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## Female Firesetters: Gender Associated Psychological and Psychopathological Features

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## **Abstract**

**Objective:** Female firesetters are reported to commit nearly a third of deliberately set fires, yet there are limited studies examining the characteristics that distinguish them from suitable comparison groups. The aim of this study is to compare incarcerated female firesetters with incarcerated male firesetters and female offender controls on psychopathological and psychological features that could be targeted via therapeutic interventions.

**Method:** Sixty-five female firesetters, 128 male firesetters, and 63 female offenders were recruited from the prison estate. Participants completed a battery of validated tools assessing psychiatric traits and psychological characteristics (i.e., inappropriate fire interest, emotion/self-regulation, social competence, self-concept, offense-supportive attitudes, and boredom proneness) highlighted in the existing literature.

**Results:** Major depression and an internal locus of control distinguished female firesetters from male firesetters. Alcohol dependence, serious/problematic fire interest, and more effective anger regulation distinguished female firesetters from the female offender control group.

**Conclusions:** This is the first study to examine differences between female firesetters, male firesetters, and female control offenders on both psychopathological features and psychological traits. These findings highlight the gender-specific and offence-specific needs of female firesetters that clinicians need to consider when implementing programs that ensure client responsiveness.

**Keywords:** firesetting, arson, psychopathology, female offenders

## **Background**

Deliberate firesetting – defined as the intentional setting of fires (Gannon & Pina, 2010) – has significant and fatal costs. In 2012-2013, there were 23,700 deliberate fires set in Great Britain resulting in 93 fatalities and 1,400 non-fatal casualties (Department for Communities and Local Government, 2014). The annual economic impact of deliberate firesetting is difficult to determine. Based on varying metrics, costs are estimated to be £2.3bn GBP in England (Department for Communities and Local Government, 2011), \$1.6bn AUD in Australia (Rollings, 2008), and \$1.3bn USD in the United States (Evarts, 2012). For consulting clinicians working with firesetters, epidemiological research has found firesetting to be associated with antisocial behavior (e.g., animal cruelty, sexual offending, and violent offending; Vaughn et al., 2010), and several psychopathological disorders (e.g., depression, schizophrenia, borderline and antisocial personality disorders; Tyler and Gannon, 2012). According to the Diagnostic and Statistical Manual of Mental Disorders (DSM V; American Psychological Association, 2013), a diagnosis of pyromania may be classified under “Disruptive, Impulse-Control, and Conduct Disorders”. However, we delineate the term pyromania from deliberate firesetting because a diagnosis of pyromania is very rare (e.g., mixed gender prevalence studies range from no evidence of pyromania [e.g., Geller and Bertsch, 1985; Leong, 1992] to 6.6% [Bourget and Bradford, 1989]) due to the DSM V’s exclusion criteria (e.g., setting fires for financial gain, socio-political ideology, criminal cover-up, anger, revenge, etc.). Deliberate firesetting, on the other hand, captures the behavioral element regardless of motivation and/or comorbid psychopathology.

Few studies have examined the psychological traits of firesetters using validated tools (for reviews see Dickens and Sugarman, 2012; Gannon and Pina, 2010). Much of this literature has focussed predominantly on male firesetters despite reported prevalence rates of

female perpetrators to be as high as 28% (Puri et al., 1995). Although the wider offending literature calls for gender-specific programming (e.g., Blanchette and Browne, 2006), there have been theoretical developments intended to explain male and female firesetting. For example, the Multi-Trajectory Theory of Adult Firesetting (M-TTAF; Gannon et al., 2012) provides a framework for understanding the etiological, maintenance, and desistance factors. Along with the moderating effects of psychopathology, Gannon et al. posited that adult firesetters (male and female) exhibit key psychological vulnerabilities (e.g., inappropriate fire interest, communication and/or emotion regulation issues, etc.) that, when primed, facilitate firesetting behavior. However, their theory was based on existing literature dominated by studies focussing on male firesetters. In light of the societal impact of deliberate firesetting, yet low prevalence of pyromania diagnoses, there is a need for the examination of the psychopathological features and psychological characteristics of deliberate firesetters who do not meet the criteria for pyromania. Crucially, there is a pressing need for an empirical examination of female firesetters' psychopathological and psychological characteristics with multiple comparisons (e.g., male/female firesetters and control offenders).

