

# **INSTITUTO UNIVERSITÁRIO EGAS MONIZ**

## **MESTRADO EM PSICOLOGIA FORENSE E CRIMINAL**

### **URBAN AND RURAL DELIBERATE FIRESETTERS RISK FACTORS: AN EXPLORATORY STUDY OF A PORTUGUESE SAMPLE OF INDIVIDUALS ON PROBATION**

Trabalho submetido por

**Maria Beatriz de Carvalho Tavares Ribeiro**

para a obtenção do grau de Mestre em Psicologia Forense e Criminal

**novembro de 2024**



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Trabalho orientado por

**Prof<sup>ª</sup>. Doutora Cristina Soeiro**

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**novembro de 2024**



### **Nota de Alteração de Título**

Devido a problemas logísticos da análise dos dados recolhidos, o título da dissertação teve de ser alterado para “Deliberate Firesetters Risk Factors: A systematic review”, uma vez que não foi possível realizar a análise exploratória prevista no título inicial.



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## Resumo

O número de incêndios tem aumentado globalmente, com dados alarmantes observados em países como Austrália, Inglaterra, Estados Unidos e Portugal. As características dos incendiários incluem características sociodemográficas, tais como dificuldades económicas e níveis baixos de educação, além de uma presença significativa de perturbações da personalidade, e abuso de substâncias. As motivações para a prática de incêndios variam, porém, as principais podem ser categorizadas como vingança e chamada de atenção, o que exemplifica a complexidade do fenómeno. Além disso, destaca-se a escassez de pesquisas que comparem incendiários em contextos urbanos e rurais, bem como a necessidade de desenvolvimento de ferramentas de avaliação de risco que integrem fatores de risco estáticos e dinâmicos. Este estudo procura sistematizar os fatores de risco associados aos incendiários, assim como contribuir para intervenções mais eficazes, baseadas em evidências, que visem a redução da reincidência. Os resultados mostram que os homens são mais propensos a comportamentos de incendiarismo motivados por vingança ou raiva, enquanto mulheres tendem a adotar estes comportamentos como uma chamada de atenção ou como uma tentativa de suicídio. As limitações na diversidade das origens dos estudos dificultam a generalização dos resultados, especialmente em relação às diferenças culturais que podem influenciar a presença de fatores de risco. A maioria dos estudos utiliza registos criminais e clínicos, no entanto, esta abordagem apresenta limitações, tais como a falta de informações sobre saúde mental e as características específicas dos crimes. Embora a literatura reconheça a prevalência de perturbações da personalidade e perturbações psicóticas entre incendiários, existe uma escassez no que concerne à recolha de dados relativos às características relacionadas ao fogo. Os resultados indicam a necessidade de futuras investigações sobre fatores de risco dinâmicos, além da realização de uma metanálise de modo a aprofundar a compreensão deste fenómeno.

**Palavras-chave:** *fatores de risco, incendiários, características individuais, avaliação de risco*



**Abstract**

The number of fires has increased globally, with alarming figures observed in countries such as Australia, England, the United States and Portugal. The characteristics of arsonists include socio-demographic features such as economic difficulties and low levels of education, as well as a significant presence of personality disorders and substance abuse. Motivations for setting fires vary, but the main ones can be categorised as revenge and attention-seeking, which exemplifies the complexity of the phenomenon. In addition, there is a lack of research comparing arsonists in urban and rural contexts, as well as the need to develop risk assessment tools that integrate static and dynamic risk factors. This study seeks to systematise the risk factors associated with arsonists, as well as contribute to more effective, evidence-based interventions aimed at reducing recidivism. The results show that men are more prone to arson behaviour motivated by revenge or anger, while women tend to adopt these behaviours as a call for attention or as a suicide attempt. Limitations in the diversity of the origins of the studies make it difficult to generalise the results, especially in relation to cultural differences that can influence the presence of risk factors. The majority of studies use criminal and clinical records, however Most studies use criminal and clinical records, however, this approach has limitations, such as the lack of information on mental health and the specific characteristics of the offences. Although the literature recognises the prevalence of personality disorders and psychotic disorders among arsonists, there is a dearth when it comes to collecting data on fire-related characteristics. The results indicate the need for future research into dynamic risk factors, as well as carrying out a meta-analysis in order to deepen understanding of this phenomenon.

**Key words:** *deliberate firesetters, risk factors, individual characteristics, risk assessment*



## Introduction

Every year, thousands of fires are intentionally lit around the globe. One good example of such a statement can be the increased rise of arson in Australia in the last few years, where it is noted that in September 2023, it had rose 31.9%, making it to a rate of 54 incidents per 100,000 people. Additionally, cases that were criminally charged for arson rose 46.3% from in 2024 and, as of June of 2024, there had been 4,582 registered arson incidents (NSW Bureau of Crime Statistics and Research, 2024). In England, according to the Home Office (2024) data, it has been stated that in the last year there were 25,591 fires, where 2,581 of those were intentional firesetting, not containing negligence fires caused by humans. Although the number of fires decreased 22% from the previous yearly statistics, this number is still alarming. When it comes to the United States there have been registered 40,206 cases of arson (FBI, 2022). Lastly, in Portugal, in the year of 2023 there were 7,593 fires registered where 5,325 of them were intentionally lit. Similar to England, the number of fires also decreased from the previous year, however the proportion of fires that were intentionally lit can also be very disturbing (RASI, 2023). Within the past year, wildfires caused 34,493 hectares of burned area, leading to a social, economic and environmental negative impact.

Deliberate firesetters is a concept that has been adapted in the recent years (Gannon et al., 2022). Previous research has referred to deliberate firesetters as arsonists or firesetters, but research has shown that these terms are both very narrow (arson) or very broad (firesetter). The term arson refers solely to the criminally convicted act of setting fires, which then leads to a deliberate restriction of some of the research samples, as not every intentional firesetter has been convicted of arson (Burton et al., 2012). Furthermore, the term 'arsonist' itself appears to be too narrow, since it includes the unintentional act of setting fires, such as accidental fires, in its definition criteria. Therefore, the broadest and most accurate term to use when researching this topic is intentional firesetting, as it includes those who have intentionally set fires but have not been criminally charged. The importance of using the broader term is that there is a significant number of firesetting cases where individuals are not considered responsible for the committed crime due to mental incapacity/illness. Individuals in this latter category are often found in prison mental health facilities and are not incarcerated with other offenders (McEwan & Freckelton, 2011).

Deliberate firesetters have been described as being likely to have mental disorder diagnoses, such as personality disorders (Sambrooks et al., 2021), psychotic disorders and unique personality traits (Enayaty et al., 2008; Hagenauw et al., 2015). Research has shown that, although deliberate firesetters have been strongly associated with learning disabilities, this diagnosis has been increasingly less common throughout the years (Räsänen et al., 1995). Substance abuse has also been strongly associated with firesetting, having been found in several studies throughout the years, especially with concerns regarding alcohol abuse (Rix, 1994; Swinton & Ahmed, 2001; Sambrooks et al., 2021).

Besides understanding the characteristics of deliberate firesetters, it is also important to question the reasons why they set fires. Although motives for firesetting have been studied, there seems to be some difficulties in gathering that type of information, since most studies rely on case-file consultation. Despite some difficulties, some authors were able to conduct research in this topic. Rix (1994) conducted a study where deliberate firesetters characteristics were identified based on the motive for firesetting. This study concluded that revenge and anger were the most common motives for firesetting, which appears to be consistent with more recent literature (Barnoux & Gannon, 2013). Excitement was identified as being the second most common motive, despite only two of the analysed cases included some type of sexual arousal. Attempted suicide and attention seeking/cry for help has also seemed to be a common motive for firesetting. This seems to be consistent with more recent literature regarding individual characteristics of deliberate firesetters, more specifically the low self-esteem (Duggan et al., 2001; Gannon et al., 2013), lack of social support and coping mechanisms (Gannon et al., 2013; Long et al., 2015; Nanayakkara et al., 2020).

Intentional firesetting is a phenomenon that is present in every part of the world being considered a global public health issue (Tyler et al., 2019). Throughout the years, numerous studies have explored different factors that might be associated with arson, including individual characteristics of offenders and contextual variables, such as the settings where fires occur. However, to our knowledge, no recent systematic review has been conducted to comprehensively synthesize the findings on these risk factors, nor to identify patterns across studies. This represents a gap in the literature that a systematic review could address, providing a consolidated understanding of existing evidence and highlighting directions for future research.

Thus, with all this provided knowledge, the ultimate goal of our work is to gather most of the risk factors already identified in the literature, in order to have a better understanding of what areas of deliberate firesetters risk factors have a higher necessity of investment.

### **Individual Characteristics of Deliberate Firesetters**

In order to understand which areas need more investment, it is necessary to comprehend what characteristics can be found in deliberate firesetters and which of these main categories can be intervened by us. With that being said, we are going to state the sociodemographic, developmental, clinical and psychological traits that can be found in deliberate firesetters.

An analysis of the individual characteristics of deliberate firesetters allows us to identify some specific sociodemographic characteristics. These types of individuals seem to be mostly male (Blanco et al., 2010; Hoertel et al., 2011; Vaughn et al., 2010), having low income (Gannon & Pina, 2010), lower levels of education (Gannon & Pina, 2010; Rasanen et al., 1995), and lower rates of skilled employment (Ducat et al., 2013a; Gannon & Pina, 2010).

In terms of developmental contexts, deliberate firesetters may have some genetic and biological specificities (Frisell et al., 2011), an average IQ (Collins et al., 2021; Nanayakkara et al., 2015; Sambrooks et al., 2021), and a background marked by adversity, such as larger families, parental neglect, and sexual and/or physical abuse (Bradford, 1982; McCarty & McMahon, 2005). These individuals also seem to be affected by a variety of mental disorders and psychopathology, where mental health may act as a facilitator and/or exacerbator of previous risk factors, inducing the individual to set fires (McEwan & Ducat, 2016). Although rare, pyromania is a disorder that, when diagnosed, is an important factor to consider (Lindberg et al., 2005; Sambrooks et al., 2021).

Studies have shown that, although pyromania has been associated with firesetting, there are only a very small number of cases where deliberate firesetters suffer from this disorder. Pyromania is an impulse control disorder that causes an individual to experience tension and/or affective arousal before setting fires having also a fascination or attraction to fire (American Psychiatric Association, 2013; Kirsch et al., 2015). What distinguishes this disorder from deliberate firesetting in general is the lack of any other motivation besides pleasure in the act of setting the fire, and the absence of any other psychiatric disorder that could potentially lead to setting the fire (Geller et al., 1986).

Furthermore, Sambrooks and colleagues (2021) concluded that a third of individuals convicted of deliberate firesetting had some sort of personality disorder. The personality disorders most associated with deliberate firesetting include antisocial personality disorder (Lindberg et al., 2005; Nanayakkara et al., 2015; Vaughn et al., 2010) and borderline personality disorder and/or traits (Ducat et al., 2013b; Duggan & Shine, 2001; Nanayakkara et al., 2015; O’Ciaraha et al., 2015).

Other diagnoses, such as psychosis and other psychotic disorders, have also been identified (Anward et al., 2011; Dickens & Sugarman, 2012; Nanayakkara et al., 2015; Tyler & Gannon, 2012). Affective and anxiety disorders, though less frequent, have also been identified, with bipolar and anxiety disorders (Alleyne et al., 2016; Blanco et al., 2010; Ducat et al., 2013b), depression (Blanco et al., 2010; Ducat et al., 2013b), major depression (Alleyne et al., 2016), and dysthymia (O’Ciardha et al., 2015a) being the most common.

In their study, Sambrooks and colleagues (2021) have also concluded that two-thirds of deliberate firesetters suffered from substance abuse, a fact confirmed by numerous studies throughout the years (Alleyne et al., 2016; Blanco et al., 2010; Ducat et al., 2013b; Hoertel et al., 2011; O’Ciardha et al., 2015a; Vaughn et al., 2010).

