Examining the Psychopathology of Incarcerated Male Firesetters using the MCMI-III

Caoilte Ó Ciardha[1], Emma K. A. Alleyne, Nichola Tyler, Magali F. L. Barnoux, Katarina Mozova, and Theresa A. Gannon

University of Kent

Accepted for publication in *Psychology, Crime & Law*

Author Note

Caoilte Ó Ciardha, Emma K. A. Alleyne, Nichola Tyler, Magali F. L. Barnoux, Katarina Mozova, and Theresa A. Gannon, Centre of Research and Education in Forensic Psychology (CORE-FP), School of Psychology, University of Kent.

This research was supported by an Economic and Social Research Council grant awarded to Theresa A. Gannon (RES-062-23-2522). We are grateful to area psychologists, prison establishment staff, and our participants. The views expressed are those of the authors and do not necessarily reflect those of National Offender Management Services.

Correspondence concerning this article should be addressed to Caoilte Ó Ciardha, School of Psychology, Keynes College, University of Kent, Canterbury, Kent, CT2 7NP, UK. Email: C.C.OCiardha@kent.ac.uk

[1] Note to editors/copy-editors: The first author's surname is Ó Ciardha. The Ó should not be mistaken for an initial

Abstract

Research to date has been equivocal on the relationship between firesetting and psychopathology, and has been impeded by studies lacking adequate control samples. The present study examined psychopathology in a sample of incarcerated adult male firesetters (*n* = 112) and prison controls (*n* = 113) using the Millon Clinical Multiaxial Inventory-III. Firesetters demonstrated multiple elevated scores on personality and clinical syndrome scales. Logistic regression showed that the borderline personality scale was the strongest personality scale discriminator between firesetters and controls. Major depression and drug dependence were the strongest clinical syndrome scale predictors. However, both clinical syndrome scale predictors appeared to be mediated by borderline personality scores indicating that firesetters are best characterized by responding indicative of borderline personality traits rather than other psychopathological deficits. The results suggest that, relative to other offenders, firesetters face challenges with impulse control, affect regulation, stability of interpersonal relationships, and self-image.

Keywords: firesetting, arson, psychopathology, personality disorder, MCMI-III

Examining the Psychopathology of Incarcerated Male Firesetters using the MCMI-III

Deliberate firesetting accounts for a large amount of deaths, injuries, and property damage worldwide. In Great Britain there were 35,900 deliberate fires in 2010-2011 (Department for Communities and Local Government, 2011b). During that period deliberate fires resulted in 72 fatalities and 1,700 non-fatal casualties (Department for Communities and Local Government, 2011b). The economic impact of deliberate firesetting in England was estimated in 2008 as £2.3bn (Department for Communities and Local Government, 2011a). In the period 2005-2009, an estimated 306,300 intentional fires were reported to U.S. fire departments each year (Evarts, 2012). This was associated with 440 civilian deaths, 1,360 civilian injuries, and $1.3 billion in direct property damage annually (Evarts, 2012). Research has established that firesetters are predominantly male juveniles (Blanco et al., 2010; Dickens & Sugarman, 2012); however, males over 18 represent the largest group of individuals arrested for arson (45%; United States Department of Justice, Federal Bureau of Investigation, 2012). In other words, male adult firesetting appears to incur a higher financial and human cost, resulting in greater police attention.

In order to develop evidence based prevention and management strategies, researchers need to establish key characteristics, in terms of treatment needs as well as risk factors, associated with deliberate firesetting. A link is often made between mental health and adult male firesetting due to firesetters' substantial history of psychiatric treatment relative to non-firesetters (Blanco et al., 2010; Labree, Nijman, van Marle, & Rassin, 2010). Yet little is known about the psychopathological characteristics underpinning deliberate firesetting.