### **Existing Comparative Research**

Firesetters are more likely to be imprisoned for their offences than receive a psychiatric hospital order, but much of the existing comparative research has been conducted in psychiatric/inpatient units. Notable gender differences have been reported in these studies. Research findings suggest that female firesetters, compared to male firesetters, are more likely to have a history of sexual abuse and relationship difficulties; whereas, male firesetters were more likely to have a more varied criminal history (i.e., theft, vehicle, and aggression related offences; Dickens et al., 2007). Gender differences in psychiatric diagnoses include higher prevalence of alcohol and affective disorders amongst female firesetters when compared to male firesetters (Dickens et al., 2007); but a subsequent study found that female

and male firesetters could not be differentiated on psychiatric disorders (Enayati et al., 2008). There are, however, gender differences in the underlying motivation for the firesetting behavior whereby female firesetters' motivations for setting fires are typically classified as attention-seeking (e.g., 'cry for help') when compared to male firesetters; whereas, male firesetters are more likely to stay and watch the fire they set suggesting a greater fascination with fire (Dickens et al., 2007).

Aside from research examining gender differences, further comparative research has examined the distinctiveness of female firesetters from female control groups in a prison setting. History of sexual abuse and self-harming behavior distinguish female firesetters from female violent offenders (who do not have fire-related convictions; Noblett and Nelson, 2001). Passive personality traits and low self-worth, but not aggressive personality traits, were also associated with female firesetters when compared to the violent control group (Noblett and Nelson, 2001).

Conducting comparative studies with the female firesetting population is challenging and, as a result, has methodological issues. For example, firesetters comprise a very specific offending group and recruiting a sample size with enough power to make meaningful inferences is difficult. Although Noblett and Nelson's (2001) study provides evidence that female firesetters exhibit distinct characteristics, they recruited only 20 firesetters, 18 violent offenders, and 16 non-offender controls. Later studies – Dickens et al. (2007) and Enayati (2008) – were much larger in scale (i.e., 129 males and 38 females; 155 males and 59 females, respectively) with samples recruited from psychiatric units. These studies identified gender differences amongst firesetters. Yet these studies are limited to psychiatric settings and it is not clear from their findings whether socio-demographic characteristics impacted their analyses.

### **Current Study**

Research, to date, has shown gender differences in firesetters specifically (e.g., Dickens et al., 2007) and offenders generally (Blanchette and Brown, 2006) on factors such as antisocial behavior, affect/emotion regulation and psychiatric diagnoses (e.g., affective disorders). Within-gender comparisons have shown that firesetters are distinguished by inappropriate attitudes towards fire, poorer emotion regulation and proneness to angry provocation, in addition to self-concept related factors (all-male prison study – Gannon et al., 2013). Based on these findings, coupled with the gender differences outlined above, it can be theorized that female firesetters would exhibit psychological vulnerabilities as theorized by Gannon et al. (2012) in their M-TTAF model. Our study extends this research by comparing female firesetters, female offender controls, and male firesetters in prison settings. Based on the limited research available, when controlling for socio-demographic variables, we hypothesized that: (1) male and female firesetters will exemplify similar gender differences to the wider literature supporting that female firesetters require gender-specific treatment and rehabilitation programme provision (Bloom and Covington, 1998; Sorbello et al., 2002); and (2) female firesetters will be associated with distinct psychopathological and psychological characteristics relative to female offender controls.

## **Materials and Methods**

### **Sample**

The sample was recruited from 16 prison establishments (ten male prisons and six female prisons) across the United Kingdom. Firesetters (65 female firesetters, 128 male firesetters) were selected if they had either a conviction for a firesetting offence (i.e., arson) or a recorded firesetting incident on file while in custody (e.g., prison documented cell fires). The female offenders who comprised the control group (63 female offenders) were randomly selected from each female prison establishment and their records were reviewed to ensure there was no previous record of firesetting.

All participants were approached individually, in private, and were informed about the study. The research staff explained the consent form verbally including voluntary participation and researchers' access to participants' prison files. We were unable to document formally the number of participants who refused to participate in our study, however, when examining our records the participation rate was estimated at over 80%. This study was approved by the National Offender Management Service (REF 74-10) which governs research conducted in UK prisons, and the University's Ethics Committee (REF 20101507).

## **Measures**

### **Independent variable**

The IV consisted of three groups: female firesetters, male firesetters, and female control offenders.

### **Socio-demographic characteristics and response-related factors**

The socio-demographic characteristics included age, ethnicity (White UK/Irish/European and Other), sentence length, education (secondary school qualification or less and post-secondary school qualification), offence history (overall number of offences, number of violent, sexual, theft, and fraud offences), and engagement with mental health services. We also assessed impression management so we could control for the effects of socially desirable responding by participants if needed (Paulhus, 1998).

### **Dependent variables**

Well-validated measures were used to assess psychopathological disorders and the psychological characteristics noted in previous research (Gannon et al., 2012; i.e., inappropriate fire interest, offense-supportive cognition, emotion/self-regulation, social competence, self-concept, and boredom proneness). All measures were selected because they



reliably demonstrated good to excellent internal consistency in previous studies. These measures were presented in randomized order.

