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To cite this article: Lydia Dalhuisen, Frans Koenraadt & Marieke Liem (2015) Psychotic versus non-psychotic firesetters: similarities and differences in characteristics, The Journal of Forensic Psychiatry & Psychology, 26:4, 439-460, DOI: [10.1080/14789949.2015.1018927](https://doi.org/10.1080/14789949.2015.1018927)

To link to this article: <http://dx.doi.org/10.1080/14789949.2015.1018927>



Published online: 13 Mar 2015.



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Psychotic versus non-psychotic firesetters: similarities and differences in characteristics

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(Received 12 June 2014; accepted 6 February 2015)

Firesetters with psychotic disorders constitute a distinct and important offender group. However, little is known about how psychotic firesetters differ from non-psychotic firesetters. More knowledge is required in order to treat this particular population effectively. Psychotic ($n = 30$) and non-psychotic ($n = 94$) firesetters of both sexes referred for pre-trial forensic mental health assessment in the Netherlands were compared on socio-demographic, pathological, judicial and event-related characteristics using binary and multivariate statistical tests. Results showed that psychotic firesetters were older, single and unemployed. They had a more extensive history of mental health problems, associated drug use and impaired self-reliance. Opposed to non-psychotic offenders, physical abuse in childhood and alcohol abuse were less prevalent. They had a more extensive history of prior convictions, committed the arsons more often alone and were less often intoxicated. Treatment implications are discussed as focusing treatment on these differences may contribute to treatment efficacy and prevention of recidivism.

Keywords: firesetting; arson; psychotic firesetters; psychosis; treatment implications

Introduction

Firesetting is a behaviour with potentially severe negative consequences, including the loss of life and large financial damage. To illustrate, in the Netherlands in 2011 almost 41,000 fires were registered, which together accounted for almost 764 million euros damage (Statistics Netherlands, 2012). Of these fires, 20% was caused by arson. In Great Britain, in the same time period, fire and rescue services attended over 100,000 ‘primary’ fires,¹ of which one-third was caused deliberately (Department for Communities and Local Government, 2012). The associated costs of these fires were estimated to

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be around 8 billion pounds in England alone (Department for Communities and Local Government, 2011). In comparison, in 2011 in France more than 300,000 fires were attended by fire services (Direction Générale de la Sécurité Civile et de la Gestion des Crises, 2012). These figures demonstrate the magnitude of the problem fire and firesetting poses to society.

Because of its societal impact, the act of firesetting is punishable under criminal law (Gannon & Pina, 2010) and is commonly referred to as arson. These crimes often appear without reason and subsequently raise questions about the mental sanity of the offender. This is reflected throughout the criminal justice system, in many instances suspected arson offenders are submitted to pre-trial forensic mental health assessments (Prins, 1994; Van Kordelaar, 2002). In addition, they are often found to suffer from mental disorders and as a result, arsonists are frequently placed in secure forensic hospitals (Hollin, 2013). Around 10% of the Dutch population in secure forensic hospitals has committed arson (De Vogel & De Ruiter, 2004; Goethals, Buitelaar, & Van Marle, 2010; Graat, Lammers, & Bloemsaat, 2011; Van Emmerik, 2001; Van Nieuwenhuizen et al., 2011), a figure comparable to the UK (Coid, Kahtan, Gault, Cook, & Jarman, 2001) and Finland (Repo, Virkkunen, Rawlings, & Linnoila, 1997).

Many firesetters treated in forensic hospitals are found to suffer from schizophrenia and other psychotic disorders (Anwar, Långström, Grann, & Fazel, 2011; Burton, McNeil, & Binder, 2012; Enayati, Grann, Lubbe, & Fazel, 2008; Puri, Baxter, & Cordess, 1995; Repo et al., 1997; Ritchie & Huff, 1999) and after treatment patients with schizophrenia often recommit serious offences, including firesetting (Thomson, Davidson, Brett, Steele, & Darjee, 2008). Thus, it is important to distinguish psychotic firesetters from non-psychotic firesetters, not only because of their number, but also because of the dangerousness of their fires: psychotic offenders more often target people and homes (often their own home), resulting in more potential danger for people (Dalhuisen & Koenraadt, 2014a). However, little is known about how psychotic firesetters differ from non-psychotic firesetters. This knowledge can contribute to effective treatment because it enables treatment to be tailored to this specific group of firesetters (Hollin, 1999). With this comparison, our study contributes to a growing body of knowledge on different types of firesetters and on psychotic firesetters in particular.

Previous research

Earlier studies in this field can be roughly divided into two types: typology-based research, resulting in the acceptance of a psychotic subtype of firesetters and studies that specifically focused on psychotic firesetters.

