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### Characteristics that predict firesetting in male and female mentally disordered offenders

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Running Head: CHARACTERISTICS THAT PREDICT FIRESETTING

**Characteristics that predict firesetting in male and female mentally disordered offenders**

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**Abstract**

Few studies have adequately explored the characteristics of male and female mentally disordered firesetters and compared these to those of non-firesetting mentally disordered offenders. Further, there is a paucity of research examining the characteristics which can predict repeat firesetting within this population. The current study aimed to examine similarities and differences in the characteristics of (1) male

and female mentally disordered firesetters, (2) male and female mentally disordered firesetters compared to non-firesetting offenders, and (3) one-time and repeat firesetters. Further, the ability of these characteristics to predict offence status (i.e., firesetter or non-firesetter) and repeat firesetting was explored. Information was collected from patient hospital records for 77 (43 firesetters, 34 non-firesetters) mentally disordered offenders; including sociodemographic, family and personal background, psychiatric, and offence history factors. The findings suggest that mentally disordered firesetters are similar to their non-firesetting counterparts on key characteristics; however, firesetters are more likely to have an expressed interest in fire/explosives and a diagnosis of a schizophrenic disorder and female firesetters are more likely to have a higher number of firesetting incidents than males. Further, findings suggest that fire interest is the largest predictor of repeat firesetting. Clinical implications in terms of treatment and risk assessment are discussed.

There has been a longstanding association between mental disorder and firesetting (Tyler & Gannon, 2012) and psychiatric morbidity is frequently reported as a common factor in the firesetting literature (Dickens, Sugarman, Edgar, Hofberg, Tewari, & Ahmad, 2009). In 2004 arson was the second highest reason for admission to forensic mental health services in the UK (Rutherford & Duggan, 2007) and research suggests that approximately 10% of patients detained in UK forensic psychiatric hospitals in the UK have some reported history of firesetting (convicted or unconvicted; Coid, Khatan, Gault, Cook, & Jarman, 2001). Despite this, firesetting has received relatively little attention in the psychological and psychiatric literature compared to other types of offending behaviour; thus, little is known about mentally disordered firesetters as a unique group of offenders.

There has been a general consensus in the literature that firesetters are a *generalist* group of offenders and that firesetting is committed as part of an array of criminal activity (Doley, Fineman, Fritzon, Dolan, & McEwan, 2011; Jackson, Hope, & Glass, 1987). As a result of this there has been a general assumption that firesetters' needs are met via general offending behaviour programmes (e.g., social skills and cognitive skills programmes; Gannon & Pina, 2010; Palmer et al., 2007). However, recent research suggests that firesetters differ psychologically from non-firesetters in several key areas (i.e., increased levels of fire interest, cognitive experiences of anger, and social ineffectiveness) (Gannon et al., 2013), suggesting that firesetters are a *specialist* group of offenders requiring specialist treatment.

Firesetting has historically been considered a male perpetrated crime (Dickens et al., 2007) and research has generally supported this assumption with the overall ratio of male to female firesetters being estimated as somewhere in the region of 6:1 (Gannon & Pina, 2010). However, within psychiatric samples females appear to be overrepresented with male to female ratios reported of approximately 3:1 (Bradford, 1982; Enyati et al., 2008; Rix, 1994; Puri, Baxter, & Cordess, 1995) and even as low as 1.5:1 in high security settings (Noblett & Nelson, 2001). Based on these statistics it has been suggested that females might be more likely than males to be referred for psychiatric assessment following an incidence of firesetting (Dickens & Sugarman, 2012).

Whilst females are often included in cohorts of mentally disordered firesetters very few studies have paid this population specific attention. Further, there have been very few studies that have adequately compared male and female mentally disordered firesetters (Gannon, 2010). The few studies that have been conducted in this area have identified several key differences between male and female mentally disordered

firesetters. For example, research has found that female mentally disordered firesetters are more likely than their male counterparts to: have suffered sexual abuse (Dickens et al., 2007), be diagnosed with depression or psychosis (Bradford, 1982; Dickens et al., 2007), have a history of relationship difficulties (Dickens et al., 2007), and have a family history of mental illness (Rix, 1994). Further, male mentally disordered firesetters have been found to be more likely than female mentally disordered firesetters to: have an alcohol problem, be intoxicated at the time of the fire, have more previous convictions (Dickens et al., 2007), have been separated from caregivers in childhood, and have a parental history of substance abuse (Rix, 1994). There is a distinct lack of research that has compared the developmental, psychiatric, and offence histories of male and female mentally disordered firesetters. Thus, there is little guiding information for clinicians on the factors pertinent to female mentally disordered firesetters.

In addition to the lack of research comparing male and female mentally disordered firesetters, there are very few studies which have adequately compared the characteristics of mentally disordered firesetters and non-firesetting mentally disordered offenders (Tyler & Gannon, 2012). Research conducted in this area has reported that compared to non-firesetting mentally disordered offenders, mentally disordered firesetters appear to hold higher levels of schizophrenia or personality disorder diagnoses, (Bradford, 1982; Anwar et al., 2011), have a higher number of previous suicide attempts (Räsänen, Hakko, & Väisänen, 1995a; 1995b; Repo et al., 1997a), have a higher prevalence of self-harm (Geller, 1992; Geller & Bertsch, 1985), are more likely to have previously engaged with psychiatric services (Hill et al., 1982; Räsänen et al., 1995a), exhibit a history of parental substance misuse (Hill et al., 1982), and are more likely to have been separated from caregivers in childhood

(Bradford et al., 1982; Jackson, et al., 1987; see Table 1 for a detailed list of the variables that have been found to distinguish between mentally disordered firesetters and non-firesetting mentally disordered offenders).

