Exploring the Behavioral and Psychological Differences between Male and Female Youth with a History of Fire Involvement

By

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Exploring the Behavioral and Psychological Differences between Male and Female Youth with a History of Fire Involvement

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Abstract

Study objectives were to explore a sample of fire-involved youth by 1) describing their overall psychological characteristics, thoughts, and behaviors, 2) comparing the psychological characteristics, thoughts, and behaviors of their male and female subgroups, 3) examining how specific psychological problems are related to fire-specific thoughts and behaviors for the overall group, and 4) examining how relations between specific psychological problems and fire-specific thoughts and behaviors may differ for the male and female subgroups. Data were gathered from a chart review of clinical files of youth with a history of fire involvement. There were 186 participants, ages 9 to18, 72% male. Data about general and fire-specific characteristics were collected using the Child Behavior Checklist, the Aggression Questionnaire, and the Children's Firesetting Interview. Results indicated that 85% of youth had clinically significant problems in at least 1 psychological domain. The proportions with clinically significant ratings for each domain were as follows: externalizing problems (77%), internalizing problems (53%), thought problems (32%), and social problems (21%). Nearly one-third of the sample had clinically significant problems in 3 or more domains. A majority of the sample reported having at least some fire curiosity, thoughts about fire, and enjoyment in reading about fire. Closer to half reported wanting to play with fire or view fire-related media. Favorite characteristics of fire were predominantly related to its functionality or observational aspects. Close to half of the sample reported having hid fire-starting materials or having left burn marks on things in their homes. Although there were no significant sex differences for internalizing and externalizing problems, the males had higher levels of social problems, thought problems, fire curiosity, and involvement in fire-related activities. Further discussions of sex differences are included. Regression models predicting fire-related thoughts and behaviors were explored for males,

females, and the overall sample. This study found sex differences in the overall pattern of correlations between psychological and behavioral problems of males and females with a history of fire involvement. Treatment implications include a strong need for clinicians not only to address externalizing problems, but to also incorporate interventions for internalizing, thought, and social problems.

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The misuse of fire by children and adolescents occurs within both normal and clinical populations (Achenbach, 1991; Achenbach & Edelbrock, 1983; Achenbach & Rescorla, 2001; Dadds & Fraser, 2006; Kolko & Kazdin, 1986) and has a significant cost to our society. In the United States, youth set fires that are annually responsible for hundreds of deaths, nearly 1,000 injuries, and millions of dollars in property damage (Evarts, 2011; Flynn, 2009a; Putnum & Kirkpatrick, 2005). Approximately half of all arson arrests consist of individuals under the age of 18 years, making it the crime with the largest proportion of youth participation (Hall, 2005; Puzzanchera, 2009). Thus, fires set by youth are an important area of clinical and academic study.

Although the literature focusing on the conceptualization, prevention, and intervention of fire behaviors is relatively small, various terms have been used to characterize the misuse of fire (e.g., fire deviant behavior, fireplay, firesetting, fire involvement, arson). Researchers have noted and criticized the lack of consistent definitions and terms used to describe youth who set fires (Hickle & Roe-Sepowitz, 2010; Kolko, 1985, 2002; Stadolnik, 2000). As a point of clarity, the current study uses the term *fire involvement*, which the U.S. Department of Justice describes as the accidental or intentional misuse of fire (Putnum & Kirkpatrick, 2005). This broad term is appropriate for the purposes of the current study because it allows for the inclusion of research findings across the fields of child and adolescent psychology and psychiatry, fire prevention, and law enforcement. The term is also reflective of the sample examined in the current study, because all of the participants had accidentally or intentionally set at least one fire.

Researchers have argued that youth fire involvement requires early intervention (Becker, Stuewig, Herrera, & McCloskey, 2004) and should not be left untreated because, when intentional, it is usually not outgrown and can lead to dysfunctional behavior patterns (Sharp,

Blaakman, Cole, & Cole, 2005). There is also empirical support indicating that fire-related thoughts and behaviors are predictive of youth fire involvement (Kolko & Kazdin, 1989a, 1989b) and repeated youth fire involvement (Kolko & Kazdin, 1992; McDonald, 2010). Understandably, the fields of fire safety, juvenile justice, and mental health have sought to gain a better understanding of youth fire involvement in order to reduce the prevalence and recidivism of this potentially destructive behavior. One approach to gain a better understanding has been to present the research and clinical communities with data regarding specific characteristics that are associated with youth fire involvement. As part of their conceptual model of juvenile firesetting, Kolko and Kazdin (1986) highlighted the importance of assessing and understanding characteristics of a youth's "personal repertoire," which they defined as cognitive, behavioral, and motivational components. Collecting information about the fire-specific thoughts and behaviors of children and adolescents with fire involvement contributes to an understanding of a youth's personal repertoire, not only by providing quantitative information about fire-related events, but also by assessing feelings and associations with fire itself. This type of information should prove useful for clinicians who are providing psychotherapeutic interventions to children or adolescents with fire involvement.

MacKay et al. (2006) found that heightened fire interest was predictive of increased frequency and versatility of fire-involved behavior and suggested the use of both self- and caregiver-report data to gain a more thorough knowledge of youth fire interest. They wrote that "progress in the measurement and classification of fire-specific behavior should facilitate risk evaluation by mental health or fire service professionals" (p. 1083). Becker et al. (2004) also advocated for the use of multiple sources (i.e., child and parent data) when evaluating youth with fire involvement. Further, they discussed the importance of analyzing multiple psychosocial

characteristics, including behavioral factors, emphasizing that knowledge of multiple associated risk factors for youth fire involvement can aid in treatment intervention. Research has demonstrated a connection between youth fire involvement and various psychosocial difficulties (Lambie & Randell, 2011; Lyons, McClelland, & Jordan, 2010). Lambie and Randell (2011) recommended the assessment of multiple personal characteristics (including various fire-specific items) using multiple sources (including self and parent reports) from a large, diverse sample of youth. Their recommendations included examining how mental health and demographic characteristics relate to fire-involved behaviors, and examining the relationship between intentional fire-involvement and antisocial behavior.