A psychotic subtype

Numerous studies have attempted to subdivide firesetters according to offence and offender characteristics. Motive has often been used as a distinguishing

feature (Inciardi, 1970; Rix, 1994; White, 1996), with the most frequently reported motive for firesetting being revenge combined with anger (Dalhuisen & Koenraad, 2012; Dickens et al., 2007; O'Sullivan & Kelleher, 1987; Ritchie & Huff, 1999). Firesetting motivated out of a psychosis was recognized as a distinct category (Geller, 2008; Inciardi, 1970; Prins, Tennet, & Trick, 1985; Rix, 1994). However, categorizing based on motive has important pitfalls, as it is typically difficult to find a clear-cut single motive (Geller, 2008; Horley & Bowlby, 2011), partly due to retrospective assessment (Häkkinen, Puolakka, & Santtila, 2004) and non-disclosing firesetters (Doley, 2003).

Moving beyond motive alone, Harris and Rice (1996) also found a psychotic subtype of firesetters through clustering of more than 200 male mentally disordered firesetters in Canada into four subgroups: psychotics (i.e. those committing the fire whilst under the influence of a psychosis), unassertives (i.e. the least assertive firesetters who likely acted out of anger or revenge), multi-firesetters (i.e. those who committed numerous firesettings) and criminals (i.e. those with extensive criminal histories and personality disorders). Their analyses showed that psychotics acted primarily under the influence of delusions, were most likely to be diagnosed as schizophrenic and least likely to have an alcohol problem. However, they only included males in their study and based their study on a distinct sample of firesetters with mental disorders.

In their well-known typology, Canter and Fritzon (1998) combined offender and event-related characteristics. Based on 175 arson cases in England, they proposed a two-by-two table modelling firesetting that focused on the relationship between offender and target leading to four distinct themes in firesetting behaviour substantiated in subsequent studies (Almond, Duggan, Shine, & Canter, 2005; Santtila, Häkkinen, Alison, & Whyte, 2003); although for serial firesetters, no significant association with one of four action themes could be discerned (Häkkinen et al., 2004). The firesetting could be committed with an instrumental (external) or an expressive (internal) objective and could be targeted at an object (external) or a person (internal). They proposed that expressive firesetting directed at people would be primarily committed by offenders with a psychiatric history, including psychotic firesetters. The model of Canter and Fritzon (1998) is based on the action system framework (Shye, 1985), however, according to Fritzon, Canter, and Wilton (2001) the general action system model is more extensive, since in addition to motives and target of a particular behaviour, the action system model enables the combination of both behaviour and characteristics of arsonists into one comprehensive model (Fritzon et al., 2001).

Psychotic firesetters

A second strand of studies into firesetting more specifically focused on psychotic firesetters. It appears that being diagnosed with schizophrenia and other psychotic disorders increases the risk of setting fire. A Swedish study

comparing all convicted arson offenders in Sweden with a random control population found that arsonists were significantly more likely to be diagnosed with a psychotic disorder. Amongst those with schizophrenia, the risk of arson in men increased 20-fold and in women almost 40-fold (Anwar et al., 2011).

Furthermore, psychotic arsonists could be distinguished from their non-psychotic counterparts on several characteristics. A Finnish study on different groups of arson recidivists, including a psychotic group, showed that most psychotic arsonists were 'pure' arsonists, in the sense that they had not committed other offences (Lindberg, Holi, Tani, & Virkkunen, 2005). In another Finish study comparing male psychotic firesetters with non-psychotic firesetters, the psychotic group showed less alcohol dependence and less intoxication during the offence, less additional criminal offences and lower incidences of other multiple crimes against property. In their family history, psychotic firesetters more often had a mother suffering from psychosis (Repo & Virkkunen, 1997). These two older studies both used an all-male sample gathered over a longer period of time, from the 1970s to 2000s, making it unclear whether results would be replicated in more recent samples including females.

In short, previous research on psychotic firesetters shows that psychotic firesetters form a distinct subgroup with different characteristics, however, recent studies on characteristics of psychotic firesetters also including women are lacking. In addition, knowledge on a wider variety of characteristics is desirable to provide tailored treatment. The aim of this study is to compare psychotic and non-psychotic male and female firesetters on socio-demographics, lifetime and pathological characteristics, judicial features and event-related characteristics. Differences herein provide insight in the specific group of psychotic firesetters and can subsequently be used to guide treatment of this potentially dangerous offender group.

Methods

Sample

We retrieved cases of all suspects accused of arson who were admitted for pre-trial forensic mental health assessment in the main forensic observation hospital in the Netherlands in the period 2000–2010. In this residential setting, suspects were observed and assessed for a period of seven weeks after which a multidisciplinary report was produced. This forensic mental health report contained social background information, a report of the accused's behaviour on the ward, a brief medical examination, a psychological and a psychiatric assessment (Koenraadt, Mooij, & Van Mulbregt, 2007). Of the 144 arson suspects we identified, reports were excluded due to the individual's refusal to cooperate ($n = 18$) or a lack of data ($n = 2$). In total, 124 individuals were included in this study.