Personality Disorders

Although several studies suggest that detected firesetters do not differ significantly from other offenders in overall levels of personality disorder (Duggan & Shine, 2001; Enayati, Grann, Lubbe, & Fazel, 2008; Labree, et al., 2010; Rice & Harris, 1991), others

suggest key differences. In a Canadian study of males charged with arson, Bradford (1982) reported 53% (*n* = 18) held a DSM-II diagnosis of personality disorder, compared to 20% (*n* = 10) of controls charged with non-arson offenses. Rix (1994) reported a similar prevalence in male UK firesetters in the absence of any control group. Some research suggests an association between Antisocial Personality Disorder (ASPD) and firesetting. For example, using retrospective data, Ducat, Ogloff, and McEwan (2013), reported that firesetters had significantly higher rates of ASPD diagnoses (assessed using the International Classification of Diseases [ICD-8/9]) than a community sample with a criminal history (excluding any charges for arson). Crucially, however, severity of community sample criminal history was not controlled for. Lindberg, Holi, Tani, and Virkkunen (2005) reported that ASPD (using ICD criteria) was the most common (22%; *n* = 20) personality disorder in a sample of 90 adult male Finnish recidivistic arsonists (see also Rix, 1994). Repo (1998) found that ASPD was more prevalent among Finnish male firesetters who committed additional violent crimes than firesetters with additional non-violent crimes or no additional offences. This suggests that ASPD may not be specifically related to firesetting offences.

Borderline Personality Disorder (BPD) is also commonly cited in firesetters. Using a semi-structured assessment (the Personality Assessment Schedule; Tyrer & Alexander, 1979), Rix (1994) reported the second highest personality traits displayed among male firesetters, after antisocial, as borderline. When applying diagnostic criteria, however, avoidant personality disorder was more commonly diagnosed than BPD. In their sample of 90 male recidivistic firesetters, Lindberg et al. (2005) reported BPD diagnoses (*n* = 11), alongside immature personality disorder (*n* = 11), to be reasonably common although both were only half as prevalent as ASPD (see also Devapriam, Raju, Singh, Collacott & Bhaumik, 2007). Ducat et al. (2013) reported that firesetters in their sample had significantly more historical diagnoses of BPD than their community sample with criminal histories. Using

the Personality Diagnostic Questionnaire (4th version; Hyler, 1994), Duggan and Shine (2001) found that male firesetters differed from prison controls only on borderline personality, with firesetters scoring significantly higher. What is not clear, however, is what percentage of each group reached a clinically significant level on the borderline scale. BPD is characterized by instability in interpersonal relationships, affect regulation, and impulse control (Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004); features which mirror male firesetter characteristics (see Gannon & Pina, 2010).

Other Psychopathological Features

Few studies have examined psychopathological deficits in firesetters who have come to the attention of the criminal justice system. Lindberg et al. (2005) reported a primary diagnosis of psychosis for 20% of their sample of 90 male apprehended recidivistic firesetters (see also Enayati et al., 2008). Räsänen et al. (1995) reported firesetters as holding higher levels of schizophrenia and other psychosis relative to homicide offenders (18% versus 4% respectively). More recently, a large scale study examining all individuals convicted of arson in Sweden over a 12-year period found relatively low levels of psychotic disorders (8% of males; Anwar, Långström, Grann, & Fazel, 2011). Ducat et al.'s (2013) retrospective study did not highlight any elevated levels of psychotic disorder in firesetters relative to their 'criminal' community sample, although schizophrenia was more prevalent among firesetters. The relationship between psychosis and firesetting, therefore, requires further examination.

Despite huge human and financial cost associated with deliberate firesetting, the underlying psychopathological features remain unclear (Gannon & Pina, 2010). Investigators have not always employed adequate comparison groups or standardized measures that highlight clinically significant psychopathologies. As a result, it is difficult to establish whether psychopathological characteristics that appear prevalent among firesetters are truly linked to firesetting or are a feature of offending or psychiatric populations more generally.