Psychopathological features were assessed with the Millon Clinical Multiaxial Inventory – III (MCMI-III; Millon et al., 2006) – a frequently administered instrument in adult forensic research (Archer et al., 2006) – and consisted of 175 true-false items. This scale was based on the DSM IV’s multiaxial system of diagnoses, so analyses will be presented according to Axis I (clinical disorders) and II (personality disorders) psychopathology. Millon et al.’s (2006) cutoff scores were used to classify participants’ mental health as subclinical (< 75), presence of syndrome/traits (75 – 85), and prominence of a syndrome/disorder (> 85; i.e., having met the diagnosable criteria).

Inappropriate fire interest was operationalized using fire-related measures assessing: the normalization of fire, perceived fire safety awareness, serious fire interest, and identification with fire (for review of these factors and associated measures, see Ó Ciardha et al., in press). Emotion/self-regulation was assessed with the 60 item Novaco Anger Scale and the 25 item Provocation Inventory (Novaco, 1994). Social competence was assessed with the 20 item Emotional Loneliness Questionnaire (Russell et al., 1980) and the 19 item Simple Rathus Assertiveness Scale (Jenerette and Dixon, 2010). Self-concept was assessed using the 40 item Culture-Free Self-Esteem Inventory (Battle, 1992) and the 40 item Nowicki-Strickland Locus of Control (Nowicki, 1976). Offense-supportive attitudes were assessed with the 46 item Measure of Criminal Attitudes and Associates (Part B – Mills et al., 2002). Boredom proneness was assessed using the 12 item Boredom Proneness Scale (Vodanovich et al., 2005).

### **Statistical analysis**

Data were entered into IBM SPSS Statistics Version 20 where analyses were conducted using a  $p < .05$  level of significance. We first conducted the bivariate analyses

(Pearson's chi-square and ANOVA) examining the relationships between the independent variable and the socio-demographic characteristics; and also the IV and Axis I and II psychopathology. We conducted five MANCOVAs, correcting for the socio-demographic characteristics significantly related to the IV, examining the relationship between the IV and the psychological characteristics of inappropriate fire interest, emotion/self-regulation, social competency, self-concept, and offense-supportive attitudes; and an ANCOVA examining the relationship between the IV and boredom proneness. Only the significant psychological and psychopathological characteristics were included in two multinomial logistic regression analyses using the female firesetter group as the reference category. Odds ratios were used to estimate the likelihood of female firesetters, male firesetters, and female offender controls endorsing the criteria for each characteristic.

### **Results**

The mean age of prisoners was 34.15 years ( $SD = 11.80$ ; range = 18–74), 50% were women, 88% received secondary school education or less, 66% had previously engaged with mental health services, and the mean sentence length was 69.67 months ( $SD = 95.70$ ; range = 0–1188). The majority of participants were White (88%) with the remaining participants indicating their ethnicities to be Black (6%), Asian (4%), Middle-Eastern (1%), and Other (1%). For the following analyses, the ethnicity variable was coded as White and Other.

We reviewed participants' prison files to identify number of previous offenses ( $M = 2.16$ ;  $SD = 2.23$ ; range = 0–16), violent offenses ( $M = 3.05$ ;  $SD = 4.26$ ; range = 0–39), sexual offenses ( $M = .12$ ;  $SD = .79$ ; range = 0–7), fraud offenses ( $M = .82$ ;  $SD = 2.23$ ; range = 0–17), and theft offenses ( $M = 5.49$ ;  $SD = 12.78$ ; range = 0–80). Finally, the mean score for impression management was 6.44 ( $SD = 3.80$ ; range = 0–17).

### **Bivariate analysis**

The bivariate associations between the IV (i.e., female firesetters, male firesetters, and female offender controls) and the socio-demographic characteristics can be seen in Table 1. Overall number of offenses, number of violent offenses, impression management, education, and previous engagement with mental health services were significantly related to the IV. There were larger proportions of female (92%) and male (90%) firesetters than female offender controls (78%) reporting secondary school qualifications or less; and a larger proportion of female firesetters (85%) reporting previous engagement with mental health services when compared to male firesetters (58%) and female offender controls (60%). Bonferroni post hoc tests showed that male firesetters had been convicted of more offenses overall and violent offenses specifically, when compared to female offenders (both firesetters and controls), and we found that female offenders (both firesetters and controls) scored significantly higher than male firesetters on impression management.

Table 2 shows the prevalence and bivariate relationships between the IV and Axis I and II psychopathology. Among the Axis I clinical disorders, we found that a higher proportion of female firesetters met the criteria for prominence of a syndrome for bipolar (manic) and major depression when compared to male firesetters and female offender controls. Conversely, a higher proportion of male firesetters met the criteria for prominence of a syndrome for dysthymia and alcohol dependence when compared to female firesetters and female offender controls. A higher proportion of female offender controls met the criteria for prominence of a syndrome for drug dependence than female and male firesetters. Among the Axis II personality disorders, schizoid, avoidant, dependent, compulsive, masochistic, schizotypal, and borderline were significantly related to the IV. A higher proportion of female firesetters met the diagnosable criteria for all of these personality disorders when compared to male firesetters and female offender controls.

