct all individual item analyses three times: (a) whole sample data, (b) younger sample data, and (c) older sample data. The parent

of the only five-year-old in the sample was asked to complete the CBCL 6 to 11-year-old form despite falling outside the age bracket. It was deemed appropriate because the purpose of the project was purely to profile repeat and non-repeat firefighters, compare their responses, and develop a firefighter risk tool based on the common characteristics, rather than to make a specific clinical diagnosis or determination.

Item differences between the whole sample of repeat and non-repeat firefighting groups were explored through three-way and 2x2 contingency chi-square analyses. The younger and older sub-samples were split and a further round of 2x2 contingency analyses were conducted to determine any additional items that might be more associated with either age bracket. Due to the large number of items that were analysed, only the results of significant analyses are displayed in Table 11.

Table 11

Significant Chi-square Analyses Determining Associations between Individual Categorical Items on the CBCL, FRI, CRS and FRS for Repeat Firefighters for the Whole Sample, Younger Sub-sample and Older Sub-sample

Item	Step 1	Step 2	Step 3	Step 4
	Three-way χ^2 - whole sample	2X2 χ^2 - whole sample	2x2 χ^2 - younger sub-sample	2x2 χ^2 - older sub-sample
1 Destroys things belonging to others	9.91**			
2 Does not get along with other kids	10.14**			
3 Breaks rules at home, school, or elsewhere	9.11**			
4 Nervous, high-strung, or tense	8.83**			
5 Not liked by other kids	10.87**			
6 Sets fires	8.91**			
7 Stores up many things he/she does not need	10.29**			
8 Withdrawn, does not get involved with others	10.93**			
9 Long history of fire interest	10.08**			
10 Gets in many fights		6.99**		
11 Too shy or timid		7.29**		
12 Sulks a lot		7.29**		
13 Swearing or obscene language		7.21**		
14 Unhappy, sad or depressed		7.68**		
15 Easily jealous			7.20**	
16 Would rather be alone than with others			7.46**	
17 Overeats			11.88**	
18 Threatens people			7.20**	
19 Trouble sleeping			4.55*	
20 Curiosity about fire			9.12**	
21 Confused or seems to be in a fog				4.13*

		Step 1	Step 2	Step 3	Step 4
Item		Three-way χ^2 - whole sample	2X2 χ^2 - whole sample	2x2 χ^2 - younger sub-sample	2x2 χ^2 - older sub- sample
22	Cries a lot				4.12*
23	Fears certain animals, situations, or places, other than school				4.12*
24	Lying or cheating				6.56**

Note. * $p < .05$. ** $p < .01$.

Initially 21 items were found to be significant at a $< .05$ level when analysing the entire sample via a three-way chi-square test of independence. Given that the aim was to develop a brief screening tool, only the nine items that were significant at a $< .01$ level were retained for the screening tool and are reported in Table 11. An additional five items were found to be significant at a $< .01$ level from the 2x2 contingency chi-square analyses when the CBCL variables were collapsed to become dichotomous. Six items were significant at $< .01$ level in the 2x2 chi-square contingency analyses conducted on the older sub-sample. Only one item was significant at a $< .01$ level for the same analyses conducted on the younger sub-sample. However, in an attempt to develop a tool that has a relatively equal number of items specific to older and younger children, combined with some generic questions for all, the four other items significant at a $< .05$ level for the younger sub-sample were retained. This resulted in there being six items specific to the older group, four items specific to the younger group, and 14 items relevant to both. These 24 items, in abbreviated form, are listed in Table 11.

Continuous items. The continuous items from the CRS, FRS, and FRI were analysed with independent samples t -tests, again based on all three samples (whole, younger, and older). As before, Bonferroni corrections were not applied to avoid Type II error and the possibility of failing to detect real differences (Field, 2009). This increased the risk of Type I error, but was deemed suitable because the combination of

items retained through this process were validated in the next study. The results of the significant independent samples *t*-tests on the continuous individual items from the CRS, FRS, and FRI for the whole sample are displayed in Table 12.

Table 12

Significant Independent Samples t-tests Comparisons for Continuous Items on the FRI, CRS, and FRS for Repeat Firefighters for the Whole Sample

Item	Firefighter status	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	95% CI
Number of past fires - Parent-report	Repeat	20	4.85	1.76	3.86**	[.95, 2.99]
	Non-repeat	41	2.88	1.93		
How curious is he/she about fire? (range: 1 = not at all, 5 = very much)	Repeat	19	4.00	1.16	2.95**	[.31, 1.59]
	Non-repeat	40	3.05	1.15		
How many times has your child ever hidden matches, lighters, or other fire-starting materials? (range: 1 = none, 5 = four)	Repeat	20	3.40	1.67	2.69**	[.30, 2.02]
	Non-repeat	37	2.24	1.48		
How often do you worry about him/her playing with fire when he/she is left unattended? (range: 1 = not at all, 5 = very much)	Repeat	20	3.60	1.35	2.56**	[.22, 1.81]
	Non-repeat	41	2.59	1.50		
How many family members have an interest or fascination with fire? (range: 1 = none, 5 = four)	Repeat	20	1.80	.89	2.53**	[.11, 1.01]
	Non-repeat	41	1.24	.58		

Note. **p* < .05. ***p* < .01.

As can be seen in Table 12, five significant items were identified. No additional significant differences were found among the continuous items from the younger and older samples, and therefore are not reported.

Phrasing and Combining of Screening Tool Items

The 29 items identified in the previous analyses come from a range of established tools (FRS, FRI, and CBCL). The intention was to develop a new, brief tool using the overlapping themes from (a) these items that were subsequently tested for validity in distinguishing repeat and non-repeat firefighters and reliability, and presented in the next study; and (b) the FEMA Comprehensive Fire Risk Survey questionnaire. As far as the author is aware, the FEMA Comprehensive Fire Risk Survey questionnaire used by fire services in the USA is not subject to copyright and contains a comprehensive array of questions that have overlapping themes with items in the CBCL. The CBCL is a copyrighted tool available for purchase and use by qualified health care practitioners only. As such, the author used a process of thematic merging to combine the themes of the relevant CBCL questions with similar wording to a matched item on the Comprehensive Fire Risk Survey. The items were also reframed as questions. For example, the theme of item 21 on the CBCL (destroys things belonging to others) was matched with the Comprehensive Fire Risk Survey item (destroys toys/property of others) and then adapted to become a question (“Does your child damage the property of others?”). Several items that were qualitatively similar to each other were combined (where appropriate) to reduce the overall length of the screening tool. For example, there are two separate items relating to curiosity on the FRS and FRI, and one question about a history of fire interest on the FRI, and subsequently, one question relating to curiosity was retained. The scoring options for all items were developed along a 5-point Likert-style system to allow for a greater range in the responses. This new screening tool was named the Behaviour Risk Tool (BRT) and it is displayed below in Figure 1. It consists of 25 redeveloped items, and includes brief instructions to parents for completion (Appendix T).

Figure 1. Behaviour Risk Tool

Instructions to parents/guardians

Note. These questions are for parents/guardians to complete about their child’s general behaviour. For each question below please circle the ONE response that best describes your child. If you are not certain please choose the answer that seems most appropriate.

Please check that you have answered ALL questions.

	None	One	Two	Three	Four +
1. Including the current fireplay or firesetting incident, how many times has he/she played with fire, including matches or lighters or set something on fire?	0	1	2	3	4+
2. How many family members have a fascination with fire?	0	1	2	3	4+
3. How many times has he/she hidden matches, lighters or other fire starting materials?	0	1	2	3	4+
	Not at all	Somewhat			Very much
4. How curious is he/she about fire?	1	2	3	4	5
5. How often do you worry about him/her playing with fire when he/she is left unattended?	1	2	3	4	5
6. Does your child have difficulty sleeping?	1	2	3	4	5
7. Is your child generally fearful?	1	2	3	4	5
8. Does your child hoard non-essential items too much?	1	2	3	4	5
9. Does your child prefer to be on their own?	1	2	3	4	5
10. Is your child very shy?	1	2	3	4	5
11. Does your child swear or display uncontrolled verbal anger?	1	2	3	4	5
12. Does your child sulk or mope if things don’t go their way?	1	2	3	4	5
13. Does your child have difficulty interacting well with other children/peers?	1	2	3	4	5
14. Does your child use threats against others?	1	2	3	4	5
15. Is your child dreamy or muddled?	1	2	3	4	5
16. Is your child dishonest (including telling lies)?	1	2	3	4	5
17. Is your child nervous or easily upset?	1	2	3	4	5

18. Does your child eat more than he/she should?	1	2	3	4	5
19. Does your child show depressed mood?	1	2	3	4	5
20. Does your child physically fight with peers or siblings?	1	2	3	4	5
21. Is your child prone to crying?	1	2	3	4	5
22. Does your child damage the property of others?	1	2	3	4	5
23. Is your child withdrawn from other children or people?	1	2	3	4	5
24. Does your child break set rules?	1	2	3	4	5
25. Is your child jealous of peers or siblings?	1	2	3	4	5

Figure 1. Behaviour Risk Tool.

The BRT was subjected to tests of predictive validity and test-retest reliability in the subsequent study in this thesis. Therefore, all items were re-evaluated based on a new sample of JFAIP clientele. Sixteen items were drawn from the analyses conducted on the whole sample, along with another four and five items specific to the younger and older sample respectively. Unfortunately, the limited sample in study 2 prevented analyses on two separate screening tools (one for younger children [20 items], and one for older children [21 items]), but this should be considered in future research.

Discussion

This study set out to assess the predictive validity of the CRS and FRS and to also pursue the possibility of developing a new screening tool based on the profile of the repeat firelighter group in the JFAIP. The utility of the new tool was then compared to the FRS and CRS in the next study in this project. Individual item analyses across all the administered questionnaires were conducted to determine the aspects yielding the most distinct differences.

Rate of Repeat Firelighting

One in three young firefighters who had participated in the JFAIP intervention continued firelighting within 12 months of completing the program and were considered repeat firefighters. This figure is largely consistent with other literature (MacKay, Henderson, Del Bove, Marton, Warling, & Root, 2006), particularly research specifically using JFAIP samples with similar criteria for repeat firelighting behaviour (McDonald, 2010). It is important to reiterate that some studies have not found such a high rate of repeat firelighting (Lambie, Ioane, Randell, & Seymour, 2013), which may be due to the inclusion of all types of firelighting behaviours (not just those that reflect the true definition of recidivism) in the definition of repeat firelighting used here, as well as the different sources of data in general. Studies that have found a reduced prevalence have often used more strict criteria for categorising firelighting activity, or have used data collected from dissimilar samples (e.g., criminal populations) and sources (e.g., police records).

It can be inferred from this result that fire safety education intervention as the sole treatment is not sufficient to eradicate firelighting behaviour for all referred participants. Given that the profile of the repeat firefighter group showed increased psychosocial disturbances (to be discussed shortly), these results uphold the contention that over third of young firefighters require additional mental health support to assist in targeting their firelighting behaviour (FEMA, 2002). The JFAIP is targeted towards lower risk firefighters whose firelighting behaviour is not directly influenced by mental health problems. As an education-based fire safety intervention program, it does not proclaim to attend to mental health problems. Based on the findings here, it appears that the JFAIP is effectively dealing with approximately two thirds of young people referred to their services. The remaining third who repeated lighting fires demonstrated

increased psychopathology that calls for additional support services, which is consistent with the literature. This finding highlights the urgency for involvement from mental health professionals in the issue of young people lighting fires (Stadolnik, 2000). If a single agency approach is most feasible and the fire service is the most likely first contact with a known firelighter (McCarty & McMahon, 2005), then this finding of 30% repeat firelighting/increased psychopathology realistically means that an effective screening process is imperative to enable more high-risk cases to be objectively identified by fire services practitioners and filtered through to separate mental health service providers. In the absence of a multidisciplinary program, this is a cost-effective and simple solution to aid in attending to the multifaceted issue of firelighting.

Referral to mental health services does not guarantee the elimination of firelighting behaviour. Notably, more than 60% of the repeat firelighters had either previously been to, or were in contact with, mental health services. Knowledge of the treatment methods for firelighters used by practicing mental health professionals is relatively limited. Unfortunately, none of the mental health professionals that were contacted for participation in this project ($n = 10$) to explore the treatment methods for young firelighters returned any completed questionnaires. Without such data, this aspect cannot be explored further here. Nonetheless, effective screening and identification of those in need of additional support is important.

Pre-existing Screening Measures

The first aim of this study was to assess the accuracy and usability of the existing CRS and FRS, which are commonly used internationally as a screening tool but yet to be empirically validated. It was expected that these tools would show utility in predicting future repeat and non-repeat firelighters when they were administered pre-fire safety intervention. The hypothesis was partially supported with the total scores on

the FRS showing a clear difference between the repeat and non-repeat firelighter groups. However, no observable differences were shown between the groups on the child administered version (the CRS), which failed to support the hypothesis.

The FRS was successful at predicting a repeat firelighter 86% of the time, demonstrating sensitivity. However, the FRS also overclassified non-repeat firelighters as high risk, when in fact half of the cases it suggested were at-risk of future firelighting did not light any further fires. It appears that the FRS was effective at identifying repeat firelighters because it was overly inclusive and classified too many cases as high-risk. Admittedly however, in these circumstances, it is more troublesome for a screening tool to fail to identify an at-risk case than to overclassify and predict high risk incorrectly. Nonetheless, there is still potential for improvement in specificity in a screening tool. The CRS demonstrated very limited ability to correctly identify both repeat and non-repeat firelighters.

Interestingly, on closer inspection of the FRS and CRS categorisation of the young firelighters, some concerns arose. If the CRS and FRS were implemented into the JFAIP and protocols according to the FEMA manual (FEMA, 2002) were followed, only 37.7% of the JFAIP clientele would have been privy to the fire safety education program. The remaining 63.3% fell into the extreme risk category and would have been considered too high risk and ineligible for fire safety education and referred on only to mental health services. Interestingly, this is in contrast to the frequency expectations reported in the FEMA manual, where only 1% of young firelighters are expected to fall into the extreme risk category (FEMA, 2002). The largest portion of cases is expected to be seen in the low risk category, and about a third in the definite risk category, which are then all still eligible to receive the fire safety education program (plus mental health referral for definite risk). However, the FEMA manual (FEMA, 2002), provides no

supporting evidence or empirically-based justification for these corresponding treatments recommended for each risk level. Hence, there is no empirical basis to suggest cases that score within the extreme risk level should not be provided with fire safety education and should only be referred on for mental health assessment and intervention. Only two cases would have been given the combined treatment approach of fire safety education and mental health referral if the FEMA guidelines had been followed with the present sample.

Based on the fact that the parent screening tool (the FRS) was successful in predicting repeat firelighting 86% of the time, and the CRS indicated no real apparent predictive value, parents appear to be a more reliable source of follow-up data than the young people themselves. There is disagreement among scholars as to whether parents or children are the most reliable reporters of firelighting information. It has been reported that there is greater utility in collecting information about covert anti-social activities from the child compared to the parent (McMahon & Frick, 2005). However, other research has found similar discrepancies to the current study between the parent and child. In one study, 25 mothers reported that their child set fires in the previous 6 months, but only one child provided corroborating information about the same behaviour (Becker, Stuewig, Herrera, & McCloskey, 2004). Importantly though, in this same study there were seven additional children (aged 6 to 12 years) that self-reported firesetting that was not reported by their mothers (Becker et al., 2004). Whether or not these mothers were unwilling to disclose this information or were unaware of the behaviour cannot be known. Ultimately, multiple sources of information are advantageous but not always feasible.

Profile of Repeat Firefighters

In an attempt to possibly provide an alternative to the FRS and CRS in the prediction of repeat firefighters, this study also compared repeat and non-repeat firefighters across a range of measures. The overall demographic, fire-specific, family, and psychosocial profile of a repeat firefighter was explored, and individual item analyses informed the development of the BRT.

Demographic variables. It was expected that there would be no relationship between age and firefighting status (repeat or non-repeat) at follow-up and this was supported. Basically, younger and older children and adolescents were equally represented in the groups signifying repeat and non-repeat firefighting status. This fits with research suggesting that firefighting occurs at any young age (Stadolnik, 2000) and there is no clear and consistent empirical evidence pointing to increased firefighting behaviour at a specific age or developmental period (Lambie & Randell, 2011). Furthermore this finding supports the notion that age specifically is not a critical factor in distinguishing between low, moderate, and high risk firefighters and, in fact, both younger and older children and adolescents are spread somewhat equally across all these categories (Del Bove & MacKay, 2011).

The current findings challenge the notion that low risk firefighters are young and naïve and successfully targeted with fire safety education, because both younger and older children repeated firefighting equally after fire safety education intervention. Past research has identified psychosocial disturbances in persistent firefighters of all ages (Sakheim, Osborn, & Abrams, 1991), but this has only recently been linked to typologies and risk levels (Del Bove & MacKay, 2011). These findings support this more recent evidence that has begun to recognise that some younger children may be driven by psychopathological motives that require additional mental health support.

Moreover, they are at variance with the previous description (refer to Chapter 2) of low risk firefighter typologies (e.g., curious) where young age was included as a common characteristic, and the higher risk (particularly the antisocial typology) was descriptive of older adolescents (FEMA, 2002).

As predicted, male firefighters were more commonly found in both the repeat and non-repeat firefighting groups than females. The overwhelming majority of firefighting research reports the same (Fineman, 1995; Martin, Bergen, Richardson, Roeger, & Allison, 2004; Del Bove & MacKay, 2011). However, despite the limited sample of female participants, it should be reiterated that there was a greater proportion of female firefighters who became repeat firefighters (50%) in comparison to the proportion of repeat firefighting males (30%). There is limited understanding about female firefighters and their profile, given that they are so rarely found in research studies, and in general. However, some researchers have indicated that female firefighters are more severely disturbed (Fineman, 1995). Unfortunately, this cannot be explored any further in this study due to the limited number of female participants. However, it may be related to the increased rate of repeated firefighting behaviour in our female cohort (albeit very small). This area warrants consideration for future research.

Fire-specific variables. A number of fire-specific variables were expected to distinguish the repeat firefighters from the non-repeat firefighters. Specifically, it was anticipated that the repeat firefighter group would demonstrate a higher level of curiosity about fire, a greater history of involvement with firefighting, more exposure to role models with fire interest, and more engagement with fire-related activity. Levels of fire safety knowledge and fire skill competency were explored but no directional hypothesis was set. Only some of these expectations were met with clear distinctions

observed between repeat firefighters and non-repeat firefighters on only some of the fire-specific variables.