Finally, very little research has been conducted examining repeat firesetting and the factors which put male and female mentally disordered firesetters at risk of reoffending. The little research that has been conducted in this area is generally descriptive in nature (Doley et al., 2011). However, existing research does suggest that there are some differences in the characteristics between one-time and repeat firesetters. For example, repeat firesetters appear to be younger, single, have spent more time in correctional institutions, and hold more previous convictions than one-time firesetters (Dickens et al., 2009; Rice & Harris, 1991). One factor that appears to be of specific importance for distinguishing between one-time and repeat firesetters, in both the adult and adolescent literature, is higher levels of reported/expressed fire interest (Doley, 2009; Kennedy, Vale, Khan, & McAnaney, 2006; MacKay et al., 2006; Rice & Harris, 1991; Rice & Harris, 1996). Thus, it appears that an interest in fire is likely to be one particular risk factor for repeat firesetting.

Few studies have examined the factors associated with repeat firesetting. The few retrospective file review studies that have examined this have identified several key variables as positively predicting repeat firesetting in mentally disordered offenders, including: being single or experiencing relationship problems (Dickens et al., 2009; Rice & Harris, 1996), history of juvenile firesetting (Rice & Harris, 1996), alcoholism (Repo, Virkkunen, Rawlings, & Linnoila, 1997b; Repo & Virkkunen, 1997b), problems at school (Dickens et al., 2009), non-compliance with psychiatric medication (Ritchie & Huff, 1999) and experiencing tension or excitement at the time of setting the fire (Dickens et al., 2009). However, despite these variables having been

identified as being more commonly associated with repeat as opposed to one-time firesetters, the extent to which these variables are able to predict repeat firesetting has yet to be empirically established. Further, none of these studies have compared these risk factors to an adequate control group. Thus it is unclear whether these risk factors are specific to mentally disordered firesetters and how important these are for the treatment of mentally disordered firesetters and for the assessment of future risk of firesetting. In addition to this, the firesetting literature has paid little attention to the *central eight* risk/need factors of criminal conduct (e.g., history of antisocial behavior, antisocial personality pattern, family/marital circumstances, substance abuse) (Andrews & Bonta, 2010) even though these have been critical in predicting recidivism in other areas of offending.

Given the paucity of research which has compared the characteristics of male and female mentally disordered firesetters and adequately compared these to non-firesetting controls, the primary aims of this study were to compare the sociodemographic, psychiatric, background and offence history characteristics of (1) male versus female mentally disordered firesetters, and (2) male and female mentally disordered firesetters and their non-firesetting counterparts. Further, this study aimed to explore whether any of these characteristics could predict offender status (i.e., firesetter or non-firesetter). Finally, given the lack of research examining the factors which may put individuals at risk of repeat firesetting, the current study also aimed to compare the characteristics of one-time and repeat firesetters and the ability of these variables in predicting repeat firesetting. This is the first study, to our knowledge, that compares male and female mentally disordered firesetters to non-firesetting controls and explores the possible factors associated with whether someone is a one-time or repeat firesetter.

Given the poor quality of the evidence base in existence this fire review study is exploratory in nature. However, given that fire interest has been found to be important in distinguishing between firesetting and non-firesetting offenders (Gannon et al., 2013) and one-time and repeat firesetters (Doley, 2009), we hypothesize that the presence of expressed interest in fire will be a characteristic that will be able to predict group membership in the current study.

## Method

### Participants

The initial sample consisted of 85 male ( $n = 56$ ) and female ( $n = 28$ ) mentally disordered offenders recruited from six secure psychiatric hospitals (low security, medium security, and rehabilitation) in the UK (48 firesetters and 36 non-firesetters). Clinical teams at each participating site were asked to identify patients who they considered suitable to be approached for the research and who had a forensic history. Based on an in depth file review of participants' recorded offence histories they were then categorized as either a firesetter or non-firesetter, based on the presence or absence of firesetting in their history. Participants who were considered not to have the mental capacity to consent or who were considered to be of risk to the researcher were excluded. All participants had a current diagnosed mental disorder and had at least one criminal conviction, inclusive of their index offence. Seven participants (all firesetters) were discharged or transferred prior to data being collected so could not be included in the study. Thus, 77 participants (43 firesetters and 34 non-firesetters) were included in the final sample. Participant's ages ranged from 19 to 79 years ( $M = 37.10$ ,  $SD = 13.86$ ) and the majority identified themselves as White British (85.7%,  $n = 66$ ).

### *Firesetting Sample*



The firesetting sample consisted of 26 male and 17 female mentally disordered offenders. Participants' ages ranged from 19 to 66 years ( $M = 36.72$ ,  $SD = 11.90$ ). All participants had at least one recorded incident of firesetting in their offence history; 12 participants had an index offence of arson. On average, firesetting participants had set 2.46 fires.

#### *Non-firesetting Sample*

The non-firesetting sample consisted of 23 male and 11 female mentally disordered offenders with ages ranging from 19 to 79 years ( $M = 37.58$ ,  $SD = 16.18$ ). Participants had committed a range of index offences including violent offences ( $n = 23$ ), sexual offences ( $n = 5$ ), and acquisitive offences ( $n = 3$ ). Several participants had a forensic history (i.e., previous convictions for offences) but had been admitted to hospital on this occasion for psychiatric treatment under Section 3 of the Mental Health Act 1983/2007 ( $n = 3$ ) and therefore did not have a current index offence. All participants' hospital files were examined in detail to ensure that they had no recorded history of firesetting (convicted or unconvicted).