Individuals had a pre-trial status and thus had not been found guilty of arson at the time of the evaluation. For a small group of firesetters information on the eventual judgement was available ($n=22$). In all these cases the arson was proven and in most cases the individual was sentenced to imprisonment alone or in combination with some form of treatment ($n=20$). Two arsonists were deemed not punishable due to lack of criminal accountability and only received treatment. Because of their pre-trial status, subjects in this study will be referred to as firesetters.

Individuals were identified as psychotic if the crime had a direct link with and was committed under the influence of a psychosis and/or a psychotic diagnosis on Axis I of the Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000) was found during the assessment.² A direct link with psychosis was determined based on the characteristics of the case, in particular the motive that was described in the reports. In total, 30 firesetters qualified as psychotic (24.2%; a portion similar to Lindberg et al., 2005). Of these firesetters, 17 were diagnosed with schizophrenia [56.7%; paranoid ($n=10$), disorganized ($n=4$), negative ($n=1$) and undifferentiated ($n=3$)], two firesetters had a schizoaffective disorder, two suffered from PTSD with psychotic symptoms, another two had a delusional disorder, in five cases other psychotic disorders were present, one diagnose was unknown and another diagnose was postponed, but a psychotic disorder was suspected. The other 94 firesetters made up the non-psychotic group.

Representativeness of the sample

Our sample consisted of firesetters who were pre-trial forensically evaluated in the main forensic psychiatric observation hospital in the Netherlands. This hospital has a national function; almost all inpatient forensic evaluations in the Netherlands are conducted here. Evaluations on an outpatient setting were not included in our sample. To ensure uniformity, in the Netherlands, an indication for pre-trial evaluation (either inpatient or an outpatient) is based on a specific instrument taking into account characteristics of the offence (e.g. bizarre, serious) and the offender (e.g. odd behaviour and recidivism) (Van Kordelaar, 2002). In the Netherlands, arson is an offence in which pre-trial mental health assessments are common (Van Kordelaar, 2002). Based on a random sample of 100 convicted arsonists in the Netherlands, 55% was evaluated (Dalhuisen & Koenraadt, 2014b). In general, around 10% of all pre-trial forensic mental health evaluations concern arson cases (Canton, 2004; Van Kordelaar, 2008), which is similar in other European countries like Sweden (8.5%; Fazel & Grann, 2002).

Measures

To enable quantitative analyses, the pre-trial forensic mental health reports were coded using a standardized item list, including demographic and

psychopathological items as well as social and cultural characteristics of the defendant. Items on this list were partly based on clinical items of the HKT-30, a Dutch risk assessment tool based on historical, clinical and future items with excellent inter-rater reliability (Hildebrand, Hesper, Spreen, & Nijman, 2005; Justitie, 2003); previous research on homicide using similar forensic mental health reports (Koenraadt, 1996; Liem, De Vet, & Koenraadt, 2010; Liem, Hengeveld, & Koenraadt, 2009; Liem & Koenraadt, 2008a, 2008b) as well as clinical experience and literature for firesetting-specific items (e.g. Canter & Fritzon, 1998; Lindberg et al., 2005).

Procedure

The identified forensic mental health reports were retrospectively coded based on the patients' assessment reports. A group of students received training to assist the first author with this labour-intensive process. To ensure consistency, all coded variables were rigorously checked by the first author. In addition, bias regarding group membership was not an issue since data were coded and analysed as part of a larger study on firesetting in the Netherlands (Dalhuisen & Koenraadt, 2014b, 2012; Koenraadt, Dalhuisen, & Nijman, 2012) and not specifically to differentiate between psychotic and non-psychotic firesetters.

Most socio-demographic items (gender, age, nationality, marital status and unemployment) were directly taken from the reports. We pooled data concerning educational level into two categories (no education or only primary school and higher levels of education).

Lifetime and pathological items were also directly obtained from the reports, in particular from the psychological and psychiatric assessments and the conclusions. Reports often contained information on past diagnoses, including (traits of) personality disorders, and actual diagnoses on the DSM. Most items were dichotomous (victim of physical abuse growing up, problems with drugs and alcohol, psychotic disorder in the past and personality disorder at the time of the offence). Intelligence level was based on IQ scores and divided in three categories. History of mental health care contact also consisted of three categories (no previous contact, outpatient and inpatient contact). Furthermore, other general psychopathological characteristics (impulsivity, hostility, social skills, self-reliance and coping skills) were divided into multiple categories and scored based on observations made by sociotherapists, psychologists and psychiatrists alone or in combination with personal inferences made by the assessor making some subjectivity inevitable.