Specifically, the repeat firefighters were expected to be significantly more curious and interested in fire than their non-repeat counterparts, which was mostly true of these results. The results for curiosity, on the surface, appear conflicting since no significant difference was found between repeat and non-repeat firefighters at the scale level on the FRI (although the results did approach significance). However, two individual items from the FRI (item 1, see Appendix D) and FRS (item 1, see Appendix B) reflecting curiosity did distinguish between them, with the repeat firefighters found to be more curious about fire than their non-repeat firefighting counterparts. Similarly, consistent with the expectations, two thirds of the repeat firefighters were reported to have an interest in fire, but less than 10% of the non-repeat firefighting group reported the same at the 12-month post-JFAIP follow-up. These latter findings are in line with an array of research that found heightened levels of curiosity, interest, and fascination were positively related to the severity and frequency of firefighting activity in young people (Watt, Geritz, Hasan, Harden, & Doley, 2015; Bailey, Smith, & Dolan, 2001; Kolko & Kazdin, 1994).

Curious firefighters have historically been considered low risk and are expected to respond well to the fire safety education model of treatment (Stadolnik, 2000; FEMA, 2002). However, at least some of the findings from the current study suggest that a unique fire interest and curiosity is important to consider in the firefighting behaviour of young people with more problematic and ongoing firefighting. Although research has found a similar relationship between problematic and continued firefighting, curiosity, and interest, as was identified here, this notion has not been reflected in early typological descriptions of high risk firefighters (e.g., FEMA, 2002).

Only recently has heightened fire interest and curiosity been recognised as a key variable in a more concerning firefighter typology, and the determination of higher risk assessments for firefighters (e.g., Home-Instability-Moderate; Multi-Risk-Persistent) (Del Bove, & MacKay, 2011). In saying this, curiosity or interest alone is not necessarily cause for alarm, as some psychopathology has also been identified as related to continued firefighting in this study (to be discussed). This finding, suggests to some extent that heightened curiosity, coupled with significant psychosocial disturbance, could potentially be a recipe for more problematic firefighting behaviour. Overall, these findings highlight the value in assessing fire interest and curiosity in firefighter risk assessments.

Finally these findings potentially highlight a need to address fire interest and curiosity in intervention. Historically, attempts to eradicate fire interest involved methods of satiation, where young known firefighters were made to repeatedly engage in firefighting activities until they presumably reached a point of satisfaction capacity and were no longer excited by it. Hardesty and Gayton (2002) report that the few documented case studies that exist report that the intended outcome was obtained, but only limited single case studies or inconclusive evidence is available about effectiveness, which does not allow for a confident conclusion to be drawn. The review of current firefighter treatment methods do not give much indication about how fire interest in particular is specifically treated, if at all. Education-based programs are aimed largely at increasing fire safety knowledge and the development of fire safe practices (Palmer, Caulfield, & Hollin, 2007). Some interventions have an element of behavioural modification through reinforcement and punishment, and mental health intervention is presumed to be targeted towards underlying mental health problems rather than firefighting behaviour specifically (Muller & Stebbins, 2007). The literature

does not allude to any current strategies or specific methods within programs that are aimed precisely at reducing fire interest and curiosity.

As anticipated, repeat firefighters reported more early experiences and greater involvement with firefighting activity. The results demonstrated that an increased number of past fires was associated with repeat firefighters, at least according to the parent. Similarly, a greater history of firefighting involvement and interest was found to increase the likelihood of repeated firefighting behaviour. The fact that repeat firefighters had a greater history with firefighting is consistent with an abundance of research on repeat firefighters (Kennedy, Vale, Khan, & McAnaney, 2006; McDonald, 2010) and confirms the assumption that the number of past fires is likely to be a good predictor of future firefighting behaviour (Moynihan & Flesher, 1998). The actual age of onset was not explored in this research, but given that half the sample was < 11 years old, their age of onset is inherently young. It is important to note that self-reported past involvement from the child did not yield a significant difference between the repeat and non-repeat firefighters. This contradiction is similar to the parent/child discrepancies across the full CRS and FRS where the parent provided more negative information, which again indicates that the parent appears to be a more forthcoming source of information.

Kolko and Kazdin's (1986) social learning model for firefighting provides a viable explanation for increased past fire involvement predicting persistent firefighting. They propose that the more fires a young person lights, their firefighting activity becomes part of their behavioural repertoire. Furthermore, a greater history of firefighting coupled with an increased interest in fire, as found here, makes sense in the context of social learning principles of reinforcement. The presence of positive experiences with fire, and the absence of negative consequences, may simultaneously

promote continued fire engagement in young people who light fires. For example, the resultant excitement experienced from the visual appeal, scientific properties, and mastery obtained through firefighting, and the absence of any negative consequences (e.g., being burnt or punishment), serves to maintain firefighting behaviour. In addition, the fire safety knowledge gained through educational intervention may not be sufficient by this point for young people to cease continued firefighting activity because they have their own lived experiences to inform their knowledge and understanding. Basically, if only positive reinforcement has resulted from their past firefighting behaviour, then they have experientially learnt fire-related outcomes that are contrary to fire safety education messages. The young person's own experiential learning is possibly a stronger learning experience, than fire safety education.

It was also expected that repeat firefighters would have more exposure to fire-related activities and materials through significant role models. Contrary to the expectation, the results determined that continuing firefighters were no more exposed to role models using fire and fire materials than non-repeating firefighters. These results differ from research (Kolko & Kazdin, 1989b) that found firefighters had more exposure to family members who are interested in fire or use fire regularly. However, one single item within the FRI scale assessing role models with an interest in fire (e.g., "How many family members have an interest in fire or fascination with fire?") did distinguish between the repeat and non-repeat firefighters. Therefore, in its entirety, exposure to the peer/family role models scale was unable to distinguish the two groups, but at least one item did show some utility.

With the rapid increase of technology, young people have access to external influences, even within the home. Since the FRI was established in 1988, Information Technology and use of the Internet has increased immensely. Unregulated YouTube

videos of any genre are readily available day and night (Romer, Jamieson, Hall Jamieson, Jones, & Sherr, 2017) and are suggested to be a negative influence on young firefighters (Thomas, MacKay, & Salsbury, 2012). In effect, the absence of poor physical role models with interest and engagement with fire no longer eliminates the influence of role models as a factor in firefighting behaviour. Role models can now influence young people through the Internet via YouTube, websites, and social media. These findings may be more reflective of an outdated scale for measuring exposure to role models with fire interest and engagement. This suggests that there is a growing need to measure other types of influences above and beyond that of physically-present friends and family that are captured via the FRI.

With limited research in this area, there was no specific relationship expected between repeat firefighting and level of fire safety knowledge and fire skill/competency. The findings demonstrated no observable differences between the groups (repeat and non-repeat firefighters) in terms of their pre-intervention fire safety knowledge, but they were found to have significantly less competency and skill with using fire. The findings relating specifically to knowledge fail to support McDonald (2010) who found that repeat firefighters had significantly less knowledge of fire safety than their non-repeat firefighter counterparts. However, the finding that repeat firefighters had less skill and competency does fit with what McDonald found. On face value, this may suggest that repeat firefighters have knowledge of fire safety but do not necessarily have the skill set to respond competently in a fire situation.

The findings around knowledge and competence are difficult to interpret because in the pre-intervention period, all the young people in this study had been involved in the lighting of a fire that resulted in their referral to the JFAIP. The group who repeated lighting fires post-intervention may not have improved their fire safety

knowledge to the same degree as the desisting group, but unfortunately, without any post-intervention data specifically measuring improvement of fire safety knowledge, this cannot be explored any further here and should be considered for future research. In regards to the repeat firefighters reporting less skill and competency, one explanation may be drawn from the suggestion that developing children have an increased need to demonstrate mastery over their environment and to prove competency to adults (Pinsonneault, 2002). The repeat firefighters may have used fire as a means of showing adults (who perceived limited competency as measured by the FRI competency scale) that they are in fact capable of independence.

However, the most probable explanation for these findings lies in the potential flaws of the “Knowledge of Fire Safety” scale and “Fire Skill/Competency” scale in the FRI (Kolko & Kazdin, 1989a). The Knowledge of Fire Safety Scale contains five items. The first item asks the parent to rate the extent to which their child understands their own behaviour in general, which is not specifically about fire behaviour. The final two items ask the parent to rate the child’s knowledge of flammable and inflammable materials, and if the child knows how to operate an ignition source. On face value these items appear to be assessing the child’s knowledge about how to effectively start a fire, and not necessarily their knowledge of fire safety as such. Similarly, the Fire Skill/Competency scale contains five items that reflect its title. Item one asks the parent to report their child’s knowledge of appropriate actions if something catches fire. It could be argued that this question is actually assessing fire safety knowledge. The third item asks for parental report of the extent to which their child plays safely when alone or with others. This item is not fire-specific and therefore is unlikely to be assessing fire skill/competency. In the development of the FRI, these two scales were not found to be valuable in distinguishing between firefighting and non-firefighting young people

(Kolko & Kazdin, 1989a). The authors noted the relative lack of informed research supporting their inclusion, but nonetheless they were retained. Given the limited research looking specifically at knowledge, skill, and competency, future research should endeavour to explore this area more thoroughly and with more robust measures.

Family-specific variables. A number of family variables were expected to set the repeat firefighters apart from the non-repeat firefighters. Specifically, it was anticipated that the repeat firefighter group would experience poorer family relationships and conflict, parental absence, ongoing problems within the family home, and inappropriate discipline for undesirable behaviour. Contrary to the hypotheses, all family functioning and relationship characteristics appeared to be relatively similar across the repeat firefighter and non-repeat firefighter groups, with no observable differences found on any of the relevant variables. This is inconsistent with the findings of other scholars (Kolko & Kazdin, 1992) who suggested repeat firefighters come from homes with increased dysfunction, disruption, and conflict. However, the lack of observable differences on familial variables is consistent with some other research (Kolko et al., 2001) where parental and familial variables were not shown to be predictive of repeat firefighting.

It was presumed that repeat firefighters would be more likely to reside in homes with poor family relationships, conflict, a lack of parental involvement, and experience ongoing family problems, yet such differences were not found. In fact, less than 10% of the whole sample, irrespective of firefighting status at follow-up, reported regular conflict with family members. Furthermore, absent fathers were equally apparent in both groups. Ongoing family problems were reported for approximately one third of the whole sample and were not found to be specific to the repeat firefighters. This was unexpected based on previous research and literature suggesting that repeat firefighters

are exposed to dysfunctional family environments and family conflict (Martin et al., 2004; McCarty & McMahon, 2005; Kafry, 1980). There were no observable differences between repeat and non-repeat firefighters in terms of the type of appropriate consequences (grounded, talked to) or inappropriate consequences (yelled at or none) they received as a result of undesirable behaviours. This is inconsistent with research that found harsh or absent parental disciplinary actions have previously been associated with persistent firefighting behaviour (McCarty & McMahon, 2005; Kolko, 1988; McDonald, 2010). Interestingly, none of the young people in the sample reported that they were physically punished for negative behaviours. Possibly, if there was physical punishment, the young people may not have been prepared to report it to the fire practitioner, especially in the presence of their caregiver. The negative consequences of physical discipline have become a point of focus in community discussions about parenting practices, and is an increasingly stigmatised disciplinary technique. Research has postulated that the decrease in prevalence of its use in the population may be more reflective of a decrease in willingness to disclose this information as a result of social desirability bias, rather than an actual reduction in incidences of physical punishment (Sturge-Apple, Rogge, Peltz, Suor, & Skibo, 2015).

A possible explanation for the absence of family differences between the groups in general could be drawn from the methodology. This study relied heavily on parent-report and participation, therefore it is probable that the most dysfunctional families were the least likely to participate in the research. Considering the low participation rate (only 17%) from the total potential population pool (313 cases), it is likely that greater dysfunction existed across the JFAIP referrals but this could not be captured here. Also worth noting is that the family variables that were assessed all came from the CRS in which responses were reported by the child. The JFAIP encourages and expects full

parental participation in the program that they deliver, and therefore it is presumed that parents were present in the room when the child was interviewed regarding the familial items on the CRS. This would very likely have impacted the way the young people responded to the items. Finally, in hindsight, a more family-specific measure would have allowed for a more thorough investigation of family functioning variables. The CRS was the only tool used in this study to measure family-specific factors. Despite its title, the FRS does not capture family-related constructs. Future research should endeavour to explore this concept more thoroughly using a more specific tool for family functioning.

Even though family variables did not appear useful in distinguishing between the groups of repeat and non-repeat firefighters, more research clearly needs to attend to family and environmental variables, using a range of data sources and measures. The literature reports a number of dysfunctional and disadvantaged familial circumstances for firefighters in comparison to non-firefighters (Stadolnik, 2000). The findings from this study have suggested there is limited utility in using familial variables for predicting problematic firefighting behaviour. However, whether these findings reflect a true lack of difference in family functioning, stability, and cohesion, or rather a lack of reported difference, is difficult to ascertain. Furthermore, this study did not assess levels of parental care or parental interest experienced by the child, the marital relations of parents, socio-economic status of families, connection with social services, stability of family environment, or parental psychopathology and abuse, all of which have been identified in previous research as relevant to persistent firefighters (Martin et al., 2004; Root, MacKay, Henderson, Del Bove, & Warling, 2008; Roe-Sepowitz & Hickie, 2011; Bailey et al., 2001; Kazdin & Kolko, 1986). Hence, it is clear that the role of familial environment and functioning needs to be explored more thoroughly in the future.

Psychosocial variables. It was predicted that important differences in psychosocial aspects would emerge between the repeat and non-repeat firefighters. Repeat firefighters were expected to have more impulse control/attention problems, social problems, externalizing problems, and internalising problems. Aside from impulse control/attention problems, all of these variables were found to be specifically related to repeat firefighting.

A diagnosis of an impulse control condition and symptoms of inattention, hyperactivity, and impulsivity were expected to be apparent for the repeat firefighter group. However, these constructs as measured by the CBCL, and a direct questionnaire seeking information about impulse control diagnoses, were not found to be distinguishing factors between repeat and non-repeat firefighters. These findings were in contrast to previous studies that have found a link between Attention Deficit Disorder with Hyperactivity (ADHD) and impulsive behaviour and firefighting (Lambie et al., 2013; Lambie & Krynen, 2017). This lack of significance in the results of this study however, is consistent with research conducted by Thomas, Ayoub, Rosenberg, Robert, and Meyer (2004). The authors expected to find an association between firefighting and ADHD, but instead found that out of the more than 8,000 cases sampled, less than 0.5% were known to have ADHD, which was much less than the rate expected to be seen in the general population. However, they offered a number of limitations that likely explained the results and highlighted that impulsive behaviour played a role in the firefighting behaviour for up to two thirds of the sample. These results and other unclear conclusions from the literature suggest that the role of impulse control and attention problems needs further investigation.

As anticipated, the repeat firefighters scored higher on the social problems scale of the CBCL. This was expected based on previous research findings reporting that

problematic firefighters have limited social skills or are socially withdrawn (Sakheim, Vigdor, Gordon, & Helprin, 1985; Sakheim et al., 1991; Chen, Arria, & Anthony, 2003; Del Bove, Caprara, Pastorelli, & Paciello, 2008; Lowenstein, 2001). Jackson, Glass, and Hope (1987) proposed that firefighting potentially serves the social needs of a socially-inept firefighter in a few ways. Firstly, an uncharacteristic sense of power, influence, and acceptance from peers may briefly result from their firefighting behaviour that they cannot usually achieve from their other available social skills. Secondly, the firefighting behaviour may gain attention from relatively absent or distant parents/carers. It is suggested that these positive outcomes provisionally increase the firefighter's self-esteem and personal effectiveness, reinforcing and promoting the continuation of firefighting in the future. This fits with research, such as Vreeland and Levin (1980) who drew on social learning theory to explain firefighting as a result of inadequate interpersonal development, as it allows the individual to symbolically control their environment to help regulate their emotions in response to a psychological stressor, which enables them to avoid resolving interpersonal conflicts directly. Support for this theory has been found in studies where a combination of aggressiveness, shyness, and social rejection have been found to be risk factors for firefighting activity (Chen et al., 2003).

In line with expectations, repeat firefighters were found to have heightened externalising symptoms, including aggression and rule-breaking behaviour, and more total problems when compared to the non-repeat firefighting group. This group also demonstrated higher levels of oppositional defiance and conduct problems specifically. These differences are not surprising and support an array of research that paints a picture of repeat firefighters as overtly antisocial and destructive individuals by nature (Sakheim et al., 1991; McDonald, 2010). However, past research has also highlighted

the association between firelighting and covert antisocial behaviours (Kolko & Kazdin, 1991a; Kolko et al., 2001). Items reflecting both overt (e.g., physical fighting) and covert antisocial behaviours (e.g., telling lies) were found to be significant in this study.

Aggressive behaviour from repeat firefighters was expected from the literature (Kolko, Kazdin & Meyer, 1985; Sakheim et al., 1985, 1991; Sakheim & Osborn, 1986). It has been explained that firefighters are potentially unable to communicate their frustration in a socially-appropriate manner and instead respond to aggressive impulses with rage (Sakheim et al., 1985). It appears that firelighting may be used as a method of releasing tension around aggressive impulses.

Firelighting behaviour in itself is an antisocial behaviour, so the clear link that exists between the two is intuitively obvious. The findings also highlight the distinct association between Conduct Disorder and firelighting behaviour that has been well documented (Bailey et al., 2001). The explanation for the commonality between the two is relatively clear, given that firelighting is one criterion set to determine a diagnosis for Conduct Disorder (DSM-5, 2013). However, conduct disordered behaviours are described as overtly antisocial (Noordermeer, Luman, & Oosterlaan) and there is usually an attempt to conceal firelighting behaviour (covert behaviour), therefore some differences may exist between those diagnosed with Conduct Disorder who do and do not light fires. It would be interesting for future studies to compare fire-specific variables between young people diagnosed with Conduct Disorder with known firelighting and absent firelighting.

Determining the possible role of fire-specific variables in any distinction between firefighters and non-firefighters all presenting with Conduct Disorder, would be valuable in exploring possible treatment methods. If fire-specific variables were heightened for conduct disordered cases with firelighting by comparison to those

without firefighting, then this may indicate a specifically unique kind of Conduct Disorder, and therefore, different treatment needs. Currently, little is known about the specific treatment approaches (if any) used by clinicians to manage firefighting behaviour. Specifically, whether treatment targets firefighting explicitly, or general treatments for broader issues (e.g., Conduct Disorder) are applied, is relatively unknown.

Internalising problems, along with affective and anxiety problems, were elevated for the repeat firefighters, which supported this hypothesis. Overall, for internalising problems, the repeat firefighter group mean fell within the borderline range compared to the non-repeat firefighter group who averaged in the normal range. A significant difference did appear between the two groups on the anxious/depressed and withdrawn/depressed scales with repeat firefighters displaying elevated mean scores for both, which indicated higher levels of disturbance. Similarly, repeat and non-repeat firefighters were significantly different on the DSM-oriented scales of affective and anxiety problems with repeat firefighters producing a larger mean score. It is important to note that, aside from the internalising problems scale as a whole, the elevated scores for the repeat firefighters on the specific internalising problems in this study were still on average in the normal range and only approached borderline. Nonetheless, the significant differences show that the current sample of repeat firefighters experienced more problems with mood (anxious/depressed and withdrawn/depressed), affect, and anxiety, and may be more inclined to internalise their problems compared to children that did not continue with firefighting behaviour. These findings mirror the results of Kolko and Kazdin (1991a) and Del Bove et al. (2008). However, these results challenge some older research (e.g., Heath, Hardesty, Goldfine, & Walker, 1985) that found a clinical sample of firefighters scored high on externalising symptoms and low on

internalising symptoms. While direct comparison to this research design is not possible since Heath et al. used a clinical sample, their finding conflicts with the internalising findings in this study. Given that established typologies describe the presence of the “cry for help” firefighter as one who is effectively trying to illuminate an internalised battle to the outside world, then it seems reasonable that internalising problems are relevant for repeat firefighters.