Analysis indicated that the groups (firesetter and non-firesetter) did not significantly differ on age [ $t(75) = .26$ ,  $p = .79$ ], hospital security level [ $\chi^2(1, n = 77) = .27$ ,  $p = .59$ ], length of current admission [ $t(75) = .01$ ,  $p = .31$ ], number of previous admissions [ $t(72) = .73$ ,  $p = .46$ ], or type of sentence for index offence (i.e., hospital order, prison transfer to hospital, or admission for treatment) [ $\chi^2(1, n = 77) = .591$ ,  $p = .43$ ]. Due to inconsistency in file information the groups were unable to be compared on IQ, however, initial analysis indicated that the groups did not significantly differ on level of education.

#### **Procedure and Measures**

The study was reviewed and approved by the University of Kent's Research Ethics Committee (Ref: 20122438) and Cornwall and Plymouth NHS REC (Ref: 12/SW/0230). Patients were asked to provide consent for the researchers to access and review their hospital files for the purposes of the research. Thus, this study comprised purely of a file review.

**Variables.** Basic demographic information was collected for both the firesetting and non-firesetting groups (i.e., age, gender, ethnicity, IQ, marital status, level of education attainment) from patients' hospital files. Further variables of interest were generated from an examination of the psychiatric and psychological literature on firesetting and included sociodemographic factors, psychiatric history, family and personal background factors, and offence histories (see Table 1 for a detailed list of variables included in the study). Due to the exploratory nature of the study, variables were selected for inclusion in the study based on whether they had been identified as differentiating factors between firesetters and non-firesetters in either a review or empirical study, regardless of whether the difference was significant or not. Where possible, variables were also selected so as to ensure incorporation of aspects of the *central eight* risk/need factors of criminal conduct (Andrews & Bonta, 2010). The *central eight* risk/need factors are conceptualized as the eight best established risk factors in the prediction of offending behavior for both male and female offenders (Andrews et al., 2012). The *central eight* include: *history of antisocial behavior* (i.e., previous convictions, age of first conviction), *antisocial personality pattern* (i.e., diagnosis of antisocial personality disorder, history of interpersonal aggression), *antisocial cognition* (i.e., motive), *family/marital circumstances* (i.e., marital status, separation from caregivers, history of relationship difficulties, number of siblings), *school/work* (i.e., history of employment, level of

education, history of truancy), and *substance abuse* (i.e., history of substance abuse, intoxication at time of offence). Two of the *central eight*, *leisure/recreation* and *antisocial associates*, were not measured as part of the study as this information was not available from file records.

**Coding.** The first author reviewed, analyzed, and coded patient hospital records for all participants using a rating sheet. Participants' files were reviewed in detail including risk assessments, psychology reports, psychological measures, and medical reports. Variables were coded as being either present or absent from each participant's file record based upon clinician recorded information. Variables such as expressed interest in fire/explosives and insecure sexual identity were recorded based upon whether participants had been recorded as having explicitly expressed information indicative of these factors in psychological assessments (e.g., as part of psychological measures, risk assessments) or clinical interviews. For example, participants may have either directly reported that they were interested in fire/explosives or that they enjoyed watching fires, or, that they felt insecure or confused about their sexual identity.

Due to limitations in the data set (e.g., inconsistency across file reporting) there were also a small number of variables identified in the literature that could not be analyzed including epilepsy and family history of firesetting. There were significant levels of missing data for some variables (e.g., IQ, number of siblings, psychiatric symptoms experienced prior to offence, compliance with psychiatric medication at time of offence). Thus any variables with more than 10% of data missing were excluded from analysis (see Table 1 for a full list). Further, any variables where there were only a minimal number of cases (less than 5) were excluded from analysis.

## Data Analysis

A-priori power analysis was conducted in G-Power 3.2.1. This indicated that a total of 78 participants (39 firesetters, 39 non-firesetters) are required to detect a medium to large effect size (.65) with power of .80. This means that the sample in the current study is slightly underpowered. Thus, our analysis will probably be able to detect medium to large differences between groups. However, it is unlikely to detect smaller differences that might be present.

Comparisons between mentally disordered firesetters and mentally disordered non-firesetters and one-time and repeat firesetters were conducted using Fisher's exact tests and independent samples t-tests. Comparisons between male and female mentally disordered firesetters and male and female mentally disordered non-firesetters were conducted using one-way ANOVA's and Pearson's chi-square (or Fisher's exact tests where expected cell frequency was low). Finally, standard forced entry logistic regressions were conducted to identify if there were any variables that were able to statistically predict (1) offence status for mentally disordered offenders (i.e., firesetter or non firesetter), (2) repeat firesetting status in terms of one-time or repeat firesetting for the firesetting group only. There were no concerns with the analyses with regard to the assumptions of homogeneity of variance, normality or multicollinearity (for the logistic regression). Adjustments in analyses were made to account for the small sample size and unequal group sizes where appropriate (e.g., use of Fishers exact test and Welch's test).

## Results

### *Characteristics of firesetters and non-firesetters*

Very few differences were identified between firesetters and non-firesetters (see Table 2). Firesetters were significantly more likely to receive a diagnosis of a

schizophrenic illness (i.e., schizophrenia, schizoaffective disorder) and have a reported expressed interest in fire/explosives than non-firesetters. Non-firesetters were found to be significantly more likely to have a diagnosed learning disability than firesetters. In addition to this, the presence of a family history of mental illness was approaching significance ( $p = .06$ ). To assess the ability of selected factors in predicting offence status (i.e., firesetter or non-firesetter) a forced entry logistic regression was performed. Due to the exploratory nature of the study and low power, a less conservative  $p$  value was adopted for selecting variables to be included in the regression ( $p < .06$ ); thus, variables that were approaching significance between firesetters and non-firesetters (*family history of mental illness*) were included in the regression in addition to *diagnosis of a schizophrenic illness*. Expressed interest in fire/explosives was not included in the model due to the non-firesetter sample having a zero cell count for this variable; thus meaning that only those in the firesetter sample had a recorded presence of expressed fire interest/explosives suggesting that having an expressed interest in fire/explosives categorises individuals as firesetters with 100% probability. Having a zero cell count in one of the predictor variables such as this would make the parameter estimates of the bivariate logarithm unstable (DeMaris, 1995; Suchower et al., 2014) thus it was decided upon this basis to exclude this variable from the model. Diagnosis of a learning disability was also excluded as the firesetter sample had a zero cell count for this variable. The overall model containing all predictors was significant  $\chi^2(2, N = 75) = 4.07, p = .02$ , indicating that the model was able to distinguish between firesetting and non-firesetting participants. The model as a whole explained between 9.2% (Cox and Snell R square) and 12.3% (Nagelkerke R squared) of the variance in offence status, and correctly classified 58.7% of cases. Despite the overall model being significant, none of the variables in