Data on judicial characteristics were predominantly found in the sections concerning criminal history (criminal background, only arson in indictment and arson recidivist), but also in the conclusion containing the final recommendations (criminal accountability, treatment recommendation and recidivism risk). The police records included in the reports were used to obtain most event-related characteristics, although these were also found throughout the

assessment reports (crime scene distance in kilometres, impulsivity, target, committed alone, intoxication and suicidal ideation). In line with Canter and Fritzon (1998), the nature of the offence was assessed based on target (whether it was directed at a person – either directly or through a personal object – or whether the firesetting targeted an object without a personal meaning) and motive [whether the firesetting had a clear and comprehensible external goal (instrumental) or the firesetting was used to change an internal/emotional state (expressive)] found in the reports.

Statistical analyses

Data were analysed using SPSS version 20.0. Pearson's chi-square tests – and if requirements were not met Fisher's Exact tests – and independent *t*-tests were run to determine whether statistical significant differences existed between psychotic and non-psychotic firesetters. In addition to these binary comparisons, logistic regression analyses were performed to determine the strength of several characteristics in predicting the probability of firesetters belonging to the group of psychotic firesetters. To test for multicollinearity between the variables included in the regression, the standard errors for the *b* coefficients were examined. We did not interpret analyses with a standard error larger than 2.0.

Results

Socio-demographic characteristics

The total study population consisted of 107 males and 17 females, who were on average 32 years old. Table 1 shows that psychotic and non-psychotic firesetters were similar with respect to gender distribution (predominantly male), nationality (predominantly Dutch) and level of education with comparable percentages of psychotic and non-psychotic firesetters receiving no education or only finishing primary school. Differences, however, were found regarding age, with the psychotics being older ($t(122) = -3.48, p < .025$). Furthermore, psychotic firesetters were more often single ($\chi^2(1, N = 122) = 7.24, p < .025$) and unemployed ($\chi^2(1, N = 122) = 4.57, p < .05$).

Lifetime and pathological characteristics

We further compared the two groups on lifetime and pathological characteristics (see Table 2). Psychotic firesetters were similar to non-psychotic firesetters with respect to lifetime hard drugs use, with a considerable proportion of firesetters experiencing prolonged and severe abuse problems (hard drugs are narcotics that are considered relatively strong and likely to cause addiction, in contrast to soft drugs). The two groups scored similarly in terms of personality-related features and abilities, like social skills and impulsivity, with the exception of

Table 1. Socio-demographic characteristics of psychotic and non-psychotic firesetters (*N* = 124).

Socio-demographic characteristics	Psychotics (<i>n</i> = 30)	Non-psychotics (<i>n</i> = 94)
Gender ^b		
Male	26 (87)	81 (86)
Female	4 (13)	13 (14)
Age (years) ^{c,**}	37.8 (10.3)	30.4 (10.2)
Dutch nationality ^b	24 (80)	83 (88)
Marital status (single) ^{a,**}	28 (97)	68 (73)
No or low education ^a	13(45)	35 (38)
Unemployed ^{a,**}	27 (90)	65 (71)

Notes: Some variables had missing values resulting in a smaller sample size.

^a = *N* (%) and chi-squared;

^b = *N* (%) and Fisher's exact;

^c = Mean (SD) and *t*-test; and

^{**}*p* < .05 (two-sided).

self-reliance, which was more impaired in the psychotic group [χ^2 (2, *N* = 119) = 9.21, *p* < .025]. Psychotic firesetters less frequently experienced physical abuse growing up compared with non-psychotic firesetters [χ^2 (1, *N* = 106) = 4.73, *p* < .05]. Further, the psychotic group had a more extensive and intensive history of mental health care, with more (compulsory) admissions to psychiatric hospitals [χ^2 (2, *N* = 121) = 14.80, *p* < .01]. In their past, they showed more traits of personality disorders and more actual personality disorders were given (Fisher's exact, *p* < .05). Contrary to our expectations, they were actually less often diagnosed with a personality disorder at the time of the offence (Fisher's exact, *p* < .001). In addition, the psychotic group had more diagnoses of psychotic disorders on Axis I of the DSM [χ^2 (1, *N* = 112) = 50.92, *p* < .001]. Psychotic firesetters were also found to have experienced more problems with the use of soft drugs, like cannabis, throughout their lifetime [χ^2 (1, *N* = 112) = 3.86, *p* < .05]. However, they less frequently showed severe problems with the use of alcohol during their lifetime [χ^2 (1, *N* = 111) = 4.60, *p* < .05].

Judicial characteristics

Psychotic and non-psychotic firesetters were similar in that both had prior convictions for arson in about one-third of cases. Further, specific recidivism (i.e. having committed a previous arson) was high amongst both groups. However, as reflected in Table 3, in the psychotic group, arson was more often the only crime in the indictment compared to the non-psychotic firesetters who allegedly committed the arson in combination with other crimes [χ^2 (1, *N* = 124) = 4.36, *p* < .05]. Further, the psychotics were found to have had more prior convictions and previous mandatory hospital placements (Fisher's exact, *p* < .05). In addition,

Table 2. Lifetime and pathological characteristics of psychotic and non-psychotic firesetters ($N = 124$).