Although this study has found results that are in keeping with the notion that the most at-risk young people are those that display obvious externalising behaviours and acting-out (Sakheim et al., 1991; McDonald, 2010), these findings highlight that internalising problems are also prominent. The findings in this study highlight a more recent line of thought (Becker et al., 2004; Del Bove et al., 2008; MacKay et al., 2012) that links firefighting to both externalising and internalising issues, and not just the former which has been the major focus in previous decades. The general impression that repeat firefighting risk is greatest for those exhibiting overt disturbance may not represent the full picture since clearly there was a proportion of repeat firefighters in this study who displayed a pattern of internalising their problems. In fact, it is important to highlight that the item ‘sets fires’ exists in the CBCL on the externalising scales (including the rule breaking scale) and conduct problems syndrome scale. Some elevations on these scales partly occurred because of the inclusion of this item. This item is largely characteristic of the population of interest, being young people who have been referred to a young firefighter program on the basis of known engagement with firefighting to some extent. Hence, it must be assumed that the rate of positive response (either ‘sometimes’ or ‘often’) to this item was ultimately high. However, it should be noted that this item has a 3-point rating scale (0-never, 1-sometimes, 2-often) and some participants were referred to the JFAIP for their involvement with fires set by peers, or

because of interest, rather than direct involvement with fires. It is also essentially the same behaviour that the new screening tool is intended to predict. The inclusion of this item on the externalising scales and not the internalising scales warrants consideration in light of these findings.

It is important that practitioners realise that internalising problems may also represent heightened risk for repeat firefighter behaviour. In fact, research (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999) has identified a comorbidity between internalising and externalising problems. In this respect the findings in this study are not out of the ordinary.

The Behaviour Risk Tool

It was the intention of this study to yield a relatively small number of items to form a new repeat firefighter screening tool. A number of fire-specific and psychosocial elements have been demonstrated in the past, and in this study, to be particularly important for distinguishing repeat firefighters in the JFAIP. A final five, fire-specific items (items 1 to 5) were included in this new screening tool reflecting aspects of past history with firefighting, curiosity, and role models with fire interest. A further 20 items (items 6 to 25) with psychosocial themes were identified for the screening tool. None of the family variables were associated with repeat firefighters specifically and therefore no family variables appear on the screening tool.

The individual items that make up the screening tool, formally named the BRT, were informed by statistical analyses of responses to questionnaire items (FRI, FRS, and CBCL) collected from the JFAIP clientele. These tools identified behaviours that distinguished the repeat and non-repeat firefighters. Questions were then devised (e.g., BRT items) in an attempt to capture this information from future participants without compromising content validity. Although this study also assessed the utility of the CRS

and FRS for the purpose of possibly recommending them for use by the JFAIP, this was not the intention with the FRI and CBCL. These tools are not suited to the needs of the JFAIP. Specifically, the FRI was originally developed for use in a clinical setting to highlight fire-specific elements that might have implications for treatment needs (Kolko et al., 2002). The two methods of interpreting scores that have been described by Kolko et al., (2002), are ambiguous and require subjective, professional, clinical judgement to be exercised. Similarly, the CBCL is a licensed psychological assessment tool that requires administration and scoring be completed or supervised by a trained clinician or researcher. Hence, the fire practitioners employed by the JFAIP are not qualified to score the completed CBCL forms. Moreover, its comprehensiveness means that it is time laden and would place increased burden on families. Further to this, many of the behaviours and problems identified by the CBCL are not relevant to young repeat firefighters (e.g., thought problems). This, in effect, means that the CBCL contains questions that go beyond the JFAIP's expertise and needs. As a result, although the final BRT contains questions that go beyond the scope of the JFAIP (e.g., psychosocial problems), these are asked with the specific purpose of identifying this fact (e.g., identifying young people in need of referral to mental health services). However, seeking further information, as would be true of the CBCL, would be intrusive and meaningless in this context. Therefore it is considered inappropriate for the fire services to seek this information and obtain this knowledge about their clients. The JFAIP is seeking a simple, easy to administer and score, measure that will enable them to make judgements about probable mental health needs relevant to continued firefighting.

Limitations

This project was limited in a number of ways. Firstly, the small sample size restricted the way the data could be explored and may have had an impact on the

strength of the findings. As previously discussed, the lack of Bonferroni corrections and small sample size increased the risk of Type I and Type II error respectively and therefore caution should be applied to drawing conclusion based upon specific items in isolation. Additionally, the low rate of research participation compared to the number of cases that took part in the JFAIP poses a further problem. Young firefighters and their families are often experiencing some unique and challenging circumstances, which can make it difficult to recruit them for research purposes. It is possible that the most severely disturbed and at-risk young people experience greater dysfunction in their families, thereby increasing the difficulty of research participation. This possible bias in recruitment suggests that the repeat firefighting rate found in this study may under-represent the problem of ongoing firefighting in the JFAIP cohort. For example, one parent requested to withdraw from the study after Part A (pre-intervention phase) because her child was too troubled and she was having difficulty dealing with their circumstances. This is an example of a case that may have become a repeat firefighter but data was unable to be collected.

The methods used to collect data in this study also may have influenced the findings. For example, following JFAIP protocols, the children and adolescents verbally responded to the questions on the CRS in the presence of their parents/carers. The young people may have felt uncomfortable fully disclosing information to a JFAIP practitioner in the presence of their primary carer. This could have caused them to alter their responses to avoid consequences or confrontation with their parent/carer after the session. This may be one explanation for the differences observed between the CRS and FRS where parents appeared to be more forthcoming about their child's behaviour. While this study does appear to demonstrate that parents are better sources of information about child firefighting behaviour than the children themselves, there could

be some added value in attempting to corroborate information from the young person as well. In contrast, parents/carers were asked to complete questionnaires on their own, via mail out, rather than face-to-face. Some families may have found it difficult to understand the meaning of some of the questions, potentially preventing them from responding accurately. However, face-to-face interviews were beyond the scope of the current study.

In addition, stage two data collection provided no opportunity for parents/carers to report any family or personal changes that the young person may have experienced during the follow-up period that may have encouraged the continuation of the firelighting behaviour. Other researchers (Lambie & Randell, 2011) have also discussed the lack of research that accounts for the impact of variables in the follow-up period.

There may be further differences that exist between “fireplayers” and firefighters with regards to the severity of their engagement. This study looked at matchplay, minor firelighting, and major firelighting as an overall category of repeat firelighting, because the JFAIP’s goal is for children and adolescents to remain fire safe under all circumstances; all of these acts, whether minimal or severe, involve some degree of risk. In future studies it would be useful to consider the differences that may exist between firefighters in terms of the severity of their fires.

Unfortunately, the data from only a handful of young female firefighters informed the development of the BRT. This is an accurate reflection of the limited female cases that are referred to the JFAIP in general. Nonetheless, the BRT has been developed on a largely male sample, and therefore the applicability of the BRT in relation to female firefighters, is unknown. Thus, caution should be applied when, and if, it is used for females.

Based on the notion that the peer group has a strong impact on adolescent behaviour and research suggesting that adolescents tend to light fires with others (FEMA, 2012; Pinsonneault, 2002), the role of peer influence in firelighting activity needs to be explored. Unfortunately, none of the measures used in this study sought information specifically about peer involvement. Future research should aim to attend to this shortcoming and develop a greater understanding around peer influence on firelighting. This is particularly pertinent in the current technological climate in which young people have increased and unsupervised access to social interactions, and are influenced by others online who they may not even know personally.

Summary

Study 1 firstly identified that the CRS was unable to distinguish between repeat and non-repeat firefighters in the JFAIP. The FRS did demonstrate distinguishing capability but was found not to be very specific. This study also developed the BRT, which is to be completed by a parent/carer of children referred to the fire services for firelighting behaviours. The fire-specific items included in the BRT relate to past involvement/early experiences with fire incidents, exposure to role models with fire interest, parental concerns about future fire behaviour, and curiosity about fire. The psychosocial items reflect internalising, externalising, and social problems. The identification of these items was based on statistical criteria and this completes the first important step in assessing the risk of future firelighting. The next step in the development of the repeat firefighter screening tool required that the predictive validity, test-retest, and internal reliability of the items that comprise the BRT are empirically established. These tests of its validity and reliability form the basis of chapter 5 and facilitate further comparison with the CRS and FRS.

Chapter 5

Study 2: Evaluation of the Behaviour Risk Tool's Validity and Reliability

Research conducted with the Juvenile Fire Awareness and Intervention Program (JFAIP) has identified the need for a repeat firefighter risk screening measure (McDonald, 2010; Kurt, 2014). As previously highlighted, a limited number of risk screening measures exist for use specifically by fire services (refer to Chapter 3). Some established tools are extensive, intrusive, and not suited to the particular skills of fire services practitioners. Furthermore, they are generally theoretically-based and/or have not been subject to tests of validity and reliability (Henderson, MacKay, & Peterson-Badali, 2010). Study 1 in this thesis attended to the latter by evaluating the validity of the pre-established Family Risk Survey (FRS) and Child Risk Survey (CRS; Moynihan & Flesher, 1998) using a Victorian JFAIP sample. In brief, the results showed that the FRS demonstrated predictive capability but limited specificity. It appeared to be an overly inclusive tool that was able to detect most of the repeat firefighters, but incorrectly over-classified about half of the non-repeat firefighters as at-risk. In contrast, the CRS was found to not distinguish between repeat and non-repeat firefighters in the JFAIP sample. Additionally, the Behaviour Risk Tool (BRT) was empirically developed in study 1 to be tested for validity and reliability in study 2 of this project.

Investigating the validity and reliability of the BRT was the overarching aim of study 2. Primarily, this study sought to determine if the BRT demonstrated more utility for screening young firefighters in the JFAIP than the FRS. The first step (Study 2: Part A) was to assess the BRT's validity with a new sample, and determine a numerical cut-off point that would distinguish cases as predicted repeat and non-repeat firefighters, depending on whether their score fell above, below, or on the cut-off value. The ability of the BRT to accurately detect a repeat firefighter (sensitivity) and the degree of

correctly identified non-repeat firefighters (specificity) was then compared to same parameters for the FRS. Firstly, it was hypothesised that one third of the sample would be repeat firefighters post-JFAIP-intervention (as was expected and found in study 1). It was also hypothesised that the screening tool would demonstrate predictive validity for determining a future repeat firefighter from a future non-repeat firefighter. The second step of study 2 (Part B) was to assess the reliability of the BRT. Firstly, an evaluation of the BRT's test-retest reliability across time was performed, along with an exploration of the internal reliability/consistency of the BRT. It was hypothesised that the BRT would demonstrate both test-retest reliability and internal reliability/consistency.

Method

Each part of study 2 utilised data collected from different samples, depending on the requirements of the aims being addressed. Part A utilised a sample made up of parents/carers of JFAIP cases who completed the BRT and provided follow-up information about their child's repeat/non-repeat firefighting behaviour. This information was used to assess the predictive validity of the BRT (i.e., to separate repeat and non-repeat firefighters). In contrast, Part B utilised a community sample (whose repeated firefighting status was unexplored) to assess the test-retest reliability of the BRT over a (minimum) two-week interval. A community sample was deemed appropriate since questions surrounding the stability of the instrument are important regardless of repeat firefighter status. Both samples were used to assess the internal reliability/consistency of the BRT (reported under Part B). The method of data collection for both samples used in this study is outlined below.

Part A: Predictive Validity of the Behaviour Risk Tool

Participants

Participants were recruited as a result of their contact with, and completion of, the JFAIP. The parents/carers of young participants who engaged with the JFAIP during the period December 2014 to June 2016 were asked to complete the screening tool developed in the previous chapter (the BRT). During this time, 270 cases were referred to the JFAIP; 204 were actioned and the remaining 66 resulted in no action from the JFAIP. Consent to contact the parents/carers for repeat firelighting follow-up was requested and demonstrated via a tick box option on the front of the paper version of the BRT. Eighty parents/carers (39%) of the actioned cases provided consent to be contacted for follow-up. Of the 80 cases, 77.57% were able to be contacted for follow-up resulting in a total sample size of 62. Most of this JFAIP sample were male (96.8%). The age range was 5 to 17 years ($m = 12.43$, $SD = 3.25$), with the exception of one 30-year-old with an intellectual disability who was considered eligible for the study because his intellectual functioning age was 12 years. The only two females in the group were aged 11 and 15 years. As in the previous study, descriptive statistics were used to provide an overview of the younger and older firelighters separately (where the split was at > 12 years). The new sample consisted of an uneven proportion of younger ($n = 24$, $m = 9.00$, $SD = 1.84$, range 5 to 11 years) and older ($n = 38$, $m = 14.65$, $SD = 1.58$, range 12 to 17 years) firelighters.

Materials

The BRT, as developed by Victoria University and JFAIP, (Appendix T) was used in this study.

Procedure

Ethics approval. Appropriate approval for the collection and analysis of Part A data was sought and granted for this project (HRE14-203) in 2014 from Victoria University's Human Research Ethics Committee (HREC).

Data collection. At the time of the pre-intervention interview conducted by a JFAIP practitioner, each parent/carer was asked to complete the 25-item BRT. In addition, they were asked to tick the appropriate box if they consented to being contacted for follow-up by the author. Each parent/carer was provided with an envelope to ensure confidentiality when returning their completed BRT to the JFAIP practitioner before their departure. The JFAIP practitioner passed the sealed BRT envelope to the JFAIP coordinator, who subsequently forwarded the BRT and contact details of the consenting parents/carers to the author for follow-up. It is worth noting that the individual BRTs completed during this period were not used to screen cases for risk because the optimum cut-off value that would distinguish between predicted repeat and non-repeat firefighters had not yet been determined (one aim of this study). Hence, no JFAIP cases were predicted to be repeat firefighters and similarly no referrals to mental health services were made based on the outcome of this measure.

A follow-up phone call was conducted after a minimum 6-month period to determine the presence or absence of repeat firefighting (using the same criteria as study 1). While an attempt was made at 6 months to contact each parent/carer, some follow-up attempts were conducted after a longer period (up to 18 months) depending on the parent/carer's availability at the time of contact. Each parent/carer was asked the following questions:

1. Has your child continued to light fires or play with fire since the JFAIP sessions were completed? Yes/ No?; and

2. Has your child used mental health services since the completion of the JFAIP sessions? Yes/ No? If yes, how many sessions have been attended?

Question two above only sought basic information (e.g., yes/no and number of sessions). Some parents provided additional brief qualitative information relating to the types of mental health services utilised, but this was not required.

A number of parents/carers were difficult to contact for follow-up and therefore, in cases where a direct telephone call failed to reach them, a text message was sent to each of them seeking a Y or N to indicate Yes or No response respectively to the above questions. Six parents/carers responded via this method.

Part B: Test-retest Reliability and Internal Consistency of the Behaviour Risk Tool

Participants

Participants were parents/carers of children from the general community aged between 5 and 17 years with no specific history of firelighting. In total, 115 responses were collected at Time 1. Thirty-nine parents/carers did not complete the Time 2 survey (2 weeks later), which meant that data was analysed for a total of 76 participants. The frequency of male children was 54.9%. The mean child age ($n = 76$) was 9.20 ($SD = 3.17$) for Time 1 and 9.24 ($SD = 3.20$) for Time 2. Four children had birthdays in the period between test and retest which accounts for the slight age increase in the mean. Over 90% of respondents were the mothers of the children reported on. Fathers and one step-mother made-up the rest of the respondents. All participants were from Victoria, Australia, and were recruited via snowball sampling from social media pages of the research team.

Materials

The 25-item BRT (Appendix T) was used to collect the data. Additionally, demographic information relating to the child's age, sex, and their relationship to the participant, was recorded.

Procedure

Ethics approval. Appropriate approval was sought and granted for Part B of this project (HRE17-038) in 2017 from HREC.

Data collection. A Qualtrics online survey was developed to collect the data, specifically, responses to the demographic questions and the 25 items of the BRT, as well as an email address for the retest survey. The survey link was posted on social media pages with an advertisement seeking participation (Appendix U). Participants were provided with a description of the study and gave informed consent by agreeing to participate online. The survey was brief, taking approximately 5 minutes to complete for each child. Parents with multiple children were given the opportunity to complete the survey for each of their children in order from oldest to youngest. At Time 1, participants were asked to provide an email address so that they could be sent a link to the follow-up survey 2 weeks later.

An automated message (Appendix V) with information and contact details for the JFAIP was set-up to pop-up on the screen for any parent who responded positively to the first five questions relating to firelighting behaviour (e.g. items 1 to 5 on the BRT). While this study did not specifically seek the parents of firelighting young people as participants, it was certainly possible that a child with a history of firelighting behaviour or interest would be identified based on their parent's responses. In the interest of ethical practice, it was important to make any parents reporting firelighting behaviour or interest aware of the services provided by the JFAIP. At Time 1, 52% of

parents/carers responded positively to one or more of these items and received the pop-up information about the JFAIP. It is unknown how many (if any) of these families contacted the JFAIP seeking their services as a result of the pop-up message. These participants were still included in the sample assessing the test-retest reliability of the BRT.

Two weeks after the first survey was completed (Time 2), a link to the follow-up survey was sent to the corresponding email address provided by parents/carers. The survey was identical to the first one with the exception that a request for an email address was no longer included. At Time 2, 43.8% of parents/carers responded positively to the fire-specific questions resulting in the pop-up information about the JFAIP. An independent research assistant downloaded the completed surveys into a Statistical Package for Social Sciences, Version 22 (SPSS) dataset and matched the Time 1 and 2 survey responses by parent email and age of children to allow for the anonymity of participants to be maintained during statistical analyses (considering researcher social media accounts were used to recruit participants).