Lastly, various psychological traits have been identified, such as fire interest and fire scripts (Alleyne et al., 2016; Barrowcliffe, 2015; Butler & Gannon, 2021; O’Ciardha et al., 2015b; O’Ciardha et al., 2017; Tyler et al., 2017), offence-supportive attitudes, although these haven’t been widely incorporated into studies (Barrowcliffe et al., 2019; Ver Ward, 2000), poor self and emotional regulation (e.g., anger issues), poor coping skills, impulsivity, lack of problem-solving skills (Gannon et al., 2012; Gannon et al., 2013; Long et al., 2015; Nanayakkara et al., 2020a), lack of communication skills (Hagenauw et al., 2015; Wilpert et al., 2017), and low self-esteem (Duggan et al., 2001; Gannon et al., 2013).

Despite the broad number of characteristics identified by all the studies abovementioned, there seems to be a higher presence of certain characteristics when compared to others. This can be noticed as there appears to be substantially more studies that include variables such as personality disorders, IQ, psychosis, substance abuse, and, predictably, fire interest and fire scripts. While there is a solid research base on these variables, there is an emergent need to study other neglected variables to systematize the information.

## **Deliberate Firesetters Risk Factors**

Although there might be a crossover between individual characteristics and risk factors, not all individual characteristics can be predictors of criminal behaviour. Consequently, risk factors are evidence-based characteristics that have a negative impact on the individual and increase the chances of the person engaging in criminal activity (Murray & Farrington, 2010). Risk factor research has been quite prevalent over the last century, and it has been improving since, becoming the most reliable way to predict crime recidivism (Quinsey et al, 1998; Connealy, 2020). These can be defined as circumstances and/or characteristics associated with the increased odds of an individual engaging in criminal and/or violent activity in the future. It can also be referred to as a predictor of criminal behaviour (Dougals & Kropp, 2002).

Before risk factors were hypothesised, professionals used clinical judgment to assess which individuals might commit other crimes in the future, however, that method has a low efficiency rate (Litwack, 2001). Glueck and Glueck (1966) pioneered the risk factors theory in their classical study in which they compared 1000 children, 500 of whom were raised in their parents' homes and the other half were institutionalized. They observed significant differences in the subject criminal engagement, concluding that institutionalized children were more likely to engage in antisocial behaviour. This study was the first step to the systematization of static risk factors, where the persons' past was considered to predict their future actions. Static risk factors (also known as historical risk factors) were lately defined as historical risk factors that due to their stability, cannot be changed or reversed (Webster et al., 1997).

However, static risk factors, despite being very important, are not the only variables to consider regarding criminal behaviour engagement. With this in mind, another classical study was conducted in order to analyse other variables that could be associated with criminal behaviour and were not as static as the environment where people had been raised. David Farrington (2003) conducted a longitudinal study in which he accompanied 411 boys' lives, from 8 to 46 years old. This study aimed to comprehend what would make people engage in criminal activity, by observing the variables that surrounded the subjects. Farrington analysed biological, psychological, family and social variables that could be associated with criminal behaviour, such as, substance abuse, sexual behaviour, low income, educational difficulties, unemployment, and other social problems. Some of the conclusions that the author gathered were that these men would have certain common characteristics, such as lack of empathy, impulsiveness, history of substance abuse, low

intelligence, low income, history of family violence, a need for sensory stimulation, and a need for social status. This study was crucial to understand what aspects of one's lives could make them engage in criminal activity. In this study were included dynamic risk factors, such as income or unemployment. These characteristics are considered dynamic because they have the potential to be changed, either naturally or with external intervention (Webster et al., 1997). Understanding these risk factors is crucial to further comprehend deliberate firesetters recidivism.

Regarding deliberate firesetters specifically, research indicates that recidivist firesetters are more likely to exhibit personality disorders and learning disabilities (Lindberg et al., 2005; Repo et al., 1997; Dickens et al., 2009), whereas psychosis is more prevalent among first-time firesetters (Dickens et al., 2009). In general, personality disorders cause individuals to have some specific characteristics, such as fragile self-esteem, emotional dysregulation, impulsiveness, and unstable interpersonal relationships, which are often found in individuals diagnosed with this type of disorders (Reising et al., 2019). Research has shown that there is a correlation between personality disorders and violent behaviour. However, having a personality disorder diagnosis does not invariably lead to violent actions. In fact, only a small percentage of violent incidents are perpetrated by those with mental health issues. Criminal behaviour typically arises from a multifaceted interplay of personal traits and specific social environments. Therefore, assessing the risk of violence in individuals with personality disorders should be tailored to the context and individual symptoms that may influence the likelihood of violent behaviour must be considered. (Reising et al., 2019).

Although this is a problem that has been studied for decades, a reduced number of studies have been conducted regarding adult deliberate firesetters (Gannon et al., 2022). Gannon and Pina (2010) conducted a literature review in which the authors concluded that, while this is a major social and economic problem, psychology research was underdeveloped regarding this topic. Moreover, the setting in which the fire has been conducted has not been considered as a common variable in literature, however it would be an important variable to be considered when analysing such a heterogenous group of offenders (Ribeiro et al., 2024).

There are not a lot of risk factors included in the literature, and most of them tend to be clinical risk factors, such as personality disorders and psychosis. There is an evident lack of research regarding this topic, since there are no studies that contemplate specific historical

risk factors, such as developmental and childhood upbringing variables (Gannon et al., 2022). Although the number of studies mentioning personality disorders is much higher than other categories of risk factors, these types of disorders are not specific of deliberate firesetters, having also a very established correlation with other types of crimes and violence in general (Fridell et al., 2008).

While it is very important to gather information about static risk factors, it is important to mention that these are impossible to change. Despite static risk factors portraying an important role into the better understanding of the individuals, we cannot forget that they can't be a target for intervention. To better intervene, it is important to know what the specific dynamic risk factors that characterise deliberate firesetters are. Unfortunately, research has not been focusing on dynamic risk factors (Nanayakkara et al., 2015). According to the existing literature, low self-esteem, impulsiveness, and unstable personal relationships are mentioned as a possible result of a personality disorder, which is present in deliberate firesetters (Gannon et al., 2013).

### **Risk Assessment Tools**

Risk assessment instruments have been the subject of various studies, with the aim of making risk assessment increasingly more effective. Since the development of the Violence Risk Assessment Scheme (HCR-20; Webster et al., 1997), researchers have been developing risk assessment tools to each type of criminality. In regard to deliberate firesetters, there are a few risk assessment tools designed specifically for this type of offenders. The Firesetting Assessment Schedule (Murphy & Clare, 1996) was developed for adult firesetters with mild intellectual disabilities. This instrument examines the feelings, cognitions and events that the offender experienced prior to setting the fire. The Firesetting Scale (Gannon & Barrowcliffe, 2012) was developed with the purpose of assessing the antisocial behaviours and fire interest of offenders, as the main predictors of firesetting behaviour. Later, Long and colleagues (2014) developed the St Andrew's Fire and Arson Risk Instrument (SAFARI) where they constructed a semi-structured interview that included several variables of interest, such as background, behaviour, consequences of firesetting, motivation to change, barriers to change, firesetting self-efficacy, perceived probability of future firesetting, and understanding firesetting behaviours. The format of it being an interview allows the professional to gather more information about the offender and the firesetting behaviour. More recently, an instrument was developed using as an inspiration the HCR-20 (Webster et al., 1997), the Northgate Firesetter Risk Assessment 2.0 (NFRA-

2.0; Taylor & Thorne, 2019), which contains historical and clinical risk factors to assess the recidivism level of offenders. The structure is very similar to its inspiration, and it has a relatively simple scoring method, which facilitates the risk assessment procedure.

Regarding these risk assessment tools, there are a couple of gaps in their development. Firstly, not every instrument uses both static and dynamic factors, which leads to the necessity of using several instruments to conduct a complete risk assessment. Secondly, regarding the semi-structured interview, although it is the most complete assessment tool, it does require a more time-consuming scoring and analysis. Additionally, even though the Firesetting Scale (Gannon & Barrowcliffe, 2012) is directed to the deliberate firesetting population, it does not assess risk factors besides fire related ones.

Being the most complete risk assessment instrument, besides the SAFARI (Long et al., 2014), the NFRA-2.0 (Taylor & Thorne, 2019) also has several improvements to be made. For instance, there are some items where scoring can be confusing. It is also not easy to fill out the instrument when recurring only to criminal records or clinical files. Considering that the access to forensic populations can be challenging, it would be relevant to develop a risk assessment tool built for this type of study design, as it is very common among research regarding deliberate firesetters.

## **Relevance and Aim**

Despite the existing literature regarding risk factors, we conclude that there are still loopholes in need to be filled, that haven't been assessed in resurging studies. Thus, it is crucial to systematize the findings surrounding deliberate firesetters risk factors in order to identify the research loopholes in this phenomenon and futurely conduct studies that tackle them. This is a fundamental step in intervening with these offenders. According to the Risk Necessity Responsivity Model (Andrews & Bonta, 2007), in order to obtain an effective intervention amongst a specific type of offenders, it's crucial to understand what the predictors for firesetting recidivism are. Alongside the importance of this information to the intervention, there is also a need to gather more of this evidence in order to develop even more precise risk assessment tools.

With all the above mentioned, the purpose of this study is to provide a comprehensive compilation and systematic review of studies regarding deliberate firesetters risk factors, the

better comprehension of the way individual characteristics can be a risk factor and what the main gaps in the literature are.

## Method

### Inclusion and Exclusion Criteria

This systematic review examined articles on the to deliberate firesetters risk factors from multiple databases such as SAGE Journals, ScienceDirect and EBSCOhost, applying the following criteria for inclusion: empirical articles which were published between 1978 and august 2024; literature reviews and empirical studies with qualitative or quantitative methods; and full text peer-reviewed articles published in English. For this study, only articles referring specifically to deliberate firesetters risk factors were included. The inclusion criteria were (1) peer-reviewed studies written in English, (2) empirical, and (3) must have been conducted with an adult deliberate firesetters sample.

Articles that referred to young firesetting were excluded. Studies which did not mention risk factors or individual characteristics were excluded.

### Search Strategy

This review was conducted according to the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Page et al., 2021). The search was conducted in April of 2023 and in August of 2024. The same search terms were used in all data bases, and they were: *Arsonist AND risk assessment; Fire Setter AND risk assessment; Arsonists AND Risk Factors; Deliberate firesetter AND Instruments; Arson AND Characteristics; Deliberate Firesetter AND Characteristics*. The total results were 5,438 articles although 5,415 were excluded after not addressing deliberate firesetters risk factors and/or characteristics in the title and/or abstract. Additionally, 18 were also retrieved through GoogleScholar. Thus, a total of 41 were retrieved for abstract analysis. From those, 11 were excluded after reading the abstract. After reading the full-text, 6 were excluded due to not meeting the inclusion criteria: 2 were excluded for not having an adult sample, and 8 for not addressing specific risk factors. Reading the 18 articles originating from the original selection, 5 more studies were added to the study by the snowballing method. Hence, 21 studies were included in the final review. Figure 1 illustrates the flowchart using PRISMA software, where inclusion and exclusion criteria are specified (Haddaway et al., 2022).

Results will be presents in two tables according to the methodology used by the authors of the selected studies for this systematic review. In the first table there will be the studies

which used a direct method to gather information, having direct contact with the individuals who participated in the studies (Table 1.), and the second table will present the studies which used a retrospective design where they accessed information using criminal records and/or clinical files (Table 2.).

Figure 1. Flowdiagram representing the search strategy.