Lifetime and pathological characteristics	Psychotics ($n = 30$)	Non-psychotics ($n = 94$)
Intelligence ^a		
Below average	9 (38)	29 (32)
Average	8 (33)	40 (44)
Above average	7 (29)	22 (24)
Victim of physical abuse growing up ^{a,**}	5 (22)	39 (47)
History of mental health care contact ^{a,**}		
No previous contact	3 (10)	24 (26)
Outpatient contact	3 (10)	31 (34)
Inpatient contact	24 (80)	36 (40)
Prolonged/severe problems with alcohol ^{a,**}	7 (28)	45 (52)
Prolonged/severe problems with soft drugs ^{a,**}	14 (54)	28 (33)
Prolonged/severe problems with hard drugs ^a	10 (40)	27 (33)
Psychotic disorder diagnosed in past ^{a,*}	22 (76)	7 (8)
Personality disorder in the past ^{b,**}		
No disorder	2 (8)	23 (29)
Traits	12 (48)	31 (39)
One or more personality disorders	11 (44)	26 (33)
Personality disorder at the time of the offence ^{b,*}	7 (23)	57 (66)
Impulsivity ^a		
No impulsivity	1 (4)	7 (8)
Moderate impulsivity	6 (21)	31 (36)
High impulsivity	21 (75)	48 (56)
Hostility ^a		
No hostility	4 (14)	17 (20)
Moderate hostility	10 (36)	32 (38)
High hostility	14 (50)	36 (42)
Social skills ^a		
Appropriate/good	2 (8)	15 (17)
Moderate	9 (35)	28 (31)
Poor/absent	15 (58)	47 (52)
Self-reliance ^{a,**}		
No to mild problems	5 (17)	37 (42)
Moderate problems	3 (10)	15 (17)
High problems	22 (73)	37 (42)

(Continued)

Table 2. (Continued).

Lifetime and pathological characteristics	Psychotics (<i>n</i> = 30)	Non-psychotics (<i>n</i> = 94)
Coping skills ^a		
Adequate	–	9 (10)
Limited and sufficient under stable conditions	3 (12)	14 (16)
Poor	23 (88)	66 (74)

Notes: Some variables had missing values resulting in a smaller sample size.

^a = *N* (%) and chi-squared;

^b = *N* (%) and Fisher's exact;

**p* < .001; and

***p* < .05 (two-sided).

Table 3. Judicial characteristics of psychotic and non-psychotic firesetters (*N* = 124).

Judicial characteristics	Psychotics (<i>n</i> = 30)	Non-psychotics (<i>n</i> = 94)
Only arson in indictment ^{a,**}	18 (60)	36 (38)
Criminal background ^{b,**}		
No prior judicial contacts or (suspended) custodial sentence	8 (27)	33 (35)
1–7 prior (suspended) custodial sentences or a conditional mandatory hospital placement	12 (40)	52 (55)
≤8 prior (suspended) custodial sentences or a mandatory hospital placement	10 (33)	9 (10)
Arson recidivist ^a	12 (40)	31 (33)
Criminal accountability ^{b,*}		
Fully accountable	–	12 (14)
Slightly diminished accountable	–	21 (25)
Diminished accountable	9 (32)	42 (49)
Severely diminished accountable	6 (21)	9 (11)
Unaccountable	13 (46)	1 (1)
Treatment recommended ^{a,**}		
No treatment	6 (20)	10 (12)
Some form of treatment	23 (77)	51 (55)
No advice was given	1 (3)	26 (30)
Recidivism risk ^b		
Low	2 (7)	14 (21)
Moderate	3 (11)	7 (11)
High	22 (82)	45 (68)

Notes: Some variables had missing values resulting in a smaller sample size.

^a = *N* (%) and chi-squared;

^b = *N* (%) and Fisher's exact;

**p* < .001; and

***p* < .05 (two-sided).

individuals in the psychotic group were deemed to be less criminally accountable compared to their non-psychotic counterparts (Fisher's exact, $p < .001$). In line with this finding, psychotics were more often recommended for treatment whether or not in combination with punishment [χ^2 (2, $N = 117$) = 9.14, $p < .025$].