The current study examined the psychopathology of male incarcerated firesetters using an appropriate comparison group and a structured inventory (i.e., the Millon Clinical Multiaxial Inventory-III; Millon, Davis, & Grossman, 2006) to highlight the presence of clinically significant psychopathologies. We predicted that firesetters would show high levels of clinically significant antisocial personality traits that would be similar to offending controls. We further predicted that levels of clinically significant borderline personality traits would also be high across the groups but would be significantly higher in firesetters. We aimed to explore whether firesetters and offending controls differ in the prevalence of clinically significant levels of other personality styles or clinical syndromes. We also aimed to determine which personality traits or clinical syndromes best predicted firesetting.

Method

Participants

The original sample contained 236 offenders (120 firesetters, 116 non firesetter controls) recruited from across nine adult prisons in the UK. Firesetters were selected from prison records indicating that they had a current or prior conviction or adjudication for an offence involving firesetting. Fifty five participants had index offences involving firesetting, 52 had previous convictions involving firesetting, and 21 reported setting fires in custody. Over a third of firesetters (n =42) reported, or had on file, multiple firesetting incidents. Each participating prison was asked to generate a list of randomly selected prisoners as controls. Their prison records were checked to ensure the absence of deliberate firesetting, and this was confirmed with the participants themselves during data collection. All participants were aware that data was collected for research purposes and would not influence parole or recategorization decisions. Individuals were excluded from study participation if they were experiencing active psychosis or suicidal ideation or if researchers were informed that they posed a risk of hostage taking. Eighty two percent of both firesetters and controls identified

themselves as white British or Irish. Firesetters and controls were statistically similar[2] in age (M = 33.4, SD = 12 versus M = 36, SD = 12.5 respectively), $t(233) = -1.61$, $p = .110$ and sentence length (M = 72.19, SD = 61.29 versus M = 79.39, SD = 60.96), $t(207) = -.85$, $p = .396$. Firesetters did, however, have a greater number of previous offences (M = 34.03, SD = 39.75) than controls (M = 21.96, SD = 29.11), $t(234) = 2.66$, $p = .008$ although they did not differ significantly on violent offences (number of offences against the person), (firesetters M = 1.93, SD = 2.73; offending controls M = 1.39, SD = 2.36), $t(215) = 1.54$, $p = .126$. It was not possible to examine intellectual disability since IQ data is not routinely recorded in the UK prison service. All participants, however, indicated verbally that they were able to understand the self-report materials presented to them.

Measures

Millon Clinical Multiaxial Inventory-III

The Millon Clinical Multiaxial Inventory-III (MCMI-III; Millon et al., 2006) is a 175 item true-false self-report inventory of personality and psychopathology that is one of the most frequently used multiscale instruments for adult forensic evaluation (Archer, Buffington-Vollum, Stredny, & Handel, 2006). The MCMI-III measures eleven Clinical Personality Patterns, three Severe Personality Pathologies, seven Clinical Syndromes, and three Severe Clinical Syndromes. It also has three modifying indices of disclosure, desirability, and debasement, in addition to a validity scale. There is not complete alignment between the MCMI-III and the DSM-5 (American Psychiatric Association, 2013). However the personality scales correspond to DSM-IV-TR (American Psychiatric Association, 2000) Axis II diagnoses and the clinical syndromes reflect Axis I diagnoses (Millon, Davis, &

[2] Degrees of freedom differ across analyses as sentence length was not applicable for participants on remand, and for some participants file data was unavailable. Where official records were unavailable, number of previous convictions was based on participant self report.

Grossman, 2006). Scores are converted to standard scores by referencing them against established population criteria to yield Base Rate scores. For the personality scales participants scoring above 75 can be viewed as demonstrating clinically significant personality traits with participants above 85 seen as having "pathology pervasive enough to be called a personality disorder" (Millon, et al., 2006, p. 130). For the clinical syndromes scores between 75 and 85 are indicative of the presence of a syndrome and scores above 85 indicate the prominence of a syndrome. We refer to scores below 75 for both clinical syndromes and personality scales as below *clinical threshold*. Groth-Marnat (2003) reports that the MCMI-III holds strong internal consistency (alpha coefficients exceed .80 for 20 of 26 scales), moderate to high test-retest reliability (median .91 over a 4- to 14-day interval), and good predictive power. Groth-Marnat (2003) sounds a note of caution regarding the use of the MCMI concluding it places the clinician in the right "diagnostic ballpark", but does not provide a diagnosis.