While seeking to understand the personal repertoire of fire-involved youth, empirical investigations of youth psychological characteristics have led to valuable clinical insight. Studies across samples of both clinical and nonclinical populations have found that youth fire involvement is associated with behaviors that are antisocial and that violate the rights of others (Heath, Hardesty, Goldfine, & Walker, 1985; Jacobson, 1985; McCarty & McMahon, 2005). Additional research has found that youth with fire involvement often have higher levels of externalizing and antisocial behaviors than youth with no fire involvement (Becker et al., 2004; Chen, Arria, & Anthony, 2003; Martin, Bergen, Richardson, Roeger, & Allison, 2004). This same body of research (Becker et al., 2004; Chen et al., 2003; Martin et al., 2004) has also provided evidence that fire-involved youth often have clinically elevated internalizing problems such as depression and anxiety, along with social problems such as peer rejection. Published data have demonstrated that youth with fire involvement have significantly more mental health problems than non-fire-involved youth with other antisocial behaviors (Becker et al., 2004; Kolko & Kazdin, 1991; Kolko, Kazdin, & Meyer, 1985; Martin et al., 2004). This suggests that

fire involvement is not simply a "symptom" of youth with conduct problems. Rather, it may indicate that fire involvement is a unique behavior with its own distinct mental health characteristics and risk factors.

There is also empirical support indicating a relationship between youth fire involvement and disordered thoughts. In a study of an inpatient psychiatric sample, Moore, Thompson-Pope, and Whited (1996) found that adolescents with fire involvement differed significantly from those without fire involvement on a number of scales on the Minnesota Multiphasic Personality Inventory – Adolescent (MMPI-A). The results indicated that the fire-involved youth were experiencing pathological symptoms related to externalizing (e.g., conduct problems, impulsivity), internalizing (e.g., fear, worry, withdrawal), and thought problems that were clinically elevated and significantly higher than the youth without fire involvement. Using measures such as the Child Behavior Checklist (CBCL) and Youth Self-Report (YSR), Del Bove, Caprara, Pastorelli, and Paciello (2008) also found significant relationships between youth fire involvement and various externalizing problems (e.g., aggression, delinquency), internalizing problems (e.g., withdrawn behavior, anxiety/depression), and thought problems. Although previous research is suggestive of connections between fire involvement and psychological problems, further study is needed across a wider span of ages and variables in order to reach a more conclusive understanding.

Aside from supporting the conceptualization that many youth with fire involvement have significant psychological challenges, the literature also indicates that the psychological problems experienced by fire-involved youth may increase the likelihood of recidivistic behaviors. For example, Del Bove et al. (2008) found a relationship between the presence of significant internalizing and externalizing psychopathology and repeated fire involvement. Kolko, Day,

Bridge, and Kazdin (2001) and MacKay et al. (2006) also found significant antisocial behaviors to be related to recidivism of youth fire involvement. All together, research underscores the importance of continuing to gain knowledge about the personal repertoire of fire-involved youth by assessing their psychological characteristics, thoughts, and behaviors, and by determining which, if any, of these factors are predictive fire-related thoughts or behaviors

In order to gain a comprehensive understanding, it is important to address a bias in the literature: a majority of the research examining the characteristics of youth with fire involvement has focused on males. This bias likely exists because there are empirical indications that the majority of youth involved with fire are males (Dadds & Fraser, 2006; Flynn, 2009b; Kolko & Kazdin, 1988). Most of the research cited above included few female participants (n = 3, Becker et al., 2004; n = 2, Dadds & Fraser, 2006; n = 8, Heath et al., 1995; n = 17, Jacobson, 1985; n = 7, Kolko et al., 1985; n = 18, Lyons et al., 2010; n = 19, McCarty & McMahon, 2005) or no females at all (MacKay et al., 2006; McDonald, 2010; Moore et al., 1996). Only a few of the cited research has had larger samples of female participants (n = 93, Chen et al., 2003; n = 44 Del Bove et al., 2008; n = 48, Kolko & Kazdin, 1989; n = 33, Kolko & Kazdin, 1991; n = 35, Martin et al., 2004). The lack of female participants in youth fire involvement research has made it difficult to fully understand what, if any, sex differences may exist and the extent to which past findings are truly applicable across the sexes.

Research in fields such as juvenile justice and clinical psychology has demonstrated that examining the differences between male and female thoughts, feelings, and behaviors can provide clinically useful information. Although females are a minority within the juvenile justice system, several studies have found that those who are present have higher rates of some types of mental health problems than their male counterparts (Abrantes, Hoffman, & Anton,

2005; Cauffman, 2004; Kataoka et al., 2001). Abrantes et al. (2005) found that female adolescents in the juvenile justice system had significantly higher rates of emotional and sexual abuse than male adolescents. Although the authors stated that it was unclear how much maltreatment contributed to the mental health and delinquent behavior problems of the youth in their sample, there was the implication that maltreatment did play a role. Findings that females in the juvenile justice system are at a higher risk for exposure to maltreatment than their male counterparts (Green, Russo, Navratil, & Loeber, 1999) also supports the position that maltreatment may account for some of the variance in psychological problems seen across the sexes. The literature seems to suggest that while it is less likely for girls to be involved in the juvenile justice system, once they are, they may have serious problems which developed through pathways that are different from boys. Such sex-specific differences have prompted researchers to call for gender-focused treatment for boys and girls (Meichenbaum, 2006; Welch-Brewer, Stoddard-Dare, & Mallett, 2011).

Similar to the broader fields of juvenile justice and clinical psychology, research on fire-involved youth that has examined sex differences has found significant differences between males and females; however, the patterns of these differences have not painted a clear and consistent picture of sex-based distinctions. In a study of youth that included 34 females, Showers and Pickrell (1987) found that fire-involved males had more complex behavior problems than fire-involved females, suggested that the psychosocial dynamics of male and female youth with fire involvement may be different, and called for more study in this area. In a youth study with 208 females, Beech (2003) found that females with a history of fire involvement had higher rates of sexual abuse, sexually acting out, and substance use, than males with a history of fire involvement. He also found that fire-involved males displayed higher rates

of anxiety than fire-involved females. Research by Martin et al. (2004) found that 8th grade girls with fire involvement engaged in more drug use and thrill-seeking behaviors than 8th grade boys with fire involvement. Their study also presented data indicating that those boys and girls had equal amounts of severe antisocial behavior. In slight contrast, the findings by Del Bove et al. (2008) found that aggressive fire-involved youth were more likely to be males than females. While it is supported that fire-involved youth tend to be males, recent statistics published by the National Fire Protection Association (NFPA) indicated sex differences in the type of fires set. Specifically, the NFPA report found that female youth were more likely to be involved in structure fires than they were to be involved in outside or unclassified fires (Evarts, 2011).