Event-related characteristics

Where the firesetting was mostly induced by a psychosis in the psychotic group, in the non-psychotic group fires were most often set out of anger and revenge or acting-out and vandalism. However, the nature of the firesettings was similar in both groups with expressive firesettings targeted at objects being the most prevalent. Furthermore, similarities existed in the degree of impulsivity related to the firesetting – which was in general high – and low incidences of suicidal ideation at the time of the offence. Psychotic firesetters, however, more often set fire to their own property compared to the non-psychotics [χ^2 (1, $N = 122$) = 15.25, $p < .001$]. Also, all psychotic firesetters acted alone, as opposed to those in the non-psychotic group [χ^2 (1, $N = 123$) = 11.16, $p < .025$]. Finally, a trend was found with psychotics being less frequently intoxicated at the time of the offence compared to non-psychotic firesetters [χ^2 (1, $N = 97$) = 3.40, $p = .065$] (see Table 4).

Table 4. Event-related characteristics of psychotic and non-psychotic firesetters ($N = 124$).

Event-related characteristics	Psychotics ($n = 30$)	Non-psychotics ($n = 94$)
Crime scene distance in km ^c	5.9 (28.7)	7.4 (31.6)
Nature of the offence ^b		
Expressive/person	7 (32)	17 (20)
Instrumental/person	6 (27)	26 (30)
Instrumental/object	2 (9)	17 (20)
Expressive/object	7 (32)	27 (31)
Fire set impulsively ^a	17 (81)	52 (68)
Fire set to own property ^{a,*}	16 (55)	17 (18)
Arson committed alone ^{a,**}	30 (100)	66 (71)
Intoxication at the time of the offence ^a	8 (36)	44 (59)
Suicidal ideation at the time of the offence ^b	4 (17)	13 (16)

Notes: Some variables had missing values resulting in a smaller sample size.

^a = N (%) and chi-squared;

^b = N (%) and Fisher's exact;

^c = Mean (SD) and t -test;

* $p < .001$; and

** $p < .05$ (two-sided).

Table 5. Stepwise logistic regression with four models to predict group membership of psychotic firesetters based on socio-demographic, individual, judicial and event-related predictors ($N = 124$).

	Model 1: socio-demographic predictors			Model 2: socio-demographic and individual predictors			Model 3: socio-demographic, individual characteristics and judicial predictors			Model 4: socio-demographic, individual characteristics, judicial characteristics and event-related predictors							
	<i>B</i>	<i>p</i>	OR	95% CI	<i>B</i>	<i>p</i>	OR	95% CI	<i>B</i>	<i>p</i>	OR	95% CI					
Age	.08	.000	1.09	1.04–1.14	.09	.001	1.10	1.04–1.16	.11	.001	1.11	1.04–1.19	.11	.004	1.11	1.03–1.20	
Being single	2.75	.011	15.46	1.89–126.75	2.51	.033	12.26	1.22–122.43	2.60	.047	13.50	1.03–176.86	2.08	.171	8.00	.41–157.18	
Victim of physical abuse					–1.48	.011	.23	.07–.71	–1.64	.007	.19	.06–.64	–2.05	.005	.13	.03–.54	
General impulsivity					1.86	.085	6.44	.77–53.89	1.61	.140	5.02	.59–42.79	2.43	.106	11.31	.60–213.63	
Arson only crime in indictment									2.59	.039	13.29	.01–.88	2.24	.063	9.38	.89–99.24	
Suicidal ideation at the time of the offence										.48	.003	1.61	.35–7.49				

Predictive value of characteristics

Logistic regressions were performed to assess the impact of different factors on the likelihood that a firesetter would fall in the psychotic category (see Table 5). The first model with socio-demographic variables was able to distinguish between psychotic and non-psychotic firesetters [χ^2 (2, $N=122$) = 24.85, $p < .001$], with between 18.4% (Cox & Snell R square) and 27.7% (Nagelkerke R square) of the variance explained, and correctly classified 78.7% of cases. The second model with individual variables [χ^2 (4, $N=104$) = 27.44, $p < .001$] accounted for 23.2–35.5% of the variance, with 78.8% accurate predictions. The third model also incorporated a judicial predictor. Being statistically significant [χ^2 (5, $N=104$) = 34.24, $p < .001$], this model explained between 28.1% and 43.0% of variance and 82.7% of cases were classified correctly. Finally, the fourth model also encompassed an event-related independent variable.³ This model was able to distinguish the two groups [χ^2 (6, $N=93$) = 29.54, $p < .001$], explained between 27.2% and 42.7% of the variance and correctly classified 82.8% of cases. As shown in Table 5, three out of six independent variables significantly contributed to this model (age, childhood abuse and suicidal ideation at the time of the offence) and one variable showed a trend towards significance (only arson in the indictment).

Discussion***Findings******General findings***

The overall socio-demographic characteristics of the firesetters in this sample correspond to findings reported elsewhere, including the high percentage of singles, males and whites and the overall high rate of unemployment (Dalhuisen & Koenraadt, 2012; Davis & Lauber, 1999; Dickens & Sugarman, 2012; Ritchie & Huff, 1999; Rix, 1994). However, overall intelligence was higher (Anwar et al., 2011; Dickens & Sugarman, 2012; Gannon & Pina, 2010; White, 1996), which may be explained by the level of compulsory education in the Netherlands (Brinch & Galloway, 2012; Ritchie, Bates, Der, Starr, & Deary, 2013).