Data Analysis: Parts A and B

The raw data collected for Part A was stored securely at Victoria University. An electronic dataset with the corresponding raw data was developed for statistical analyses to be conducted. An electronic database of Sample B data also was downloaded for use. SPSS was used to analyse the data. For Part A, descriptive statistics were used to determine the rate of repeat firelighting and provide a basic overall description of the repeat and non-repeat firelighters. The receiver operating characteristic (ROC) area under the curve (AUC) analysis was conducted for the screening tool. If any tool is able to perfectly discriminate between repeat and non-repeat firelighters at a particular cut-off value, the value of the AUC of the ROC curve would be 1.0. If a tool's ability to

distinguish between repeat and non-repeat firefighters was equal to chance, the AUC value would be 0.5. An AUC ranging from 0.5 to less than 1.0 is indicative of a test that is better at distinguishing than chance, but is still flawed. The ROC curve plots the sensitivity of the measure at each possible cut-off value against the parallel 1-specificity. Sensitivity reflects the extent to which a screening measure can avoid false negatives (e.g., failing to detect a repeat firefighter). Specificity represents the measure's ability to avoid false positives (e.g., inaccurately classifying a non-repeat firefighter as "at-risk" of repeat firefighting). In any screening measure, there generally needs to be a trade-off between sensitivity and specificity. The optimal cut-off value is determined by the researcher based on the most suitable sensitivity and specificity (Safari, Baratloo, Elfil, & Negida, 2016). More specifically, the cut-off value is determined by the investigator depending on what is considered to be more important (e.g., over-classifying negative cases to ensure fewer positive cases are missed or under-classifying positive cases correctly in order to avoid classifying a negative incorrectly).

For Part B test-retest reliability was determined via a Pearson product-moment correlation coefficient measure of the association or consistency between the Time 1 and Time 2 data (Pallant, 2009). The assumptions of normality, linearity, and homoscedasticity were assessed and found not to be violated, relevant to a Pearson's correlation coefficient (r ; Pallant, 2016). Cronbach's alpha was used to measure the internal reliability/consistency of the BRT (for both samples), based on the average inter-item correlations and the number of items.

Results

The results that describe the sample of young repeat and non-repeat firefighters in the JFAIP sample are presented first. The results of the sensitivity and specificity analyses of the BRT are then reported, followed by the findings in relation to the

reliability analyses conducted with the JFAIP sample and the sample from the general population.

Part A: Predictive Validity of the Behaviour Risk Tool

In the total sample of 62 JFAIP cases, the repeat firelighting rate post-JFAIP intervention was 16.1%. The repeat and non-repeat firelighting children and adolescents ranged from 5 to 17 years of age (plus one 30-year-old with a mental age equivalent to 12 years) with no significant difference in the mean age between the groups, $t = -1.16$ (60), $p = .52$, $CI = -4.26$ to 1.14 . A chi-square test of contingencies ($\alpha = .05$) showed that age group (5 to 11 and 12 to 17 years [plus one 30-year-old]) was not significantly related to repeat firelighting status, Fisher's Exact Test $p = .166$, two-tailed. In addition, the repeat firelighting rate of males alone was 15%, and for females, 50%. The latter figure should be interpreted cautiously as there were only two female participants in the entire sample, but is nonetheless important to note. Of the total sample, 27.4% had engaged with mental health services to some extent within the period between completion of the JFAIP and follow-up. Specifically, 50% of the repeat firelighters reported using mental health services, and 23.1% of the non-repeat group reported the same. There was a significant relationship between repeated firelighter status and mental health service use post-intervention, Fisher's Exact Test $p = .037$, two-tailed. This indicates that significantly more repeat than non-repeat firelighters were linked in with mental health services to some extent. Information about the type and level of mental health services utilised by the young people in this sample is largely unknown. This data was not specifically sought, but some parents/carers provided some brief qualitative information in regards to the mental health services used in the follow-up period by the young person. This information indicated varying degrees of mental health intervention from very brief contact or early stages of assessment through to

more intensive, ongoing, and regular therapy. The limited and inconsistent information obtained pertaining to the type and degree of mental health service use by young people in this sample prevents further interpretation of the possible impact of mental health services on firelighting behaviour.

Sensitivity and specificity. Fifteen participants (24%) failed to respond to at least one question on the screening tool, either accidentally or by choice. However, of the total number of questions across the entire sample, 98.7% received responses. Table 13 displays information relating to the missed questions. This missing data needs to be considered and taken into account. The most ideal approach to managing the missing data was explored using a few methods described below (options one to three).

Table 13

Number and Percentage of Each Item on the BRT with Missing Data

	Item	Number of missing responses	Percentage of missing responses
2	How many other family members have a fascination with fire?	5	8.1%
3	How many times has your child hidden matches, lighters or other fire-starting materials?	2	3.2%
4	How curious is your child about fire?	3	4.8%
5	How often do you worry about your child playing with fire when left unattended?	2	3.2%
10	Is your child very shy?	2	3.2%
18	Does your child eat more than he/she should?	1	1.6%
19	Does your child show depressed mood?	2	3.2%
20	Does your child physically fight with peers or siblings?	1	1.6%
21	Is your child prone to crying?	1	1.6%

Option one: Analyses using raw totals (missing values become zero). Firstly, an independent samples *t*-test analysis was conducted to compare the repeat and non-repeat firefighters based on the raw totals of the BRT. Therefore, missing values were inherently considered as a value of zero. The analysis demonstrated there was a significant difference between the mean total screening tool score for repeat ($m = 68.10$, $SD = 11.89$) and non-repeat firefighters ($m = 52.21$, $SD = 19.27$), $t = 2.51(60)$, $p = .015$, $CI = 3.21$ to 28.56 .

The ROC AUC analysis was then used to determine how useful the screening tool was for predicting repeat firefighters, and what the most suitable cut-off total was to classify future repeat and non-repeat firefighters. The AUC value was .784 indicating that the screening tool was a significantly ($p < .01$) fair to good measure for predicting continued firefighting (Safari et al., 2016). The most optimal cut-off value was 57.5 demonstrating a sensitivity of .80 and a specificity of .31, indicating that the screening tool was 80% sensitive and 69% specific. This infers that the screening tool with that cut-off score can accurately detect a future repeat firefighter 80% of the time but will inaccurately classify a non-repeat firefighter as at-risk for approximately 30% of not at-risk cases.

Option two: Analyses using mean response for missing values. A second independent samples *t*-test was conducted on the total BRT score. However, this time, missing values were replaced with the mean response score across the number of questions that were responded to (e.g., if the participant responded to 24 questions, the raw total was divided by 24 and the resulting mean score was rounded to the closest whole number to replace the missing value, and a new total score was calculated). The results showed that there was a significant difference between the mean screening tool totals of the repeat ($m = 70.60$, $SD = 14.98$) and non-repeat firefighters ($m = 52.77$, SD

= 19.29) $t = 2.76(60)$, $p = .008$, CI = 4.91 to 30.75. The ROC AUC value was .785, again demonstrating that the screening tool was a significantly ($p < .01$) fair to good predictor of repeat firefighters (Safari et al., 2016). Similarly, the most ideal cut-off value was 57.5 demonstrating a sensitivity of .80 and a specificity of .31, indicating that the BRT was again 80% sensitive and 69% specific.

Option three: Analyses using multiple imputation for missing values. Finally, missing data was accounted for when totalling participant's scores using a multiple imputation procedure (Little & Rubin, 1987). An independent samples t -test comparing the total screening tool score for the repeat ($m = 72.80$, $SD = 14.05$) and non-repeat firefighters ($m = 55.41$, $SD = 19.85$) showed those who continued to light fire scored significantly higher on the screening tool overall $t = 7.91(101)$ $p = <.001$, CI = 13.04 to 21.76.

Imputation number four produced the AUC value of .789 (i.e., slightly higher than in the other two options) again showing that the screening tool was significantly ($p < .01$) fair to good (Safari et al., 2016) at distinguishing future repeat firefighters from non-repeat firefighters. In this case, the most optimal cut-off value was 60.5 demonstrating a sensitivity of .80 and a specificity of .31, indicating once again that the screening tool was 80% sensitive and 69% specific (i.e., identical to options one and two above).

Based on the cut-off value of 57.5 (derived from options one and two), Table 14 displays the raw totals of the BRT, the corresponding risk and treatment recommendation, and firefighting status at follow-up for each case.

Table 14

Raw BRT Total, BRT Risk Classification and Treatment Recommendation and Firelighting Status at Follow-up

Case ID	Risk category	Treatment recommendation according to BRT instructions	Actual repeat firelighting
1	Low risk	Fire safety education	No
2	Low risk	Fire safety education	Yes
3	High risk	Fire safety education + mental health referral	Yes
4	Low risk	Fire safety education	No
5	Low risk	Fire safety education	No
6	Low risk	Fire safety education	No
7	Low risk	Fire safety education	No
8	Low risk	Fire safety education	No
9	Low risk	Fire safety education	No
10	High risk	Fire safety education + mental health referral	No
11	Low risk	Fire safety education	No
12	Low risk	Fire safety education	No
13	High risk	Fire safety education + mental health referral	No
14	High risk	Fire safety education + mental health referral	No
15	Low risk	Fire safety education	No
16	Low risk	Fire safety education	No
17	High risk	Fire safety education + mental health referral	No
18	Low risk	Fire safety education	No
29	Low risk	Fire safety education	No
20	Low risk	Fire safety education	No
21	High risk	Fire safety education + mental health referral	No
22	High risk	Fire safety education + mental health referral	No

Case ID	Risk category	Treatment recommendation according to BRT instructions	Actual repeat firefighting
23	High risk	Fire safety education + mental health referral	No
24	High risk	Fire safety education + mental health referral	Yes
25	High risk	Fire safety education + mental health referral	Yes
26	Low risk	Fire safety education	No
27	High risk	Fire safety education + mental health referral	No
28	High risk	Fire safety education + mental health referral	No
29	Low risk	Fire safety education	No
30	High risk	Fire safety education + mental health referral	Yes
31	High risk	Fire safety education + mental health referral	Yes
32	Low risk	Fire safety education	No
33	Low risk	Fire safety education	No
34	Low risk	Fire safety education	No
35	High risk	Fire safety education + mental health referral	Yes
36	High risk	Fire safety education + mental health referral	No
37	Low risk	Fire safety education	Yes
38	Low risk	Fire safety education	No
39	Low risk	Fire safety education	No
40	Low risk	Fire safety education	No
41	Low risk	Fire safety education	No
42	High risk	Fire safety education + mental health referral	Yes
43	High risk	Fire safety education + mental health referral	Yes
44	High risk	Fire safety education + mental health referral	No
45	High risk	Fire safety education + mental health referral	No

Case ID	Risk category	Treatment recommendation according to BRT instructions	Actual repeat firefighting
46	High risk	Fire safety education + mental health referral	No
47	Low risk	Fire safety education	No
48	Low risk	Fire safety education	No
49	Low risk	Fire safety education	No
50	Low risk	Fire safety education	No
51	Low risk	Fire safety education	No
52	High risk	Fire safety education + mental health referral	No
53	Low risk	Fire safety education + mental health referral	No
54	Low risk	Fire safety education	No
55	Low risk	Fire safety education	No
56	Low risk	Fire safety education	No
57	Low risk	Fire safety education	No
58	Low risk	Fire safety education	No
59	Low risk	Fire safety education	No
60	Low risk	Fire safety education	No
61	Low risk	Fire safety education	No
62	High risk	Fire safety education + mental health referral	No

As can be seen from Table 14, based on the protocols attached to the BRT, all the referrals the JFAIP received regardless of the BRT score would have been given the JFAIP. In 23 cases (37%) where the BRT score was above 57.5, additional mental health referral recommendations would have been made to the parents/carers of these cases. Ten of these cases were already in contact with mental health services and attempts to re-engage a further 2 with services were already being made. According to the follow-up data, the BRT would have been able to accurately predict 8 repeat

firefighters (5 of which were already seeking mental health support or attempts were being made to engage these cases with services) but failed to identify 2 (both of whom were already in contact with mental health services). Thirteen non-repeat firefighters would have been given a recommendation to seek a mental health referral (7 of whom were currently seeking mental health services for other non-fire-related issues).

Part B: Reliability of the Behaviour Risk Tool

Internal consistency. The 25 items on the BRT demonstrated high internal consistency with Cronbach's alpha being .93 for Sample A, with the removal of any one single item not improving the reliability of the tool. Sample B produced Cronbach's Alpha's of 0.88 for Time 1 and 0.90 for Time 2, further demonstrating internal reliability/consistency.

Test-retest reliability. The test-retest reliability of the BRT was assessed using the Pearson product-moment correlation coefficient. There was a large, positive correlation between the responses by parents/carers on the BRT at Time 1 and Time 2, $r = .93, n = 70, p < .001$. Therefore there is evidence of high repeatability across time for the BRT.

Discussion

The aim of this study was to evaluate the validity and reliability of the BRT, and determine the most appropriate cut-off value that could effectively categorise future repeat and non-repeat firefighters. The first hypothesis of this study was that there would be approximately one third repeated firefighting post-JFAIP intervention reported for the JFAIP population. This hypothesis was not supported as only 16.1% reported continued firefighting behaviour. This was less than expected based on the results from study 1 (32.8%), and it was also lower than rates reported in the literature (McDonald, 2010; Adler, Nunn, Northam, Lebnan, & Ross, 1994; MacKay, Henderson, Del Bove,

Marton, Warling, & Root, 2006). It does however match the repeat firelighting rate of 15% postulated by Del Bove, Caprara, Pastorelli, and Paciello (2008). The reduced rate found here could possibly be a result of the author obtaining this information by direct telephone contact with participants. In study 1, information was obtained via self-report questionnaires that were posted back to the author. This provided participants with more time to think about the question and respond in their own time in a less direct and personal way compared to the telephone contact employed in study 2. It is perhaps possible that participants may have been unwilling to orally report continued firelighting behaviour on their child's behalf directly to the author without time to consider their response thoroughly. Effects of the social desirability bias (Nederhof, 1985; Dickens & Sugarman, 2012), and discomfort in reporting outcomes in a telephone conversation (that infers the services of the JFAIP were ineffective) to the author whom the participants knew to be linked to the JFAIP, may have caused some reluctance from parents/carers to disclose repeated firelighting. Hence, the disparity in repeated firelighting reports between Study 1 and Part A of Study 2 could be reflective of the different methods in collecting the data, which has been noted as issue in this area (MacKay, Feldberg, Ward & Marton, 2014). This further highlights the difficulties inherent in collecting data in this field, which were discussed in Chapter 1 of this thesis.

In accordance with the literature (e.g. Fineman, 1995; Martin, Bergen, Richardson, Roeger, & Allison, 2004; Del Bove & MacKay, 2011) and study 1, male participants dominated the overall firelighting sample. Research generally reports a 1:9 female to male ratio of firelighting participation (Lambie & Krynen, 2017), but the rate of females participating in this study was less than 4%. Despite the very low number, one of the two females that participated in the research, continued firelighting. Given the insufficient data available in this study relevant to female firelighters, adequate

conclusions cannot be drawn from the female data. However, it has been reported that females are expected to most commonly be involved in firelighting during adolescence (Stadolnik, 2000), and are suggested to be more severely disturbed than young male firelighters (Fineman, 1995). It is interesting to note that the females in effect had a much higher repeated firelighting rate than males in both study 1 and study 2 of this thesis. In study 1, females had a 50% repeat firelighting rate with a likewise restricted sample of only 6 female participants. Albeit the inability to draw any real conclusion about young female firelighters, there is certainly scope for investigating young female firelighter behaviour in more depth in the future. For study 2, closer exploration of female BRT scores showed that the sole female repeat firelighter's score fell into the at-risk category, while the non-repeat female firelighter scored in the range for not at-risk. This provides some very limited evidence that the BRT has utility in assessing risk for female firelighters. The applicability of the BRT to female firelighters was noted as a limitation of this tool in study 1 because of the limited female data from which the tool was developed.

Interestingly, half of the repeat firelighters reported contact with mental health services, but this contact was largely in the early stages, or the parent/carer reported trouble engaging the young person with these services. Only 1 repeat firelighter reported regular, ongoing therapy sessions. As these few participants had received only limited contact with these services at the time of follow-up, no meaningful suggestions about their effectiveness could be implied. According to the determined risk cut-off score for the BRT (to be discussed in shortly), 24 cases would have received a recommendation to seek mental health services. Fifty percent of these cases were already engaged, or attempts were being made to try and link them in, with mental

health services. The remaining half, had not sought mental health services in the post-intervention period but demonstrated a heightened risk score on the BRT.

Validity and Reliability of the Behaviour Risk Tool

The overarching main aim of this study was to assess the BRT's validity to distinguish between predicted repeat and non-repeat firelighter cases, and assess its reliability. Determining the most suitable cut-off value that corresponds with an appropriate sensitivity and specificity was also sought. It was expected that the BRT would demonstrate predictive capability via a degree of sensitivity and specificity. This expectation was met.

To reiterate, sensitivity refers to the degree to which a screening measure can avoid false negatives (e.g., failing to detect a repeat firelighter), whereas specificity reflects the measure's ability to avoid false positives (e.g., inaccurately classifying a non-repeat firelighter as at risk of repeat firelighting). The most optimal cut-off value is determined by the number at which the researcher is satisfied that the balance of sensitivity and specificity is suitable for the tool's purpose (Safari, Baratloo, Elfil, & Negida, 2016). For this project, it was decided that it was more critical for the BRT to have high sensitivity than specificity. However, an improved level of specificity than that demonstrated for the FRS (Moynihan & Flesher, 1998) in study 1 (e.g., 52.5%) was sought. The evaluation of the BRT in study 2 here identified a sensitivity of 80% for predicting repeat firelighters correctly pre-intervention, with a cut-off value of 57.5 (or 60.5), which is discussed further below. Specificity for correctly identifying those who did not continue to light fire was found to be 70% at the cut-off value of 57.5 (or 60.5). In effect, this means that approximately 30% of cases would have been misclassified as at-risk for repeat firelighting, which would have indicated a possible unnecessary referral to mental health services (for repeat firelighting specifically). However, this is

an improvement on the 50% of cases that were misidentified as high risk for repeat firelighting by the FRS (Moynihan & Flesher, 1998) in study 1. It has also shown to be substantially more useful than the CRS which demonstrated very little utility in separating the repeat and non-repeat firelighters pre-intervention (when administered in the presence of the parent guardian as was done for the current study). Furthermore, the non-repeat firelighting cases detected as at-risk on the BRT and given a recommendation for mental health services, inherently scored higher on a number of the psychosocial elements of the tool, and therefore a mental health referral for heightened psychosocial issues may be warranted. It was also hypothesised that the BRT would demonstrate internal consistency and test-retest reliability, which was supported. The BRT showed high internal consistency and a high degree of repeatability across a 2-week interval. These findings provide evidence that the BRT is a valid and reliable measure for assessing risk of repeated firelighting, which has been highlighted as essential in a young firelighter screening tool (Pierce & Hardesty, 1997; Henderson, MacKay, & Peterson-Badali, 2010).