Slavkin (2004) sought to predict the motivational classification of juvenile fire involvement by examining various youth personality, psychological, and demographic characteristics. His analyses found only one relationship between sex and motivation for fire involvement. Specifically, Slavkin found that "cry-for-help firesetters" (i.e., someone who misuses fire as a means to bring attention to his/her intrapersonal or interpersonal dysfunctions; Fineman, 1995) were more likely to be females than males. Slavkin described cry-for-help fire-involved youth as having problems with social and emotional expression and found it surprising that females were associated with covert emotional expression through firesetting behavior because they are typically socialized to express emotions overtly. If the female-dominated structure fires documented by NFPA are in fact a "cry for help," then it is possible that these females are setting fires in response to significant stressors, such as maltreatment. If so, this could be consistent with reports from the 18th and 19th centuries which indicated that arsonists were often females – specifically servant girls who set the houses of their masters on fire (Lewis & Yarnell, 1951, as cited by Vreeland & Waller, 1978).

A recent study by Roe-Sepowitz and Hickle (2011) looked at a subset of fire-involved youth: adolescents engaged in arson. Examining a sample with 114 females, the researchers found several differences between male and female adolescents who had been charged with arson. For example, they found that the females in their study more often reported experiencing more significant family crises, greater issues with tardiness or truancy, more childhood abuse, higher levels of suicidal ideation, and more school-based fire involvement than the males. In addition, the authors' analyses indicated that males with a history of arson were more likely to have greater mental health problems and diagnoses, gang involvement, a history of prior delinquency and prior arson, and residential-based fire involvement in comparison with their female counterparts. Roe-Sepowitz and Hickle (2011) concluded that male and female adolescents charged with arson are dissimilar enough to require unique assessment and treatment strategies. This is similar to indications from Lambie and Randell (2011) after their review of the literature on intentional youth fire involvement.

MacKay, Paglia-Boak, Henderson, Marton, and Adlaf (2009) have called for continued research on the sex differences for youth fire involvement, indicating that this line of study could contribute to a better understanding of the behavior, its persistence, and its recidivism. Together, the body of youth fire research indicates that there are, in fact, psychosocial differences (including internalizing, externalizing, and social problems) between males and females. However, the patterns of these differences have not painted a clear and consistent picture of sex-based distinctions. This suggests that the need to investigate the psychological characteristics, thoughts, and behaviors of youth with fire involvement should include an explicit examination of sex as a main effect. It would also follow that there is a need to examine which factors, if any, are specifically predictive of fire-related thoughts and behaviors for each sex.

Purpose of Current Study

A recent review of research and practice in adolescent fire involvement noted a dearth of empirical research that has impacted the daily practice of assessing or treating youth fire involvement (MacKay, Feldberg, Ward, & Marton, 2012). The current study seeks to strengthen the research base upon which clinicians can understand and ultimately treat youth fire involvement. The objectives of this study were to explore a sample of fire-involved youth by 1) describing their overall psychological characteristics, thoughts, and behaviors, 2) comparing the psychological characteristics, thoughts, and behaviors of their male and female subgroups, 3) examining how specific psychological problems are related to fire-specific thoughts and behaviors for the overall group, and 4) examining how relations between specific psychological problems and fire-specific thoughts and behavior may differ for the male and female subgroups.

Due to the published indications that youth fire involvement is related to conduct problems, antisociality, anxiety, depression, and poor reality testing, the current study analyzed parent-reports of fire-involved youths' internalizing, externalizing, social, and thought problems. The current study also analyzed three self-report subcategories of aggression in order to gain additional details about aggressiveness. Self-reports of youth curiosity about fire and involvement in fire-related activities were examined to explore fire-specific thoughts and behaviors. The current study extends the literature on youth fire involvement by presenting data on the thought, behavioral, and psychological characteristics of youth from a sample that, compared to previous studies, is relatively large with respect to the number of participants with fire involvement and the subset number of females. It provides additional novelty by presenting both parent- and self-report information from standardized measures of psychopathology and information from multiple fire-specific items that allow for the presentation of descriptive,

predictive, and mean differential data. Much of the existing research has yet to lead to a consistent or conclusive understanding of the sex differences of youth with fire involvement. It is the hoped that the current study will contribute to a fuller understanding of the complex nature of general and sex-specific youth fire involvement so that clinicians treating these individuals can provide more comprehensive and effective interventions.

Predictions

The literature reviewed above indicates that there is a strong relationship between fire involvement and various psychological problems. Therefore, it was predicted that a majority of fire-involved youth in the current study would have at least one clinically significant elevation on the measured mental health domains. Although data from the study of child and adolescent fire involvement do not resolve the issue of sex-specific psychological differences, they do seem to suggest that there *are* differences. Therefore, it was predicted that the males and females in the current study would have significant differences across multiple mental health domains. There is little conclusive information about what predictive relationships may exist between mental health problems and fire-related thoughts and behaviors. Thus, the current study did not have any formal expectations regarding which psychological characteristics would be predictive of fire-related thoughts and behaviors for the overall sample. Given the indications of sex-based differences in youth fire involvement, it was anticipated that male and female fire-related thoughts and behaviors would have at least one predictive characteristic that was unique to their respective sex. Inconsistent empirical findings regarding sex differences, coupled with its unique sample characteristics, place the current study in a largely exploratory role in examining male and female fire-involved youth.

Method

Participants & Procedures

Data were gathered from a chart review of youth clinical files from a private psychology practice in Massachusetts that specialized in the assessment and treatment of fire involvement with children, adolescents, and adults. All youth were referred for a fire-specific psychological assessment due to a history of at least one incident of fire involvement. Seventy-four percent of the participants were mandated by the state of Massachusetts to receive an assessment because they were about to receive an out-of-home placement (e.g., residential care, foster care) through the Department of Children and Family (DCF). The remaining 26% of the participants had an assessment initiated by parent or guardian request. Although it is clear that the parent-initiated assessments were for participants who were not receiving out-of-home placements through the state of Massachusetts, it is unclear whether these participants had involvement with DCF, or were being considered for out-of-home placements through means other than the state of Massachusetts. The charts reviewed for the current study spanned a 10 year period from 2001 to 2010. A total of 375 charts of youth ages 5 to 18 years were reviewed. Approximately 70% (n = 261) were male.