### **Multinomial logistic regression model with psychopathological features**

We conducted a multinomial logistic regression (adjusting for the significant socio-demographic characteristics) with female firesetters as the reference category (Table 3). Major depression was endorsed by the female firesetters significantly more than male firesetters; whereas, dysthymia was endorsed by the male firesetters significantly more than the female firesetters. When investigating the differences between female firesetters and other types of female offenders, alcohol dependence was endorsed more by the female firesetters; conversely, drug dependence was endorsed more by the female offender control group.

### **Group comparisons on psychological characteristics**

We conducted a MANCOVA for each category of psychological characteristics – i.e., inappropriate fire interest, emotional/self-regulation, self-concept, social competency, and offence-supportive attitudes (see Table 4 for means, standard deviations, and F-statistics) – and covaried out the significant socio-demographic variables from the bivariate analyses. We also conducted an ANCOVA for boredom proneness. There were overall significant effects for emotional/self-regulation and self-concept. When we conducted univariate analyses on the individual measures we found significant main effects for: serious fire interest, arousal and regulation subscales of the NAS, self-esteem, and locus of control.

### **Multinomial logistic regression model with psychological characteristics**

Given the significant main effects for specific psychological characteristics across several categories, Table 5 shows the multinomial regression model (controlling for the significant demographic characteristics) with female firesetters as the reference category. An external locus of control was endorsed more by the male firesetter group when compared to female firesetters. Serious fire interest distinguished female firesetters when compared to female offender controls, whereas the regulation subscale of the NAS was marginally significant.

## **Discussion**

This research represents the first ever comparative study – conducted in a prison setting – of female firesetters, male firesetters and female control offenders on both psychopathological features and psychological traits. We hypothesized that female firesetters would be distinguishable from male firesetters and female offender controls on psychopathological features and the psychological characteristics highlighted in the limited existing literature.

### **Group Differences in Socio-demographic Characteristics**

The bivariate analysis showed that female firesetters, male firesetters, and female offender controls differed on socio-demographic characteristics. Specifically, firesetters (both male and female) indicated lower school attainment than the female offender controls. Male firesetters had been convicted of more offences – violence-related and overall – than female offenders (firesetters and controls). Female firesetters were more likely to report previous engagement with mental health services when compared to male firesetters and female control offenders; and female firesetters and female control offenders scored significantly higher on impression management.

The gender differences are in line with existing literature. That is, males are typically more antisocial when compared to females (e.g., Blanchette and Brown, 2006) and females are typically more likely to impression manage when compared to males (e.g., He et al., 2015). What is interesting is that both male and female firesetters achieve less in school than the female offender controls. The literature is conflicted in this regard. Although firesetters have appeared to be low academic achievers (Anwar et al., 2011) and more likely to be in unskilled employment when compared to non-firesetting comparison groups (Bradford, 1982), contradictory findings have shown no differences between firesetters and non-firesetters on academic attainment (Harmon et al., 1985; Stewart, 1993; Vaughn et al., 2010; Wachi et al., 2007). Female firesetters' previous engagement with mental health services was

notably more likely than the two other comparison groups. Female firesetters are more likely to be referred for psychiatric assessment than males following a firesetting incident (Dickens and Sugarman, 2012), which could partly explain the higher rates of psychiatric diagnoses of female firesetters when compared to male firesetters (e.g., Dickens et al., 2007; Rix, 1994).

### **Group Differences on Psychopathological Features**

The proportion of Axis I diagnoses exemplified the complex relationship between clinical syndromes, gender, and firesetting behavior. A higher proportion of female firesetters met the diagnosable criteria for bipolar (manic) disorder and major depression, when compared to both the male firesetter and female control groups; whereas, a higher proportion of male firesetters met the diagnosable criteria for dysthymia and alcohol dependence, when compared to female firesetters and female control offenders. We also found that a higher proportion of female firesetters met the diagnosable criteria for drug dependence when compared to their male counterparts. Some of these findings reflect the existing literature. A lifetime history of bipolar disorder and cannabis disorder has been strongly associated with female firesetters, when compared to male firesetters (Hoertel et al., 2011). But contrary to our findings, researchers have identified alcohol dependence as a prominent diagnosis for female firesetters, more so than male firesetters (Dickens et al., 2007) and female offender controls (Enayati et al., 2008). We conducted further (and more robust) analyses by controlling for the effects of the other psychopathological features (i.e., Axis II disorders) and found that the group differences remained. This demonstrates that the effects (although small in magnitude) of the Axis I clinical syndromes that distinguish female firesetters are over and above other symptomology.