The Behaviour Risk Tool in Practice

The BRT was developed from the empirical analyses of parent/carer-reported items from a sample of young people aged 5 to 17 years. Therefore, the most appropriate method for use is also parent/carer-report. The three different approaches for accounting for missing data yielded two slightly different cut-off scores, 57.5 and 60.5, although the most appropriate sensitivity and specificity were the same across all three methods (80% and 69% respectively). It was deemed most suitable to set the lower value as the cut-off point. Firstly, using this method makes for a more conservative tool and less chance of missing a possible repeat firelighter. Secondly, the lower cut-off value was associated with a simpler method of handling any missing

values (e.g., giving a zero value rather than relying on statistical imputation methods). The importance of a tool that is simple to administer and fits within the realm of skills and expertise of the fire practitioners who will be administering it has previously been indicated (MacKay, Feldberg, Ward & Marton, 2012). To account for missing items, it is recommended that practitioners check that all items on the BRT are responded to, and where necessary ask the parent/carer to complete omitted items. Any items that remain blank should be left as such, as using this method produced the same sensitivity and specificity at the same cut-off value as did replacing the missing data via the methods described in the results. Hence, to put it simply, blank items should be ignored. However, given that no more than three items were missing from any of the tools that were part of this analysis, it is cautioned that any more than three items missing may compromise the effectiveness of the tool.

The scoring of the BRT is simple, and only requires the scores on the 25 individual items to be tallied. This combined total is then used to determine if a case is at risk of repeated firelighting or not. An outcome score of or above 57.5 is considered to be at-risk. At-risk cases should be given a letter by the fire service suggesting they seek advice from their general practitioner regarding a mental health referral.

Advantages of the Behaviour Risk Tool

In terms of its use by fire services personnel, the BRT has a number of critical advantages in comparison to other existing screening tools. Firstly, it has demonstrated more utility for distinguishing repeat and non-repeat firelighters than the FRS and CRS (Moynihan & Flesher, 1998) in this study. The rate of inaccurate classifications as at-risk is substantially lower, reducing the potential unnecessary use of mental health services and risk of stigmatisation. Given that the corresponding treatment methods are either fire safety education only or fire safety education plus mental health

recommendation, all cases regardless of the outcome on the BRT would be given access to the JFAIP as is current practice. The additional benefit here is that they now have a more objective measure to base any suggestions to families about seeking additional mental health services. As described in study 1 (Chapter 4), only about one third of the JFAIP clients would have been privy to the services of the JFAIP based on the current rules applied to the CRS and FRS (Moynihan & Flesher, 1998) (regardless of sensitivity and specificity).

Secondly, the BRT was also developed from a sample of young people with a wide age range (5 to 17 years). This improves on the shortcomings of the Children and Fire – A Bad Match screening tool (DiMillo & Hardesty, 1996), and the Juvenile with Fire Screening Tool, which have been criticised for their specific focus on younger children and adolescent firefighters respectively (among other limitations as discussed below and in Chapter 3 (DiMillo, 2002)).

Thirdly, the BRT combines a mix of fire-specific and psychosocial items. It includes items that reflect similar underlying constructs to the Strengths and Difficulties Questionnaire (Goodman, 1997) that was promoted by Lambie and Krynen (2017) for use by young firefighter programs. One advantage that differentiates the BRT from the Strengths and Difficulties Questionnaire is its inclusion of the five fire-specific items that represent interest and history with fire and role models with fire interest. These fire-specific elements have been identified as important for predicting repeat firefighters in addition to psychosocial factors (MacKay et al., 2006; McCardle, Lambie, & Barker-Collo, 2004; Kolko, Bridge, Day, & Kazdin, 2001).

The BRT is relatively short with just 25-items, and therefore, this places limited burden on parents/carers to complete it. This improves on the lengthiness of the Children and Fire – A Bad Match screening tool (DiMillo & Hardesty, 1997), and the

assumption of the Juvenile with Fire Screening Tool that fire practitioners are able to make subjective judgements about the degree of seriousness of presenting psychosocial issues (DiMillo, 2002). Out of the three separate tools that make up the Juvenile with Fire Screening Tool Package, the self-report “Parent Checklist” appears to be the most straightforward and user-friendly for fire services. Similar to the BRT, the checklist consists of 27 items that parents respond to based on their relevance to their child. Many of these items match well with items in the BRT (e.g., items 1, 2, 4, 18, 19, 21, 23, 25; Appendix T). Unfortunately, the scoring procedure and referral pathway for the checklist is ambiguous (DiMillo, 2002). The scoring and treatment protocols for the Parent and Youth Interview forms have more clarity, and the treatment recommendations are similar to the BRT (either fire safety education only, or fire safety education and mental health recommendation), but it assumes skills in determining complexity and severity of mental health-related issues (DiMillo, 2002). The scoring system for the Strengths and Difficulties Questionnaire is moderately simple, however it requires some items to be scored in reverse (Goodman, 1997).

Conversely, the BRT does not require the practitioner to be skilled and have expertise in administering and/or scoring and interpreting. The corresponding treatment methods are clear and do not overstate the utility of the tool. More specifically, the BRT is designed as a preliminary filtering mechanism. It is only intended to give the practitioner a basic idea that a child or adolescent may need some additional mental health support, which enables them to offer this recommendation to the parent/guardian. From here, any subsequent referrals, diagnoses, and treatments are left to trained medical and mental health professionals. Therefore, the BRT does not assume, expect, or require any professional expertise out of the realm of what is appropriate for a fire practitioner in this role. The importance of a manual to accompany firefighter screening

tools has been stressed (DiMillo, 2002). However, the BRT is such a straightforward tool, it only necessitates some very basic instructions for administering, scoring, and referral as described on the front of the BRT practitioner instructions (see Appendix T).

Limitations of the Behaviour Risk Tool

The limited inclusion of females in both the sample where the BRT was established and then evaluated means that the validity and reliability of the tool for screening young female firefighters is unknown. However, as noted above, the BRT did accurately discriminate between the repeat and non-repeat female firefighters here in study 2. Furthermore, it may be difficult to screen young people in residential care because often they have multiple carers and/or there is a high turnover of case managers. This may prevent an accurate screen because the respondent is unlikely to know the child very well. The JFAIP receives a proportion of cases via referral from social service departments. However, the purpose of the screening tool is to filter risk cases through to mental health services, and it is assumed that young people in residential settings in need of mental health care have already been detected and linked with the relevant services. Finally, the BRT demonstrated 80% sensitivity and 70% specificity. This in effect means that unfortunately it would have failed to detect 2 out of 10 repeat firefighters, and incorrectly suggested a mental health referral was necessary for approximately 1 in every 3 at-risk cases it identified.

Limitations

This study has some critical limitations to consider. Some of the same limitations from study 1 (Chapter 4) also are applicable here. For example, the small sample size had an impact on the strength of the findings. Similarly, as in study 1, there were some families who chose not to participate and therefore their data was not able to be used. That said, their value to the accuracy of the evaluation should not be

discounted. With specific regard to study 2, a further limitation arose in relation to the use of a telephone for follow-up. While data collection via telephone proved to have benefits in reducing participant burden and possibly contributed to an increased participation rate compared to study 1, this method may have some pitfalls regarding accuracy of reporting repeat firelighting as previously described at the start of this discussion section. This may explain the lower repeat firelighting rate that was found in this study compared to study 1 and some previous research. Furthermore, inaccuracies in parent-reports due to simply being unaware of further firelighting activity from their child are again possible, no matter what the reporting method. Some families were difficult to contact via telephone as many people ignore phone calls from blocked and unrecognised phone numbers. These limitations could have implications for the effectiveness of the tool. Unfortunately this is a limitation with research in this area in general due to the nature of the topic.

In addition the minimum 6-month follow-up period is relatively short and therefore there is the potential for these young people to reoffend outside of this period, making them repeat firelighters but recorded as non-repeat firelighters in the data analysed. This was of considerable concern to the author when developing the research design to meet the timelines of a doctoral program. However, past research has documented repeat firelighting rates within the 6-month post-intervention period (Kolko, Watson & Faust, 1991), but some reoffending beyond this period is, of course, possible. Furthermore, almost 40% of cases were not contactable at the 6-month point, with some follow-up stretching out to 18 months post-intervention. In future research, if feasible, a longitudinal study with follow-up periods of a maximum two years, across a minimum ten-year span, would provide particularly valuable data.

Summary

In this study the BRT empirically demonstrated validity and reliability in screening for repeat firefighters. The methodology of its use in practice has been documented and the critical advantages and limitations of its use for the JFAIP over some other similar-style tools has been discussed in this chapter. The concluding chapter of this thesis discusses the overall implications of this research program and directions for future research in this area.

Chapter 6

Concluding Remarks

Firelighting in childhood and adolescence is a complex and multi-faceted behaviour requiring at least two different methods of intervention depending on the case. For example, educational fire safety interventions, generally delivered by fire services personnel, have proven successful for some firelighters. Alternatively, psychosocial interventions provided by mental health professionals may be necessary, at least in conjunction with, fire education programs for young people who have a more pathological interest in fire and more complex fire-specific and psychosocial issues. The current study provides evidence that externalising behaviours, some internalising behaviours, and social issues, are all problems that may indicate psychosocial intervention is necessary.

Young firelighter programs have been identified as the likely first-point of professional contact for young people with potentially problematic underlying psychosocial disturbances (Pierce & Hardesty, 1997; Henderson, MacKay, & Peterson-Badali, 2010). Therefore programs of this style and the families they serve would benefit from an effective early triage process that identifies risk and filters them correctly (DiMillo, 2002). It is expected that future firelighting behaviour will be reduced through identification of “at-risk” cases via a screening process and subsequent referral to mental health services. This is based on the assumption that families will engage with recommended services. The purpose that the Behaviour Risk Tool (BRT) will serve is similar to the triage process identified by Adler, Nunn, Northam, Lebnan, & Ross, (1994). In the study by Adler et al., JFAIP clients were triaged as either pathological or non-pathological prior to the intervention and directed to 1 of 4 treatment types. All cases considered pathological were referred to treatment with a

specialist mental health component. The non-pathological group were given a form of fire safety education. Both groups reported a reduction in firelighting activity with neither one being significantly better than the other. It appears that each of the interventions demonstrated effectiveness for the specific clients it treated. In effect, this indicates that the early triage process, with corresponding treatment pathways depending on levels of psychopathology, has utility. Unfortunately, at the time, Adler et al. concluded that it was only necessary to retain the fire safety education component of the program because no added benefit was found from the special mental health element. The BRT is essentially a tool to be used in an early triage process and can direct cases to supplementary mental health services, in conjunction with the fire safety education provided by the JFAIP. If the BRT leads to an “incorrect” pathway whereby a young person is considered to need mental health intervention according to the BRT, but no mental health intervention is deemed necessary by the mental health professionals, then no such intervention need be commenced. However, if the BRT is accurate, the young person is linked with the necessary mental health services and the clinician has the ability to assess and treat accordingly.

Future Directions

The outcomes described in the current body of research would benefit from further development. The following activities regarding the BRT are specifically recommended:

- the screening tool has indicated effectiveness in discriminating between repeat and non-repeat firelighters in the Victorian JFAIP in a preliminary evaluation study. The utility of the screening tool nationwide or in other countries is unknown. A similar evaluation study to that of study 2 could be

conducted with other Australian states to see how generalisable the screening tool is to the young firefighter population in Australia;

- the BRT would benefit from being more thoroughly validated with larger samples and across time, in particular for its discriminant validity;
- the BRT should be compared against other measures (e.g., Strengths & Difficulties Questionnaire) for content and construct validity;
- the BRT should be separated into the two age-relevant tools identified in study 1 and assessed on sufficient targeted age samples;
- the BRT should be assessed for its utility in identifying risk for young female firefighters; and
- research should investigate the accuracy of the BRT from the perspective of the mental health professionals that treat young people through the BRT referrals. This would determine if the cases filtered were correctly referred, the types of presenting problems, and treatment methods that were used in psychotherapy.

More broadly, within this field the following research and developments would be valuable:

- more thorough investigation identifying the characteristics of young female firefighters;
- empirical investigation into the types and effectiveness of mental health intervention for young repeat firefighters should be conducted;
- future research should focus on establishing a multidisciplinary program that can collaboratively meet the needs of repeat firefighters; and
- a national database system encompassing information about young firefighters and their fire incidents could provide a substantial Australia-

wide resource that would provide valuable data for future research.

Currently, each state uses a separate reporting system.

Recommendations

It is recommended that:

- the JFAIP adopt the BRT into their early stages of intervention to predict high risk cases and endorse mental health intervention for those families. A letter recommending referral to mental health services (Appendix W) for the general practitioner has been generated for the JFAIP to provide to families of cases screened as high risk; and
- the JFAIP continue to do follow-up evaluations with families and record information such as the BRT score, the presence or absence of repeat firelighting, and whether they have been in contact with the recommended mental health professionals.

Conclusion

The process of screening for risk in young firefighter intervention programs has been likened to that of sifting sand (DiMillo, 2002). It is necessary to separate the more simple cases from the complex cases that need the attention of a more extensive team of people with different expertise. The BRT is anticipated to be a basic preliminary screening measure to flag cases where there might be a need for mental health support. All referrals, regardless of the screening tool's assessment, should continue with the JFAIP as per current practice. The only difference would be that the program's personnel would have an objective way of identifying risk and the possible need for subsequent mental health intervention to assist in targeting any underlying psychological dysfunction.

Together study 1 and study 2 allowed for the development of an evidence-based screening questionnaire, with a cut-off score, and with demonstrated satisfactory levels of sensitivity and specificity, for identifying young people referred to a fire education program (aged 5 to 17 years) who are significantly at-risk for repeat firelighting. Items for the tool were statistically derived from one cohort of young people with a history of firelighting to determine the items that best predict risk, and then assessed for utility on a different cohort from whom information about repeat firelighting over a minimum 6-month period was gathered from the parent/carer. The tool combines items assessing fire-specific items with questions assessing externalising, internalising, and social behaviours. The 25-item BRT, completed by the parent/carer, has also been shown to have good levels of test-retest reliability and good scale reliability. This is the first such tool to be developed in Australia and the first time two internationally-developed surveys, the Fire Risk Survey and Child Risk Survey, have been empirically assessed for their ability to predict which young people are most at-risk for repeat firelighting. It is hoped that the BRT will be used over many years with many families, and that it will undergo a process of continual evaluation and, if necessary, continuous improvement.

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Appendix A

The Juvenile Firesetter Child Risk Survey (CRS)

TO BE COMPLETED BY THE FIREFIGHTER PRACTITIONER

CHILD RISK SURVEY

PRACTITIONER INSTRUCTIONS: You must obtain the consent of the parent/guardian before asking the child/adolescent the following questions. Please ensure that the parent/guardian signs below.

<p><i>Improving Risk Prediction in Child and Adolescents with a History of Firesetting Behaviour</i></p> <p>Parent/Guardian Declaration</p>	
<p>I have read and understood the <i>Information for Parents of Children/Adolescents Involved in Research</i> and have signed the form <i>Consent Form for Parents of Children/Adolescents Involved in Research</i>. I have also understood the Confidentiality Agreement of the Juvenile Fire Awareness and Intervention Program and I understand that the agreement extends to the information my child, or I provide to the firefighter practitioner for the purposes of the study. I therefore provide consent for the firefighter practitioner to ask my child the questions contained in this booklet.</p>	
Name of Parent/Guardian: _____	
Signed: _____	Date: _____

Name of Practitioner: _____

Determine the Level of Understanding (For Children Under 7)

PRACTITIONER INSTRUCTIONS: *It is often difficult to determine if a young child really understands you. There may be an age barrier, a language barrier, a learning problem, or sub normal intelligence. It is fruitless to go through an entire interview unless you are first assured that the child has enough understanding to complete the interview.*

Based on your interaction with the child so far, does the child have an adequate understanding?

Practitioner's Notes and Comments:

If you are satisfied that the child has adequate understanding, proceed with the interview.

PRACTITIONER INSTRUCTIONS: *Once you have developed a rapport with the child/adolescent, please ask the following questions. You must read directly from this sheet to the child/adolescent. You must read all answer options provided in the survey to the child/adolescent and you must provide only ONE answer from the options on the sheet.*

1. Do you have brothers or sisters?
 - Yes _____
 - No _____ If no, skip to Question 3

2. How well do you get along with them?
 - Always get along _____
 - Usually get along _____
 - Sometimes get along _____
 - Don't get along very often _____
 - Never get along _____

3. How well do you get along with your mother?
 - Always get along _____
 - Usually get along _____
 - Sometimes get along _____
 - Don't get along very often _____
 - Never get along _____

4. Do you fight or argue with your mother?
 - Never _____
 - Rarely _____
 - Sometimes _____
 - Usually _____
 - Always _____

5. Do you see your father as much as you'd like?
 - Yes _____
 - No _____
 - Too Much _____

6. When you are asked to do something, do you usually do it?
 - Yes _____
 - No _____

7. Do you lie a lot?
 - Yes _____
 - No _____

8. What happens at home when you get in trouble?

- Grounded _____
- Talked/Lectured _____
- Physical punishment _____
- Sought outside help _____
- Other/Nothing _____
- Yelled at _____

9. Has there been an ongoing big problem in your life or in your family?

- Yes _____ (What?)
- No _____

10. Besides this fireplay or firesetting incident, how many other times have you played with fire, including matches or lighters, or set something on fire?

- 1 (Current) _____
- 2 (Current + 1) _____
- 4 (Current +2 to 4) _____
- 6 (Current + 5) _____

11. What did you do after the fire started?

- Put it out _____
- Called for help _____
- Ran away _____
- Didn't try to run _____
- Panicked _____
- Tried to extinguish _____
- Other _____
- Stayed and watched _____

12. Did you intend to play with fire or set the fire, that is, did you play with or set the fire on purpose?

- Yes _____
- No _____

13. Where did you set the fire?

14. Do you like to look at fire for long periods of time?

- Yes _____
- No _____

PRACTITIONER INSTRUCTIONS

It is important the researchers are aware of the parents/guardians who have expressed an interest in completing the questionnaires for the study. Please determine whether the parent/guardian seeks to complete the questionnaires and make a note of this below. This information will direct researchers to follow up with the parents/guardians who have not yet returned their questionnaires.

Please ensure that you have obtained demographic information. The information below will have already been obtained in the Juvenile Fire Awareness and Intervention Program documentation (yellow and blue forms). Please complete this form after the visit, by transferring information from the yellow and blue forms.