Inclusion criteria for this study were that the youth range in age from 9 to18 years and have the following measures in their chart: Child Behavior Checklist (CBCL), Aggression Questionnaire (AQ), and Children's Firesetting Interview (CFI). Of the 375 charts that were initially reviewed, 186 contained youth who met the inclusion criteria described above. There were no exclusion criteria. Table 1 presents basic demographic data for the study participants, who ranged in age from 9 to18 years (M = 13.4, SD = 1.97) and were 72% male. Data on race/ethnicity were compiled from the participant behavior rating scales, psychological

assessments, or other documents located in the chart. The racial/ethnic identities were organized into 1 of 7 mutually exclusive categories, yielding the following results: White/Caucasian – 55%, Hispanic – 17%, Black/African American – 14%, Biracial – 8%, Native American – 1%, Asian - 1%, and "other" – 1%. Less than 4% of the participants had missing racial/ethnic information.

Power analyses were conducted to determine the effect sizes that can be detected with 80% power. The effect sizes able to be detected in the current study were estimated using G* Power (Erdfelder, Faul, & Buchner, 1996). Running power analyses for correlations with an alpha level of .05 and sample sizes of 186 (overall sample), 133 (males only), and 53 (females only) demonstrated effects of $r = .20$, $r = .24$, and $r = .37$, respectively. A power analysis for an analysis of covariance with 2 groups, 1 covariate, an alpha level of .05, and overall sample size of 186, demonstrated that an effect size of $f = .21$ can be predicted by the current study. Running power analyses for a regression model with 4 predictors, an alpha level of .05, and sample size of 186 (overall sample), 133 (males only), and 53 (females only) demonstrated that respective effect sizes of $f^2 = .07$, $f^2 = .09$, and $f^2 = .25$ can be predicted by the current study. Thus, for all planned analyses the current study possesses the power to detect between small and moderate effect sizes for the overall sample and male subset, and between moderate and large effect sizes for the female subset.

Table 1

Basic Demographics

Category	% (*n*)
Sex	
Male	71.5 (133)
Female	28.5 (53)
Race/Ethnicity	
White/Caucasian	54.8 (102)
Hispanic	16.7 (31)
Black/African American	14.0 (26)
Biracial	8.1 (15)
Native American	1.1 (2)
Asian	0.5 (1)
Other	1.1 (2)
unrecorded	3.8 (7)
Age	
Child Age	13.4 (1.97) [a]
Child Age Range	9-18

[a] *M* (*SD*).

The lead clinician of the psychology practice supplying the data for this study was a licensed, doctoral-level psychologist. The other assessors were licensed, masters-level clinicians. Each clinician met the state of Massachusetts guidelines for a "qualified diagnostician" for firesetting and was trained in the Massachusetts model for firesetting assessment (for a description see Stadolnik, 2000). Administration of all assessment measures was facilitated by the individual clinician assigned to each participant. Although there was no formal protocol for the collection of assessment data, under most circumstances the clinicians adhered to the following guidelines: 1) CBCLs were mailed to the parent or parent-surrogate two to three weeks before the participant's initial meeting with a clinician, and 2) CFIs and AQs were administered personally to each youth by their assessing clinician.

Item-level raw data were scanned by the author, in a de-identified format, on-site at the psychology practice of the assessment clinicians. These data were then brought to the author's university research site for entry and analysis. Signed consent for participation in this study was waived because this project utilized pre-existing chart data that spanned the period of a decade. All aspects of this study were approved by the Human Subjects Committee Lawrence at the University of Kansas.

Measures

Child Behavior Checklist (CBCL). The CBCL is a 113-item measure designed to use parent or parent-surrogate endorsements to compare individual children to age- and gender-referenced norms (Achenbach, 2001). The measure asks an adult to rate statements about a child's behavior on a 3-point Likert scale (where 0 = *Not true (as far as you know)* and 2 = *Very True or Often True*). The measure yields scores for eight Syndrome Scales and two aggregate Syndrome Scales. The CBCL Syndrome Scales have test-retest reliabilities and Cronbach's alpha coefficients that range from .82 to .92 and .78 to.94, respectively (Achenbach & Rescorla, 2001). The current study utilized two CBCL aggregate Syndrome Scales (*Internalizing* and *Externalizing*) and two non-aggregated Syndrome Scales (*Social Problems* and *Thought Problems*). Eight percent (n = 15) of the CBCL data in the current study were collected from the 1991 version of the CBCL (CBCL/4-18; Achenbach, 1991). The remaining 92% (n = 171) were collected from the current version of the CBCL, published in 2001 (CBCL/6-18; Achenbach, 2001). Achenbach and Rescorla (2001) cited high correlations between the 1991 and 2001 CBCL raw score totals for the *Internalizing*, *Externalizing*, *Social Problems*, and *Thought Problems* scales (.98, .99, .91, and .87, respectively). They also provided directions on how to use 1991 CBCL raw data and score it using the 2001 CBCL scoring protocols. This procedure

was followed for the current study. Achenbach and Rescorla stated that CBCL *Social Problems* and *Thought Problems t*-scores from 65 to 69, and 70 and above denote scores that are respectively in the "borderline" and "clinical" ranges. In contrast, they stated CBCL *Internalizing* and *Externalizing t*-scores from 60 to 63, and 64 and above denote scores that are respectively in the "borderline" and "clinical" ranges. It is explicitly recommended that raw score totals be utilized when using any non-aggregated Syndrome Scale for research purposes (Achenbach & Rescorla, 2001). The current study utilized *t*-scores to describe the clinical features of its sample across all of the CBCL aggregate and non-aggregated Syndrome Scales. CBCL raw score data were used for all other analyses.