Demographic data and offending history

Demographic characteristics and background information were collected using a short questionnaire and additional information such as previous convictions was obtained from prisoners' files with their consent.

Procedure

The study was approved by the University Research Ethics Committee (REF 20101507). Prisoners were assessed individually to maximize validity of self-report responding. Prisoners first provided written informed consent, answered demographic and background questions, and then completed the MCMI-III which was randomized amongst other questionnaire assessments. To ensure maximum comprehension, prisoners were asked

if they would like the questionnaires to be read aloud to them. This format was chosen by the majority of firesetters and control prisoners (90%).

Results

Firesetters were more likely than controls to report engaging with mental health services either inside or outside prison, (56% versus 25% respectively), $\chi^2(1, N = 233) = 21.73$, $p < .001$, OR = 3.65, 95% CI [2.09, 6.36]. Of those who reported engaging with mental health services, no group differences were found regarding self-reported mental health diagnosis prevalence (firesetters 71%, controls 70%), $\chi^2(1, N = 95) = .05$, $p = .825$, OR = 1.11, 95% CI [0.43, 2.88].

Removal of Problematic Data

Eleven participants had their MCMI-III data removed from further analysis as they had either too many missing answers (12 or more) or scored above 178 on the disclosure scale. No participants had problematically low scores on the disclosure scale or validity scores greater than one. In total, 225 participants were retained for analysis (112 firesetters, 113 controls).

Personality Scales

Table 1 shows the distribution of base rate scores for the MCMI-III personality scales. Firesetters were more likely to exhibit scores above the clinical threshold (i.e., clinically significant traits or personality disorder) for at least one of the personality scales (firesetters 85.7%, controls 72.6%), $\chi^2(1, N = 225) = 5.88$, $p = .015$, OR = 2.27, 95% CI [1.16, 4.44]. Table 1 shows that clinically significant traits or personality disorder were found among firesetters and controls across most of the personality scales. Exceptions are the histrionic and compulsive scales where 95-100% of participants scored below clinical significance. These two scales were therefore excluded from further analysis.

We examined the distribution of scores classified as below clinical threshold or clinically significant (i.e., personality disorder) according to group status (firesetter or control). Chi-square analysis suggested that these distributions varied according to group status for all scales with the exceptions of the narcissistic, antisocial, and paranoid scales. The nine statistically significant scales were entered—via backward selection—into a binary logistic regression to examine their ability to predict group status (i.e., firesetter or control). Seven steps were carried out, removing six of the personality scales from the model. The final model significantly predicted firesetters from controls (Omnibus $\chi^2 = 32.99$, df = 3, $p < .001$). The variables that remained in the model were the avoidant, dependent, and borderline scales. However, only the borderline scale made a statistically significant contribution in the final model (Wald $\chi^2 = 13.64$, $p < .001$). This logistic regression model alone correctly predicted group membership 64.9% of the time (67% firesetters, 62.8% controls). The coefficient values suggest that every one point increase in the borderline scale increases the odds of being a firesetter by a factor of 1.03, 95% CI [1.01, 1.05].

Approximate location of Table 1

Clinical Syndromes

The analysis of the MCMI-III clinical syndrome scales mirrored the steps taken for the MCMI-III personality scales. Firesetters were more likely to exhibit scores above the clinical threshold (i.e., presence or prominence of a syndrome) for at least one of the clinical syndromes (firesetters 83.9%, controls 58.4%), $\chi^2(1, N = 225) = 17.83$, $p < .001$, OR = 3.72, 95% CI [1.98, 6.97]. Table 2 shows that presence or prominence of a syndrome were found among firesetters and controls across most of the syndrome scales. Chi-square analysis highlighted significant group differences for anxiety, dysthymia, alcohol dependence, drug dependence, post traumatic stress disorder, and major depression scales. These six variables were entered into a binary logistic regression using backward selection. Following five steps,