Psychotic firesetters

Apart from these general findings, psychotic and non-psychotic firesetters differed with respect to social-demographic background, lifetime characteristics and psychopathology, judicial features and event-related characteristics. Some of our findings reflect characteristics associated with psychotic disorder in general (Fujii & Ahmed, 2007; Noll, 2007). Psychotics had a more extensive history of previous mental health care compared to non-psychotics, with more frequent and more elaborate care reflected by less outpatient care and a higher number of prior admissions to psychiatric hospitals. In addition, they had lower self-reliance

during the assessment. In line with their more severe psychopathological history, psychotic firesetters more often were single and had a higher unemployment rate than their non-psychotic counterparts. Further, psychotic firesetters more often showed severe soft drug use throughout their life, which is congruent with studies showing an association and even a causal link between cannabis use and psychosis in which the use of cannabis at a young age can cause psychosis later on (Arseneault, Cannon, Witton, & Murray, 2004; Kuepper et al., 2011; Large, Sharma, Compton, Slade, & Nielssen, 2011; Moore et al., 2007; Tosato et al., 2013). In line with Repo and Virkkunen (1997), however, alcohol problems were less common in the psychotic group, a result also found in schizophrenic homicide offenders (Laajasalo & Häkkänen, 2004).

The finding that few psychotic individuals were diagnosed with personality disorder during the forensic mental health assessment is consistent with Lindberg et al. (2005). However, in their past, personality disorders were more common amongst psychotic firesetters. This contradiction may be explained by the fact that a present psychosis can obscure underlying personality issues and by the fact that certain psychotic diagnoses exclude a simultaneous diagnosis of a personality disorder. Growing up, firesetters in the psychotic group suffered less parental physical abuse than the non-psychotics. This was a powerful predictor and differs from overall findings that firesetters stem from troubled homes with parental abuse (O'Sullivan & Kelleher, 1987; Rix, 1994; Stewart, 1993). The fact that psychotic firesetters had a less unfavourable upbringing in comparison, may indicate that psychotic firesetters follow a different pathway with different background experiences leading up to the offence (Gannon, Ó Ciardha, Doley, & Alleyne, 2012).

Overall, the judicial history of psychotic firesetters was less favourable with more prior convictions and previous mandatory hospital placements. Psychotic firesetters more exclusively committed arson, a given, which could be used to predict group membership (see also Repo & Virkkunen, 1997). In psychotic offenders, firesetting might be a function of their thought disturbance and not serve an instrumental goal, possibly explaining the finding that psychotic firesetters were more 'pure' firesetters. In line with previous findings, criminal accountability was deemed to be more limited and the legal recommendation given in the reports more often favoured treatment (Barendregt, Muller, Nijman, & de Beurs, 2008).

Regarding the offence, psychotic firesetters more often acted on their own and more frequently targeted their own property, a finding dissimilar of that of Repo and Virkkunen (1997). These findings may be explained by the fact that people acting under the influence of a psychosis normally do not have close relationships with others and often live alone. A Finnish study comparing diagnostic groups of homicide offenders, including offenders with schizophrenia, also found them to be more isolated and withdrawn (Laajasalo & Häkkänen, 2004). Furthermore, although a difference in suicidal ideation at the time of the offence could not be established on bivariate comparison, it was a predictor

of group membership with psychotic offenders more often experiencing suicidal ideation at the time of the offence (see also Björkenstam, Björkenstam, Hjern, Bodén, & Reutfors, 2014; Räsänen, Hakko, & Väisänen, 1995).

Psychotic versus vandalism firesetters

Findings suggest a clear distinction between psychotic and non-psychotic firesetters. This difference may, in particular, be explained by the vandalism group of offenders. Vandalism firesetters are generally found to be young offenders who act in groups (Canter & Almond, 2002; Dalhuisen & Koenraadt, 2014a; Rix, 1994; White, 1996). This forms a contrast with our findings that psychotic firesetters are older and more often commit the firesetting alone. These results are congruent with other literature on psychotic firesetters (Canter & Fritzon, 1998; Harris & Rice, 1996; Rix, 1994). Psychotic firesetters may less frequently interact with others because of their condition and the motive for their fire is often delusional, which is difficult to share with one or more accomplices. Regarding judicial characteristics, psychotics are more often exclusively accused of arson, rather than in combination with other offences. This corresponds to other findings in Finland showing that psychotic arson recidivists were more often guilty only of arsons in their criminal careers compared to arsonists with personality disorders (Lindberg et al., 2005). An explanation for this difference can be that the young offenders who commit arson out of vandalism also commit other vandalism crimes, like destruction of property.