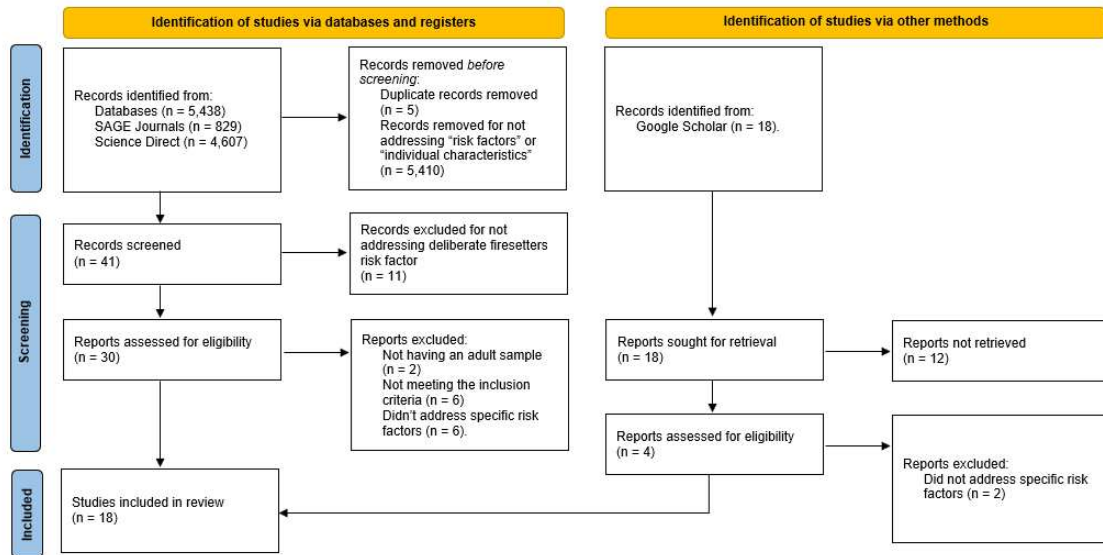


Table 1. Selected studies conducted in prison or psychiatric unit/hospital settings

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Sapsford et al. (1978)	25 arsonists sentenced to life and 96 arsonists sentenced to 18 months.	Both groups of arsonists were compared in terms of social and criminogenic variables.	This research was carried out in two phases, the first phase where arsonists were compared according to social and criminogenic variables (such as personality disorders, psychopathy, history of previous arson, bad work history, absence of relationship with the victim, and the value of the damage caused by the fire), and a second phase where a follow-up study was carried to determine the factors which were related to reconviction, in general, and particularly to reconviction for arson.	Lifers had significantly more previous convictions for arson, and a higher incidence of past sexual abnormality, as well as having been diagnosed as “psychopathic” or with another personality disorder. Regarding the follow up analysis, men who had higher sentences showed a higher reconviction rate. However, when referring specifically to arson, only 6% were convicted for arson within three years of release.	Higher prison sentences; higher incidence of sexual abnormality; psychopathic disorder; personality disorder,	The study did not mention any limitations.
Rix (1994)	153 individuals, with 129 men	The sample was divided between motives for arson,	The sample consisted of 153 individual who were referred for pre-trial psychiatric assessment	The mean age of men convicted for arson was 25 years old, being the most common age gap from 16- to	Unemployment; criminal history; substance abuse	It’s important to note that personality assessment was not

Table 1. Selected studies conducted in prison or psychiatric unit/hospital settings

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
	( <i>M</i> =25 years), and 24 women ( <i>M</i> =31 years) referred for pre-trial psychiatric assessment and subsequently convicted for arson between 1983 and 1993.	using the following categories: vandalism, cry for help, attempted suicide, rehousing, psychoses, carelessness, insurance fraud, cover up, heroism, other manipulation, anti-depressant, political, and proxy.	and subsequently convicted for arson between 1983 and 1993. The information was based on personal interviews and examination of the subjects. Diagnoses were based on routine clinical assessment, except when personality was assessed using the Personality Assessment Schedule (Tyrer and Alexander, 1979). The sample was divided according to motives for committing arson, using several classification systems (Incardi, 1970; Faulk, 1983; Prins et al., 1985), however none of these classifications systems were enough to classify every individual. Therefore, the author created a classification system	20-year-olds. The mean age of women convicted for arson was 31 years old. 78 per cent of the male firesetters were unemployed and 92 per cent of women were in the same situation. Although the history of parental separation was present in 31 per cent of the cases, this is something that can be associated with crime in general and not arson specifically. The majority of the sample has some kind of criminal history (81%), in which 18 per cent were from violence against other people, 5 per cent from sexual offences, and 18 per cent from arson. Firesetters mostly targeted dwelling houses (55%), followed by commercial targets (10%), motor vehicles (7%), and only 4.5 per cent of fires had a barn, haystack or out-	(alcohol being the most common form of intoxication); personality disorders.	conducted in all individuals, which may lead to result underestimating the real number of subjects with a personality disorder

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			using all previous systems. The categories that were created were: proxy – subjects who carried out a revenge arson attack on behalf of someone else; re-housing -subjects who set fires to properties rented from the local authority in order to be re-housed; other manipulative – subjects who started fires in order to get arrested and imprisoned or in order to try and win back a partner; carelessness – subjects who appeared to have started fires accidentally and, in most cases, when intoxicated with alcohol or solvents.	building as a target. More than a third of firesetters were intoxicated with some kind of substance at the time of the crime, being the most common alcohol intoxication. More than half of the sample (54%) has a personality disorder diagnosis, 11 per cent were diagnosed as mentally handicapped, and eight per cent was diagnosed with some sort of psychosis.		

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Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Noblett & Nelson (2001)	20 women who committed arson were recruited, ages ranging from 18 to 65 years old ( $M=30,6$ ; $SD=8,2$ ). From the two comparison groups, the violent women group consisted of 18 women ( $M=29,1$ ; $SD=29,1$ ), and the control group, which consisted of nurses, had 16 participants	Personal Information Questionnaire, The <i>National Adult Reading Test</i> (Nelson, 1982) is used to obtain a predicted IQ. Consists of fifty questions in an increasing difficulty level; the <i>Personality Assessment Inventory</i> (Morey, 1991) includes 344 questions designed to assess critical clinical variables within an	The study aimed to compare females deliberate firesetters to women who committed violent crimes, hypothesising that women committing arson may be due to a lack of self-esteem and an inability to confront individuals directly.	Eighty per cent of the deliberate firesetters group admitted to a history of sexual abuse as a child, whilst only forty-four per cent of the violent women group reported having suffered from sexual abuse as a child. Regarding to a history of self-harm, eighty-five per cent of arsonists and fifty-six per cent of the violent women group reported having committed intentional self-harm. Both of these variables showed statistically significant difference between arsonists and violent women. There was no disparity, however, in the IQ level of both groups. Female arsonists were more likely to have a greater degree of suicidal ideation than the violent female group. Additionally, female arsonists also seem to me more self-	Childhood sexual abuse; history of self-harm; suicidal ideation (women); self-conscious when in social environments (women); lack of assertiveness skills.	The study didn't mention any limitation.

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Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Swinton and Ahmed (2001)	( $M=30,9$ ; $SD=7,64$ ).  79 patients, being 48 male and 31 female.  Age ranged from 17 to 71 years old ( $M=35.6$ years old)	individual's personality, using a four-point Likert-type scale.  Patient Interview, <i>Brief Psychiatric Rating Scale</i> , <i>Functional Assessment Schedule (FAS)</i> (Murphy & Clare, 1996) - consists of 32 statements in which the patients were asked to describe how much the statement applied to them.	Patients were chosen according to the existence of any type of registration of having committed arson, convicted or not for it.  The data collection started from the gathering of demographic data, family history, clinical data, history of substance abuse, and records of fires.	conscious in social interactions, be uncomfortable when being the centre of attention, and more likely to have fewer skills of assertiveness.  The main factors identified were fire relieving affective symptoms and hallucinations, lack of social attention and affective symptoms, such as anxiety, anger and depression) present before the fire. The comparison between men and women show that women had more episodes of self-injury and overdoses, however, there was no differences on the number of fires set by each group.	Psychotic symptoms (hallucinations); lack of social attention; substance abuse (women); history of self-injury (women).	The study did not mention any limitations.
Labree et al. (2010)	The sample consisted in 25	<i>Psychopathy Checklist Revised</i>	Information was collected through the patient's hospital	Firesetters show a higher level of personality disorders, alcohol abuse,	Personality disorders; alcohol and substance	The sample size was small, and from a

Table 1. Selected studies conducted in prison or psychiatric unit/hospital settings

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	convicted firesetters ( $M=41,4$ years old; $SD=8,0$ ) who had a history of repeated arson, and a control group of 50 criminals without arson related offenses. All these men were in a psychiatric hospital. ( $M=41,4$ years old; $SD=9,6$ ).	(PCL-R) (Hare, 1991, 2003)	files and police reports, as well as information through psychological assessment where motives, psychopathy and intelligence were assessed.	substance abuse, growing up in a broken home, as well as more history of psychiatric treatment in the past. However, they scored less in all the factors that assess psychopathy. They also had a normal IQ, although lower than the control group. The main motives for committing arson were delusions, felling of revenge and feeling of excitement or kick	abuse; psychiatric treatment in the past; normal IQ; feelings of revenge, delusions and feelings of excitement or kick.	very specific context (hospital). Lastly, there were no risk assessment tool used.

Table 1. Selected studies conducted in prison or psychiatric unit/hospital settings

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Tyler et al. (2013)	The sample consisted of 23 arsonists recruited from two medium security mental hospitals ( $n=18$ ) and four prison establishments ( $n=5$ ). Ages ranged from 24 to 64 ( $M=39,13$ ; $SD=11,52$ ). Six of the participants declined to be interviewed but consented in their data being used in the study.	A semi-structured interview was developed for this study.	A semi-structured interview was conducted, and participants were asked to describe the events, thoughts and feelings leading up to one of their recorded firesetting offenses. The interviews were then transcribed and analysed. To validate the information given by the participants, hospital and prison files were examined to check the offense narrative provided were accurate.	The study analysed the content of the interviews and gathered that some characteristics were present in a large number of participants. Caregiver experiences, especially negative, were frequent among the participants. Family history of mental health issues was reported by the majority of participants, and these factors had a negative impact on patients' relationships with their caregivers, according to them. Separation experiences also seemed relatively common among this group of firesetters. Having experienced abusive experiences during childhood and/or adolescence, which in the majority of the cases was conducted by a caregiver. More than half of the participants revealed having engaged in at least one form of antisocial	Negative caregiver experiences, family history of mental illness, experiencing abuse during childhood/adolescence; history of mental illness; antisocial behaviour during adolescence; maladaptive coping skills; substance abuse; poor problem-solving skills.	The authors mention the small sample size as a limitation to this study, as well as the low number of female firesetters included in the study. Additionally, the self-report method comes with its own limitations, since there is a tendency to participants to present themselves in a more socially desirable manner, and they can also have distorted memories of the events.