Incident #: _____ Incident Date: ___/___/___ Incident Location: _____

Incident Description: _____

Child's Last Name: _____ First Name: _____

D.O.B. ___/___/___ Child's Address: _____

_____ Home Phone: _____

School Child Attends: _____ Grade: _____

Interviewer's Name: _____

Appendix B

The Juvenile Firesetter Family Risk Survey (FRS)

1. If you had to describe his/her curiosity about fire, would you say it was absent, mild, moderate or extreme?
 - Absent _____
 - Mild _____
 - Moderate _____
 - Extreme _____

2. Has he/she been diagnosed with any impulse control conditions, such as Attention Deficit Disorder (ADD) or Attention Deficit Disorder with Hyperactivity (ADHD)?
 - Yes _____ (Diagnosis)
 - No _____

3. Has he/she been in trouble outside of school for non fire related behaviour?
 - Yes _____ (What?)
 - No _____

4. Has he/she ever stolen or shoplifted?
 - Yes _____
 - No _____
 - Don't Know/Not Applicable _____

5. Has he/she ever beat up or hurt others?
 - Yes _____
 - No _____
 - Don't Know/Not Applicable _____

6. Besides this fireplay or firesetting incident, how many other times has he/she played with fire, including matches or lighters, or set something on fire?
 - 1 (Current) _____
 - 2 (Current + 1) _____
 - 4 (Current + 2 to 4) _____
 - 6 (Current + 5) _____

7. Is there an impulsive (sudden urge) quality to his/her firesetting or fireplay?
 - Yes _____
 - No _____
 - Don't Know/Not Applicable _____

Appendix C

The Brief Agency Contact History

Date: _____

The following asks about any contact you or your family may have had with any counselling or mental health agency providing help for your child/adolescent's fire related activities. (Please be aware that we will NOT approach any agency based on this information). Please tick all that apply and provide responses in the boxes to the best of your recollection. Additional comments welcome.

Note: You may have received help for more than one of your children and their fire-related activities. Therefore, your responses for each child may vary. We have included two forms for your convenience; you may fill out one form per child, or just use the one form, making the differences for each child clear.

<i>Agency</i>	<i>Who first suggested this service? (e.g. teacher, doctor, mother)</i>	<i>How many sessions were attended by the child/adolescent in total?</i>	<i>How old was this child/adolescent at the time of first attending the service? (Age, Grade, Year)</i>
<i>Psychologist</i>			
<i>Psychiatrist</i>			
<i>Counsellor</i>			
<i>Family Therapist</i>			
<i>Child/ Adolescent Therapist</i>			
<i>Social Worker</i>			
<i>School Guidance Officer</i>			

Appendix D

Firesetting Risk Interview (FRI)

Curiosity About Fire

	Not At All		Somewhat		Very Much
How curious is he/she about fire?	1	2	3	4	5
How much does he/she want to play with fire?	1	2	3	4	5
How much does he/she think that fire is special or magical?	1	2	3	4	5
How much does he/she get excited or fascinated when fires or fire related topics are mentioned in everyday conversation?	1	2	3	4	5
How much does he/she like to talk about fire?	1	2	3	4	5
How much does he/she want to visit exhibits or watch movies about fires, or to actually watch a real fire?	1	2	3	4	5
How much does he/she read and attempt to learn about fire and its uses?	1	2	3	4	5

Knowledge of Fire Safety

	Not At All		Somewhat		Very Much
To what extent does your child understand his/her own behaviour in general?	1	2	3	4	5
To what extent does he/she know different facts about fires or fire fighters?	1	2	3	4	5
To what extent does he/she understand why playing with fire is dangerous?	1	2	3	4	5
To what extent does he/she know what things will burn and what things won't?	1	2	3	4	5
To what extent does he/she know how to use matches or lighters correctly?	1	2	3	4	5

Fire Skill/Competence

	Not At All		Somewhat		Very Much
To what extent does he/she know what to do if something catches on fire suddenly?	1	2	3	4	5
To what extent has he/she been taught to use matches or lighters correctly?	1	2	3	4	5
To what extent does he/she play safely when alone or with others?	1	2	3	4	5
To what extent is he/she able to light a fire and put it out correctly?	1	2	3	4	5
To what extent is he/she allowed to use matches or lighters at home?	1	2	3	4	5

Complaints/Concern About Fire Behaviour

	Not At All		Somewhat		Very Much
How often do you receive complaints about his/her behaviour, in general, from others in the community?	1	2	3	4	5
To what extent do you receive complaints about his/her play with fire from others in the community?	1	2	3	4	5
How often do you worry about him/her playing with fire when he/she is left unattended?	1	2	3	4	5

Exposure to Peer/Family Models

	Not At All		Available/Not Easy To Get To		Available or Easy To Get To
How available are matches, lighters or other fire starting materials at his/her school or in his/her friends' homes?	1	2	3	4	5
How available are matches, lighters, or other fire starting materials in or around your home?	1	2	3	4	5

	Not All The Time	Some Of The Time		Almost Always	
How often is he/she in the presence of friends who smoke anywhere outside the home (e.g., school, friends' homes)?	1	2	3	4	5
How often is there a cigarette or pipe smoking in your home?	1	2	3	4	5

	None	One	Two	Three	Four or More
How many times have other family members been burned or hurt because of a fire in the last year?	1	2	3	4	5
How many people who live at home including yourself, smoke cigarettes or pipes?	1	2	3	4	5
How many family members have an interest or fascination with fire?	1	2	3	4	5

	None	One	Two	Three or Four	Five
How many family members has he/she observed playing with matches or lighting fires in the last year?	1	2	3	4	5
How many other persons in your neighbourhood have been burned or hurt because of a fire in the last year?	1	2	3	4	5
How many times has he/she ever been burned or hurt because of a fire in the last year?	1	2	3	4	5
How many times have other family members been burned or hurt because of a fire in the last year?	1	2	3	4	5
How many of his/her friends smoke or experiment with smoking?	1	2	3	4	5
How many fires have there been in your neighbourhood in the last year?	1	2	3	4	5

Involvement in Fire Related Activities

	None	One	Two	Three	Four or More
How many times has your child ever hidden matches, lighters, or other fire starting materials?	1	2	3	4	5
How many times has your child left burn marks on things in your home?	1	2	3	4	5
How many times has anyone, like school officials, the police, or your neighbours, told someone in your family about your child's playing with fire?	1	2	3	4	5

Early Experiences with Fire

	No	Yes
Were there any smokers living in your home more than one year ago?	0	1
Did any members of your family play with matches or lighters, or light fires more than one year ago?	0	1
Was your child exposed to any neighbourhood fires or to other people who played with fire more than one year ago?	0	1
More than one year ago, did your child ever play with matches/lighters or fire?	0	1
Did your child ever show any special interest in fire more than one year ago?	0	1

Appendix E

Child Behaviour Checklist (CBCL)



Please print

CHILD BEHAVIOR CHECKLIST FOR AGES 6-18

For office use only
ID # _____

CHILD'S FULL NAME First Middle Last

CHILD'S GENDER Boy Girl CHILD'S AGE CHILD'S ETHNIC GROUP OR RACE

TODAY'S DATE Mo. ___ Day ___ Year ___ CHILD'S BIRTHDATE Mo. ___ Day ___ Year ___

GRADE IN SCHOOL _____
NOT ATTENDING SCHOOL

Please fill out this form to reflect your view of the child's behavior even if other people might not agree. Feel free to print additional comments beside each item and in the space provided on page 2. **Be sure to answer all items.**

PARENTS' USUAL TYPE OF WORK, even if not working now. (Please be specific — for example, auto mechanic, high school teacher, homemaker, laborer, lathe operator, shoe salesman, army sergeant.)

PARENT 1 (or FATHER) TYPE OF WORK _____
PARENT 2 (or MOTHER) TYPE OF WORK _____

THIS FORM FILLED OUT BY: (print your full name)

Your gender: Man Woman Other (specify)

Your relation to the child:

Biological Parent Step Parent Grandparent

Adoptive Parent Foster Parent Other (specify): _____

I. Please list the sports your child most likes to take part in. For example: swimming, baseball, skating, skate boarding, bike riding, fishing, etc.

- None
- a. _____
- b. _____
- c. _____

Compared to others of the same age, about how much time does he/she spend in each?

Less Than Average	Average	More Than Average	Don't Know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Compared to others of the same age, how well does he/she do each one?

Below Average	Average	Above Average	Don't Know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

II. Please list your child's favorite hobbies, activities, and games, other than sports. For example: video games, dolls, reading, piano, crafts, cars, computers, singing, etc. (Do not include listening to radio, TV, or other media.)

- None
- a. _____
- b. _____
- c. _____

Compared to others of the same age, about how much time does he/she spend in each?

Less Than Average	Average	More Than Average	Don't Know
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Compared to others of the same age, how well does he/she do each one?

Below Average	Average	Above Average	Don't Know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

III. Please list any organizations, clubs, teams, or groups your child belongs to.

- None
- a. _____
- b. _____
- c. _____

Compared to others of the same age, how active is he/she in each?

Less Active	Average	More Active	Don't Know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IV. Please list any jobs or chores your child has. For example: doing dishes, babysitting, making bed, working in store, etc. (Include both paid and unpaid jobs and chores.)

- None
- a. _____
- b. _____
- c. _____

Compared to others of the same age, how well does he/she carry them out?

Below Average	Average	Above Average	Don't Know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Be sure you answered all items. Then see other side.

Please print. Be sure to answer all items.

V. 1. About how many close friends does your child have? (Do *not* include brothers & sisters)

None 1 2 or 3 4 or more

2. About how many times a week does your child do things with any friends outside of regular school hours? (Do *not* include brothers & sisters)

Less than 1 1 or 2 3 or more

VI. Compared to others of his/her age, how well does your child:

	Worse	Average	Better	
a. Get along with his/her brothers & sisters?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Has no brothers or sisters
b. Get along with other kids?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. Behave with his/her parents?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. Play and work alone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

VII. 1. Performance in academic subjects.

Does not attend school because _____

	Failing	Below Average	Average	Above Average
<i>Check a box for each subject that child takes</i>				
a. Reading, English, or Language Arts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. History or Social Studies	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Arithmetic or Math	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. Science	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other academic subjects—for example: computer courses, foreign language, business. Do *not* include gym, shop, driver's ed., or other nonacademic subjects.

2. Does your child receive special education or remedial services or attend a special class or special school?

No Yes—kind of services, class, or school: _____

3. Has your child repeated any grades?

No Yes—grades and reasons: _____

4. Has your child had any academic or other problems in school?

No Yes—please describe: _____

When did these problems start?

Have these problems ended? No Yes—when? _____

Does your child have any illness or disability (either physical or mental)? No

Yes—please describe: _____

What concerns you most about your child? _____

Please describe the best things about your child. _____

Please print. Be sure to answer all items.

Below is a list of items that describe children and youths. For each item that describes your child *now or within the past 6 months*, please circle the **2** if the item is *very true or often true* of your child. Circle the **1** if the item is *somewhat or sometimes true* of your child. If the item is *not true* of your child, circle the **0**. Please answer all items as well as you can, even if some do not seem to apply to your child.

0 = Not True (as far as you know)

1 = Somewhat or Sometimes True

2 = Very True or Often True

0	1	2	1. Acts too young for his/her age	0	1	2	32. Feels he/she has to be perfect
0	1	2	2. Drinks alcohol without parents' approval (describe):	0	1	2	33. Feels or complains that no one loves him/her
0	1	2	3. Argues a lot	0	1	2	34. Feels others are out to get him/her
0	1	2	4. Fails to finish things he/she starts	0	1	2	35. Feels worthless or inferior
0	1	2	5. There is very little he/she enjoys	0	1	2	36. Gets hurt a lot, accident-prone
0	1	2	6. Bowel movements outside toilet	0	1	2	37. Gets in many fights
0	1	2	7. Bragging, boasting	0	1	2	38. Gets teased a lot
0	1	2	8. Can't concentrate, can't pay attention for long	0	1	2	39. Hangs around with others who get in trouble
0	1	2	9. Can't get his/her mind off certain thoughts; obsessions (describe):	0	1	2	40. Hears sound or voices that aren't there (describe):
0	1	2	10. Can't sit still, restless, or hyperactive	0	1	2	41. Impulsive or acts without thinking
0	1	2	11. Clings to adults or too dependent	0	1	2	42. Would rather be alone than with others
0	1	2	12. Complains of loneliness	0	1	2	43. Lying or cheating
0	1	2	13. Confused or seems to be in a fog	0	1	2	44. Bites fingernails
0	1	2	14. Cries a lot	0	1	2	45. Nervous, highstrung, or tense
0	1	2	15. Cruel to animals	0	1	2	46. Nervous movements or twitching (describe):
0	1	2	16. Cruelty, bullying, or meanness to others	0	1	2	47. Nightmares
0	1	2	17. Daydreams or gets lost in his/her thoughts	0	1	2	48. Not liked by other kids
0	1	2	18. Deliberately harms self or attempts suicide	0	1	2	49. Constipated, doesn't move bowels
0	1	2	19. Demands a lot of attention	0	1	2	50. Too fearful or anxious
0	1	2	20. Destroys his/her own things	0	1	2	51. Feels dizzy or lightheaded
0	1	2	21. Destroys things belonging to his/her family or others	0	1	2	52. Feels too guilty
0	1	2	22. Disobedient at home	0	1	2	53. Overeating
0	1	2	23. Disobedient at school	0	1	2	54. Overtired without good reason
0	1	2	24. Doesn't eat well	0	1	2	55. Overweight
0	1	2	25. Doesn't get along with other kids	0	1	2	56. Physical problems <i>without know medical cause</i> :
0	1	2	26. Doesn't seem to feel guilty after misbehaving	0	1	2	a. Aches or pains (<i>not</i> stomach or headaches)
0	1	2	27. Easily jealous	0	1	2	b. Headaches
0	1	2	28. Breaks rules at home, school, or elsewhere	0	1	2	c. Nausea, feels sick
0	1	2	29. Fears certain animals, situations, or places, other than school (describe):	0	1	2	d. Problems with eyes (<i>not</i> if corrected by glasses) (describe):
0	1	2	30. Fears going to school	0	1	2	e. Rashes or other skin problems
0	1	2	31. Fears he/she might think or do something bad	0	1	2	f. Stomachaches
				0	1	2	g. Vomiting, throwing up
				0	1	2	h. Other (describe):

Please print. Be sure to answer all items.

0 = Not True (as far as you know)

1 = Somewhat or Sometimes True

2 = Very True or Often True

0 1 2 57. Physically attacks people	0 1 2 84. Strange behavior (describe):
0 1 2 58. Picks nose, skin, or other parts of body (describe):	_____
_____	0 1 2 85. Strange ideas (describe):
0 1 2 59. Plays with own sex parts in public	_____
0 1 2 60. Plays with own sex parts too much	0 1 2 86. Stubborn, sullen, or irritable
0 1 2 61. Poor school work	0 1 2 87. Sudden changes in mood or feelings
0 1 2 62. Poorly coordinated or clumsy	0 1 2 88. Sulks a lot
0 1 2 63. Prefers being with older kids	0 1 2 89. Suspicious
0 1 2 64. Prefers being with younger kids	0 1 2 90. Swearing or obscene language
0 1 2 65. Refuses to talk	0 1 2 91. Talks about killing self
0 1 2 66. Repeats certain acts over and over; compulsions (describe):	0 1 2 92. Talks or walks in sleep (describe):
_____	_____
0 1 2 67. Runs away from home	0 1 2 93. Talks too much
0 1 2 68. Screams a lot	0 1 2 94. Teases a lot
0 1 2 69. Secretive, keeps things to self	0 1 2 95. Temper tantrums or hot temper
0 1 2 70. Sees things that aren't there (describe):	0 1 2 96. Thinks about sex too much
_____	0 1 2 97. Threatens people
0 1 2 71. Self-conscious or easily embarrassed	0 1 2 98. Thumb-sucking
0 1 2 72. Sets fires	0 1 2 99. Smokes, chews, or sniffs tobacco
0 1 2 73. Sexual problems (describe):	0 1 2 100. Trouble sleeping (describe):
_____	_____
0 1 2 74. Showing off or clowning	0 1 2 101. Truancy, skips school
0 1 2 75. Too shy or timid	0 1 2 102. Underactive, slow moving, or lacks energy
0 1 2 76. Sleeps less than most kids	0 1 2 103. Unhappy, sad, or depressed
0 1 2 77. Sleeps more than most kids during day and/or night (describe):	0 1 2 104. Unusually loud
_____	0 1 2 105. Uses drugs for nonmedical purposes (<i>don't</i> include alcohol or tobacco) (describe):
0 1 2 78. Inattentive or easily distracted	_____
0 1 2 79. Speech problem (describe):	0 1 2 106. Vandalism
_____	0 1 2 107. Wets self during the day
0 1 2 80. Stares blankly	0 1 2 108. Wets the bed
0 1 2 81. Steals at home	0 1 2 109. Whining
0 1 2 82. Steals outside the home	0 1 2 110. Wishes to be of opposite sex
0 1 2 83. Stores up too many things he/she doesn't need (describe):	0 1 2 111. Withdrawn, doesn't get involved with others
_____	0 1 2 112. Worries
	113. Please write in any problems your child has that were not listed above:

	0 1 2 _____
	0 1 2 _____
	0 1 2 _____

Appendix F

The Fire History Screen (FHS)

Date: _____

Please answer each question as best you can about the child/adolescent who participated in the Juvenile Fire and Awareness Program in 2010 – 2012. This information is necessary for us to learn about the factors that may predict whether a child/adolescent with a history of firesetting behaviour will continue to set fires.

Firesetting

1. Based on the LAST 12 MONTHS, would you say that your child has been interested in fire – that is, did he/she seem to like fire or be attracted to fire?

Yes No

2. In the LAST 12 MONTHS, how many times did your child burn something like paper, clothes, furniture, walls or the house, or set something on fire, without permission from an adult (excluding the incident for which the child/adolescent was referred to the Juvenile Fire and Awareness Program)?

3. What did your child burn or set on fire in the most recent incident?

4. (a) Were fire fighters called to the most recent incident?

Yes No

- (b) Did an investigator write up a report about the most recent fire?

Yes No

5. (If applicable) What else was burned the other times, beginning with the next most recent incident?

6. What was the most serious damage caused by any of these incidents?

7. (a) Were the fire fighters called to the incident that caused the most damage?

Yes No

(b) Did an investigator write up a report about the fire that caused the most damage?

Yes No

Matchplay

8. Did your child ever just play with matches, lighters, or the stove, without burning anything else, IN THE LAST 12 MONTHS?

Yes No

9. How about how often do you think he/she did this?

10. In that time period, was your child seen with any matches or lighters, or where they in his/her possession (i.e. like in his/her room)?

Yes No

11. About how often do you think he/she did this?

12. In that time period, did your child talk about fire?

Yes No

13. About how often do you think he/she did this?

Appendix G

The Questionnaire about Mental Health Services

NOTE TO PARENT/GUARDIAN: *The following questions are only applicable if the child/adolescent has received counselling or mental health services in the past twelve months since completing the Juvenile Fire Awareness and Intervention Program. If this does not apply to the child/adolescent, please disregard.*

The following asks about any contact the child/adolescent has had with a counselling or mental health agency in the past twelve months since completing the Juvenile Fire Awareness and Intervention Program. Please circle the correct response or answer in the space provided. Additional comments welcome.

Please be aware that we will NOT approach any agency based on this information. Your answers are confidential and will not influence the services you or the child/adolescent will receive.

1. Has the child/adolescent received any services from services from a counsellor or mental health agency in the LAST 12 MONTHS?

Yes No

If so, what type of professional provided this service (i.e. social worker, psychologist)?