removing four variables, the model significantly predicted firesetters from controls (Omnibus $\chi^2 = 24.82$, df = 2, $p < .001$) and was able to correctly predict group membership 63.1% of the time (69.6% firesetters, 56.6% controls). The two remaining significant variables were drug dependence (Wald $\chi^2 = 13.64$, $p = .003$) and major depression (Wald $\chi^2 = 13.64$, $p = .002$). The coefficients suggested that a one point increase on either scale would increase the odds of belonging to the firesetting group by a factor of 1.02, 95% CI [1.01, 1.03].

Approximate location of Table 2

Further Analysis

To establish the exact relationship between personality style/disorder, other psychopathology, and firesetting we carried out several additional analyses. Since drug dependence and mood instability are characteristic of BPD (Lieb et al, 2004) we examined whether the relationship between both drug dependence and major depression with firesetting might be mediated by borderline scale scores. We used a bootstrapping procedure (INDIRECT SPSS macro; Preacher & Hayes, 2008) in which one thousand bootstrapped samples were drawn and bias corrected confidence intervals (CIs) were calculated. CIs that did not include zero indicated significant mediation. We found that the relationship between drug dependence and firesetting was significantly mediated (total effect $\beta = .023$, $p < .001$ versus direct effect $\beta = .01$, $p = .459$) by scores on the borderline scale (mediating path $\beta = 0.02$, 95% CI [.01, .03]). This pattern was mirrored in the second analysis examining the relationship between major depression and firesetting which was mediated (total effect $\beta = .02$, $p < .001$ versus direct effect $\beta = .01$, $p = .322$) by scores on the borderline scale. Once again the mediating path was significant ($\beta = 0.02$, 95% CI [.01, .02]).

A receiver operating characteristic (ROC) analysis was carried out to quantify the specificity/sensitivity trade-off with which the borderline personality scale could discriminate between firesetters and controls. This performed at a level greater than chance; area under the

curve (AUC) = .70, p < .001, 95% CI [.64, .77] corresponding to a Cohen's *d* effect size of approximately 1.05 (Rice & Harris, 2005). Because the groups differed on number of mental health engagements, we re-ran the ROC analysis separately for those who had reported engaging with mental health services and those who had not. The borderline scale significantly discriminated between firesetters and controls in both analyses, with AUCs greater than any of the other MCMI-III scales[3].

Discussion

Consistent with previous findings (Blanco et al, 2010; Ducat et al., 2013), firesetters reported more mental health service engagement than non-firesetters. However, among those who had engaged with mental health services, both groups were equally likely to report receiving a diagnosis of a mental health disorder. In our sample there were more firesetters scoring in the clinically significant range, across the majority of scales on both axes of the MCMI-III. Despite the breadth of apparent psychopathological deficits faced by firesetters relative to controls it was the borderline personality scale that emerged from our analyses as the strongest discriminator between firesetters and controls (supporting previous research implicating borderline personality; e.g. Ducat et al, 2013; Duggan & Shine, 2001). Results did not appear to be an artifact of any sampling bias as between group differences in accessing mental health services or in the number of previous offenses appeared related to increased psychopathological deficits rather than group membership.

Crucially, the findings of the current study indicate that certain psychopathological traits previously associated with firesetting may be associated with factors such as general offending or general mental health deficits. Firesetters were no more likely than controls to

[3] We also found through mediation analysis that mental health (i.e., number of MCMI scores in the clinical range) confounded the relationship between offender type (firesetter or control) and number of previous convictions. This suggests that mental health deficits might be impacting on number of convictions rather than less 'criminal' inmates being selected as controls.