Table 1. Selected studies conducted in prison or psychiatric unit/hospital settings

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				activity during childhood and/or adolescence. Additionally, maladaptive coping skills were present in two thirds of participants life description. The most common maladaptive coping was substance abuse, although some of the firesetters reported having set fires as a coping mechanism. Substance abuse was reported to have remain through adolescence into adulthood, as well as mental health issues that some participant developed. Authors also concluded that poor problem solving was also present some of the participants.		
Hagenauw et al. (2014)	58 inpatient firesetters in a Psychiatric Hospital.	<i>Minnesota Impulse Disorders Interview</i> (MIDI; Christenson et al., 1994)	The information regarding diagnosis was retrieved from the medical file and/or police report. The HKT-30 was applied to the	All firesetters were diagnosed with some type of personality disorder, including borderline, antisocial, and narcissistic personality disorder.	Personality disorder; substance abuse (alcohol); behavioural problems during	The sample size was very small (n=14) and it was only a forensic sample,

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	( $M=34,4$ ; $SD=1,37$ years old)	<i>Historical Clinical Future-30</i> (HKT-30; Werkgroep Risicotaxatie Forensische Psychiatrie, 2003)	patients 6 months after admission to the hospital. The categories used to classify each individual were made by the <i>Multi-Trajectory Theory of Adult Firesetting</i> (M-TTAF; Gannon et al., 2012). Of the 73 individuals that participated in the study, only 14 were considered arsonists (inpatients were considered arsonists if they had lit a fire intentionally when adults (18+ years)).	Substance abuse was present in 78,6% of the arsonist sample, whereas nearly half were intoxicated when they committed arson (46,2%). Three were intoxicated by alcohol, one was under the influence of drugs and three were under the influence of both alcohol and drugs. Comparison between arsonist and non-arsonists showed that arsonists had a three times higher risk of violent recidivism. Arsonists had a higher presence of behavioural problems before age 12, including oppositional behaviour. They also had a more extensive history of mental health care, and there was a higher percentage of individuals diagnosed with a psychotic disorder. Concerning dynamic risk factors, arsonists were more hostile, passive aggressive and	childhood; history of mental illness; psychotic disorder; lack of social and relational skills.	which did not allow to compare result with a non-arsonists sample.

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				more easily irritated. They also had poorer social and relational skills. In terms of motive, four of the arsonists were motivated by revenge, whereas the others were motivated by vandalism/boredom/sensation seeking and/or peer pressure, a cry for help, and an attempt of self-harm. Four of the arsonists group set the fire as a result of psychotic delusions or hallucinations. In regard to the M-TTAF categories, four of the patients were placed in the grievance trajectory, three in the antisocial trajectory, and three in the emotional expressive/need for recognition trajectory.		
Rose et al. (2016)	Seven male deliberate	A semi-structured interview was	The individuals who were eligible to participate in the	Firesetters reported that their first firesetting experience was in response	Childhood abuse; unfulfilling	The authors mention a small sample size

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	firesetters were chosen from medium and low secure units. Participants ages ranged between 23 and 46 years old ( $M=36,3$ ; $SD=10,98$ ).	created by the researchers to conduct the interviews.	study were contacted by a clinician they already knew, and then were given an informed consent about the study. The interview durations varied between twenty-two minutes and one hour and thirty-eight minutes.	to some kind of childhood abuse and unfulfilling relationships in young adulthood. Lack of social skills was also an underlined factor, firesetting being associated to a maladaptive coping mechanism, as well as other emotional, contextual and functional aspects of individuals life. The symptoms leading to the firesetting reported by firesetters include anger, depression, pressure, isolation, desperation and frustration. On this same note, the feelings that were described to be felt during the firesetting were control and sensory stimulation, which served as an escape to the underlying negative feelings.	relationships; lack of social skills, maladaptive coping mechanisms.	as a limitation to this study. Since the participants had mild intellectual disabilities, there were some communication difficulties.

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Wilpert et al. (2017)	55 male arsonists of a treatment centre and 41 male violent offenders. Ages ranged from 18 to 58 years old (M=29,3; SD=9,89)	<i>Risk Assessment Instrument for Forensic Outpatients Mental Health</i> (RAF MH; Horn et al., 2012), <i>Historical Clinical Risk Management – 20</i> (HCR-20; Webster et al., 1997), <i>Structured Assessment of Violence and Risk in Youth</i> (SAVRY; Borum et al., 2002), and the <i>Level of Service Inventory – Revised</i> (LSI-R; Andrews & Bonta, 2000)	The main goal of this study was to compare the main characteristics of both arsonists and violent offenders. The files of the patients were analysed in order to obtain information about research variables. An interview was conducted by a psychologist or psychiatrist, being 60 minutes long, regarding topics such as family history, education, and work. Then, a team of psychologists specialized in risk assessment, carried out the risk assessment using the RAF MH. Information about criminal history and recidivism of the sample was requested to the Judicial Authorities of convicted people.	Deliberate firesetters displayed to have a higher number of Axis II diagnosis, social isolation, and more lack of social skills. Violent offenders, however, showed higher levels of substance abuse, and were younger at their first manifestation of antisocial behaviour. Regarding differences in criminal career, the violent offenders' group were more likely to have a criminal history and had a higher recidivism rate.	Social isolation, lack of social skills, personality disorders.	As a retrospective study, there is no way to control de quality of the information previously gathered, which contributed to the limitations of the study.

Table 2. Selected studies conducted using criminal records/clinical files

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Barnett et al. (1999)	470 arsonists (410 male firesetters and 60 female) which criminal records were in the Federal Central Register. Ages were analysed according to the groups in which firesetters were divided by, being not responsible for the crime ( $M=32$ , $SD=11$ ), partly responsible ( $M=30$ , $SD=9$ ), and fully	Qualitative analysis comparing different cases, using criminal records.	Individuals were divided by amount of responsibility: the not responsible due to psychiatric reasons ( $n=186$ ), the ones with diminished responsibility for psychiatric reasons ( $n=97$ ), and a random sample of arsonists who were fully responsible for their actions ( $n=187$ ) and were then compared in order to understand which groups are more likely to commit further crimes.	Individuals who were partially responsible for their actions and didn't commit other type of criminal offenses set the higher number of fires. Many of the arsonists were classified as alcoholics although the previously referred group did not seem to be prone to alcoholism.	Substance abuse (alcohol); partially responsible for their actions (due to some mental illness).	The study did not mention any limitations.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Soothill et al. (2004)	<p>responsible (<math>M=28</math>, <math>SD=9</math>).</p> <p>58,549 men and 6,778 women, making a total sample of 65,327 individuals.</p> <p>Ages ranged from 10 to 77 years old, and the mean age of the male sample was 21 years old, and the female sample was 25 years old.</p>	<p>Case file consultation of arsonists divided in three samples 1) <i>Those convicted of arson between 1963 and 1965</i>; 2) <i>Those convicted of arson between 1980 and 1981</i>; 3) <i>Those convicted of arson between 2000 and 2001</i>.</p>	<p>The analyses were divided in different categories. First, they were divided by four year-gaps in which firesetters were convicted, 1) from 1963 to 1965 (<math>n=1352</math>); 2) 1980 to 1981 (<math>n=5584</math>); 3) from 2000 to 2001 (<math>n=3335</math>).</p> <p>A comparison was made regarding different categories, which included the gender of the convicted, the age which the conviction was made, previous convictions, subsequent convictions of those who set fires, type of conviction and level of danger.</p>	<p>The difference between the number of male and female arsonists is becoming smaller. The average age of the first fire has been rising and women tend to be older at the time of the first arson. The most recent convictions have less previous criminal offenses, however, when they do, the crimes are more violent. The study also shows that a bigger sentence for arsonists, results in reoffending, whereas when the conviction is lighter, arsonists tend to not commit any other crimes.</p>	<p>Recidivist deliberate firesetters had higher prison sentences; No previous criminal history, but when there is a criminal history it tends to be a more violent offense.</p>	<p>The study did not mention any limitations.</p>

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Dickens et al. (2007)	129 males and 38 females. Ages ranged from 18 to 77 years old ( $M=29$ years old; $SD=11,3$ ).	The study was conducted through the analysis of clinical records of the Psychiatry service where the study was conducted, and a questionnaire. The questionnaire was built, to identify the main risk factors associated with arson, based on literature research.	Comparison of gender differences in both male and female arsonists regarding the following domains: <i>1) socio-demographic, family background and childhood factors, 2) adult adjustment factors, 3) arson history, 4) motives, 5) features of pyromania, and 6) other reoffending.</i>	Female arsonists tend to be older than male arsonists. Childhood sexual abuse tends to be more common in female arsonists than in male. Also, women tend to have a higher chance to have a diagnosed mental illness. The motive that was identified to be more common amongst women was attention seeking/parasuicide. Women tend to set fire to personal and residential targets whilst men target vehicles, work, and industrial places. Setting fires for revenge or anger is common in both genders, however, men tend to set fires for their own sake, while women tend to set fires to achieve a particular end. Men met more pyromania diagnosis criteria than women, according to DSM-IV).	Women: older at the time of the fire; childhood sexual abuse; higher chance of being diagnosed with a mental illness; the most common motive is attention seeking/parasuicide; the target tends to be personal or residential areas.  Men: the most common motive seems to be for revenge or anger; men tend to target vehicles, work and industrial places;	The study did not mention any limitations.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Dickens et al. (2008)	202 case files were analysed. There were 40 females and 162 males. The mean age of men at assessment was 27.9 years old ( <i>SD</i> =11,0), and women was 26 years old ( <i>SD</i> =12,1).	The data was collected from the West Midlands regional forensic psychiatry service over a 24-year time frame.	The quality of the information was categorized in “poor” (3,5%), “limited” (30,7%), or “good” (65,8%). All the data was previously collected and was consulted in the case file. 101 variables were assessed.	The low IQ arsonists (44%) and the control group were similar in a lot of their characteristics; however, they were more likely to have experienced childhood temperamental issues, history of relationship difficulties, and were also more likely to be introverted. Most of the low IQ firesetters set fires for impulse or to relieve boredom or tension. Normal IQ firesetters were more likely to have set fires because of external factors, such as relationship problems, alcohol abuse, and life events.	more criteria for pyromania.  Childhood temperamental issues, history of relationship difficulties, introverted.	The study does not mention any limitations.
Enayati et al. (2008)	155 males and 59 female arsonists	The data were collected through the National	The diagnoses of arsonists and other offenders were compared regarding socio-demographic	Firesetters showed a higher percentage of learning disabilities. Female arsonists had a higher	Learning disabilities; substance abuse;	The sample used does not allow the results to be