the model were significantly associated with offending status; the presence of a diagnosis of schizophrenic illness was approaching significance ( $p = .06$ ). This was also the strongest predictor of offending recording an odds ratio of 2.50. Thus, participants who were firesetters were more than twice as likely to have a diagnosis of a schizophrenic disorder, controlling for all other factors.

#### *Gender differences between firesetters and non-firesetters*

One-way ANOVA's and Pearsons's chi-square were conducted to examine any differences on the variables measured between male firesetters, female firesetter, male non-firesetters and female non-firesetters (see Table 3). Due to the relatively small sample size and the unequal size of the groups adjusted tests are reported (i.e., Welch's test; Welch, 1951) to control for Type I errors. Significant effects were found between the groups for *diagnosis of a personality disorder, history of self-harm, history of previous suicide attempts, bullied at school, expressed interest in fire/explosives, history of abuse, and number of previous convictions for drug/alcohol offences*. Post-hoc comparisons using the Games-Howell test indicated that only the mean number of previous convictions for drug and alcohol offences was significantly higher for male firesetters ( $M = .40$ ,  $SD = .90$ ) than female firesetters ( $M = .05$ ,  $SD = .24$ ). Post-hoc tests did not indicate any significant differences on the number of previous drug/alcohol convictions for any of the other groups. Although the ANOVA conducted on age of first contact with mental health services indicated a significant difference between the groups, post-hoc comparisons only indicated differences that were approaching significance ( $p = .06$ ) between male non-firesetters ( $M = 38.7$ ,  $SD = 66.2$ ) and female non-firesetter ( $M = 15.9$ ,  $SD = 3.2$ ).

To explore if there were any differences in the firesetting histories of male and female firesetters, independent t-tests were conducted (see Table 3). Female firesetters

had significantly more incidents of adult firesetting on record, had more convictions for firesetting, had more unconvicted incidents of firesetting on record, had set more fires in hospital, and had more incidents of juvenile firesetting than male firesetters. Male firesetters had set significantly more fires in prison than female firesetters.

#### *Characteristics of 'one-time' and repeat firesetters*

Since this part of the analysis was examining repeat firesetting in adulthood, five participants were excluded from analysis as their firesetting incidents were restricted to childhood/adolescence and they had not set any further fires as an adult. Very few differences were observed between 'one-time' and repeat firesetter (see Table 4). However, Fishers exact tests and independent t-tests indicated that one-time firesetters significantly differed from repeat firesetters on four variables: *expressed interest in fire/explosives*, *number of convicted incidents of firesetting*, *number of unconvicted incidents of firesetting*, and *number of incidents of juvenile firesetting*. Two other variables approached significance between one-time and repeat firesetters, history of *self-harm* ( $p = .08$ ) and *number of previous suicide attempts* ( $p = .09$ ).

#### *Predicting repeat firesetting*

Since repeat firesetters were more likely to have more incidences of various types of firesetting compared to one-time firesetters by their very nature, it was decided that the ability of background factors in predicting repeat firesetting would be explored. One again, due to the exploratory nature of the study and low power, a less conservative  $p$  value was adopted for selecting variables to be included in the regression ( $p < .06$ ); thus, the three background variables that were approaching significance between one-time and repeat firesetters (*expressed interest in fire/explosives*, *history of self-harm*, *number of previous suicide attempts*) were selected for further analysis. A forced entry logistic regression was performed to

assess the ability of these variables to predict whether participants were either a one-time or repeat firesetter. The overall model containing all predictors was significant  $\chi^2(3, N = 37) = 13.03, p = <.05$  indicating that the model was able to distinguish between participants who had set one fire and those who had set two or more fires. The model as a whole explained between 34.1% (Cox and Snell R square) and 45.7% (Nagelkerke R squared) of the variance in firesetter status, and correctly classified 79.4 % of cases. Expressed interest in fire/explosives ( $p = .02$ ) was significantly associated with firesetter status and was the strongest predictor of multiple firesetting, recording an odds ratio of 15.12. This indicates that individuals who had a reported expressed interest in fire/explosives were over 15 times more likely to have set multiple fires than those who had set one fire. Number of suicide attempts was approaching significance in terms of being associated with repeat firesetter status ( $p = .07$ ) and recorded an odds ratio of 1.43. History of self-harm was not significantly associated with repeat firesetter status.

### Discussion

The current study investigated similarities and differences between (1) mentally disordered firesetters and non-firesetting mentally disordered offenders, (2) male and female mentally disordered firesetters, (3) male and female mentally disordered offenders and their non-firesetting counterparts, and (4) one-time and repeat firesetters. Further, the current study explored the predictive ability of the characteristics which differentiated between (a) mentally disordered firesetters and non-firesetting mentally disordered offenders, and (b) one time and repeat firesetters. Very few differences were observed between mentally disordered firesetters and non-firesetting mentally disordered offenders or between one-time and repeat firesetters. However, some gender differences were observed between the firesetting and non-



firesetting groups. Further, several key variables were found to be predictive of repeat firesetting in this population. Thus, the findings of the study suggest that mentally disordered firesetters are not characteristically different from the general mentally disordered offender population; however, male and female firesetting and non-firesetting mentally disordered offenders appear to be characteristically different from one another particularly in relation to psychiatric and background factors. Further, an expressed interest in fire/explosives appears to be particularly important in the prediction of engagement in repeat firesetting amongst mentally disordered firesetters.