Aggression Questionnaire (AQ). The AQ is a 34-item, self-report tool that measures aggressive responses and how these responses are channeled in the individual (Buss & Warren, 2000). The AQ is a result of revisions to the Buss-Durkee Hostility Inventory (Buss & Durkee, 1957) and the Buss-Perry Aggression Questionnaire (Buss & Perry, 1992), and has been used in research to examine aggression across and within gender for youth and adult populations (Byrd, 2005; Conway et al., 2012; Sadeh, Javdani, Finy, & Verona, 2011). The AQ was standardized from a set of 2,138 individuals, ages 9 to 88 years. Norms were calculated based on trichotomous age sets, one of which was youth ages 9 to 18 years (n = 1,062). The AQ asks the respondent to rate statements about him/herself on a 5-point Likert scale (where 1 = *Not at all like me* and 5 = *Completely like me*). These answers yield scores on five subscales denoting constructs related to aggression. The current study used three of the AQ subscales–*Anger*, *Hostility*, and *Indirect Aggression*–which were all normed on the entire group of male and female youth. The authors of the AQ reported internal consistency for these subscales ranges from .76 to .88 (Buss & Warren, 2000). The aforementioned AQ scales were chosen to add

some self-report data into the analysis and to supplement the aggression items contained within the CBCL/*Externalizing* scale. A majority of the aggression items measured in the CBCL focus on external, verbal, and physical aggression. Compared to the aggression items on the CBCL, the items on the AQ *Anger*, *Hostility*, and *Indirect Aggression* subscales assess more internal thoughts and motivations of aggression such as vindictive and rageful thoughts, which have been shown to be significantly related to deliberate, planned, and persistent fire involvement (Sakheim & Osborn, 1999). The authors of the AQ state that *t*-scores from 60 to 69 denote elevation that is "high" and *t*-scores 70 and above denote elevation that is "Very High." The current study utilized AQ *t*-scores to describe the clinical features of its sample and AQ raw scores for other analyses.

Children's Firesetting Interview (CFI). The CFI is a 46-item semi-structured interview developed by Kolko and Kazdin (1989b) to provide both quantitative and qualitative information about firesetting and fire-related behaviors. This measure uses youth self-reports to produce quantitative scores on six dimensions, all of which are factors thought to contribute to the risk of youth fire involvement according to a model proposed by Kolko and Kazdin (1986). The CFI has been used in treatment outcome research for children with fire involvement (Kolko, Herschell, & Scharf, 2006; McDonald, 2010) and is currently being utilized in various clinical settings to aide in clinical assessment and treatment planning. The current study utilized the CFI *Curiosity about Fire* and *Involvement in Fire-related Activities* scales because their individual items assess fire-related thoughts and behaviors. For most of the items the *Curiosity about Fire* scale, youth are asked to rate statements about their thoughts and behaviors (e.g., *How much do you want to play with fire?*) using a 5-point Likert scale (where 1 = *Not at all* and 5 = *Very much*). However, two questions (e.g., *What do you like most about fire?*) required the clinician

to rate the participant's answer based on a 5-point rubric provided by the authors. Questions on the *Involvement in Fire-related Activities* scale are scored by taking youth-reported quantities and matching them to the ranges within the 5-point scale provided by the authors. For both scales, larger numbers indicate a higher level or higher intensity of the identified construct. Mean scores on these scales have been shown to discriminate fire-involved youth from non-fire-involved youth (Kolko & Kazdin, 1989b) and youth recidivist firesetters from nonrecidivist firesetters (Kolko & Kazdin, 1992; McDonald, 2010). Kolko and Kazdin's (1989b) reliability tests yielded Cronbach's alphas for the *Curiosity about Fire* and *Involvement in Fire-related Activities* scales of .69 and .47, respectively. Compared to Kolko and Kazdin, reliability tests for the current study were higher for the *Curiosity about Fire* scale (Cronbach's alpha = .86) and similar for the *Involvement in Fire-related Activities* scale (Cronbach's alpha = .41).

Results

Characteristics of Youth with Fire Involvement

The first objective of this study was to describe the psychological characteristics, thoughts, and behaviors of youth with a history of fire involvement. Table 2 presents raw and *t*-score data from the CBCL and AQ. Table 3 presents CBCL raw data based on the dichotomization used by Achenbach and Rescorla (2001) to generate age-normed *t*-scores. As stated above, the CBCL aggregate, CBCL non-aggregated, and AQ scales all have slightly different interpretations of the clinical severity that is represented by their respective *t*-scores. Using their criteria, this study found that a large portion of the participants had CBCL *Internalizing*, *Externalizing*, *Social Problems*, and *Thought Problems* *t*-scores that were clinically significant (53%, 77%, 21%, and 32%, respectively). This study also found that nearly half or more of the CBCL *Internalizing*, *Externalizing*, *Social Problems*, and *Thought Problems*

t-scores were elevated at a level that was at least in the borderline-clinical range (66%, 86%, 46%, and 48%, respectively). A much smaller portion of participants had AQ *Anger*, *Hostility*, and *Indirect Aggression t*-scores that were clinically significant (1%, 3%, and 2%, respectively) with a larger minority of *t*-scores elevated to a level that was at least borderline-clinical (18%, 19%, and 16%, respectively). Approximately 85% of the participants had at least one CBCL *t*-score that was clinically significant, whereas approximately 4% had at least one AQ *t*-score that was clinically significant. All of the participants with at least one clinically significant AQ *t*-score also had at least one clinically significant CBCL *t*-score. Further analyses of the sample across both CBCL and AQ measures found that 30% had one clinically significant *t*-score, 23% had two clinically significant *t*-scores, 18% had 3 clinically significant *t*-scores, 12% had 4 clinically significant *t*-scores, 1% had five clinically significant *t*-scores, and 1% had six clinically significant *t*-scores.

Table 4 presents participant raw data for the CFI scales. *T*-scores were not calculated for the CFI because this measure has yet to be standardized. However, the authors of the CFI do provide raw score data with which some limited comparisons can be made. In their study of 519 children (ages 6-13 years, 66% male, 38% with fire involvement) Kolko and Kazdin (1989b) found significant main effects for firesetting status (i.e. fire-involved or not fire-involved) on many of the CFI scales. The current study's CFI/*Curiosity about Fire* mean score of 19.9 is comparable to Kolko and Kazdin's fire-involved youth mean score of 20.3 (non-fire-involved youth, $M = 18.3$). In contrast, the current study's CFI/*Involvement in Fire-Related Activities* mean score of 6.7 is higher than Kolko and Kazdin's fire-involved youth mean score of 5.5 (non-fire-involved youth, $M = 4.5$).