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Kelly et al. (2009)	( $M=35,5$ ; $SD=11,8$ years old for men and $M=40,2$ ; $SD=11,5$ years old for women)	Board of Forensic Medicine of Sweden.	data, including the age which the forensic psychiatric evaluation was made, gender, citizenship, and diagnosis information.	alcohol abuse than other female offenders. In general, the most common diagnoses of fire related offenders were personality disorders, substance abuse and psychotic disorders, both in male and female arsonists.	personality disorders; psychotic disorders.	generalized to all arsonists.
	20 male individuals, 10 being deliberate firesetters and the other half were offender without arson offenses, all with a diagnosis of mild learning disability	The data was collected through patients' files that contained a psychological assessment and detailed psychiatric and psychological reports of participants histories. Authors also used the <i>Locus of Control Questionnaire</i> .	Authors variable targets were 1) <i>Perceived inability to effect social change</i> 2) <i>Childhood experiences with fire</i> , 3) <i>Family problems</i> and 4) <i>All three risk factors combined</i> .	It was not possible to test the predictive value of the studied risk factors because of the significant reduction of sample size. However, authors concluded that arsonists with mild learning disabilities have distinct risk factors, and that firesetting is often used as a form of problem resolution due to lack of coping ad social skills. Additionally, authors also found a positive association between childhood experiences with fire and childhood firesetting.	Lack of coping and social skills; childhood firesetting; childhood experiences with fire.	The study had a small sample size and the self-report information that was used was often insufficient and/or conflicting.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Anwar et al. (2009)	1,340 men ( $M=28.6$ years old, $SD=12.1$ ) and 349 women ( $M=31.2$ years old, $SD=12.4$ ) convicted for arson between 1988 and 2000, and a control group of 19,963 men ( $M=45.3$ ; $SD=18.8$ years old) and 20,597 women ( $M=47.6$ years old, $SD=20.1$ ).	The data regarding all firesetters were compared to the control group, including demographic data and prevalence of mental illness.	First, every person charged and convicted for arson was identified. After, these firesetters that had psychiatric hospitalization histories were selected through the principal discharge diagnoses, which could be schizophrenia, bipolar affective disorder, and other psychoses, including drug-induced psychoses.	Authors found that a significant percentage of firesetters had some kind of psychotic illness. Thus, there is an increased risk of these people committing arson. Although it was found a correlation between psychotic disorders and schizophrenia in both genders, women had a higher prevalence of these disorders.	Psychotic disorders.	There is a strong association between firesetting and mental illness and this can be confused with arson. Also, the study relied on criminal files information and existent registers of psychiatric diagnoses.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Ducat et al. (2013a)	207 (167 males and 40 females, with a mean age of 30,5 years [ $SD=11,32$ ], ranging from 17 to 68 years old) individuals were convicted for arson between 2004 and 2009, by the higher courts in the state of Victoria, Australia. This number only included the cases where arson was the principle proven offense. The control group consisted of 197	The authors gathered information using criminal records and court files. Variables were created based on psychiatric, psychological and criminological literature on firesetting. The main topics for the variables created were demographic variables, criminal history, psychiatric/psychological, and childhood variables.	The firesetter sample was divided and consisted of three groups: the exclusive firesetters (43 firesetters, with ages ranging from 17 to 61; $M=31,0$ , $SD=12,5$ ; 30 of which were male, making it 69,8% of the group), which arson was the only crime they were convicted for; the predominant firesetters (67 offenders, with ages ranging from 17 to 67; $M=28,9$ , $SD=11,1$ ; 47 of which were male, making it 70,1% of the group), which had arson as a past offense and up to two other offense types; and the mixed firesetters (97 firesetters, with ages ranging from 10 to 68; $M=30,4$ , $SD=11,0$ ; 89 of which were	Firesetters were more likely to have experienced suicidal ideation and/or attempted suicide, exhibit behavioural problems as a child, and more likely have been submitted to psychiatric/psychological treatment across their lifespan. Firesetters were much more likely to receive an Axis II personality disorder diagnoses, and cluster B personality traits (antisocial, borderline, histrionic, and narcissistic). Firesetters were also more likely to have been diagnosed with depression at the time of their court ordered assessment. They also had lower education and were more likely to be unemployed at the time of starting the fire. However, firesetters did not differ in the	Suicidal ideation and Depression; childhood behavioural problems; Axis II personality disorders; antisocial, borderline, histrionic and narcissistic personality traits; lower levels of education; unemployed; low self-esteem; impulsiveness; poor communication skills; lack of assertiveness; substance abuse; early fire interest,	The retrospective case review studies are limited in the number of variables available in the case files, and the variables were very general.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
	(174 males and 23 females, with a mean age of 30,7 years old [SD=10,64] ranging from 17 to 64 years old) randomly selected non-firesetting offenders, sentenced at a similar time period.		male, making it 92,7% of the group), in which had arson as a past conviction and more than other three offense types. The information that was retrieved from the case files were the criminal history, pre-sentence psychological or psychiatric reports, police summaries of charges and descriptions of the events in question, and other information that seemed relevant to the courts such as employment records and letters from service providers like disability services. The variables were generated from and examination of the psychiatric, psychological and criminological literature on firesetting and a sub-sample of	probability of having a criminal history.  Regarding the differences between different types of firesetters exclusive firesetters were older at the time of their first conviction, when compared to mixed firesetters and non-firesetters. They were, however, less likely to be diagnosed with a personality disorder than mixed firesetters. Exclusive firesetters also had less previous convictions.  Authors also hypothesised that these characteristics could predict a low self-esteem, poor assertiveness and communication skills, and impulsiveness. Firesetters could use the fire as an emotional expression. Mixed firesetters had a higher chance of to have a criminal history	fire play, fire-related cognitions and behaviours related to firesetting.	

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
			the court files. The variables included in the study were demographic variables, criminal history, psychiatric/psychological variables, and childhood factors. Firesetters were also divided into groups (exclusive, predominant and mixed firesetters) compared between each other, and they were sorted using the definition of criminal versatility from the Psychopathy Checklist-Revised (Hare, 2003).	when compared to other categories and of having a personality disorder diagnosis. These offenders have a higher chance of engaging in more anti-social behaviour and having a larger number of criminogenic needs to change their behaviour. Several risk factors for general crime versatility were identified in the mixed firesetters category, including personality disorders, substance abuse, low work engagement, and extensive and early criminal careers. Some of the offense-specific risk factors authors believe to influence the firesetting behaviour are early fire interest, fire play, fire-related cognitions and behaviours related to firesetting.		
Ducat et al. (2013b)	The firesetter sample consisted	The data was retrieved from the Sentencing	Information was collected in order to compare the three	More than one third of firesetters (37%) were registered on the	Psychotic disorders, primary Axis I	The study stood on previously collected

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
	of 1328 individuals (1140 males and 188 females; $M=33.4$ ; $SD=14.4$ ), the offender sample gathered 421 individuals ( $M=35.0$ ; $SD=11.6$ ) and 4830 Victorian residents as the control group ( $M=34.7$ ; $SD=12.4$ ).	Advisory Council of Victoria according to the Victorian Psychiatric Case Register, where the mental disorders are recorded according to the International Classification of Diseases.	groups regarding the mental health usage and diagnoses of mental disorders, such as childhood disorder diagnoses, personality disorders, and substance use diagnoses. The mental illnesses were coded into categories, for example, the “psychotic disorders” category included disorders such as schizophrenia, schizoaffective disorder, and others. The category “substance-use disorder” included any type of substance abuse, only excluding nicotine-related disorders.	psychiatric register, compared to the 29,3% of other offenders, and 8.7% of the control group. Firesetters are more likely to suffer from more mental disorders, with the exception of bipolar affective disorder and psychotic disorders, compared with other offenders. However, firesetters were had higher chances of suffering from a psychotic disorder than the general population. Schizophrenia was identified as being much more common in firesetters than any other control group. Firesetters had higher rates of primary Axis I clinical diagnosis, psychotic disorders, depressive disorder, anxiety disorder, childhood disorders, as well as substance misuse.	clinical diagnosis, psychotic disorders, depressive disorder, anxiety disorder, childhood disorders, as well as substance misuse; personality disorder, specifically antisocial personality disorder.	data for non-research purposes, which may affect the quality and the level of details available.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
Hollin et al. (2013)	129 arsonists on a medium security hospital, 93 men and 36 women. ( $M=28,9$ ; $SD=8,9$ years old for men, and $M=28,5$ ; $SD=9,6$ years old for women)	Information was gathered through medical files. Authors also gathered information about the clinical diagnosis, that was made using 1983 Mental Health Act Classifications	The clinical information was gathered and was then compared between men and women.	The psychiatric profile of these arsonists consisted of high levels of mental illness and psychopathic disorder. Although the number of men within the sample was much higher, when taken into proportion, arson was three times more common in women than in men.	Mental illness; psychopathic disorder.	As a retrospective study, there is no way to control de quality of the information previously gathered, which contributed to the limitations of the study. Also, the data was collected from the same hospital.
Edwards & Grace (2014)	1250 individuals (1246 were male, which makes 99,7% of the sample, and with only 4 females making 0.3% of the total sample) charged with at least one arson	Data was collected and from the National Intelligence Application (NIA) database through the New Zealand Police	The primary goal was to study recidivism in the 10 years following individuals' first offense. Reoffences were categorized within three categories including arson recidivism, violent recidivism and non-violent recidivism. Among the information retrieved there were also some	14 per cent of the sample had a previous conviction/charge for arson. During the follow-up period 77 offenders were convicted with arson (6,2%), 606 with a new violent offense (48.5%), and 991 with a non-violent offense (81,7%), which means that 81,7% of the sample had a new conviction in the follow-up period. The variables which were	Firesetting behaviour before 18 years old; vandalism during adolescence; violent vandalism, theft.	The model is based only on static variables, not considering dynamic risk factors that might be linked to arson.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
	offense between 1985 and 1994, and criminally convicted for it. Ages ranged from 14 to 77 years old ( $M=23.34$ , $SD=8.48$ ).		potential predictor variables such as demographics and offense-history.	significantly correlated with arson were the first arson being under the age of 18, multiple arsons and the number of prior arsons, vandalism, violent/vandalism and theft/vandalism offences. Variables that were significantly correlated with violent reoffences were ethnicity, first arson before 18 years old, age at first offense, and number of prior offenses (violent, vandalism, theft, violent/vandalism, theft/vandalism, drug, driving, other and all prior offenses). Regarding the predictor of non-violent recidivism, they were ethnicity, first arson being before the age of 18, age at first arson offense, first offense before 18 years of old, and number of prior offenses (violent, vandalism, theft, combination of violent/vandalism, theft/vandalism,		

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
				drug, driving other and all prior offenses).  Authors also concluded that the variables used to predict arson recidivism were different than those which predict violent and non-violent recidivism.		
Ducat et al. (2015)	1052 firesetters, which 909 individuals were male, and 143 were female ( $M=33$ ; $SD=14,4$ , ranging from 10 to 83 years old). 5.9% ( $n=62$ ) were under the age of 18 at the time of index offense, the	A sample of deliberate firesetters was identified from the Sentencing Advisory Council of Victoria (SAC), Australia. The final sample consisted of 1052 individuals. Regarding offenders which had more than one types of offense, were included the ones in which arson was the more serious offense. The	The primary psychiatric diagnoses were sorted into categories: psychotic disorders (including schizophrenia, schizoaffective disorder, schizotypal disorder, shared psychotic disorder, delusional disorders, and other unspecified non-organic disorders, and did not include substance-induced psychosis, depression with psychotic features, or senile psychotic	The recidivism rate for firesetting was significantly smaller than the general recidivism rate (5,3% against 55,4%). More than a third of recidivist firesetters (37,5%) committed their first arson reoffence within 1 to 2 years, and another 35,7% reoffended within 2 to 3 years after the index offence. 17,8% had their first reoffending episode between 3 and 5 years, and 8,9% between 6 and 11 years.	Male; criminal history; firesetting history; psychiatric disorders (except depression and anxiety), such as childhood behavioural problems, personality disorders, bipolar disorder, and schizophrenia;	There were some limitations in the available information, such as the actual conviction of those who were charged with arson. The data linkage, since it was not collected with research purposes, could be incomplete, such as crime scene

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
	majority being 17 (n=49; 4.7%).	criminal history of the offenders was extracted from Law Enforcement Assistance Program (LEAP). The mental health was retrieved from the Victorian Case Psychiatric Register (VPCR), and they followed the International Classification of Diseases (ICD-10), typically diagnosed by psychiatrist.	conditions), bipolar affective disorder, depression, anxiety, substance misuse (which included any type of substance abuse, dependence or any substance-induced psychosis, excluding nicotine related disorders and acute intoxication), childhood behavioural disorders, pyromania and personality disorders. The information was crossed using personal information from the cases, such as the first name, surname, date of birth, aliases, age range, and gender.	The majority of the recidivists were male (n=46; 82,1%) and were significantly younger at the time of their first arson offense. Recidivist firesetters had more prior charges for any offense and an even greater number of arson charges. However, 94,6 % of this group fallen into the general recidivism category, where the reoffences were not arson related, which highlights the criminal versatility of this type of offenders. This group of firesetters were also more likely to have higher levels of psychiatric disturbance, except diagnosis from depression and anxiety. Recidivists had more charges for firesetting, as well as all other offence types, and were younger at their first offence. Other factors also identified were past firesetting behaviour, general	antisocial behaviour; substance abuse (alcohol).	actions, offenders mental state and motivations.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
				antisociality, specially from a young age, which seem to be the one that are the better predictors to firesetters recidivism. Additionally, firesetters recidivists were also more likely to receive a clinical diagnosis, such as bipolar disorder or schizophrenia, personality disorders, have a substance abuse history, or having childhood behavioural disorders. Although most of the sample did not receive a formal diagnosis prior to the index offense, 73% had some sort of contact with the public psychiatric services.		
Wyatt et al. (2018)	132 mentally disorder arsonists. Ages ranged between 18 and 71 years old	The clinical files of the patients were collected and analysed in order to collect information. This data was coded in different categories. The	The information of each individual was collected through their case file. To be considered Mentally Disorder Firesetter (MDF) individuals needed to be under care for	The main risk factors identified within the MDF's when compared to MDC's were the premeditation of the fire incident, emotion regulation problems, social isolation (although these last two factors were only a	Premeditation; suicidal ideation; emotion regulation problems; social isolation; history of mental health;	Some of the risk factors associated with mentally disordered firesetters were hard to identify within patient files.