#### *Firesetters vs. non-firesetters*

It was hypothesized that mentally disordered firesetters and non-firesetting mentally disordered offenders would differ on a range of demographic, background, psychiatric and offending factors. The findings of the study partially supported this hypothesis. Consistent with the literature firesetters were found to be more likely to have a diagnosis of a schizophrenic illness compared to non-firesetters (Anwar et al., 2011) and have a reported expressed interest in fire/explosives (Gannon et al., 2013). However, firesetters were no more likely to have a history of suicide attempts, a history of self-harming behaviour, have more previous admissions to psychiatric hospitals, or have a history of substance misuse than non-firesetters. The lack of significant differences between firesetters and non-firesetters on background characteristics is consistent with previous findings in the literature (e.g., Bradford et al., 1982; Hill et al., 1982), highlighting how, characteristically, mentally disordered firesetters are similar to the rest of the general offending population. However, recent research has found that firesetters can be distinguished from other types of offenders based upon psychological and psychopathological differences (Gannon et al., 2013; Ó Ciardha et al., 2013). This suggests that the criminogenic needs of firesetters that

distinguish them from the general offending population is perhaps more psychological and psychiatric in nature.

In terms of gender differences between mentally disordered firesetters and their non-firesetting counterparts, very few gender differences were observed between male and female mentally disordered firesetters and male and female mentally disordered non-firesetting offenders. However, several key differences were observed between male and female firesetters. Male firesetters were found to have significantly more previous convictions for drug/alcohol offences than female firesetters whilst female firesetters had significantly more recorded incidents of firesetting (convicted, unconvicted, hospital incidents, and juvenile) compared to male firesetters. These findings partially support previous findings that male firesetters have significantly more previous convictions and are more likely to have an alcohol problem than female firesetters (Dickens et al., 2007). However, comparisons between the number of incidents of firesetting by male and female firesetters have yet to be made in the literature. These findings suggest that female firesetters may account for a larger number of firesetting incidents than males and may be more likely to be repeat firesetters.

#### *One-time firesetters vs. repeat firesetters*

The findings of the study highlighted several distinct differences between one-time and repeat firesetters. Repeat firesetters were more likely to have an expressed interest in fire or explosives, were more likely to have engaged in juvenile firesetting, and were more likely to have a conviction for firesetting compared to one-time firesetters. These findings partially replicate those found in previous research (i.e., fire interest, Doley, 2009). These findings suggest that repeat firesetters are more likely to have engaged in firesetting at a young age and to have come to the attention of

authorities for a firesetting offence than one-time firesetters. Further, they suggest that holding an interest or fascination in fire/explosives differentiates between those firesetters who have set just one fire and those who have set multiple fires, with those who have an expressed interest in fire/explosives being fifteen times more likely to engage in repeat firesetting. This highlights holding an expressed interest in fire/explosives as a potential key risk factor for repeat firesetting.

In terms of predicting repeat firesetting, fire interest was found to be the largest unique predictor of repeat firesetting. This has not been previously examined in the literature and warrants further exploration as this finding suggests that individuals who present in clinical settings with a treatment need of fire interest are potentially at an increased risk of setting future fires.

### *Limitations*

There are some methodological limitations within which the findings of the current study should be considered. Firstly, as with other file review studies, the current study was limited by the quality of patients' clinical notes. The availability and level of detail of information for certain variables varied from file to file which meant the number of cases within each factor differed and meant that certain variables were unable to be included for analysis. Further, this meant that variables had to be recorded more generally and it may be that more detailed information may have detected other differences between the groups. For example, there were significant amounts of missing data for the more specific psychiatric and offence related variables (i.e., medication compliance, psychiatric symptoms at the time of the offence, motive) which were unable to be analysed as part of the study. Finally, even though the sample size of the current study built upon those of previous studies it is still relatively small, particularly within the firesetting group (i.e., one-time and repeat

firesetters). A-prior power analysis conducted in G-Power 3.2.1 indicated that 78 participants (39 firesetters, 39 non-firesetters) would have been required to detect a medium to large effect size (.65) with power of .80, meaning that the sample in the current study was very slightly underpowered. Therefore our analysis was probably fine for detecting medium to large differences between the groups. However, it is not likely to have detected small differences that might have been present. Despite this, the variables studied in this research did detect some key differences between one-time and repeat firesetters which future research can build upon.

### *Implications*

The findings of this study suggest that mentally disordered firesetters are similar to non-mentally disordered offenders in terms of developmental, sociodemographic, psychiatric and offence history related factors. Thus, suggesting that criminogenic need amongst this population may be more related to psychological factors than historical factors. This study also highlighted the importance of fire interest as a differentiating factor between mentally disordered firesetters and non-firesetters. Fire interest has been recognized as a criminogenic need specific to firesetters in the literature and is included as an area of treatment in the few published studies on specialized treatment programmes for this population (Gannon, Lockerbie, & Tyler, 2012; Russell, Cosway & McNicholas, 2005; Swaffer, Haggett, & Oxley, 2001; Taylor et al., 2002). The identification of criminogenic needs specific to firesetters suggests that firesetters needs may not be effectively addressed as part of generic offending behavior programmes and highlights the need for interventions that focus specifically on the criminogenic factors which are unique to firesetters, particularly that of fire interest. The findings of the current study also suggest that those mentally disordered offenders who have an expressed interest in fire may be at a

heightened risk of setting further fires, being up to fifteen times more likely to engage in repeat firesetting. This suggests that specialized treatment may be of particular importance for these individuals specifically relating to the identification and management of fire interest.