Table 2

Mean Raw and T-Scores for CBCL, AQ, and CFI Scales

MEASURE/*Scale*	Raw Score (*SD*)	*T*-score (*SD*)	Borderline *T*-Scores	Clinical *T*-Scores
		Overall Sample (*n* = 186)		
CBCL/*Internalizing*[a]	14.9 (8.97)	62.6 (10.31)	66.1%	53.2%
CBCL/*Externalizing*[a]	27.8 (13.34)	69.7 (9.93)	86.0%	76.9%
CBCL/*Social Problems*[b]	5.8 (3.94)	63.4 (8.97)	45.7%	21.0%
CBCL/*Thought Problems*[b]	5.6 (4.56)	63.5 (9.70)	47.8%	32.3%
AQ/*Anger*[c]	18.6 (5.45)	52.6 (8.44)	18.3%	1.1%
AQ/*Hostility*[c]	20.7 (6.03)	51.3 (8.98)	19.4%	2.7%
AQ/*Indirect Aggression*[c]	15.1 (5.05)	49.7 (10.07)	15.6%	1.6%
		Males (*n* = 133)		
CBCL/*Internalizing*[a]	15.2 (9.03)	63.4 (10.17)	67.7%	56.4%
CBCL/*Externalizing*[a]	28.4 (12.83)	69.9 (9.95)	87.2%	78.9%
CBCL/*Social Problems*[b]	6.3 (4.14)	64.5 (9.53)	50.4%	27.1%
CBCL/*Thought Problems*[b]	6.1 (4.54)	64.7 (9.53)	52.6%	36.1%
AQ/*Anger*[c]	19.1 (5.49)	53.3 (8.40)	21.1%	1.5%
AQ/*Hostility*[c]	21.1 (6.03)	52.0 (8.93)	21.1%	3.0%
AQ/*Indirect Aggression*[c]	15.3 (5.09)	50.1 (10.1)	17.3%	2.3%
		Females (*n* = 53)		
CBCL/*Internalizing*[a]	14.2 (8.89)	60.7 (10.50)	62.3%	45.3%
CBCL/*Externalizing*[a]	26.5 (14.59)	69.2 (9.95)	83.0%	71.7%
CBCL/*Social Problems*[b]	4.5 (3.04)	60.6 (7.57)	34.0%	5.7%
CBCL/*Thought Problems*[b]	4.4 (4.43)	61.1 (9.75)	35.8%	22.6%
AQ/*Anger*[c]	17.3 (5.20)	50.6 (8.31)	11.3%	0.0%
AQ/*Hostility*[c]	19.6 (5.95)	49.7 (8.97)	15.1%	1.9%
AQ/*Indirect Aggression*[c]	14.6 (4.98)	48.7 (10.11)	11.3%	0.0%

Note. "Borderline *T*-scores" are *t*-scores at or above the borderline level. "Clinical *T*-scores" are *t*-scores at or above the clinically significant level. CBCL = Child Behavior Checklist; AQ = Aggression Questionnaire.
[a]*T*-scores 60-63 are "Borderline" and *t*-scores ≥ 64 are "Clinical" (Achenbach & Rescorla, 2001). [b]*T*-scores 65-69 are "Borderline" and *t*-scores ≥ 70 are "Clinical" (Achenbach & Rescorla, 2001). [c]*T*-scores 60-69 are "High," and *t*-scores ≥ 70 are "Very High" (Buss & Warren, 2000).

Table 3

Mean CBCL Raw Scores by Age and Sex

CBCL Scale	Age	Males[c]		Females[d]	
		Raw Score (*SD*)	*n*	Raw Score (*SD*)	*n*
Externalizing	9-11yrs[a]	32.0 (9.93)	27	21.1 (5.18)	7
	12-18yrs[b]	27.4 (13.35)	106	27.3 (15.41)	46
Internalizing	9-11yrs[a]	17.2 (8.28)	27	13.1 (7.43)	7
	12-18yrs[b]	14.7 (9.18)	106	14.4 (9.15)	46
Social Problems	9-11yrs[a]	7.5 (3.11)	27	6.4 (4.12)	7
	12-18yrs[b]	6.0 (4.32)	106	4.2 (2.79)	46
Thought Problems	9-11yrs[a]	7.2 (4.65)	27	4.6 (6.11)	7
	12-18yrs[b]	5.8 (4.49)	106	4.3 (4.21)	46

Note. Dichotomization of age follows the CBCL scoring protocol for *t*-score calculations. CBCL = Child Behavior Checklist.
[a]*n* = 34 for participants 9-11 years old. [b]*n* = 152 for participants 12-18 years old. [c]*n* =133 for male participants. [d]*n* = 53 for female participants.

Table 4

Mean Raw Scores for CFI Scales

MEASURE/*Scale*	Score (*SD*)[a]	Score (*SD*)[b]	Score (*SD*)[c]
CFI/*Curiosity about Fire*	19.9 (7.46)		19.9 (7.30)
CFI/*Involvement in Fire-Related Activities*		6.7 (2.56)	6.6 (2.50)

Note. CFI = Children's Firesetting Interview.
[a]All cases with full data for CFI/*Curiosity about Fire* scale (*n* = 140). [b]All cases with full data for CFI/*Involvement in Fire-Related Activities* scale (*n* = 175). [c]All cases with full data for both CFI scales (*n* = 135).