Source/Authors	Sample	Instruments/Type of analysis	Description	Conclusions	Main risk factors identified	Limitations
	( <i>M</i> =41,7; <i>SD</i> =15,1).	variables used were basis static, dynamic and incident factors. These variables were listed as present or absent.	psychiatric problem and the named perpetrator of a deliberate incident of firesetting. These were compared with a Mentally Disordered Controls (MDC). The MDC's had to be under trust care for a psychiatric problem and the named perpetrator of a non-firesetting incident. Additionally, there was also another analysis to compare static, dynamic and incident characteristics differentiate male and female MDF's and one-time versus repeat MDF's.	predictor in the female group of firesetters). MDF's present a more general mental health history characterized by several hospitalizations, general impulsivity, and premeditations regarding firesetting. Findings suggest that male and female have similar risk factors. Regarding the one-time and repeat firesetters, findings suggest that having a diagnosis of personality disorders, as well as an external locus of control, predicted repetitive firesetting.	impulsivity; premeditation; personality disorders; external locus of control.	The target of the fire was also not considered.

## Results

### Study Origin

The studies were conducted majorly in the United Kingdom (Sapsford et al., 1978; Rix, 1994; Noblet & Nelson, 2001; Swinton & Ahmed, 2001; Soothill et al., 2004; Dickens et al., 2007; Dickens et al., 2008; Kelly et al., 2009; Hollin et al., 2013; Tyler et al., 2013; Rose et al., 2015; Wyatt et al., 2018), followed by Australia (Ducat et al., 2013a; Ducat et al., 2013b; Ducat et al., 2015); The Netherlands (Labree et al., 2010; Hagenauw et al., 2015), New Zealand (Edwards & Grace, 2014; Wilpert et al., 2017); Germany (Barnett et al., 1999), Finland (Anwar et al., 2009), and lastly one study from Sweden (Enayati et al., 2008). All the studies were conducted in developed countries from only two continents, being seventy-seven per cent of them conducted in Europe, which does not provide a lot of cultural diversity in order to take in consideration the sociocultural impacts on risk factors. There were no studies conducted in the United States of America where statistics show that arson crime has a lot of representativity. Additionally, it would be important to conduct studies in other continents which were not represented by the selected studies, such as South America, North America, Africa and Asia.

### Sample Size

The sample size varied between seven (Rose et al., 2016) and 65,327 (Soothill et al., 2004), adding up to a total of 113,610 individuals on the global sample, being 40,882 members of the control groups from five of the twenty-one studies (Noblett & Nelson, 2001; Anwar et al., 2009; Ducat et al., 2013a; Wilpert et al., 2017). The total amount of deliberate firesetters included in all the studies were 72,728. However, there Soothill and colleagues (2004) study had a significant amount of deliberate firesetters included, which makes the total sample much higher than what it would have been if this study was not included. If so, the total sample would have been 7,401 deliberate firesetters. This would make an average sample size of 352 deliberate firesetters by study, excluding the study conducted by Soothill and colleagues (2004). This amount of deliberate firesetters is a very good number of sample size, allowing the generalization of results with a good source of reliability.

### Sociodemographic Characteristics of the Samples

Regarding gender, six studies had an all-male sample (Sapsford et al., 1978; Kelly et al., 2009; Labree et al., 2010; Rose et al., 2016; Wilpert et al., 2017), one had an all-female

sample (Noblet & Nelson, 2001), whereas the others had mixed samples, comprising men and women (Rix, 1994; Barnett et al., 1999; Swinton & Ahmed, 2001; Soothill et al., 2004; Dickens et al., 2007; Dickens et al., 2008; Enayati et al., 2008; Anwar et al., 2009; Ducat et al., 2013a; Ducat et al., 2013b; Hollin et al., 2013; Tyler et al., 2013; Edwards & Grace, 2014; Hagenauw et al., 2015; Ducat et al., 2015; Wyatt et al., 2018). Regarding the studies with mixed gender samples, in every study the number of individuals in the female group was lower, being sometimes significantly smaller than the male group. This led to some problems when comparing characteristics between the groups. Also, the reduced number of female firesetters within the studies, although it may represent the proportion of the phenomenon, it hampers the conclusions drawn about the specific characteristics of this group. It would be important to make further studies comprising only female deliberate firesetters and/or develop a study with equivalent samples between men and women. Considering methodology, the majority of the retrospective studies had a mixed sample comprising both men and women, with only one having an all-male sample (Kelly et al., 2009). The in-person studies did have a more distributed proportion of mixed samples, with six of the studies being conducted with both men and women (Rix, 1994; Swinton & Ahmed, 2001; Dickens et al., 2007; Dickens et al., 2008; Tyler et al., 2013; Hagenauw et al., 2014), and the remaining five studies being all-male (Sapsford et al., 1978; Labree et al., 2010; Rose et al., 2016; Wipert et al., 2017) or all-female samples (Noblet & Nelson, 2001),

The mean age was 30,7 years old, although not all studies had information about the mean age of the sample (Sapsford et al., 1978; Barnett et al., 1999; Tyler et al., 2013). The majority of the studies did not include the mean ages of each group of the sample, such as female and male, or firesetters and control group (Swinton & Ahmed, 2001; Dickens et al., 2008; Anwar et al., 2009; Ducat et al., 2013a; Ducat et al., 2013b; Edwards & Grace, 2014; Hagenauw et al., 2015; Ducat et al., 2015).

In a more recent perspective of their lives, it was found in several studies that deliberate firesetters are often unemployed at the time of the offense (Rix, 1994; Ducat et al., 2013a). and they have lower levels of education (Ducat et al., 2013a).

### **Type of Sample**

Regarding the setting where studies were conducted, there seems to be a tendency to conduct studies using a retrospective design, in which researchers consulted existing criminal records and clinical files of the individuals comprised in their samples. However,

there were also studies that were conducted in mental health settings, more specifically in psychiatric units or hospitals, and prisons, sometimes using other offenders in their samples as a control group to compare characteristics identified in deliberate firesetters.

More specifically, seven of the studies took place in a psychiatric units/hospitals (Swinton & Ahmed, 2001; Dickens et al., 2007; Labree et al., 2010; Hagenauw et al., 2015; Rose et al., 2016; Wilpert et al., 2017), three were conducted in prisons (Sapsford et al., 1978; Rix, 1994; Noblet & Nelson, 2016), and one of the studies was conducted with individuals from both hospital and prison settings (Tyler et al., 2013).

The retrospective design was used in the vast majority of the included studies, using criminal records (Barnett et al., 1999; Soothill et al., 2004; Ducat et al., 2013a; Ducat et al., 2013b; Edwards & Grace, 2014; Wyatt et al., 2018), clinical files (Dickens et al., 2007; Dickens et al., 2008; Enayati et al., 2008; Kelly et al., 2009; Hollin et al., 2013), and both criminal and clinical files (Anwar et al., 2009; Ducat et al., 2015).

However, the collected information also differed from one type of study to another. There is some information that is simply impossible to retrieve from previously collected data, especially if this data is not collected for research purposes. An example is the motives for firesetting. None of the studies who used this type of method withdrew information about motives for firesetting.

## **Risk Factors**

### **Mental Health**

Concerning mental health, the most common disorders associated with firesetting in the in-person studies seem to be personality disorders (Sapsford, et al., 1978; Rix, 1994; Labree et al., 2010; Hagenauw et al., 2014; Wilpert et al., 2017), as well as in retrospective studies (Enayati et al., 2008; Ducat et al., 2013a; Ducat et al., 2013b; Ducat et al., 2015; Wyatt et al., 2018), more specifically Axis II personality disorders (paranoid, schizoid, schizotypal, antisocial, borderline, histrionic, narcissistic, avoidant, dependent, obsessive-compulsive, and mental retardation), and psychotic disorder, although it was more frequent among retrospective studies (Enayati et al., 2008; Anwar et al., 2009; Ducat et al., 2013b; Ducat et al., 2015), than in-person studies (Swinton & Ahmed, 2001; Labree et al., 2010).

Only two studies added psychopathic disorder to research variables (Sapsford et al., 1978; Hollin et al., 2013) and firesetters had, in fact, more psychopathic traits than other offenders. Although this is an interesting risk factor to be analysed in a study, this assessment

was not made with the more scientifically accepted, which is the Psychopathy Checklist-Revised (PCL-R; Hare, 2003). Thus, the more correct conclusion to draw from these results are that deliberate firesetters seem to also have some psychopathic traits. Labree and colleagues (2010), did use the PCL-R, however psychopathy was not identified as a risk factor in this study.

Learning disabilities a characteristic of some of the samples, as some of the studies were conducted using individuals with diagnosed learning disabilities (Dickens et al., 2008; Kelly et al., 2009; Rose et al., 2016). Nonetheless, six studies did identify learning disabilities as a risk factor, being a more present characteristic among retrospective studies (Dickens et al., 2007; Dickens et al., 2008; Enayati et al., 2008; Hollin et al., 2013), being present in only two in-person studies (Rix, 1994; Wilpert et al., 2017). Although being identified in six of the studies, five of these studies were conducted in psychiatric units or resorting to clinical files consultation (Dickens et al., 2007; Dickens et al., 2008; Enayati et al., 2008; Hollin et al., 2013; Wilpert et al., 2017).

Other diagnoses were identified, such as impulse control and behavioural disorders, monthly in retrospective studies (Dickens et al., 2007; Dickens et al., 2008; Ducat et al., 2013a; Ducat et al., 2015; Wyatt et al., 2018), being identified in only one in-person study (Hagenauw et al., 2014). Although none of the studies identified pyromania as a risk factor, four of them identified individuals diagnosed with pyromania in their samples (Ducat et al., 2013a; Ducat et al., 2013b; Ducat et al., 2015; Wilpert et al., 2017), making a total of seven pyromaniacs identified. Interestingly enough, all of these individuals were identified in the Oceania continent.

Suicidal ideation and history of self-harm was found in some of the retrospective studies (Dickens et al., 2007; Ducat et al., 2013a; Wyatt et al., 2018) but only in one in-person study (Noblett & Nelson, 2001), however depression diagnoses were only mentioned as a risk factor in two of the studies (Ducat et al 2013a; Ducat et al., 2015), both conducted with retrospective design.

### **Substance Abuse**

Abusing substances have been widely associated with firesetting, and a very common variable included across a lot of studies. In the analysed studies, this variable was included in nine of the studies and was identified as a risk factor in all of them, being fairly distributed across in-person (Rix. 1994; Swinton & Ahmed, 2001; Labree et al., 2010; Tyler

et al., 2013; Hagenauw et al., 2015) and retrospective studies (Barnett et al., 1999; Enayati et al., 2008; Ducat et al., 2013b; Ducat et al., 2015). The most common type of substance abuse is alcohol, being identified in all nine studies as a risk factor. Drug abuse was considered as a variable in some of the studies, however, it was not identified as a risk factor due to the small percentage of users within the samples. There were some cases where authors only identified substance abuse if there was a formal diagnose of substance use disorder (Enayati et al., 2008; Anwar et al., 2009; Ducat et al., 2013a; Ducat et al., 2013b; Ducat et al., 2015), which may underestimate the actual number of individuals with some of addiction to substances, even if there was no diagnose. This constraint in the sample may have been due to the setting in which the study was carried out.