display clinically significant levels of antisocial personality and thought or delusional disorders (related to psychosis). However, Craig (1999) concludes that the MCMI performs poorly in the assessment of psychotic disorders, and therefore this conclusion would benefit from replication using additional methods. An elevated but non predictive pattern of scoring was found for the schizoid, avoidant, depressive, dependent, sadistic, negativistic, masochistic, and schizotypal personality scales along with anxiety, dysthymia, alcohol dependence, and post traumatic stress disorder. While both major depression and drug dependence were significant predictors of firesetting, the predictive ability of those scales could be subsumed by that of the borderline personality scale. We therefore conclude that while firesetters, as a group, seem to suffer from a range of problematic psychopathological traits, it is their endorsement of traits indicative of borderline personality disorder that most sets them apart as a group from other offenders. It should be noted, however, that over 60% of firesetters did not reach a level on the borderline personality scale that would be considered clinically significant (see Table 1). Therefore it is apparent that the predictive ability of the scale in discriminating between groups was being driven, in part, by the results of subclinical individuals. Thus, it would be inaccurate to say that firesetters seem to be characterized by BPD. Instead, firesetters' pattern of responding on the borderline personality items is indicative of underlying borderline personality traits such as instability in interpersonal relationships (e.g., 'My feelings toward important people in my life often swing from loving them to hating them'), poor impulse control (e.g., 'I act quickly much of the time and don't think things through as I should') and affect regulation issues (e.g., 'My moods seem to change a great deal from one day to the next'). Future research may examine whether such traits operate as distinct risk factors for firesetting, or whether they cluster together implicating borderline personality style as a single risk factor.

There are specific caveats to consider when interpreting the findings of this study. Common method variance (i.e., variance as a result of consistent responding from participants due to the self-report methodology) may have biased the findings of this study. However, self-report was deemed most appropriate in order to assess the respondents' perceptual and experiential constructs (Chan, 2009) and the order of measures was randomized and counterbalanced to account for any order effects. It should also be noted that the MCMI-III is not a replacement clinical assessment of individuals, rather an adjunct that validly identifies traits indicative of a disorder (Retzlaff, Stoner, & Kleinsasser, 2002). Future studies should examine whether corresponding patterns of psychopathological deficits are found when using clinically assessed judgments and diagnoses.

The clinical utility of the current study is most applicable when working with adult male firesetters. Future research should examine whether borderline personality is as predictive of firesetting amongst other firesetting populations, such as female offenders, adolescents, and mentally disordered firesetters. Finally research should address whether firesetters benefit from interventions that include focused work on features of borderline personality such as instability in interpersonal relationships, affect regulation, and impulse control.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders : DSM-IV-TR* (4th ed.). Washington: American Psychiatric Association.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Arlington, VA: American Psychiatric Publishing.

Anwar, S., Långström, N., Grann, M., & Fazel, S. (2011). Is Arson the Crime Most Strongly Associated With Psychosis?—A National Case-Control Study of Arson Risk in Schizophrenia and Other Psychoses. *Schizophrenia Bulletin, 37*, 580-586. doi:10.1093/schbul/sbp098

Archer, R. P., Buffington-Vollum, J. K., Stredny, R. V., & Handel, R. W. (2006). A survey of psychological test use patterns among forensic psychologists. *Journal of Personality Assessment, 87*(1), 84-94. doi:10.1207/s15327752jpa8701_07

Blanco, C., Alegría, A. A., Petry, N. M., Grant, J. E., Simpson, H. B., Liu, S. M., et al. (2010). Prevalence and correlates of fire-setting in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *J Clin Psychiatry*, *71*(9), 1218-1225. doi:10.4088/JCP.08m04812gry

Bradford, J. M. (1982). Arson: A clinical study. *The Canadian Journal of Psychiatry / La Revue canadienne de psychiatrie, 27*, 188-193.

Chan, D. (2009). So Why Ask Me? – Are Self-Report Data Really That Bad? In C.E. Lance & R.J. Vandenber (Eds.), *Statistical and Methodological Myths and Urban Legends: Received Doctrine, Verity, and Fable in the Organizational and Social Sciences* (pp. 309-336). East Sussex, UK: Taylor & Francis Group.