CFI item-level data is presented in order to provide the reader with a more comprehensive understanding of the content and sample endorsements for each scale. Table 5 presents the individual items for the CFI/*Curiosity about Fire* scale, the answer choices for each

item, and the responses of the current study sample. A majority of the sample reported having at least some fire curiosity, thoughts about fire, and enjoyment in reading about fire (60%, 52%, and 59%, respectively) with a minority endorsing these characteristics as highly present (17%, 5%, and 26%, respectively). Closer to half of the sample reported wanting to play with fire or view fire-related media (43% and 46%, respectively) with a smaller portion endorsing these characteristics as highly present (9% and 14%, respectively). A minority of the sample endorsed fire as being magical, an exciting topic to listen to, or an exciting topic to talk about (36%, 37%, and 28%, respectively) with a smaller portion frequently endorsing these thoughts (9%, 6%, and 3%, respectively). Favorite characteristics of fire were predominantly related to its functionality (31%, e.g., providing a means of heat, cooking, or light) or observational aspects (31%, e.g., seeing the fire or firefighters); however, some of the sample did respond with answers indicating they like fire because it can be played with (5%, e.g., fireplay or using it without burning things) or used for burning (5%, e.g., to burn, control, or influence others). When asked about the thoughts they associate with fire, participant responses were categorized as follows: 28% nothing/safety concerns, 10% heat, 38% candles/colors/flames, 19% fireplay or use without burning, and 5% lighting things on fire/excitement.

Table 5

Percent Endorsed for Each CFI/Curiosity about Fire Item

Questions	Answer Choices[a]				
	Not at All	Very Little	Somewhat	A Lot	Very Much
1. How curious are you about fire (i.e., want to know more about it)?	40.2%	26.6%	16.3%	10.3%	6.5%
2. How much do you think about fire?	47.8%	37.0%	10.3%	3.8%	1.1%
3. How much do you want to play with fire?	56.6%	23.4%	10.9%	7.1%	2.2%
4. How special or magical is fire to you?	63.9%	15.8%	10.9%	7.1%	2.2%
5. How excited or interested do you get when people talk about fires?	62.8%	24.6%	7.1%	4.4%	1.1%
6. How much do you like to visit exhibits or movies about fires, or watch a real fire?	53.8%	18.7%	13.7%	9.3%	4.4%
7. How much do you like to read and learn about fire, and the right way to use it?	40.8%	15.8%	17.4%	13.0%	13.0%
8. How much do you like to talk about fire, rather than other things?	72.3%	21.5%	2.8%	2.3%	1.1%
	Answer Choices[b]				
	Nothing	Heat[c]	Observing[d]	Fireplay[e]	Burning[f]
9. What do you like most about fire?	27.1%	31.3%	31.3%	5.4%	4.8%
	Answer Choices[b]				
	Nothing[g]	Heat	Flames[h]	Matchplay[i]	Excitement[j]
10. When you think about fire, what do you think about?	27.9%	10.2%	38.1%	19.0%	4.8%

Note. CFI = Children's Firesetting Interview.
[a]Participants were presented with these answer choices. [b]Clinicians scored participant responses into one of these categories. [c]Heat/Cooking/Light. [d]Observing Fire or firefighters, or some other contact with fire. [e]Fire play or use without burning. [f]Use of fire to burn, control, or influence. [g]Nothing/Fire Safety/Concerns about Injuries or Destruction. [h]Candles/Colors/Flames. [i]Matchplay, Camping, Fireplace, Paper Burning. [j]Lighting Things on Fire/Excitement/Supernatural.

Table 6 presents the individual items for the CFI/*Involvement in Fire-Related Activities* scale, the answer choices for each item, and the responses of the current study sample. Fifty-two percent of the sample reported having hid fire-starting materials at least once and 28% reported this occurring three or more times. Forty-three percent of the sample reported having left burn marks on things in their homes at least once and 10% reported this occurred three or more times. Twenty-three percent of the sample reported having adults outside of their home report them for playing with fire at least one time and 1% reported that this occurred 3 or more times. Thirteen percent of the sample reported having set off a fire alarm when there was no smoke or fire around at least one time and 4% reported this occurring three or more times.

Table 6

Endorsements for Each CFI/Involvement in Fire-Related Activities Item

Questions	Answer Choices				
	No	Yes: 1 Time	Yes: 2 Times	Yes: 3-5 Times	Yes: 6 or More Times
1. Did you ever set off a fire alarm when there really wasn't any fire or smoke around? If yes, how many times?	86.6%	7.3%	2.2%	2.2%	1.7%
2. Did you ever hide matches, lighters, or other fire-starting materials? If yes, how many times?	47.8%	14.6%	10.1%	10.7%	16.9%
3. Did you ever leave burn marks on things in your home? If yes, how many times?	57.0%	21.8%	11.2%	6.7%	3.4%
4. Did anyone, like someone from the school, the police, or your neighbors, ever tell someone in your family about your playing with fire? If yes, how many times?	77.3%	19.3%	2.3%	1.1%	0.0%

Comparing Characteristics of Males and Females

The second objective of this study was to compare the psychological characteristics, thoughts, and behaviors of males and females with a history of fire involvement. This was accomplished by examining the similarities and differences between males and females across five broad domains – internalizing difficulties (CBCL/*Internalizing Problems* scale), social difficulties (CBCL/*Social Problems* scale), thought difficulties (CBCL/*Though Problems*), externalizing difficulties (CBCL/*Externalizing Problems*, AQ/*Anger*, AQ/*Hostility*, AQ/*Indirect Aggression*), and fire-related thoughts and feelings (CFI/*Curiosity about Fire*, CFI/*Involvement in Fire-Related Activities*). Two of the broad domains (externalizing difficulties and fire-related thoughts and feelings) contain data from more than one measured scale. This is because the scales represented in their respective domains are conceptualized as part of the same construct. Given data that suggest a relationship between age and youth fire involvement (Chen et al., 2003; Flynn, 2009b; Slavkin, 2004), planned analyses for the current study's male-female comparisons included analysis of variance (ANOVA) and multivariate analysis of variance

(MANOVA) procedures utilizing age as a covariate. Because researchers have cautioned against the use of MANOVA simply as a means of reducing Type I error (Grice & Iwasaki, 2007; Jaccard & Guilamo-Ramos, 2002) it is important to clarify that MANOVAs were used in the current study because all of the independent variables for each MANOVA tap into the same construct.