The literature consistently highlights a gender difference in depression (see Hyde et al., 2008) that we found here. A larger proportion of female firesetters were diagnosed with the more severe form of depression (i.e., major depression) than male firesetters. This was

further substantiated by the robust follow-up analyses controlling for the other psychopathological features. Some argue that firesetting is a behavioral manifestation of such diagnoses (i.e., Hoertel et al., 2011), and given that internalizing behaviors such as suicide and self-harming are more common in the female offender population (Byrne and Howells, 2002; Sorbello et al., 2002), it can be argued that firesetting is a form of expression. Amongst Axis I diagnoses, fewer differences were found between female firesetters and female control offenders which is mirrored in the existing literature (see Gannon, 2010).

The proportions of Axis II diagnoses exemplified a much simpler relationship between personality disorders, gender, and firesetting behavior. A larger proportion of female firesetters met the diagnosable criteria for schizoid, avoidant, dependent, compulsive, masochistic, schizotypal, and borderline personality disorders, when compared to the male firesetters and female offender controls; whereas, no other group differences were found. The literature has consistently found that firesetters are more likely to have been diagnosed with personality disorders when compared to non-firesetters (mixed gender studies – Ducat et al., 2013; Ducat et al., 2013; Vaughn et al., 2010). Also supported by the literature are the gender differences in personality disorder diagnoses amongst firesetters (Bourget and Bradford, 1989). Female firesetters are distinct from other female offenders with significantly higher proportions of Axis II diagnoses (Hoertel et al., 2011). These personality traits are indicative of the types of characteristics (e.g., impulsivity, poor emotion regulation and interpersonal skills) that underlie a motivation to gain control in an otherwise unstable lifestyle. However, clinicians should use caution when drawing any conclusions from these findings because none of the Axis II disorders remained significant when controlling for the Axis I disorders suggesting that the clinical syndromes should be of higher importance in clinical formulation.

### **Group Differences on Psychological Characteristics**

We found that female firesetters were more likely to have an internal locus of control when compared to male firesetters. These findings, in conjunction with the aforementioned results related to depression, may explain why female firesetters use fire to cope with negative affect in response to distressing life experiences (Cunningham et al., 2011). These findings in firesetters could also be a manifestation of gender differences found in affective and depressive diagnoses. Typically, female offenders are more likely to engage in self-harming behavior (e.g., Blanchette and Brown, 2006; Byrne and Howells, 2002; Sorbello et al., 2002), thus firesetting might be the behavioral manifestation of this form of coping (Hoertel et al., 2011).

It is not surprising that the female firesetters exhibited a more serious interest in fire, when compared to other female offenders, but it was surprising to find that they indicated more effective anger regulation than female offenders. An explanation of this could be that the firesetters' serious fire interest has an underlying antisocial and psychopathological component given the group differences on the psychopathological features. The group differences on major depression suggest that firesetting behavior could be acting as a coping mechanism because of its sensory stimulation and instantly perceived positive (or negative) reinforcements (Gannon et al., 2012). Therefore, female firesetters may be viewed as effective anger regulators who employ preferred coping strategies (i.e., setting fires). Overall, these findings highlight group differences that need further attention but we must temper our conclusions with consideration for the small effect sizes.

### **Limitations**

Although this is the first comprehensive examination of the distinct features of female firesetters, this study is not without its limitations. First, offender participants were volunteers. This could have resulted in a self-selection bias whereby the offenders recruited were the least problematic. Second, the study is based on self-report questionnaires. As a



result, the findings may have been biased by common method variance (i.e., variance as a result of consistent responding from participants due to the self-report methodology). Third, although the MCMI-III is a validated tool assessing traits indicative of disorders/syndromes, it should not replace clinical diagnoses. Instead, it can be used to place clinicians in the right “diagnostic ballpark” (Groth-Marnat, 2003). Finally, this study is correlational in design. We cannot say for certain which variables preceded others. Therefore, future research would benefit from more longitudinal designs to aid clinicians in identifying risk factors for firesetting behavior.

## **Conclusions**

The current study presents key treatment targets for female firesetters in comparison to male firesetters and female offender controls. It would be expected that female firesetters would exhibit higher levels of serious fire interest than their female counterparts and this forms the argument for delivering existing treatment packages that target fire-related schema within the female estate (e.g., the Firesetting Intervention Programme for Prisoners [FIPP]; Gannon et al., 2015). However, amendments to current fire-related treatment protocol need to account for the gender differences found in the current study and the wider offending literature (i.e., to address symptoms of major depression and an internal locus of control in female firesetters). Also, further investigation is needed in the assessment and treatment of emotion regulation amongst female firesetters because our findings indicate that they are better at regulating than their non-firesetting counterparts.