Department for Communities and Local Government. (2011a). The economic cost of fire: estimates for 2008. London: Department for Communities and Local Government.

Department for Communities and Local Government. (2011b). Fire Statistics Great Britain, 2010 - 2011. London: Department for Communities and Local Government.

Devapriam, J., Raju, L. B., Singh, N., Collacott, R., & Bhaumik, S. (2007). Arson: Characteristics and predisposing factors in offenders with intellectual disabilities. *British Journal of Forensic Practice*, *9*(4), 23-27.

Dickens, G. L., & Sugarman, P. A. (2012). Adult firesetters: prevalence, characteristics and psychopathology. In G. L. Dickens, P. A. Sugarman & T. A. Gannon (Eds.), *Firesetting and Mental Health: Theory, Research and Practice* (pp. 3-27). London: RCPsych Publications.

Ducat, L., Ogloff, J. R., & McEwan, T. (2013). Mental illness and psychiatric treatment amongst firesetters, other offenders and the general community.*Australian and New Zealand Journal of Psychiatry*. doi:10.1177/0004867413492223

Duggan, L., & Shine, J. (2001). An investigation of the relationship between Arson, Personality Disorder, Hostility, Neuroticism and Self-esteem amongst incarcerated Fire-Setters. *Prison Service Journal*, 18-21.

Enayati, J., Grann, M., Lubbe, S., & Fazel, S. (2008). Psychiatric morbidity in arsonists referred for forensic psychiatric assessment in Sweden. *Journal of Forensic Psychiatry & Psychology, 19*, 139-147. doi:10.1080/14789940701789500

Evarts, B. (2012). *Intentional Fires*. Quincy, MA: National Fire Protection Association, Fire Analysis and Research Division.

Gannon, T. A., & Pina, A. (2010). Firesetting: Psychopathology, theory and treatment. *Aggression and Violent Behavior, 15*, 224-238. doi:10.1016/j.avb.2010.01.001

Groth-Marnat, G. (2003). Handbook of psychological assessment.

Hyler, S. (1994). Personality diagnostic questionnaire-4. *New York: New York State Psychiatric Institute*.

Labree, W., Nijman, H., van Marle, H., & Rassin, E. (2010). Backgrounds and characteristics of arsonists. *International Journal of Law and Psychiatry, 33*, 149-153. doi:10.1016/j.ijlp.2010.03.004

Lieb, K., Zanarini, M. C., Schmahl, C., Linehan, M. M., & Bohus, M. (2004). Borderline personality disorder. *The Lancet, 364*, 453-461. doi:10.1016/S0140-6736(04)16770-6

Lindberg, N., Holi, M. M., Tani, P., & Virkkunen, M. (2005). Looking for pyromania: Characteristics of a consecutive sample of Finnish male criminals with histories of recidivist fire-setting between 1973 and 1993. *BMC Psychiatry, 5*, 47. doi:10.1186/1471-244x-5-47

Millon, C., Davis, R., & Grossman, S. (2006). *MCMI-III: Millon Clinical Multiaxial Inventory-III*: Pearson Assessments.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879-891. doi:10.3758/brm.40.3.879

Räsänen, P., Hakko, H., & Väisänen, E. (1995). The mental state of arsonists as determined by forensic psychiatric examinations. *Bulletin of the American Academy of Psychiatry and the Law, 23*, 547-553.

Repo, E. (1998). Finnish fire-setting offenders evaluated pretrial. *Psychiatria Fennica, 29*, 175-189.

Retzlaff, P., Stoner, J., & Kleinsasser, D. (2002). The Use of the MCMI-III in the Screening and Triage of Offenders. *International Journal of Offender Therapy and Comparative Criminology, 46*, 319-332. doi:10.1177/0306624x02463006

Rice, M., & Harris, G. (2005). Comparing Effect Sizes in Follow-Up Studies: ROC Area, Cohen's d, and r. *Law and Human Behavior, 29*, 615-620. doi:10.1007/s10979-005-6832-7

Rice, M. E., & Harris, G. T. (1991). Firesetters admitted to a maximum security psychiatric institution: Offenders and offenses. *Journal of Interpersonal Violence, 6*, 461-475. doi:10.1177/088626091006004005

Rix, K. J. B. (1994). A psychiatric study of adult arsonists. *Medicine Science and the Law, 34*, 21-34.