### **Personal and Social Characteristics**

Regarding personal characteristics, deliberate firesetters seem to have a more introverted personality (Dickens et al., 2008). Their coping skills tend to be maladaptive (Kelly et al., 2009; Tyler et al., 2013; Rose et al., 2016), with authors hypothesising that firesetting behaviour could be a way to cope with life events. Associated with the coping skills, these offenders also tend to have poor problem-solving skills (Tyler et al., 2013) and problems with regulating emotions (Wyatt et al., 2018), leading them to be characterized by impulsivity (Labree et al., 2010; Ducat et al., 2013a; Wyatt et al., 2018). Additionally, deliberate firesetters tend to have low self-esteem (Ducat et al., 2013a). These characteristics were concluded both in retrospective (Dickens et al., 2008; Kelly et al., 2009; Ducat et al., 2013a; Wyatt et al., 2018) and in-person studies (Labree et al., 2010; Tyler et al., 2013; Rose et al., 2016), being fairly distributed among them.

As for social characteristics, these were more common among in-person (Noblett & Nelson, 2001; Swinton & Ahmed, 2001; Tyler et al., 2013; Hagenauw et al., 2015; Rose et al., 2016; Wilpert et al., 2017) than in retrospective studies (Dickens et al., 2008; Kelly et al., 2009; Ducat et al., 2013a; Ducat et al., 2013b; Wyatt et al., 2018). Deliberate firesetters seem to have many problems engaging in social relationships (Dickens et al., 2008; Ducat et al., 2013a; Hagenauw et al., 2015; Rose et al., 2016), having poor relational skills (Noblett & Nelson, 2001; Swinton & Ahmed, 2001; Dickens et al., 2008; Kelly et al., 2009; Ducat et al., 2013a; Tyler et al., 2013; Hagenauw et al., 2015; Rose et al., 2016; Wilpert et al., 2017; Wyatt et al., 2018). This lack of skills can induce some specific characteristics such as poor communication skills (Ducat et al., 2013a) and lack of assertiveness, as found in some of the studies (Noblett & Nelson, 2001; Ducat et al., 2013b). Similarly to personal

characteristics, social characteristics have not been one of the focuses of the literature. However, deliberate firesetters do seem to have particular type of social characteristics, being more introverted and having more difficulties building and maintaining social relationships.

### **Personal History**

Although personal history aspects were more commonly identified as a risk factor in retrospective studies (Dickens et al., 2007; Dickens et al., 2008; Ducat et al., 2013a; Ducat et al., 2015; Edwards & Grace, 2014), the study design that provided more information was in-person (Noblett & Nelson, 2001; Hagenauw et al., 2015; Rose et al., 2016), more specifically que qualitative in-person study (Tyler et al., 2013). Deliberate firesetters tend to have a troubled history, marked by several negative experiences. Regarding childhood factors, these individuals have a history of behavioural and temperamental issues (Dickens et al., 2008; Ducat et al., 2013a; Hagenauw et al., 2015; Ducat et al., 2015). These issues could have led to the engagement on antisocial activities during childhood and adolescence, as we can see in the studies above (Tyler et al., 2013; Ducat et al., 2015), such as substance abuse, vandalism, theft, among other behaviours (Edwards & Grace, 2014).

Childhood abuse also seems to mark deliberate firesetters lives (Tyler et al., 2013; Rose et al., 2016), however this is a risk factor common among different types of offenders, not being an exclusive risk factor of firesetters. Sexual assault was also found in the studies as being part of these offenders' histories, especially in women (Noblett & Nelson, 2016; Dickens et al., 2007). Regarding family dynamics, this was not a common variable present in the studies, being only present in Tyler and colleagues (2013) research, where authors found that deliberate firesetters had not only a history of mental health issues in the family, but also negative experiences with caregivers.

### **Criminal History**

Besides the criminal activity during their upbringing, several authors also found evidence that deliberate firesetters have some sort of criminal history (Rix, 1994; Soothill et al., 2004; Ducat et al., 2015). In their study Ducat and colleagues (2013a) concluded that firesetters that had other offenses in their criminal history (mixed firesetters) had higher chances of further engaging in criminal activities, making criminal versatility as something to include in future research in order to understand how this affects firesetting behaviour. These specific group of individuals were more likely to have a larger number of

criminogenic needs and to have more extensive and early criminal careers. On this matter, there were also evidence of higher sentences in firesetters, and those with higher sentences were more likely to engage in future criminal activities (Sapsford et al., 1978; Soothill et al., 2004).

### **Fire-Related Characteristics**

Several studies analysed fire-related cognitions (Dickens et al., 2007; Ducat et al., 2013a; Tyler et al., 2013; Ducat et al., 2015), and in all of them at least some portion of the sample exhibited fire-related cognitions. Most of these studies were done using a retrospective design (Dickens et al., 2007; Ducat et al., 2013a; Ducat et al., 2015), and it would be important to know how these cognitions were identified. Since Taylor and colleagues (2013) conducted a qualitative study, they collected examples from the deliberate firesetters, where they revealed that setting fires made them feel excited.

Four of the selected studies reported that deliberate firesetters exhibited firesetting behaviour during childhood (Kelly et al., 2009; Ducat et al., 2013a; Edwards & Grace, 2014; Ducat et al., 2015). It would be interesting to understand if these individuals' motivation for starting fires remains constants during their lives, and if not, what changed and why. Every study that identified this behaviour was retrospective

### **Motives for Firesetting**

Considering motives for firesetting, few of the selected studies exhibited this information in their results. Rix (1994) gave the bigger relevance to motive, selecting the sample according to it. By doing this, the author concluded that the most common motive for firesetting was revenge/anger, being the motive reported by a third of the sample, followed by excitement (11%), vandalism (9%), attention seeking/cry for help (7%), attempted suicide (7%), rehousing (7%), psychoses (5%), carelessness (5%), insurance fraud (5%), covering up other crimes (5%), heroism (4%), anti-depressant (2%) and political (2%).

Revenge/anger as the primary motive for firesetting was also present in Tyler and colleagues (2013) research, followed by hallucinations, cry for help, fire interest, followed by protection, protest and boredom with the same percentage, and lastly covering up other crimes and suicide/self-harm were tied in last, with the lower percentage. Dickens and colleagues (2007) also uncovered that, women had higher levels of parasuicide and attention seeking motives, being the only statistically significant difference among between men and women. However, in one of the other studies the primary motive was

hallucinations, followed by revenge and, lastly excitement or kick related to the fire (Labree et al., 2010).

### **Limitations of the Studies**

Despite the improvements in deliberate firesetters risk assessment, there are some limitations to the studies, such as the setting where the sample was collected. The majority of the studies were conducted in psychiatric hospitals or unites, what could influence the risk factors identified, leading the studies to conclude a higher presence of mental health related risk factors.

The type of setting where the fire was lit was not included in none of the studies, and it did not identify if the case files analysed were regarding rural or urban fires.

Additionally, there is no coherence between assessment tools. Most studies use case file consultation and do not resort to any instruments to conduct risk assessments. However, in the studies in which an assessment tool was used, only three used a forensic risk assessment tool (Hagenauw et al., 2015; Labree et al., 2010; Wilpert et al., 2017). The rest of the tools were instruments designed for the clinical setting.

## **Discussion**

There wasn't a very diverse origin of the studies, since most of them were mainly focused on Europe (specially the United Kingdom), followed by Australia and New Zealand, thus making it difficult to globalize the findings. Cultural differences might have a severe impact on deliberate risk factors, since they have a big impact on individual characteristics. Therefore, the impact of cultural aspects in static and dynamic risk factors can be something important to further investigate.

When it comes to sample sizes these varied a lot throughout the selected studies. There were a couple of studies with very reduced samples of seven and twenty deliberate firesetters (Tyler et al., 2013; Rose et al., 2016). By contrast, there were also a couple of studies that had a very large sample, such as 65,327 (Soothill et al., 2004). This last sample was significantly higher than all the other studies, increasing significantly the samples mean. The total number of deliberate firesetters included in the studies was 72,728, which can be considered a reasonable sample to take conclusions from.

The mean age of the different samples varied between twenty and forty-two years old. However, some of the studies did not provide information about the mean age of deliberate firesetters and the control group separately, and only included the general mean age in their descriptions. This information can be relevant since groups may have significantly different values. For example, there was a study in which the mean age of the firesetter sample was twenty-eight and the control group had a mean age of forty-five years old (Anwar et al., 2009).

Gender wise, in all the studies where both males and females were present, the male sample was larger than the female, which is consistent with the literature that states that men are more likely to commit deliberate firesetting (Blanco et al., 2010; Vaughn et al., 2010; Hoertel et al., 2011; Gannon et al., 2022). Females not only are less likely to engage in deliberate firesetting, but also tend to engage in this criminal behaviour for different reasons than males. Dickens and colleagues (2007) compared both female and male deliberate firesetters and concluded that females tend to set fires as a way for attention seeking or as a suicide attempt, targeting personal locations in residential areas. Men, however, according to the same study, tend to target vehicles, commerce and industrial locations, as a form of revenge or anger expression. The authors suggest that men have more expressive motives, as an emotional expression, whereas women have more instrumental motives, by setting fires as a mean to achieve an end. Ducat and colleagues

(2013a) also identified that firesetters had lower levels of skilled employment, which is something that had been previously stated in the literature (Gannon & Pina, 2010). There were other sociodemographic characteristics previously identified in the literature, such as low income (Gannon & Pina, 2010) and lower levels of education (Rasanen et al., 1995; Gannon & Pina, 2010), however these were not identified in none of the studies included in this systematic review.

Methodology wise, the majority of the studies were conducted using criminal records and/or clinical files to obtain information for the research. This method, although common in forensic research, has its' limitations, since the information was not collected for research purposes. In criminal records, for instance, there is no guarantee that there will be any information about mental health matters, since criminal investigations often focus on historical factors and more crime detailed information. On the other hand, clinical files also have its' limitations since clinicians do not have the obligation to gather information about the crime itself, such as where the crime was committed, how it was committed, what were their intentions, and so on. Using both criminal and clinical files seems to be the most complete and trustworthy way of conducting this type of study design, however crossing this information can be difficult since not every country has a national database of clinical information, which can present itself as a limitation. Additionally, there is some information that will hardly be found in these files, such as motives for firesetting.

Regarding deliberate firesetters risk factors, studies do seem to agree that personality disorders are common among these offenders, alongside psychotic disorders. Some authors specify that axis II personality disorders seem to have more relevance when considering firesetting behaviour. Methodology wise, these disorders were identified both in empirical and retrospective studies in equal quantity, in a total of ten of the selected studies. In empirical studies, these disorders were found both in prison context (Sapsford et al., 1978; Rix, 1994) and in psychiatric units (Labree et al., 2010; Hagenauw et al., 2015; Wilpert et al., 2017). In retrospective studies, personality disorders were identified using clinical files (Enayati et al., 2008), criminal records (Ducat et al., 2013 a; Ducat et al., 2013b; Wyatt et al., 2018), and both methods (Ducat et al., 2015). Personality disorders have been previously associated with deliberate firesetting, more specifically with antisocial personality disorder (Lindberg et al., 2005; Vaughn et al., 2010; Nanayakkara et al., 2016) and borderline personality disorder (Duggan & Shine; 2001; Ducat et al., 2013b; Ó Ciardha et al., 2015a; Nanayakkara et al., 2016), with some studies having a very large portion of

the sample of firesetters with a diagnose of some sort of personality disorder, such as a third of the entire sample (Sambrooks et al., 2021). The prevalence of this type of disorders was on hundred per cent, being concluded as a risk factor in every study where it was considered a variable.