2. When did the child/adolescent first receive this service (i.e. approximate date of the first visit)?

3. How many sessions has the child/adolescent participated in during the LAST 12 MONTHS?

4. How often did or does the child/adolescent receive this service (i.e. weekly, fortnightly, monthly)?

5. What was the child/adolescent's main presenting problem when contact with this service began?

6. Please outline the nature of the service the child/adolescent received or currently receives.

7. Who attended or attends the sessions with the child/adolescent?

Mother

Father

Parents

Family

Other: _____

8. How much do you agree with the following statement:

"The child/adolescent was engaged during the sessions"

Strongly Disagree

Disagree

Agree

Strongly Agree

Comments (Optional)

9. What was or is this child/adolescent's diagnosis?

- None _____
- I Don't Know _____
- Conduct Disorder _____
- Oppositional Disorder _____
- Attention Deficit Hyperactivity Disorder _____
- Asperger's Syndrome _____
- Autism _____
- Other (please specify) _____

10. This child/adolescent has demonstrated firesetting behaviour. Was or is this behaviour addressed by the services through the provision of an intervention or therapy that specifically deals with firesetting?

Yes No

(a) If no, please outline the reasons why you believe the service did not address this behaviour.

(b) If yes, how was the firesetting behaviour addressed by the service?

(c) If yes, how much do you agree with the following statement:

"This therapy/treatment for firesetting was effective for the child/adolescent"

Strongly Disagree

Disagree

Agree

Strongly Agree

Please state the reason for your choice.

11. Overall, I am happy with the service the child/adolescent has received or is still receiving.

Yes No

(a) If yes, what has been the most helpful aspect of the services?

(b) If no, how do you think the service could be improved?

Appendix H

The Questionnaire for the Counsellor or Mental Health Professional

ID: _____

Date: _____

QUESTIONNAIRE FOR COUNSELLOR OR MENTAL HEALTH PROFESSIONAL

The questions below relate to _____
(name of child/adolescent) and the services he/she received from you within the past twelve months. Please circle the correct response or answer in the space provided. Additional comments welcome.

1. When did this child/adolescent first receive services from you or your agency? (i.e. the date of the first visit)

For how many sessions did you, or another professional in your agency, see this child/adolescent?

2. Did or does the child/adolescent attend scheduled appointments?
(Please circle)

Yes No

Who attended or attends appointments with the child/adolescent?

3. How much do you agree with the following statement:

“The child/adolescent was engaged during the sessions”

Strongly Disagree

Disagree

Agree

Strongly Agree

Comments (Optional)

4. Is this child/adolescent still in your care? (Please circle)

Yes No

(a) *If no*, why is this the case? (i.e. therapy complete, child/adolescent has terminated services)

5. What was the child/adolescent's presenting problem when they first had contact with you or your agency?

6. What was or is this child/adolescent's treatment? (Please outline)

7. What was or is this child/adolescent's diagnosis?

- None _____
- Conduct Disorder _____
- Oppositional Disorder _____
- Attention Deficit Hyperactivity Disorder _____
- Asperger's Syndrome _____
- Autism _____
- Other (please specify) _____

8. This child has demonstrated firesetting behaviour. Was this behaviour specifically addressed by your services by an intervention or therapy?
(Please circle)

Yes No

(a) Please outline the reasons for your choice.

(b) If yes, how was the firesetting behaviour addressed by your services (i.e. what approach was taken, how did the intervention proceed, was the child/adolescent given homework tasks)?

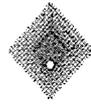
9. What were or are your recommendations for this child/adolescent?

Appendix I

Introduction letter to participants 1



**JUVENILE FIRE AWARENESS
and INTERVENTION PROGRAM**



**VICTORIA
UNIVERSITY**

**A NEW
SCHOOL OF
THOUGHT**

Dear Parent/Guardian,

You have received this package because you have expressed interest in obtaining information about a research study being conducted by the Juvenile Fire Awareness and Intervention Program in collaboration with Victoria University.

Please read the enclosed information: if you choose to participate in the study, it is important that you understand this information.

For your participation, you will receive a \$10 Target Gift Voucher.

Thank you for your interest. We hope that you choose to participate in the study.

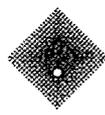
Kind Regards,

Esma Kurt
Student Researcher
Victoria University

Murray Talbot
Senior Station Officer
Community Education

Appendix J

Information to parents of children/adolescents involved in research document 1



INFORMATION TO PARENTS OF CHILDREN/ADOLESCENTS INVOLVED IN RESEARCH

YOU ARE INVITED TO PARTICIPATE

You are invited to participate in a research study entitled *Improving Risk Prediction in Children and Adolescents with a History of Firesetting Behaviour*. This study is being conducted by Victoria University in collaboration with the Juvenile Fire Awareness and Intervention Program (Metropolitan Fire Brigade and the Country Fire Authority) by Professor Dorothy Bruck and Dr Michelle Ball from the School of Social Sciences and Psychology at the university. A student researcher will conduct the study as part of a Doctor of Philosophy (PhD) degree at Victoria University.

PROJECT EXPLANATION

This study will investigate firesetting behaviour in children and adolescents who are participating in the Juvenile Fire Awareness and Intervention Program. The purposes of the study are;

1. To develop an understanding of the factors that may predict whether a child or adolescent will continue to set fires
2. To investigate the role of counselling and mental health services in dealing with young firesetters

There are two parts to this study; one will be conducted now (Part A), and the other in twelve months time (Part B). The different parts represent when information will be collected and who will provide this information. You may choose to participate in all, or part of this study. We will only ask for you to consent to Part A of the study now. If you choose to participate, you will receive another package of information in twelve months time. Your consent to Part B will be asked then.

In Part A, we will ask you to provide information about your child and we will ask you to consent to your child being asked some additional questions to those asked as a normal part of the Juvenile Fire Awareness and Intervention Program. We will also ask for you to nominate a teacher that has recent knowledge of your child and consent to us asking them to provide some information about your child's behaviour at school. The information we obtain will allow us to determine whether there are any factors that can predict whether a child or adolescent who has completed the Juvenile Fire Awareness and Intervention Program will continue to set fires.

In Part B, we will ask you to provide information about your child's firesetting behaviour within twelve months of completing the Juvenile Fire Awareness and Intervention Program. This information will simply allow us to determine whether your child has continued to set fires. If a mental health professional has become involved for the child's firesetting since completing the program, we will ask you to consent to us sending a questionnaire to your child's mental health professional asking them to provide some information about the types of services they provided to the child. This information will help us to understand what mental health services exist for children and adolescents and their firesetting behaviour.

As a parent, we ask you to consider discussing the study with your child to the extent to which you think they should know and will understand. We understand that you know your child best, therefore this is a matter for your judgement. Included in this package is a document to help you with this, however, if you need further assistance with making this decision, you can contact the research assistant at kara.patton@live.vu.edu.au.

WHAT WILL MY CHILD AND I BE ASKED TO DO?

In this package of information you have been sent, you will find several documents. The documents have been colour coded for your convenience and relate to this part of the study only.

PART A: What Will My Child and I Be Asked to Do Now?

1. The white documents are information and consent forms. If you choose to participate in the study it is important that you understand this information. If you consent to participate, and/or you consent for us to contact your child's teacher, you must sign the consent forms.
2. The yellow document provides some information about the study that you may discuss with your child if you decide to do so. This is a guide only.
3. The blue documents are to be completed by you, the parent or guardian. These questions will ask about your child's fire behaviour, behaviour in general and the family's past involvement with counselling or mental health services (if any). These documents can be completed at your convenience and returned directly to the student researcher in the reply paid envelope, or can be given to the firefighter practitioner during a Juvenile Fire Awareness and Intervention Program visit. When we receive your returned questionnaires, we will send you a \$10 Target gift voucher in the mail for your time and effort.
4. The cream document is a copy of what the firefighter practitioner will ask your child in the first Juvenile Fire Awareness and Intervention Program visit (only if you have given consent). The questions will ask about your family, your child's fire incident, and their involvement and interest in fire. The firefighter practitioner will read exactly from this form.
5. The green document is a copy of what will be sent to the teacher (only if you have given consent). These questions ask about your child's behaviour in the classroom; there will be no mention of fire in these questions. The teacher will be told that your child is participating in a university study, but will not be told that the study is fire related. It is also important to understand that the teacher will not be told about your child's involvement in the Juvenile Fire Awareness and Intervention Program. The teacher will be advised not to disclose information they provide for the research to you, your child or anyone outside the research team.

PART B: What Will My Child and I Be Asked To Do In Twelve Months Time?

If you choose to participate now, you will receive an information package about Part B in twelve months time. Your child will not participate in Part B. For Part B, you will be asked to complete one questionnaire. The questionnaire will comprise two sections; questions that will ask about (1) your child's fire behaviour since completing the Juvenile Fire Awareness and Intervention Program and

(2) the counselling or mental health services your child may have received in the past twelve months since completing the program. You will only be required to answer the questions in the section(s) that are applicable to your child. When we receive your returned questionnaires, we will send you a \$20 Target Gift Voucher in the mail for your time and effort.

If you consent, and if your child has received counselling/mental health services in the past twelve months since completing the Juvenile Fire Awareness and Intervention Program, we will send your child's counsellor or mental health professional one questionnaire that will ask about the services your child received.

It is important that you understand that your participation in this study is voluntary. If you do not wish to take part in the study you are under no obligation to do so. Also, if you decide to take part but later change your mind, *you are free to withdraw from the study at any time*. Your decision to take part or not to take part, or to take part and then withdraw, will not affect your relationship with the Juvenile Fire Awareness and Intervention Program, Victoria University or the agencies that may be providing services to your child.

WHAT WILL I GAIN FROM PARTICIPATING?

Your participation in the study will contribute to our understanding of young firesetters. If we can find ways to predict whether children and adolescents will continue to set fires we can develop and improve education, intervention and treatment programs to prevent them from harming themselves and others in the future.

Your contribution to the study will allow us to determine what mental health services are available to children and adolescents for their firesetting behaviour so that we can improve the quality of and access to these services in the future. To thank you and your child for your valuable contributions, we will send you a \$10 Target gift voucher in the mail when we receive your returned questionnaires for Part A and a \$20 Target gift voucher in the mail when we receive your returned questionnaires for Part B in twelve months time.

HOW WILL THE INFORMATION I GIVE BE USED

The information provided by you, your child, a teacher and mental health professional will only be identifiable and available to the student researcher, research assistant, Kara Patton and supervising researchers, Professor Dorothy Bruck and Dr Michelle Ball. All identifiable information relating to the study will be destroyed according to departmental procedures; after the minimum period of seven years after publication of the results. Only group data will be available to the Juvenile Fire Awareness and Intervention Program and findings of the study that are published will not identify individual participants. Please note that the information that is obtained for the purposes of the study will only be used in the context of this study, and not for any future behavioural study.

WHAT ARE THE POTENTIAL RISKS OF PARTICIPATING?

You may be concerned that the information you provide as part of this research will become more widely known. It is important that you understand that the information you provide to the firefighter practitioner relating to the study is subject to the confidentiality agreement of the Juvenile Fire

Awareness and Intervention Program. This agreement will be explained to you by the firefighter practitioner. However, please be assured that the information you provide in your questionnaires and the information that is provided by the teacher and mental health professional will remain completely confidential.

You may worry that your child's school may find out about their firesetting through their teacher completing our questionnaire. This will not happen because there will be no reference to the Juvenile Fire Awareness and Intervention Program, Metropolitan Fire Brigade, Country Fire Authority or firesetting in the teacher's questionnaire. Also, we will ask that you and the teacher do not discuss the study with each other. We will also ask the teacher not to discuss the study with your child.

You may also be concerned that your child may become upset during the study. It is not expected that the study will provoke any feelings in your child beyond those they may experience as part of the Juvenile Fire Awareness and Intervention Program. Please be aware that the firefighter practitioners have been specially trained for the Juvenile Fire Awareness and Intervention Program and are trained in dealing with these feelings.

Should you or your child become distressed as a result of the study, please contact Professor Gerard Kennedy, psychologist and senior lecturer at Victoria University on 9919 2481, or the research assistant, Kara Patton.

HOW WILL THIS PROJECT BE CONDUCTED?

The project will be conducted using questionnaires. Information will be collected now, and again in twelve months time. All the information relating to the study will be sent to you in the post. If you choose to participate in the study, you will receive another package of information in twelve months time. As a parent or guardian, you are asked to consent to your child taking part in this study, however, the extent to which you discuss this with your child is up to you and your knowledge of how much you think your child should know and will understand.

WHO IS CONDUCTING THE STUDY?

The Juvenile Fire Awareness and Intervention Program

Murray Talbot: jfaipoffice@mfb.vic.gov.au

Victoria University

Professor Dorothy Bruck: dorothy.bruck@vu.edu.au

Dr. Michelle Ball: michelle.ball@vu.edu.au

Kara Patton: kara.patton@live.vu.edu.au

If you have any questions or concerns about your participation, please contact the research assistant, Kara Patton, at the above email.

Please be aware that firefighter practitioners may not be able to answer all the questions you may have about the study so it is important that you direct your questions and concerns to the student researcher.

This study has been approved by the Victoria University Human Research Ethics Committee (VUHREC).

If you have any concerns or complaints about the conduct of this project, please contact: Ethics and Biosafety Coordinator, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 Phone (03) 9919 4148

Appendix K

Directions to parents of children/adolescents involved in research document 1



DIRECTIONS TO PARENTS OF CHILDREN INVOLVED IN RESEARCH

We invite you to consider discussing your child's involvement in the research project, *Improving Risk Prediction in Children and Adolescents with a History of Firesetting Behaviour* with your child, to the extent to which you think they will understand. This is a matter for your judgment. Please remember, that for the child, their involvement in the project is to be asked 14 questions by the firefighter practitioner, additional to those asked as a normal part of the Juvenile Fire Awareness and Intervention Program. Below is some information that you could use as a basis to inform your child, *if you decide to do so*.

WHAT THE PROJECT IS ABOUT AND WHY IT IS BEING DONE

The project is about children and adolescents who are taking part in the Juvenile Fire Awareness and Intervention Program. The project seeks to understand why young people play with fire and if they continue to play with fire after they complete the Juvenile Fire Awareness and Intervention Program. The project is being done to help us understand more about young people who play with fire. The more we know, the more we can do to help children and adolescents who play with fire to stop them from potentially hurting themselves or other people.

WHAT THE CHILD/ADOLESCENT WILL BE ASKED TO DO

A firefighter practitioner will be coming to visit your child and teach them about fire. They will ask your child some questions – this is a normal part of the program. For the purposes of the project, the firefighter practitioner will ask your child 14 additional questions about themselves, their family and about playing with fire. They are short questions, very similar to those asked as a normal part of the Juvenile Fire Awareness and Intervention Program and will not take long for the child to answer.

WHAT HAPPENS WITH THE INFORMATION THEY PROVIDE?

You will be asked to be in the room with your child during the visit from the firefighter practitioner. Whatever your child discloses to the firefighter will not be communicated to anyone else. Your child will not be in trouble for playing with fire.

WHAT HAPPENS IF THE CHILD/ADOLESCENT DOES NOT WANT TO PARTICIPATE?

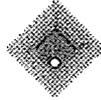
If your child does not want to participate, that is okay. If they don't, they will still take part in the Juvenile Fire Awareness and Intervention Program. Also, if the child would like to participate, but later changes their mind that is okay. Make sure the firefighter practitioner or the student researcher is aware that the child does not want to participate in the research.

WHO CAN BE CONTACTED TO ANSWER THEIR QUESTIONS OR CONCERNS?

If you or your child have any questions, the student researcher can be contacted at Kara.Patton k.patton@live.vu.edu.au or on 01223 191111.

Appendix L

Consent form for parents and children/adolescents involved in research Part A



**VICTORIA
UNIVERSITY**

**A NEW
SCHOOL OF
THOUGHT**

ID: _____

CONSENT FORM FOR PARENTS AND CHILDREN/ ADOLESCENTS INVOLVED IN RESEARCH PART A

INFORMATION TO PARTICIPANTS:

You are invited to participate in a study entitled *Improving Risk Prediction in Children and Adolescents with a History of Firesetting Behaviour*. This study is being conducted by Victoria University in collaboration with the Juvenile Fire Awareness and Intervention Program (Metropolitan Fire Brigade and the Country Fire Authority) by Professor Dorothy Bruck and Dr Michelle Ball from the School of Social Sciences and Psychology at the university. The student researcher, Esma Kurt, will conduct the study as part of a Doctor of Philosophy (PhD) degree at Victoria University.

This study will investigate firesetting behaviour in children and adolescents who are participating in the Juvenile Fire Awareness and Intervention Program. The purpose of the study is to develop an understanding of the factors that may predict whether a child/adolescent will continue to set fires. The study will also investigate the role of counselling and mental health services in dealing with child/adolescent firesetters.

CERTIFICATION BY PARENT

I, _____ (name of parent/guardian) of _____ (suburb of parent/guardian) certify that I am at least 18 years old* and that I am voluntarily giving my consent for _____ (name of child/adolescent) to participate in the study *Improving Risk Prediction in Children and Adolescents with a History of Firesetting Behaviour* being conducted at Victoria University by Professor Dorothy Bruck and Dr Michelle Ball and Esma Kurt.

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by the document, 'Information to Parents of Children/Adolescents Involved in Research' and that any additional questions have been answered by Murray Talbot (Juvenile Fire Awareness and Intervention Program coordinator) or Esma Kurt (student researcher), and that I freely consent to participation involving the below mentioned procedures:

- I understand that my child will be asked questions from one questionnaire by a firefighter practitioner in the first Juvenile Fire Awareness and Intervention Program visit.
- I understand that my participation in Part A means that I will be invited to participate in Part B of the study. I understand that I will be sent another package in twelve months time that will include the relevant information for Part B. I am aware that my participation in Part B is voluntary and that my consent to participate in Part B will be asked in twelve months time. In order to help this happen, I am happy to provide *at least two* contact details:

1. My Contact Number (e.g. home or mobile): _____

2. My Email Address: _____

3. Other Contact Number (e.g. family/friend):

- I understand that the researchers may contact me to obtain the address where my gift vouchers will be sent.
- I also understand that I have been asked to consider discussing the study with my child to the extent to which I feel they should know and will understand.

I certify that I have had the opportunity to have any questions answered by contacting the student researcher, Esma Kurt, on 0403 533 514, or, at esma.kurt@live.vu.edu.au, and I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me, or my child in any way. I have been informed that the information I provide will be kept confidential.

Signed (Parent/Guardian):

Date:

Any queries about your participation in this project may be directed to the researchers.

Professor Dorothy Bruck: dorothy.bruck@vu.edu.au

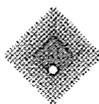
Dr. Michelle Ball: michelle.ball@vu.edu.au

Esma Kurt: esma.kurt@live.vu.edu.au

If you have any queries or complaints about the way you have been treated, you may contact the Ethics & Biosafety Coordinator, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001, Phone (03) 9919 4148.