To date there is a distinct lack of risk assessment tools for firesetting. Although there have been some attempts to adapt existing risk assessment tools for violence to accommodate firesetters (i.e., HCR-20, Hagenauw, Karsten, de Jager, & Lancel, 2014; Taylor & Thorne., 2013; VRAG, Quinsey, Harris, Rice, & Cormier, 2005) these have not been empirically validated. Interestingly, despite fire interest being included as a treatment need in interventions for this population, fire interest has not been included as a risk factor within risk assessment tools for firesetting. The identification of fire interest as the largest unique predictor for repeat firesetting highlights the importance of the inclusion of fire interest in any risk assessment tool for firesetting. Further research is required to further explore the psychological factors related to firesetting and if there are any differences in these between one-time and repeat firesetters to further inform the development of a risk assessment tool for firesetting.

#### *Future Directions and Conclusion*

Whilst the findings of the study suggest more similarities than differences between firesetters and non-firesetters, previous research has found distinct differences in the psychological and psychopathological characteristics of firesetters compared to non-firesetting offenders (Gannon et al., 2013; Ó Ciardha et al., 2013). Thus, future research would benefit from focusing on further developing knowledge of the key psychological differences between firesetters and non-firesetters and exploring the ability of such factors to predict firesetting behavior; so as to develop an

evidence base to aid professionals in the assessment of firesetters and in the development of specific treatment programmes for this population. Further, the findings of this study highlight the need for further research into the differences between one-time and multiple firesetters. Whilst there has been some research in this area (see Dickens et al., 2009; Doley, 2009) more research into the role that fire interest plays for repeat firesetters along with any specific related cognitions about fire that these individuals may have should be explored.

In conclusion, the findings of the current study provides clinicians with further information on the factors that differentiate firesetters from non-firesetting offenders and highlights key factors that are predictive of repeat firesetting. In addition to this, the current study highlights other much needed areas of research relating to the assessment of future risk of firesetting. Further research in this area will allow for the development of empirically evidenced risk assessment tools and treatment programmes, something which would be highly beneficial for clinicians working with this population.

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**Table 1: Variables reported in the literature as differing between mentally disordered firesetters and non-firesetting offenders.**

Factor	Study
<b>Psychiatric</b>	
Age at first contact with mental health services	Ducat, Ogloff, & McEwan (2013), Labree et al. (2010)
Number of previous hospital admissions	Ducat, McEwan, & Ogloff (2013), Geller, Fisher, & Moynihan (1992)
Presence of neurological impairment†	Bradford (1982), Hill et al. (1982)
History of self-harm	Geller (1992), Geller & Bertsch (1985)
History of suicide	Repo et al. (1997a)
No. suicide attempts	O'Sullivan & Kelleher (1987)
<b>Background</b>	
History of cruelty to animals†	Slavkin (2001), Dadds et al. (2006)
History of enuresis†	Heath et al. (1998)
Family history mental illness	Rix (1994), Repo et al. (1997b)
History of parental substance misuse	Repo & Virkunen (1997)
Absent parent	Hill et al. (1982), Regehr & Glancy (1991)
Family History of firesetting†	Rice & Harris (1991)
Large family – No. siblings*	Bradford (1982)
Previous suicide attempts	Räsänen, Hakko, & Väisänen (1995a; 1995b)
History of truanting	Hill et al. (1982), Puri et al. (1995), Ritchie & Huff (1999)
Bullied at school	Dickens et al. (2009)
Insecure sexual identity	Räsänen et al., 1996
Interest in fire/explosives	Dickens et al. (2009), Gannon et al. (2013)
Separation from caregivers	Strachan (1981)
History relationships difficulties	Dickens et al. (2007), Rice & Harris
History of interpersonal aggression	Hurley & Monahan (1969), Jackson,
History of substance abuse	Koson & Dvoskin (1982), Repo &
History of abuse	Hill et al. (1982), Jayaraman & Frazer
History of employment	Ducat, Mcewan, & Ogloff (2013),
<b>Offence History</b>	
Age of first conviction	-
No. previous convictions	O'Sullivan & Kelleher (1987)
No. violent convictions	Rice & Harris (1996)
No. property convictions	Jackson, Hope, & Glass (1987)
No. acquisitive convictions	Jackson, Hope, & Glass (1987)
Previous convictions for firesetting	Koson & Dvoskin (1982), Jayaraman & Frazer (2006)

Unconvicted incidents firesetting	-
Incidents of juvenile firesetting	Rice & Harris (1996)
<b>Offence Related</b>	
Prescribed psychiatric medication at time of offence*	-
Compliance with medication at time of offence*	Ritchie & Huff (1999)
Psychiatric symptoms week before offence*	Rix (1994), Ritchie & Huff (1999)
Intoxicated at time of offence*	Lindberg et al. (2005); Hagenauw et al. (2014)
Motive*	Rix (1994)

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\*More than 10% missing data