Psychoses, however, were more commonly found in retrospective studies (Enayati et al., 2008; Anwar et al., 2009; Ducat et al., 2013b; Ducat et al., 2015). In empirical studies, psychotic disorders were also identified, but only in studies that were conducted in a psychiatric setting (Swinton & Ahmed, 2001; Labree et al., 2010). Previous research had identified psychotic disorders as a risk factor for deliberate firesetting (Anwar et al., 2011; Dickens & Sugarman, 2012; Tyler & Gannon, 2012; Nanayakkara et al., 2016; Sambrooks et al., 2021), and some of the classifications for firesetting motives include firesetting as a result of psychoses (e.g. Bradford, 1982; Rix, 1994; Puri et al., 1995). In this specific topic, the setting where studies are conducted can influence the prevalence of individuals with this disorder, being something to bear in mind when conducting future research.

Hollin and colleagues (2013) concluded that psychopathy could be present in deliberate firesetters, however, this conclusion was deducted from the diagnosis criteria of the antisocial personality disorder and research has already accepted that, although with some similarities, the concept of psychopathy and antisocial personality disorder are different and not always coexist (Hare, 1991; Soeiro & Goncalves, 2010).

Depression was identified as a risk factor in some of the studies, however, there seems to be a disagreement among authors about this topic being considered a risk factor (Ducat et al., 2013a; Ducat et al., 2015). This disagreement surfaces due to the fact that there were four other studies that only identified previous depressive symptoms, such as history of self-harm and suicidal ideation, as a risk factor (Noblett & Nelson, 2001; Dickens et al., 2007; Wyatt et al., 2018). This mismatch could have been caused by several reasons, one of them being that not everyone that suffers from depressive symptoms seeks professional help, thus not being diagnosed with a depressive disorder. Thus, having had depression in the past may be a risk factor to be considered in future research. Another reason that could have led to the disagreement is the existence of some sort of gap in the information retrieved by authors regarding formal diagnoses, since the majority of these studies were conducted in prison settings (Noblett & Nelson, 2001; Ducat et al., 2013a; Wyatt et al., 2018). Literature does suggest that depression is a risk factor for firesetting (Dickens & Sugarman, 2012; Ó Ciardha et al., 2015a; Alley et al., 2016), as well as some other emotional disorders such as

anxiety disorders (Dickens & Sugarman, 2012; Blanco et al., 2010; Ó Ciardha et al., 2015a), as well as dysthymia (Ó Ciardha et al., 2015a).

Behavioural and impulse control disorders were also found in the deliberate firesetters sample, both in childhood and in adulthood. These disorders were more commonly found in the retrospective studies (Dickens et al., 2007; Dickens et al., 2008; Ducat et al., 2013a; Ducat et al., 2015; Wyatt et al., 2018), having been found in only one empirical study (Hagenauw et al., 2015). With pyromania being a type of impulse control disorder, it is not surprising that these disorders had been included as a variable in some of the studies. Nonetheless, there is scarce information about the prevalence and the connection between these disorders and deliberate firesetting. Although it was not identified as a risk factor, probably because of the low number of diagnoses, pyromania was identified in 7 individuals across four studies (Ducat et al., 2013a; Ducat et al., 2013b; Ducat et al., 2015; Wilpert et al., 2017). Since three of the studies were conducted by the same authors, there may be the case that there were records from the same individuals in them, however, since we do not possess this information, we count the total number of people diagnosed with pyromania across the studies. This is a type of impulse control disorder that is very rare due to the exclusion criteria present in the diagnostic process (Lindberg et al., 2015; Sambrooks et al., 2021). Despite not being identified as a risk factor due to the previously described reasons, pyromania has a clear connection with deliberate firesetting. This can be justified due to the fact that some of the diagnostic criteria for this disorder implies setting multiple fires and the feeling of tension and/or arousal prior to setting a fire. These implications reveal an evident relation to deliberate firesetting, making it a risk factor due to the relationship between the concepts instead of the empirical conclusions.

Learning disabilities have been widely associated with deliberate firesetting (Repo et al., 1997; Lindberg et al., 2005; Dickens et al., 2009), however there doesn't seem to be a consensus in the scientific community. This occurs because there are studies that claim that deliberate firesetters aren't more likely to have learning disabilities than other justice-involved individuals (Nanayakkara et al., 2015; Collins et al., 2021; Sambrooks et al., 2021). Some of the studies selected in our sample do identify learning disabilities as a risk factor, being more prevalent among retrospective studies (Dickens et al., 2007; Dickens et al., 2008; Enayati et al., 2008; Hollin et al., 2013), than in empirical studies (Rix, 1994; Wilpert et al., 2017).

Following mental health issues, substance abuse was a matter that was widely found to be present in the majority of the studies, both in empirical (Rix, 1994; Swinton & Ahmed, 2001; Labree et al., 2010; Tyler et al., 2013; Hagenauw et al., 2015) and in retrospective studies (Barnett et al., 1999; Enayati et al., 2008; Ducat et al., 2013b; Ducat et al., 2015). This issue has been very present in the literature, with authors identifying that these individuals were usually under the influence of some type of substance at the time of the fire (Blanco et al., 2010; Alleyne et al., 2016). Sambrooks and colleagues (2021) did conclude that two thirds of their sample had a diagnoses of some substance related issue, which was also concluded by previous research (Vaughn et al., 2010; Hoertel et al., 2011; Ó Ciardha et al., 2015a). The most common substance from which individuals intoxicate themselves is alcohol, being the most common substance identified in all of the studies in this systematic review. Some of the individuals did report consuming illicit substances, however there was only a small percentage of the sample that did consume other types of substances other than alcohol (Ducat et al., 2013b).

Regarding personality traits, some characteristics were identified as being more prevalent among firesetters, such as having a more introverted personality (Dickens et al., 2008), having poor problem-solving skills (Tyler et al., 2013), low self-esteem (Ducat et al., 2013a), and having difficulties engaging and maintaining social relationships (Dickens et al., 2008; Ducat et al., 2013a; Hagenauw et al., 2015; Rose et al., 2016). This may happen due to the lack of social skills that these offenders tend to present (Noblett & Nelson, 2001; Swinton & Ahmed; Dickens et al., 2008; Kelly et al., 2009; Ducat et al., 2013a; Tyler et al., 2013; Hagenauw et al., 2014; Rose et al., 2016; Wilpert et al., 2017; Wyatt et al., 2018). The lack of social support and social relationships seem to be a very present characteristic among deliberate firesetters. These characteristics are present in ten of the studies included in this systematic review, both in empirical and in retrospective studies, and also in both settings in simultaneous, although these were more commonly found in the psychiatric setting. Additionally, the absence of social relationships can have some impacts on people since some abilities are often developed by experiencing these relationships, such as assertiveness and communication skills, which the studies indicate that are flawed within the deliberate firesetters sample (Noblett & Nelson, 2001; Ducat et al., 2013a; Ducat et al., 2013b). Conducting retrospective studies can make the gathering of information regarding personal characteristics more difficult than in-person studies, which can lead to fewer results about this topic.

Authors suggest that firesetting can be a result of the lack of healthy coping mechanisms among this type of offenders, which aligns with the maladaptive coping mechanisms found in some of the studies (Kelly et al., 2009; Tyler et al., 2013; Rose et al., 2016). These characteristics have been previously identified in the literature (Gannon et al., 2013; Long et al., 2015; Nanayakkara et al., 2020), however there is still a big gap in this matter. Substance abuse can also be used by deliberate firesetters as a coping mechanism, as there is a large percentage of people that resort to drinking or consuming illicit substances to ‘run away’ from their problems. In this case, and since alcohol is the most commonly used substance in the studies, drinking can be used as a way of running away from life problems and as a way of enabling individuals to engage in behaviours that they would not engage in if they were sober.

When it comes to personal history, deliberate firesetters seem to have troubled backgrounds marked by childhood behavioural issues (Dickens et al., 2008; Ducat et al., 2013a; Ducat et al., 2015), antisocial activities (Tyler et al., 2013; Edwards & Grace, 2014; Ducat et al., 2015), child abuse (Tyler et al., 2013; Rose et al., 2016), and sexual abuse (Noblett & Nelson, 2001; Dickens et al., 2007), which is consistent with the existing literature (Bradford, 1982; McCarty & McMahan, 2005; Gannon & Pina, 2010). However, some of the found literature did conclude that deliberate firesetters came from larger families, and their upbringing would be marked by parental neglect (Bradford, 1982; McCarty & McMahan, 2005). Furthermore, when conducting their qualitative study, Tyler and colleagues (2013), concluded that deliberate firesetters had negative experiences with their caregivers. This also supports the presence of child abuse and neglect as a risk factor, as well as a history of mental health issues in the family, from usually one of the caregivers. This is another issue that has been neglected in both the reviewed studies and the general literature, despite its importance in understanding the specific characteristics of these offenders and, more specifically, in identifying environmental variables that may have influenced individuals to start fires.

Fire-related characteristics were not commonly found in the results of the selected studies which, being a very relevant variable in common literature, is a gap that is worth mentioning. Some of the studies did conclude that deliberate firesetters did exhibit some fire-related cognitions (Dickens et al., 2007; Ducat et al., 2013a; Tyler et al., 2013; Ducat et al., 2015), and firesetting behaviour during their upbringing (Kelly et al., 2009, Ducat et al., 2013a; Edwards & Grace, 2014; Ducat et al., 2015). Only one of the studies that identified

any fire-related characteristics was empirical, which may indicate that professionals that had direct contact with deliberate firesetters registered this information in their files. Even though the studies did not identify much fire-related characteristics, literature has shown that deliberate firesetters do tend to exhibit some levels of fire interest and fire scripts (Barrowcliffe, 2015; Ó Ciardha et al., 2015; Tyler et al., 2015; Alleyne et al., 2016; Ó Ciardha et al., 2017; Butler & Gannon, 2021). It would be important to study the relationship between fire-related characteristics and motives for deliberate firesetting, since motives have not been nearly as studied as they should regarding deliberate firesetting. These findings are crucial in order to build a structured and cohesive method for classify motive for deliberate firesetting.

The results, despite being enlightening about some of the risk factors, have focused more on static risk factors for deliberate firesetting. It became evident that, although static risk factor has been the focus, research has been neglecting important variables such as childhood and adolescence history.

As previously mentioned, although it is very important to understand the historical events in individuals' lives that led them to initiate firesetting behaviour, these are not susceptible to be intervened with, except for clinical variables such as psychopathological disorders, where it is possible to stabilize the symptoms. Future research should focus on dynamic risk factors and understand the impact they have on this type of criminal activity. We believe that it would be relevant to conduct more qualitative studies to further understand the variables of interest and afterward conduct quantitative studies aiming to statistically proving which life events are the most relevant to deliberate firesetting behaviour.

Furthermore, future research should also focus on dynamic risk factors besides psychiatric diagnoses, in order to complement the existing information. Both static and dynamic risk factors can lead to a more efficient intervention and prevention strategy, helping professionals around the world to eradicate this problem that is firesetting. Additionally, it would be recommended that a meta-analysis is conducted to further understand this phenomenon, the risk factors, and their influence in this behaviour.

This review included some limitations. Firstly, the analysis of the studies did not include a structured quality review, which may have led to a similar analysis of different quality studies without having that factor in consideration. Additionally, some studies may have

been excluded for not having the key words in their title, despite addressing this phenomenon.

Regarding practical implications, the systematization of deliberate firesetters risk factors is a crucial step when trying to understand the gaps in the literature and what has been studied throughout the years. With this review, it became clear that an investment should be made in regard to dynamic risk factors, other than clinical, as well as developmental factors that may have influenced individuals to engage in this type of criminal behaviour. More studies should be conducted regarding this topic, as well as studying the viability of existing intervention programs and if the risk factors that are addressed remain updated. Additionally, there is also a need to build a risk assessment tool that included as many risk factors as possible, in order to maximise effectiveness of said instrument. Lastly, this systematic review provides a clear understanding of what remains to be done regarding deliberate firesetters risk assessment.

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