Appendix M

Letter of appreciation 1



**VICTORIA
UNIVERSITY**

**A NEW
SCHOOL OF
THOUGHT**

Dear

Thank you for your contribution to the research study being conducted by Victoria University in collaboration with the Juvenile Fire Awareness and Intervention Program.

Enclosed is a \$10 Coles-Myer Gift Vouchers to thank you for your involvement.

Kind Regards,

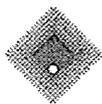
Esma Kurt

Student Researcher

Victoria University

Appendix N

Introduction letter to participants 2



**VICTORIA
UNIVERSITY**

**A NEW
SCHOOL OF
THOUGHT**

Dear Parent/Guardian,

As you may remember, your child/adolescent completed the Juvenile Fire Awareness and Intervention Program within the last year and you both participated in the research study being conducted by the Juvenile Fire Awareness and Intervention Program, in collaboration with Victoria University. The enclosed information relates to completing your part in the study.

Please read the enclosed information: if you choose to complete your part in the study, it is important that you understand this information. For your participation, you will receive another \$20 Target Gift Voucher.

Thank you for your participation so far. We hope that you choose to complete our study.

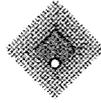
Kind Regards,

Esma Kurt
Student Researcher
Victoria University

Murray Talbot
Senior Station Officer
Community Education

Appendix O

Information to parents of children/adolescents involved in research document 2



INFORMATION TO PARENTS OF CHILDREN/ ADOLESCENTS INVOLVED IN RESEARCH

YOU ARE INVITED TO PARTICIPATE

You are invited to complete your part in the study, *Improving Risk Prediction in Children and Adolescents with a History of Firesetting Behaviour*. As you may recall, this study is being conducted by Victoria University in collaboration with the Juvenile Fire Awareness and Intervention Program (Metropolitan Fire Brigade and the Country Fire Authority) by Professor Dorothy Bruck and Dr Michelle Ball from the School of Social Sciences and Psychology at the university. The student researcher, Esmá Kurt, will conduct the study as part of a Master of Clinical Psychology degree at Victoria University.

PROJECT EXPLANATION

This study will investigate firesetting behaviour in children and adolescents who are participating in the Juvenile Fire Awareness and Intervention Program. The purposes of the study are;

1. To develop an understanding of the factors that may predict whether a child or adolescent will continue to set fires.
2. To investigate the role of counselling and mental health services in dealing with young firesetters.

There are two parts to this study; A and B. You and your child completed Part A twelve months ago. You will now be asked to complete Part B. This is the second and final part of the study.

In Part A, we asked you to provide information about your child. We also asked your child for information, and we may have obtained information from your child's teacher. In Part B, we will ask you to provide information about your child's firesetting behaviour within twelve months of completing the Juvenile Fire Awareness and Intervention Program. This information will simply allow us to determine whether your child has continued to set fires. If a mental health professional has become involved for the child's firesetting since completing the program, we will ask for you to consent to us sending a questionnaire to your child's mental health professional asking them to provide some information about the types of services they provided to the child. This information will help

us to understand what mental health services exist for children and adolescents and their firesetting behaviour.

WHAT WILL I BE ASKED TO DO?

In this package of information you have been sent, you will find several documents. The documents have been colour coded for your convenience and relate to Part B of the study only.

1. The white documents are information and consent forms. If you choose to participate in the study it is important that you understand this information. If you and your child consent to use contacting your child's mental health professional, you and your child must sign the consent form.
2. The blue documents are to be completed by you. Your questionnaire will comprise two sections; questions that will ask about (1) your child's fire behaviour since completing the Juvenile Fire Awareness and Intervention Program and (2) the counselling or mental health services your child may have received in the past twelve months since completing the program. You will only be required to answer the questions in the section(s) that are applicable to your child. On receiving returned questionnaires, you will be sent a \$20 Target gift voucher for your time and effort.
3. If you consent, and if your child has received counselling/mental health services in the past twelve months since completing the Juvenile Fire Awareness and Intervention Program, your child's counsellor or mental health professional will be asked to complete a questionnaire. The pink document is a copy of what will be sent to the child's mental health professional. These questions ask about the services and treatment your child has received in the past twelve months. The mental health professional will be advised not to disclose the information to anyone outside the research team.

It is important that you understand that your participation in this study is voluntary. If you do not wish to take part in the study, you are under no obligation to do so. Also, if you decide to take part, but later change your mind, you are free to withdraw from the study at any time. Your decision to take part or not to take part, or to take part and then withdraw, will not affect your relationship with the Juvenile Fire Awareness and Intervention Program, Victoria University or the agencies that may be providing services to the child/adolescent.

WHAT WILL I GAIN FROM PARTICIPATING?

Your participation in the study will contribute to our understanding of young firesetters. If we can find ways to predict whether children and adolescents will continue to set fires we can develop and improve education, intervention and treatment programs to prevent them from harming themselves and others in the future. Your contribution to the study will allow us to determine what mental health services are available to children and adolescents for their firesetting behaviour so that we can improve the quality of and access to these services in the future. To thank you for your valuable contribution, you will have received a \$10 Target gift voucher for Part A in the mail twelve months ago, and will receive a \$20 Target gift voucher for your participation in Part Two, the final part of the study in the mail when we receive your returned questionnaire.

HOW WILL THE INFORMATION I GIVE BE USED

The information provided by you, your child, a teacher and mental health professional will only be identifiable and available to the student researcher, Esma Kurt and supervising researchers, Professor Dorothy Bruck and Dr Michelle Ball. All identifiable information relating to the study will be destroyed according to departmental procedures; after the minimum period of seven years after publication of the results. Only group data will be available to the Juvenile Fire Awareness and Intervention Program and findings of the study that are published will not identify individual participants. Please note that the information that is obtained for the purposes of the study will only be used in the context of this study, and not for any future behavioural study.

WHAT ARE THE POTENTIAL RISKS OF PARTICIPATING?

You may be concerned that the information you provide as part of this research will become more widely known. Please be assured that every effort will be taken to ensure that the information you provide will remain completely confidential. Your child may be concerned about the involvement of their mental health professional in the research. We ask that you consider discussing this with your child to the extent to which you think they should know and will understand. This is a matter for your judgement. Should you or your child become distressed as a result of the study, please contact Professor Gerard

Kennedy, psychologist and senior lecturer at Victoria University on 9919 2481, or the student researcher, Esma Kurt.

HOW WILL THIS PROJECT BE CONDUCTED?

The project will be conducted using questionnaires. This is the final part of the study. You will not be contacted again to provide information for the purposes of the research.

WHO IS CONDUCTING THE STUDY?

The Juvenile Fire Awareness and Intervention Program

Murray Talbot: jfaipoffice@mfb.vic.gov.au

Victoria University

Professor Dorothy Bruck: dorothy.bruck@vu.edu.au

Dr. Michelle Ball: michelle.ball@vu.edu.au

Esma Kurt: esma.kurt@live.vu.edu.au

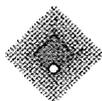
If you have any questions or concerns about your participation, please contact the student researcher, Esma Kurt, at the above email, or on 0403 533 514.

This study has been approved by the Victoria University Human Research Ethics Committee (VUHREC).

If you have any concerns or complaints about the conduct of this project, please contact: Ethics and Biosafety Coordinator, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001
Phone (03) 9919 4148.

Appendix P

Consent form for participants involved in research Part B



ID: _____

CONSENT FORM FOR PARTICIPANTS INVOLVED IN RESEARCH

INFORMATION TO PARTICIPANTS:

We would like to invite you to complete your part in the study conducted by the Juvenile Fire Awareness and Intervention Program (The Metropolitan Fire Brigade and The Country Fire Authority) in collaboration with Victoria University. The student researcher, Esma Kurt, is conducting the project as part of a Doctorate in Clinical Psychology degree at Victoria University under the supervision of Professor Dorothy Bruck and Dr Michelle Ball from the School of Social Sciences and Psychology at the university. This study is investigating firesetting behaviour in children and adolescents who have been referred to the Juvenile Fire Awareness and Intervention Program. The purpose of the study is to develop an understanding of the factors that may predict whether a child/adolescent will continue to set fires. The study is also investigating the role of the mental health services in dealing with child/adolescent firesetters.

CERTIFICATION OF PARTICIPATION

I, _____ (name
of parent/guardian)

of _____ (suburb
of parent/guardian) certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in the study *Improving Risk Prediction in Children and Adolescents with a History of Firesetting Behaviour* being conducted at Victoria University by Esma Kurt, Professor Dorothy Bruck and Dr Michelle Ball.

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by the document, 'Information to Participants Involved in Research', and that I free consent to participation involving the below mentioned procedures:

Please turn over.

Please tick the box below to participate in Part C. Your Consent means you agree to the conditions that apply to that part.

Part C

- I give consent for the student researcher, Esma Kurt, to send a questionnaire to _____
(name of child/adolescent's counsellor or mental health professional).

Note: If you consent to Part C, you must also sign the 'Certification by Parent/Guardian about Contact with Counsellors or Mental Health Professional' as this will be forwarded to the counsellor or mental health professional.

I certify that I have had the opportunity to have any questions answered by contacting the student researcher, Esma Kurt, on 0403 533 514, or at esma.kurt@live.vu.edu.au, and I understand that I can withdraw from this study at any time and withdrawal will not jeopardise me in any way.

I have been informed that the information I will provide will be kept confidential.

Signed:

Date:

Any queries about your participation in this project may be directed to the researcher Professor Dorothy Bruck, 9919 2336.

If you have any queries or complaints about the way you have been treated, you may contact the Ethics and Biosafety Coordinator, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001, Phone (03) 9919 4148.

Appendix Q

Consent to contact the mental health professional



**VICTORIA
UNIVERSITY**

**A NEW
SCHOOL OF
THOUGHT**

ID: _____

**CERTIFICATION BY PARENT/GUARDIAN TO CONTACT
COUNSELLOR OR MENTAL HEALTH PROFESSIONAL**

I, _____ (name of parent/guardian)
certify that I am at least 18 years old and that I am voluntarily giving my consent
for _____ (name of counsellor/mental
health professional) of _____ (name of
organisation) to share information about _____
(name of child/adolescent) with the researchers, Esma Kurt, Professor Dorothy
Bruck and Dr Michelle Ball from Victoria University.

I certify that the objectives of the study, together with any risks and safeguards
associated with the procedures listed hereunder to be carried out in the
research, have been fully explained to me by Esma Kurt, and that I freely
consent to participation involving the below mentioned procedures:

I understand that the student researcher, Esma Kurt, will contact this
professional and will ask them to complete a questionnaire about the services
my child has received from them in the past twelve months.

I certify that I have had the opportunity to read through the above and have had
my questions answered. I understand that I can withdraw from this study at any
time and that this withdrawal will not jeopardise me in any way. I have been
informed that the information that this professional provides will be kept
confidential.

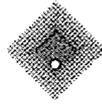
Signed (Parent/Guardian):

Date:

**Please note that a copy of this form will be sent to the counsellor or
mental health professional.**

Appendix R

Information to the mental health professional involved in the research brief



**VICTORIA
UNIVERSITY**

**A NEW
SCHOOL OF
THOUGHT**

INFORMATION FOR MENTAL HEALTH PROFESSIONALS INVOLVED IN RESEARCH

To

My name is Esma Kurt and I am conducting a study as part of a Master of Clinical Psychology degree at Victoria University under the supervision of Professor Dorothy Bruck and Doctor Michelle Ball from the School of Social Sciences and Psychology at Victoria University.

I have been in contact with the family of _____
(name of child/adolescent), and they have given consent (attached) for me to approach you about completing a questionnaire about the services the child/adolescent received from you.

I acknowledge your busy work schedule, however I would be grateful if you could complete the survey for me within one week, and return to me in the reply paid envelope provided. It should take no longer than twenty minutes to complete.

The information you provide for the purposes of the study will be kept confidential. Under no circumstances will this information be shared with the child/adolescent or the parent/guardian. Furthermore, findings of the study that are published will be group data and will not identify you, the child/adolescent or the parent/guardian.

I ask that you do not disclose the information you provide about participants to anyone outside the research team. We have asked the parent/guardian to consider discussing the study with their child/adolescent to the extent to which they feel their child/adolescent should know and will understand. We feel that this is a matter for their judgement, therefore we ask you not to discuss the study in the presence of the child/adolescent.

If you have any questions or concerns about your participation in the study, I may be contacted on 0403 533 514 or at esma.kurt@live.vu.edu.au.
Your participation would be much appreciated.

Kind Regards,

Esma Kurt

Appendix S

Letter of Appreciation 2



**VICTORIA
UNIVERSITY**

**A NEW
SCHOOL OF
THOUGHT**



**JUVENILE FIRE AWARENESS
and INTERVENTION PROGRAM**

Dear

Thank you for your contribution to the research study being conducted by Victoria University in collaboration with the Juvenile Fire Awareness and Intervention Program.

Enclosed is a \$20 Coles-Myer Gift Vouchers to thank you for your involvement.

Kind Regards,

Esma Kurt
Student Researcher
Victoria University

Appendix T

Behaviour Risk Tool

Behaviour Risk Tool

Information for the Fire Practitioner

Administration & Scoring: This questionnaire (overleaf) should be given to parents/guardians to complete.

When receiving the completed questionnaire from parents/guardians, please check that ALL items have been responded to, and ask them to complete omitted items.

Score the questionnaire by adding responses to all items. The possible range of scores is 22-122. If the score adds up to **above the recommended cut off score of 57.5**, there is an increased risk of repeat firelighting.¹

Where the score is above the cut-off score parents/guardians should be told that their child has been identified as at risk and a referral for mental health services is recommended for assessment and, if indicated, treatment. Please give them the standard letter for their GP (in this pack). This letter asks the GP to give the parent/guardian a referral to mental health services with a Medicare rebate. If the child is already receiving mental health services please ask the parent/guardian to convey the recommended outcome of the questionnaire at their next appointment.

Once again, please check that the parent/guardian has responded to ALL the questions. Any Behaviour Risk Tool with missing responses for more than three questions may detrimentally impact on the identification of risk.

The child should participate in the JFAIP program regardless of their score on the Behaviour Risk Tool.

Thank you.

¹ This information is based on the results of a series of studies conducted by Victoria University over seven years that have developed and tested the Behaviour Risk Tool. The questionnaire may be copied and used without explicit permission from Victoria University but it may not be altered or used for any other purpose.

Behaviour Risk Tool

Child's Name _____

Date of Birth _____

Today's Date _____

Note: These questions are for parents/guardians to complete about their child's general behaviour.

For each question below please circle the ONE response that best describes your child. If you are not certain please choose the answer that seems most appropriate.

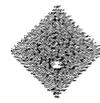
Please check that you have answered ALL questions.

	None	One	Two	Three	Four +
1. Including the current fireplay or firesetting incident, how many times has he/she played with fire, including matches or lighters or set something on fire?	0	1	2	3	4+
2. How many family members have a fascination with fire?	0	1	2	3	4+
3. How many times has he/she hidden matches, lighters or other fire starting materials?	0	1	2	3	4+
	Not at all		Somewhat		Very much
4. How curious is he/she about fire?	1	2	3	4	5
5. How often do you worry about him/her playing with fire when he/she is left unattended?	1	2	3	4	5
6. Does your child have difficulty sleeping?	1	2	3	4	5
7. Is your child generally fearful?	1	2	3	4	5
8. Does your child hoard non-essential items too much?	1	2	3	4	5
9. Does your child prefer to be on their own?	1	2	3	4	5
10. Is your child very shy?	1	2	3	4	5
11. Does your child swear or display uncontrolled verbal anger	1	2	3	4	5
12. Does your child sulk or mope if things don't go their way	1	2	3	4	5
13. Does your child have difficulty interacting well with other children/peers?	1	2	3	4	5
14. Does your child use threats against others?	1	2	3	4	5
15. Is your child dreamy or muddled?	1	2	3	4	5
16. Is your child dishonest (including telling lies)	1	2	3	4	5
17. Is your child nervous or easily upset	1	2	3	4	5
18. Does your child eat more than he/she should?	1	2	3	4	5
19. Does your child show depressed mood?	1	2	3	4	5
20. Does your child physically fight with peers or siblings?	1	2	3	4	5
21. Is your child prone to crying?	1	2	3	4	5
22. Does your child damage the property of others?	1	2	3	4	5
23. Is your child withdrawn from other children or people?	1	2	3	4	5
24. Does your child break set rules?	1	2	3	4	5
25. Is your child jealous of peers or siblings?	1	2	3	4	5

Please check that you have circled a number for ALL questions. Thank you.

Appendix U

Social media advertisement seeking participation for Study 2



VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

Do you have a child aged between 5 and 17?

If you answered **YES**, we would appreciate your help in completing two multiple choice questionnaires about your child/children's behaviour.

The results of this research based on general community responses will help us to assess the robustness of a measure currently being used in the Junior Fire Awareness and Intervention Program (JFAIP).

What does participation involve?

- Phase 1: Complete a short survey relating to your child's general behaviour.
- Phase 2: 14 days after completing the first survey, you will receive a link via email to complete the survey a second time.
- Each survey will take about 5 minutes per child and consists of multiple choice and demographic questions.
- The surveys can be completed wherever convenient for you and in your own time.

Please follow the link to find out more about the research study and/or to participate by completing the questionnaires.

[[LINK TO SURVEY 1](#)]

If you have any questions please contact a member of the research team:

Kara Dadswell

kara.dadswell@live.vu.edu.au
9919 9588

Dr Michelle Ball

Michelle.ball@vu.edu.au
9919 2536

Professor Dorothy Bruck

Dorothy.bruck@vu.edu.au
9919 2158

Appendix V

Automated pop-up message

"Before you continue with the questionnaire: If you have any concerns about your child's fire play/lighting you might be interested in contacting the Juvenile Fire Awareness and Intervention Program run jointly by the MFB and CFA. The program is designed to provide fire safety education targeted at young people engaging in fire risk behavior. For more information or to join the program please contact 1300 309 988 or email jfaipoffice@mfb.vic.gov.au"

Appendix W

Letter recommending referral to mental health services

Date: _____

Dear General Practitioner,

This letter is in reference to _____. He/she was referred to the Juvenile Fire Awareness and Intervention Program after involvement in a firelighting incident. He/she has scored above the cut-off on our questionnaire designed to assess risk of ongoing firelighting behavior (Behaviour Risk Tool), and some mental health assessment and possible treatment is thus indicated. The Behaviour Risk Tool has been developed and tested by Victoria University and found to have good sensitivity and specificity for identifying children at high risk for repeat firelighting.

It is recommended that referral to a psychologist, under the special referral process of the Mental Health Care Plan (that allows an initial six sessions, attracting a Medicare rebate), be considered.

If you require any further information, please contact the Juvenile Fire Awareness and Intervention Program (JFAIP) State-Coordinator on 1300 309 988.

Kind regards,

Murray Talbot
JFAIP State-Coordinator
MFB
1300 309 988.