† too few cases to analyse variable

**Table 2: Characteristics of firesetters versus non-firesetters**

	Non-Firesetters No. yes (%) N = 34	Firesetters No. yes (%) N = 43	$t/\chi^2$	P	OR (95% CI)
<b>Sociodemographic</b>					
Current Age <sup>a</sup>	37.58	36.72	.26	.79	-
<b>Psychiatric Factors</b>					
Schizophrenic disorder <sup>b*</sup>	14 (41.1)	28 (65.1)	†	<.05	.63 (.40-.99)
Mood disorder <sup>b</sup>	4 (11.7)	3 (6.9)	†	.69	1.68 (.40-7.03)
Personality disorder <sup>b</sup>	20 (58.8)	23 (53.4)	†	.65	1.10 (.74-1.63)
Diagnosis Substance Misuse <sup>b</sup>	5 (14.7)	11 (25.5)	†	.27	.57 (.22-1.49)
Learning disability <sup>b*</sup>	6 (17.6)	1 (2.3)	†	<.05	7.5 (.95-60.05)
Age at first contact with mental <sup>a</sup> health services	31.38	20.39	1.15	.25	-
No. previous hospital admissions <sup>a</sup>	4.75	2.75	.73	.46	-
No. suicide attempts <sup>a</sup>	1.84	3.48	-.96	.33	-
<b>Background</b>					
Family history mental illness <sup>b</sup>	10 (29.4)	21 (48.8)	†	.06	.57 (.31-1.04)
History of parental substance abuse <sup>b</sup>	5 (14.7)	11 (25.5)	†	.26	.56 (.21-1.46)
Absent parent <sup>b</sup>	13 (38.2)	16 (37.2)	†	1.00	1.00 (.56-1.78)
Previous suicide attempts <sup>b</sup>	20 (58.8)	24 (55.8)	†	1.00	1.02 (.70-1.51)
History of truanting <sup>b</sup>	12 (35.2)	11 (25.5)	†	.45	1.38 (.70-2.73)
Bullied at school <sup>b</sup>	11 (32.3)	13 (30.2)	†	1.00	1.07 (.55-2.08)
Separation from caregivers <sup>b</sup>	12 (35.2)	21 (48.8)	†	.25	.72 (.41-1.25)
Interest in fire/explosives <sup>b*</sup>	0 (0)	12 (27.9)	†	<.001	1.4 (1.15-1.69)
History relationships difficulties <sup>b</sup>	23 (67.6)	30 (69.7)	†	1.00	.97 (.71-1.31)
History interpersonal aggression <sup>b</sup>	31 (91.1)	41 (95.3)	†	.65	.95 (.84-1.08)

History of self-harm <sup>b</sup>	19 (55.8)	28 (65.1)	†	.35	.83 (.58-1.21)
History of substance abuse <sup>b</sup>	27 (79.4)	34 (79.0)	†	1.00	1.00 (.79-1.26)
History of abuse <sup>b</sup>	23 (67.6)	29 (67.4)	†	1.00	1.00 (.74-1.36)
History of employment <sup>b</sup>	17 (50.0)	18 (41.8)	†	.49	1.19 (.73-1.94)

# **Offence History**

Age of first conviction <sup>a</sup>	22.24	19.39	.91	.36	-
Total no. of previous convictions <sup>a</sup>	186.88	22.32			-
No. violent convictions <sup>a</sup>	3.08	4.11	-.75	.45	-
No. property convictions <sup>a</sup>	1.00	3.37	-1.30	.19	-
No. acquisitive convictions <sup>a</sup>	3.64	6.37	-.98	.32	-
No. drug and alcohol convictions <sup>a</sup>	.45	.76	-1.03	.30	-
No. motoring convictions <sup>a</sup>	.03	1.20	-1.62	.11	-

<sup>a</sup> t-test<sup>b</sup>  $\chi^2$ 

† Fishers exact test used

\*Significant  
t p < .05



**Table 3: Firesetters vs. Non-Firesetters by Gender**

	Male Firesetters No. Yes (%) N = 26	Female Firesetters No. yes (%) N = 17	Male Non- Firesetters No. yes (%) N = 23	Female Non- Firesetters No. yes (%) N = 11	F/ $\chi^2$	p
<b>Sociodemographic</b>						
Current Age <sup>a</sup>	38.00	34.76	40.82	30.81	1.60	.20
<b>Psychiatric Factors</b>						
Schizophrenic disorder <sup>b</sup>	19 (73.0)	9 (52.9)	10 (43.4)	4 (36.3)	6.22	.10
Mood disorder <sup>b</sup>	3 (11.5)	0 (0)	3 (13.0)	1 (9.0)	2.32	.50
Personality disorder <sup>b*</sup>	6 (23.0)	17 (100)	10 (43.4)	10 (90.9)	31.67	<.001
Diagnosis Substance Misuse <sup>b</sup>	5 (19.2)	6 (35.2)	5 (21.7)	0 (0)	5.11	.16
Learning Disability <sup>b</sup>	0 (0)	1 (5.8)	3 (13.0)	3 (27.2)	7.64	.05
Age first contact with mental health services <sup>a</sup>	21.46	18.53	38.78	15.90	1.48	.22
No. previous hospital admissions <sup>a</sup>	3.08	2.25	6.08	1.70	.90	.44
No. suicide attempts <sup>a*</sup>	.72	8.42	.95	3.80	2.22	.11
<b>Background</b>						
Family history mental illness <sup>b</sup>	12 (46.1)	9 (52.9)	7 (30.4)	3 (27.2)	3.71	.29
Absent parent <sup>b</sup>	9 (34.6)	7 (41.1)	7 (30.4)	6 (54.5)	1.94	.58
History of self-harm <sup>b*</sup>	12 (46.1)	16 (94.1)	8 (34.7)	10 (90.9)	21.27	<.05
Previous suicide attempts <sup>*</sup>	9 (34.6)	15 (88.2)	13 (56.5)	7 (63.6)	11.50	<.05
History of truanting <sup>b</sup>	7 (26.9)	4 (23.5)	8 (34.7)	4 (36.3)	.99	.80
Bullied at school <sup>b*</sup>	3 (11.5)	10 (58.8)	6 (26.0)	5 (45.4)	11.35	<.05
Interest in fire/explosives <sup>b *</sup>	8 (30.7)	4 (23.5)	0 (0)	0 (0)	12.08	<.05
History relationships difficulties <sup>b</sup>	19 (73.0)	11 (64.7)	15 (65.2)	8 (72.7)	.57	.90
History of employment <sup>b</sup>	12 (46.1)	6 (35.2)	12 (46.1)	5 (45.4)	1.13	.76