In summary, the findings are in support of two main conclusions: (1) female firesetters exhibit some unique characteristics when compared to male firesetters and clinicians need to ensure that programmes delivered account for these gender differences; and (2) female firesetters are distinct from other types of female offenders especially in relation to fire-related factors, so, within institutions, clinicians need to ensure that these treatment

targets are accounted for in provision. Future intervention work that targets the unique psychological characteristics outlined in this study may lead to reducing the recidivism rates of firesetting within this group.

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Table 1

Bivariate relationships between the IV and socio-demographic characteristics

Variable	Female Firesetter	Male Firesetter	Female Offender Control	F	df	p	$\omega$
	M (SD)	M (SD)	M (SD)				
	n = 65	n = 128	n = 63				
Age (Years)	34.49 (11.53)	33.92 (12.55)	34.25 (10.65)	.05	2, 249	.948	.09
Sentence Length (Months)	59.89 (147.99)	74.38 (64.41)	72.00 (66.95)	.48	2, 229	.618	.07
Number of Offences (Overall)	1.64 (1.94)	2.62 (2.33)	1.82 (2.16)	5.19	2, 242	.006	.18
Violence	2.41 (3.78)	4.51 (4.68)	1.32 (3.11)	13.16	2, 225	<.001	.31
Theft	3.38 (7.67)	0 (0)	7.71 (16.32)	3.49	1, 117	.064	.14
Fraud	35.29 (263.98)	0 (0)	1.02 (2.81)	.91	1, 110	.342	.04
Sexual	0 (0)	0 (0)	.25 (1.12)	2.70	1, 104	.103	.13
Impression Management	7.40 (4.02)	5.35 (3.47)	7.52 (3.66)	9.89	2, 237	<.001	.26
	<b>N (%)</b>	<b>N (%)</b>	<b>N (%)</b>	<b><math>\chi^2</math></b>	<b>df</b>	<b>p</b>	<b><math>\phi</math></b>
Ethnicity				1.72	2	.424	.08
White	57 (88)	105 (85)	50 (79)				

Other	8 (12)	19 (15)	13 (21)				
Education				7.63	2	.022	.18
≤ Secondary school	59 (92)	111 (90)	49 (78)				
> Secondary school	5 (8)	12 (10)	14 (22)				
Engaged with mental health services	55 (85)	67 (58)	37 (60)	26.40	4	< .001	.33

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Table 2

Percentage of Participants Scoring in Subclinical and Clinical Ranges on Axis I and II Psychopathology Scales

Axis I psychopathology	Type	% of Participants			$\chi^2$	p	$\phi$	
		Subclinical	Presence of a syndrome/disorder	Prominence of a syndrome/disorder				
A	Anxiety	Female firesetters	34.4	26.2	39.3	5.71	.222	.15
		Male firesetters	30.8	22.5	46.7			
		Female controls	39.7	31.7	28.6			
H	Somatoform	Female firesetters	78.7	8.2	13.1	3.57	.467	.12
		Male firesetters	87.5	6.7	5.8			
		Female controls	87.3	6.3	6.3			
N	Bipolar: Manic	Female firesetters	59.0	18.0	23.0	12.06	.017	.22
		Male firesetters	79.2	10.0	10.8			
		Female controls	74.6	4.8	20.6			
D	Dysthymia	Female firesetters	65.6	23.0	11.5	12.14	.016	.22
		Male firesetters	50.0	36.7	13.3			
		Female controls	74.6	20.6	4.8			
B	Alcohol Dependence	Female firesetters	59.0	24.6	16.4	21.25	<.001	.30
		Male firesetters	41.7	29.2	29.2			
		Female controls	76.2	11.1	12.7			
T	Drug Dependence	Female firesetters	54.1	8.2	37.7	12.90	.012	.23
		Male firesetters	53.3	16.7	30.0			
		Female controls	50.8	1.6	47.6			
R	Post Traumatic Stress Disorder	Female firesetters	50.8	16.4	32.8	8.41	.078	.19
		Male firesetters	67.5	14.2	18.3			
		Female controls	73.0	11.1	15.9			
SS	Thought Disorder	Female firesetters	82.0	4.9	13.1	3.50	.478	.12
		Male firesetters	80.8	8.3	10.8			
CC	Major Depression	Female controls	88.9	6.3	4.8	11.24	.024	.22
		Female firesetters	57.4	11.5	31.1			