Tyrer, P., & Alexander, J. (1979). Classification of personality disorder. *The British Journal of Psychiatry, 135*, 163-167. doi:10.1192/bjp.135.2.163

United States Department of Justice, Federal Bureau of Investigation. (2012). Crime in the United States, 2011 Retrieved April 23, 2013, from http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2011/crime-in-the-u.s.-2011/index-page

Table 1

Percentage of Participants Scoring Below Clinical Threshold and in the Clinical Ranges on Personality Scales

Personality Scales		Below Clinical Threshold		Clinically significant traits		Personality disorder		
		Firesetters %	Controls %	Firesetters %	Controls %	Firesetters %	Controls %	χ^2
1	Schizoid	55.4	74.3	32.1	18.6	12.5	7.1	8.90*
2a	Avoidant	51.8	75.2	26.8	18.6	21.4	6.2	16.01***
2b	Depressive	45.5	68.1	20.5	17.7	33.9	14.2	14.45**
3	Dependent	58.0	80.5	29.5	15.0	12.5	4.4	13.71**
4	Histrionic[a]	99.1	99.1	0.9	0.9	0.0	0.0	
5	Narcissistic	83.0	88.5	10.7	5.3	6.3	6.2	2.25
6a	Antisocial	48.2	57.5	20.5	20.4	31.3	22.1	2.68
6b	Sadistic	67.0	83.2	17.9	10.6	15.2	6.2	8.30*
7	Compulsive[b]	100	95.6	0.0	4.4	0.0	0.0	
8a	Negativistic	43.8	65.5	29.5	21.2	26.8	13.3	11.50**
8b	Masochistic	40.2	57.5	42.0	38.1	17.9	4.4	12.81**
S	Schizotypal	68.8	87.6	22.3	9.7	8.9	2.7	12.00**
C	Borderline	63.4	81.4	12.5	9.7	24.1	8.8	10.87*
P	Paranoid	68.8	80.5	17.9	9.7	13.4	9.7	4.39

Note. Distributions based on unadjusted Base Rate

[a,b] Chi-square not calculated as over 20% of cell counts less than 5

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 2

Percentage of Participants Scoring Below Clinical Threshold and in the Clinical Ranges on Clinical Syndrome Scales

Clinical Syndromes		Below Clinical Threshold		Presence of a syndrome		Prominence of a syndrome		
		Firesetters %	Controls %	Firesetters %	Controls %	Firesetters %	Controls %	χ^2
A	Anxiety	31.3	60.2	24.1	20.4	44.6	19.5	21.78***
H	Somatoform	89.3	95.6	6.3	1.8	4.5	2.7	3.58
N	Bipolar: Manic	83.0	90.3	8.9	7.1	8.0	2.7	3.63
D	Dysthymia	51.8	80.5	36.6	14.2	11.6	5.3	20.85***
B	Alcohol Dependence	42.9	60.2	29.5	26.5	27.7	13.3	9.15*
T	Drug Dependence	55.4	72.6	16.1	5.3	28.6	22.1	9.63**
R	Post Traumatic Stress Disorder	70.5	86.7	14.3	9.7	15.2	3.5	11.01**
SS	Thought Disorder	84.8	93.8	8.0	3.5	7.1	2.7	4.79
CC	Major Depression	83.0	92.9	4.5	4.4	12.5	2.7	7.84*
PP	Delusional Disorder	86.6	93.8	6.3	3.5	7.1	2.7	3.49

Note. Distributions based on unadjusted Base Rate

* $p < .05$ ** $p < .01$ *** $p < .001$