Separation from caregivers	13 (50.0)	8 (47.0)	6 (26.0)	6 (54.5)	3.91	.27
History of abuse <sup>b*</sup>	12 (46.1)	17 (100)	13 (56.5)	10 (90.9)	16.36	<.001
<b>Offence History</b>						
Age of first conviction <sup>a</sup>	18.83	20.17	24.13	18.45	.54	.65
Total no. previous convictions <sup>a</sup>	22.00	22.80	227.34	102.27	.53	.66
No. violent convictions <sup>a</sup>	18.83	20.17	24.13	18.45	1.70	.18
No. property convictions <sup>a</sup>	1.46	6.29	.81	1.40	1.15	.34
No. acquisitive convictions <sup>a</sup>	8.69	2.82	4.60	1.63	1.79	.16
No. drug and alcohol convictions <sup>a*</sup>	1.23	.05	.40	.54	4.13	<.05
<b>Firesetting History</b>						
No. incidents firesetting adult† *	1.96	3.25	-	-	-4.25	<.001
No. convictions firesetting† *	.64	1.05	-	-	-5.15	<.001
No. unconvicted fires† *	.80	1.56	-	-	-4.55	<.001
No. fires in hospital† *	.28	1.68	-	-	-2.05	<.05
No. fires in prison† *	.36	.25	-	-	-2.27	<.05
No. juvenile fires † *	.22	.81	-	-	-2.57	<.05

\*Significant  $p < .05$ <sup>a</sup> One-way ANOVA<sup>b</sup>  $\chi^2$ 

† t-test

**Table 4: Characteristics of one-time firesetters versus repeat firesetters**

	One-time Firesetters No. yes (%) N = 17	Repeat Firesetters No. yes (%) N = 20	$t/\chi^2$	$p$	OR (95% CI)
<b>Sociodemographic</b>					
Current Age <sup>a</sup>	35.82	41.55	-1.58	.12	-
<b>Psychiatric Factors</b>					
Schizophrenic disorder <sup>b</sup>	11 (64.7)	14 (70)	†	1.00	.92 (.58-1.45)
Mood disorder <sup>b</sup>	2 (11.7)	1 (5)	†	.58	2.35 (.233 – 23.74)
Personality disorder <sup>b</sup>	8 (47.0)	11 (55)	†	.74	.85 (.45-1.62)
Diagnosis Substance Misuse <sup>b</sup>	4 (23.5)	6 (30)	†	.72	.78 (.26-2.32)
Age first contact with mental health services <sup>b</sup>	21.87	20.57	.41	.68	-
No. previous hospital admissions <sup>a b</sup>	3.00	3.05	-.03	.96	-
No. suicide attempts <sup>b</sup>	.93	6.31	-1.71	.09	-
<b>Background</b>					
Family history mental illness <sup>b</sup>	11 (64.7)	8 (40)	†	.17	1.63 (.87-3.04)
Absent parent <sup>b</sup>	6 (35.2)	7 (35)	†	1.00	1.07 (.44-2.55)
History of self-harm <sup>b</sup>	7 (41.1)	15 (75)	†	.08	.58 (.31-1.07)
History of substance abuse <sup>b</sup>	12 (70.5)	16 (80)	†	.70	.88 (.60-1.28)
Previous suicide attempts	7 (41.1)	14 (70)	†	.17	.62 (.33-1.16)
History of truanting <sup>b</sup>	3 (17.6)	7 (35)	†	.28	.50 (.15-1.65)
Bullied at school <sup>b</sup>	4 (23.5)	7 (35)	†	.49	.67 (.23-1.91)
Interest in fire/explosives <sup>b</sup>	2 (11.7)	9 (45)	†	<.05	.26 (.06-1.04)
History of interpersonal aggression <sup>b</sup>	15 (88.2)	20 (100)	†	.20	.88 (.74-1.05)

History relationships difficulties <sup>b</sup>	10 (58.8)	17 (85)	†	.13	.69 (.44-1.07)
History of employment <sup>b</sup>	10 (58.8)	8 (40)	†	1.00	.94 (.48-1.83)
Separation from caregivers	9 (52.9)	8 (40)	†	.51	1.32 (.65-2.66)
History of abuse <sup>b</sup>	14 (82.3)	11 (55)	†	1.00	.98 (.63-1.52)
<b>Offence History</b>					
Age of first conviction <sup>a</sup>	19.43	21.05			-
Total no. previous convictions <sup>a</sup>	25.4	21.4	.32	.74	-
No. violent convictions <sup>a</sup>	3.76	4.90	-.44	.66	-
No. property convictions <sup>a</sup>	1.82	5.50	-1.02	.31	-
No. acquisitive convictions <sup>a</sup>	8.41	6.30	.44	.65	-
No. drug and alcohol convictions <sup>a</sup>	1.29	.50	1.36	.18	-
No. motoring convictions	1.41	1.40	.00	.99	-
<b>Firesetting History</b>					
No. convictions firesetting <sup>a *</sup>	.47	1.20	-2.33	<.05	-
No. unconvicted fires <sup>a *</sup>	.41	1.55	-2.72	<.05	-
No. fires in hospital <sup>a</sup>	.17	1.55	-1.69	.10	-
No. fires in prison <sup>a</sup>	.17	.50	-1.27	.21	-
No. juvenile fires <sup>a *</sup>	.00	.84	-2.44	<.05	-

\*Significant  $p < .05$ <sup>a</sup> t-test<sup>b</sup>  $\chi^2$ 

† Fishers exact test used