		Male firesetters	80.0	5.8	14.2			
		Female controls	71.4	4.8	23.8			
		Female firesetters	65.6	16.4	18.0	8.33	.080	.19
PP	Delusional Disorder	Male firesetters	83.3	6.7	10.0			
		Female controls	71.4	11.1	17.5			
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Axis II psychopathology								
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1	Schizoid	Female firesetters	59.0	16.4	24.6	12.73	.013	.23
		Male firesetters	54.2	30.0	15.8			
		Female controls	74.6	17.5	7.9			
2a	Avoidant	Female firesetters	59.0	11.5	29.5	15.19	.004	.25
		Male firesetters	50.0	26.7	23.3			
		Female controls	73.0	7.9	19.0			
2b	Depressive	Female firesetters	37.7	14.8	47.5	7.72	.102	.18
		Male firesetters	44.2	20.0	35.8			
		Female controls	54.0	22.2	23.8			
3	Dependent	Female firesetters	52.5	16.4	31.1	11.10	.025	.21
		Male firesetters	55.8	28.3	15.8			
		Female controls	65.1	12.7	22.2			
4	Histrionic	Female firesetters	96.7	3.3	0	4.56	.102	.14
		Male firesetters	99.2	.8	0			
		Female controls	93.7	6.3	0			
5	Narcissistic	Female firesetters	78.5	9.2	6.2	2.53	.639	.10
		Male firesetters	77.3	10.2	6.3			
		Female controls	79.4	7.9	12.7			
6a	Antisocial	Female firesetters	54.1	26.2	19.7	6.63	.157	.17
		Male firesetters	46.1	19.5	28.1			
		Female controls	61.9	23.8	14.3			
6b	Sadistic	Female firesetters	78.7	9.8	11.5	6.45	.168	.16
		Male firesetters	65.0	17.5	17.5			
		Female controls	79.4	7.9	12.7			
7	Compulsive	Female firesetters	91.8	4.9	3.3	22.39	<.001	.30

		Male firesetters	100	0	0			
		Female controls	82.5	14.3	3.2			
8a	Negativistic	Female firesetters	49.2	23.0	27.9	6.41	.171	.16
		Male firesetters	42.5	28.3	29.2			
		Female controls	61.9	17.5	20.6			
8b	Masochistic	Female firesetters	32.8	8.2	59.0	41.83	<.001	.41
		Male firesetters	38.3	40.8	20.8			
		Female controls	52.4	14.3	33.3			
S	Schizotypal	Female firesetters	70.5	4.9	24.6	22.67	<.001	.31
		Male firesetters	65.8	22.5	11.7			
		Female controls	84.1	3.2	12.7			
C	Borderline	Female firesetters	32.8	29.5	37.7	15.97	.003	.26
		Male firesetters	61.7	11.7	26.7			
		Female controls	57.1	17.5	25.4			
P	Paranoid	Female firesetters	45.9	31.1	23.0	7.74	.101	.18
		Male firesetters	66.7	16.7	16.7			
		Female controls	60.3	22.2	17.5			

Note. Distributions based on unadjusted Base Rate

Cutoff scores: < 75 = subclinical; 75 – 85 = presence of syndrome/traits; > 85 = prominence of a syndrome/disorder (i.e., having met the diagnosable criteria).

Table 3

Multinomial logistic regression with Axis I and II psychopathology, female firesetter group as reference group (n = 65)

	Odds Ratio (95% CI)		
	Wald $\chi^2$	Male firesetter n = 128	Female offender control n = 63
Education	3.43	2.54 (.53,12.26)	3.69 (.86,15.81)
Number of offences (overall)	1.23	1.05 (.85,1.30)	1.15 (.90,1.47)
Number of violent offences	10.13**	1.11 (.99,1.25)	.88 (.74,1.04)
Engaged with mental health services	15.66***	7.40** (2.30,23.80)	5.98** (1.75,20.50)
Impression management	10.67**	.83** (.73,.93)	.94 (.83,1.07)
Schizoid	1.58	1.01 (.98,1.04)	.99 (.96,1.02)
Avoidant	4.56	.99 (.96,1.02)	1.03 (.99,1.06)
Dependent	.60	1.00 (.98,1.03)	1.01 (.99,1.04)
Compulsive	2.73	.99 (.97,1.02)	1.02 (.99,1.05)
Masochistic	2.30	.98 (.95,1.01)	.99 (.96,1.02)
Schizotypal	4.33	1.00 (.97,1.03)	1.03 (.99,1.07)

Borderline	1.07	.99 (.95,1.03)	.98 (.94,1.02)
Bipolar (Manic)	.47	.99 (.97,1.02)	1.01 (.97,1.04)
Dysthymia	22.83***	1.06** (1.02,1.10)	.97 (.94,1.01)
Alcohol dependence	14.00**	1.03 (1.00,1.06)	.97* (.94,1.00)
Drug dependence	25.31***	.99 (.97,1.02)	1.06*** (1.03,1.09)
Major depression	6.08*	.97* (.95,1.00)	.99 (.97,1.02)

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\*p < .05. \*\*p < .01. \*\*\*p < .001. R<sup>2</sup> = .49 (Cox and Snell), .55 (Nagelkerke). Model:  $\chi^2(34) = 134.744$ , p < .001.