In general, non-psychotic firesetters experience more problems with substances directly related to the offence, especially alcohol. This is in line with previous studies reporting alcohol to be associated with arson, in which it can act as a trigger, decreasing inhibitions (Burton et al., 2012; Jayaraman & Frazer, 2006; Lindberg et al., 2005; Ritchie & Huff, 1999). Especially, in firesettings motivated out of revenge, alcohol intoxication has been reported (White, 1996). The fact that psychotic firesetters showed less intoxication at the time of the offence may be explained by their psychosis providing them with a different source of disinhibition leading up to the arson. Research shows that patients with a psychotic disorder have deficits in response suppression (Harris, Reilly, Thase, Keshavan, & Sweeney, 2009), indicating a difficulty with inhibiting extraneous responses that is not much different from the triggering effects of alcohol. In groups that act out of vandalism, arson might occur because of peer pressure and group processes acting as disinhibitors (Newton & Bussey, 2012).

Limitations

First and foremost, we relied on a specific sample, stemming from a national forensic psychiatric hospital, especially meant for observation and assessment and not for treatment. Those admitted to the centre were mostly suspects who

were expected to suffer from severe mental disturbances, possibly creating a bias towards a more disordered research population (Koenraadt et al., 2007). Despite the implementation of an indication-instrument for pre-trial mental health evaluation, selection bias cannot be ruled out completely. In addition, indications for and methods of forensic mental health assessments also differ between countries (Dressing & Salize, 2006; Nedopil, 2009). This limits the generalizability of the results of our study. On the other hand, the forensic psychiatric hospital has a national function and virtually all inpatient forensic mental health evaluations in the Netherlands are conducted here, increasing the representativeness for the Dutch situation. Another limitation of this study is the given that psychotic firesetters are treated as a homogeneous group. A growing body of evidence shows that psychotic offenders are heterogeneous, with different characteristics and pathways into offending (Hodgins, 2008; Kooyman et al., 2012). However, subdividing our group of psychotic offenders would result in too small sample sizes to allow for statistical comparisons.

Keeping in mind these limitations, caution must be exercised with interpreting the results and the implications for treatment. However, in spite of our relatively modest sample size and associated reduction in statistical power, our results not only contribute to the body of knowledge on arson types, but also to treatment effectiveness by directing specific treatment for psychotic firesetters.

Treatment implications

Because of the adverse consequences of arson, effective treatment of arsonists is important in order to prevent recidivism. An often used treatment model, the Risk-Need-Responsivity model (Andrews, Bonta, & Hoge, 1990), outlines that treatment intensity must correspond with the offender's risk level (Risk principle), treatment should be targeted at the specific criminogenic needs of the offender (Need principle) and be responsive and tailored to the specific individual (Responsivity principle). The Good Lives Model (Ward & Steward, 2003) states that treatment should focus on positive human needs instead of criminogenic needs. Although focus points differ, the general consensus is that effective treatment should be tailored to the offender and to his needs. Therefore, knowledge on offender characteristics is important in order for a treatment programme to be effective (Hollin, 1999) and findings of our study can contribute to more tailored treatment of psychotic firesetters.

In line with the Risk-Need-Responsivity model, the intensity of treatment should correspond to the high risk of recidivism and larger judicial history and impairment of criminal accountability found in psychotic firesetters (Risk principle). Furthermore, treatment of psychotics should focus on improving the current mental condition and reducing positive symptoms, which we found to be of major influence on the firesetting. This can be done by prescribing antipsychotic medication and focusing on medication compliance. In addition, attention should be paid to co-occurring soft drug use, instead of merely

concentrating on historical background characteristics and alcohol abuse problems (Need and Responsivity principle).

In accordance with the Good Lives Model, the results from this study suggest that improving self-reliance and focusing on finding employment may have positive effects for this specific population of firesetters, as might be the case with having a romantic relationship. Increasing self-reliance (e.g. by concrete training courses) can enhance chances of finding employment and an intimate partner. In general, receiving the right medication, having employment, intimate partner relationships and a good ability to perform essential daily tasks (self-reliance or self-efficacy) are all factors that can promote desistance (Healy, 2010). Further research on the long-term effects of targeting these areas in psychotic firesetters is needed. On a preventative level, treating people suffering from a psychosis adequately may prevent them from committing psychosis-induced firesetting in the first place.

Notes

1. Primary fires include all fires in buildings, vehicles and outdoor structures or any fire involving casualties, rescues or fires attended by five or more appliances.
2. The forensic reports included in this study made use of the DSM version IV-TR, therefore a psychotic diagnosis based on this (old) version of the DSM was chosen as an identifying agent.
3. Although the item on whether the firesetting was committed alone showed a bivariate association, a model including this item resulted in a standard error larger than 2.0 and was not interpreted to avoid numerical problems such as multicollinearity.

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