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Table 4

F-statistics for psychological characteristics amongst comparison groups

Measures	Female firesetters			Male firesetters			Female controls			F	p	$\eta^2_p$
	M	SD	95% CI	M	SD	95% CI	M	SD	95% CI			
	n = 65			n = 128			n = 63					
Inappropriate fire interest												
Firesetting as normal	20.11	6.81	18.41, 21.96	20.92	4.96	19.21, 21.66	19.09	6.05	18.25, 21.63	.10	.901	.001
Fire safety	10.24	3.65	9.51, 11.54	10.53	3.19	9.63, 11.03	9.13	2.58	8.28, 10.22	2.03	.135	.02
Serious fire interest	10.35	6.89	9.08, 12.26	11.98	5.27	10.37, 12.57	7.78	2.85	6.94, 9.96	4.83	.009	.06
Identification with fire	17.31	9.36	14.98, 19.63	17.05	6.94	15.14, 18.35	13.61	5.63	11.98, 16.41	2.22	.112	.03
Emotional/Self regulation												
Novaco Anger Scale												
Cognition	30.87	5.66	30.52, 33.60	31.25	6.37	28.82, 31.37	29.60	7.76	28.80, 31.82	1.99	.140	.02
Arousal	30.35	7.47	29.33, 33.23	28.80	7.25	26.28, 29.51	29.53	9.12	28.29, 32.13	3.44	.034	.03
Behavior	28.10	8.64	27.52, 31.50	29.25	7.82	26.22, 29.52	27.40	9.31	26.17, 30.08	.80	.452	.01
Regulation	25.71	4.56	23.91, 26.54	25.74	5.30	25.20, 27.39	23.43	5.66	21.75, 24.34	6.98	.001	.07



Provocation Inventory	64.31	20.92	61.54, 71.15	63.02	16.93	57.38, 65.36	61.49	19.01	57.66, 67.11	1.22	.298	.01
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Self Concept												
Culture-Free Self Esteem	9.19	3.86	7.91, 10.07	10.70	3.99	10.17, 11.98	8.58	4.65	7.13, 9.25	8.53	<.001	.08
Inventory – General												
Nowicki-Strickland	22.95	5.57	21.06, 24.01	24.47	4.72	23.59, 26.07	22.98	6.67	21.14, 24.04	3.47	.033	.03
Locus of Control												

The univariate analyses presented in the table are for significant models: emotional/self regulation,  $F(10, 392) = 2.96$ ,  $p = .001$ , Wilk's Lambda = .87,  $\eta_p^2 = .07$ ; self concept,  $F(4, 394) = 4.38$ ,  $p = .002$ , Wilk's Lambda = .92,  $\eta_p^2 = .04$ ; with the exception of inappropriate fire interest,  $F(8, 326) = 1.66$ ,  $p = .108$ , Wilk's Lambda = .92,  $\eta_p^2 = .04$ , where univariate analyses indicated an effect for serious fire interest.

The following models were not significant: social competency,  $F(4, 396) = 2.10$ ,  $p = .081$ , Wilk's Lambda = .96,  $\eta_p^2 = .02$ ; offence-supportive attitudes,  $F(8, 390) = 1.19$ ,  $p = .304$ , Wilk's Lambda = .95,  $\eta_p^2 = .02$ ; boredom proneness,  $F(2, 200) = .51$ ,  $p = .601$ ,  $\eta_p^2 = .01$ .

Table 5

Multinomial logistic regression with psychological characteristics, female firesetter group as reference group (n = 65)

	Odds Ratio (95% CI)		
	Wald $\chi^2$	Male firesetter n = 128	Female offender control n = 63
Education	2.69	2.12 (.21,21.54)	4.79 (.49,46.60)
Number of offences (overall)	.31	1.02 (.81,1.28)	1.08 (.81,1.43)
Number of violent offences	20.32***	1.16* (1.01,1.33)	.76* (.60,.97)
Engaged with mental health services	10.81**	5.01** (1.69,14.90)	3.95* (1.24,12.56)
Impression management	9.07*	.82** (.71,.94)	.95 (.81, 1.12)
Serious fire interest	16.08***	1.07 (.98,1.16)	.85* (.74,.97)
Novaco – Arousal	1.94	.97 (.90,1.04)	.95 (.88,1.03)
Novaco – Regulation	9.64**	1.06 (.96,1.18)	.89 <sup>†</sup> (.79,1.00)
Culture-Free Self-Esteem Inventory – General	1.88	1.01 (.88,1.15)	.92 (.79,1.07)
Nowick-Strickland Locus of Control	4.80	1.13* (1.01,1.27)	1.06 (.94,1.20)

<sup>†</sup>p = .053. \*p < .05. \*\*p < .01. \*\*\*p < .001. R<sup>2</sup> = .45 (Cox and Snell), .52 (Nagelkerke). Model:  $\chi^2$  (20) = 104.02, p < .001.