Table 7 presents correlations between age and the CBCL, AQ, and CFI scales. Analysis indicated that there was no significant relationship between age and: CBCL/*Internalizing Problems* scores ($r < .01$, $p = .99$), CBCL/*Externalizing Problems* scores ($r = -.06$, $p = .44$), CBCL/*Social Problems* scores ($r = -.14$, $p = .06$), CBCL/*Thought Problems* scores ($r = -.03$, $p = .67$), AQ/*Anger* scores ($r = -.09$, $p = .24$), AQ/*Indirect Aggression* scores ($r = -.14$, $p = .06$), or CFI/*Involvement in Fire-Related Activities* scores ($r = .06$, $p = .43$). However, there was a significant relationship between age and: AQ/*Hostility* scores ($r = -.17$, $p = .02$), and CFI/*Curiosity about Fire* scale scores ($r = -.19$, $p = .02$), indicating that less hostility and less fire curiosity were reported by the older participants. Because age was not significantly related to internalizing, social, or thought difficulties, the planned ANOVAs for these three categories were substituted with *t*-test analyses. The MANOVAs for the externalizing and fire-related thoughts and feelings categories were carried out as planned because of the relationship between age and one of the dependent variables.

Table 7

Correlations between Age and CBCL, AQ, and CFI Variables

	CBCL[a]				AQ[b]			CFI	
	Internal	External	Social	Thought	Anger	Hostility	Ind. Agg.	Curiosity[c]	Involve[d]
Overall Sample Age	< .01	-.06	-.14	-.03	-.09	- .17*	-.14	-.19*	.06
Male Age	-.11	-.12	-.13	-.04	-.12	-.19*	-.13	-.19[†]	.07
Female Age	.27	.09	-.14	.03	.02	-.13	-.14	-.18	.08

Note. CBCL = Child Behavior Checklist; Internal = *Internalizing* scale; External = *Externalizing* scale; Social = *Social Problems* scale; Thought = *Thought Problems* scale; AQ = Aggression Questionnaire; Anger = *Anger* scale; Hostility = *Hostility* scale; Ind. Agg. = *Indirect Aggression* scale; CFI = Children's Firesetting Interview; Curiosity = *Curiosity about Fire* scale; Involve = *Involvement in Fire-Related Activities* scale.
[a]*n* = 186. [b]*n* = 186. [c]*n* = 140. [d]*n* = 175
* p < .05. [†] *p* = .05.

Internalizing Difficulties. Although males (*M* = 15.2) scored higher than females (*M* = 14.2) on the CBCL/*Internalizing Problems* scale, an independent *t*-test showed that their difference was not significant (*t* = .68, *df* = 184, *p* = .50, two-tailed; Table 8). Table 2 shows that males and females had relatively similar levels of *t*-score elevation for their internalizing difficulties.

Table 8

T-Tests Comparing Males and Females Across Selected CBCL Variables

	Male			Female			95% CI for Mean Difference			
Variable	*M*	SD	*n*	*M*	SD	*n*		*t*	df	Cohen's *d*
CBCL/*Internalizing*	15.22	9.03	133	14.23	8.89	53	-1.88, 3.87	0.68	184	
CBCL/*Social Problems*	6.32	4.14	133	4.51	3.04	53	.72, 2.90[a]	3.29[a] **	129.2[a]	0.50
CBCL/*Thought Problems*	6.07	4.54	133	4.36	4.43	53	.26, 3.16	2.33*	184	0.38

Note. CBCL = Child Behavior Checklist; CI = Confidence Interval.
[a]Adjustments made for inequality in variance.
* p < .05. ** p < .01.

Social Difficulties. Males (*M* = 6.32) scored higher than females (*M* = 4.51) on the CBCL/*Social Problems* scale, with an independent *t*-test demonstrating this difference to be significant (*t* = 3.29, *df* = 184, *p* < .01, two-tailed; Table 8). The magnitude of the differences in the means (mean difference = 1.81, 95% CI: .72 to 2.90) was medium (*d* = 0.50; Cohen, 1969). Table 2 illustrates the broad differences between the sexes on this scale, showing that 27% of

males received a CBCL/*Social Problems t*-score that was clinically significant, compared to only 6% of females.

Thought Difficulties. Males (M = 6.07) scored higher than females (M = 4.36) on the CBCL/*Thought Problems* scale, with an independent *t*-test establishing the difference as significant (t = 2.33, df = 184, p = .02, two-tailed; Table 8). The magnitude of the differences in the means (mean difference = 1.71, 95% CI: .26 to 3.16) was small (d = 0.38). Table 2 shows that more males (36%) received a clinically significant CBCL/*Thought Problems t*-score than did their female counterparts (23%).

Externalizing Difficulties. A one-way between-subject MANOVA was conducted using age as a covariate. The between-subject factor was participant sex; dependent variables were the CBCL/*Externalizing Problems*, AQ/*Anger*, AQ/*Hostility*, and AQ/*Indirect Aggression* scale scores. There was no significant relationship between age and this group of externalizing difficulties, $F(4, 180) = 1.56$, p = .19; Wilks' Lambda = .97. Table 9 presents data indicating that adjusting for age as a covariate resulted in a non-significant model for the main effects of sex on externalizing difficulties, $F(4, 180) = 1.24$, p = .30; Wilks' Lambda = .97. Table 2 displays the relatively similar levels of *t*-score elevation across the externalizing difficulties.

Table 9

MANOVA for Sex and Externalizing and Fire-Specific Difficulties

Variable subset	*n*	Multivariate *F* [a]	Univariate *F*	df	partial η^2	Male *M*	Female *M*
Externalizing Difficulties	186	1.24		4, 180	.03		
CBCL/*Externalizing*			0.71	1, 183	< .01	28.34	26.51
AQ/*Anger*			3.77	1, 183	.02	19.06	17.36
AQ/*Hostility*			2.12	1, 183	.01	21.09	19.68
AQ/*Indirect-Aggression*			0.48	1, 183	< .01	15.24	14.68
Fire-Related Thoughts and Behaviors	135	5.08**		2, 131	.07		
CFI/*Curiosity*			9.28**	1, 132	.07	20.95	16.57
CFI/*Involvement*			5.35*	1, 132	.04	6.90	5.73

Note. These data are the MANOVA results after partialing out any variance accounted for by age. CBCL = Child Behavior Checklist; AQ = Aggression Questionnaire; CFI = Children's Firesetting Interview.

[a]Wilks' Lamba.

* p < .05. ** p < .01.

Fire-Related Thoughts and Behaviors. A one-way between-subjects MANOVA was conducted using age as a covariate. The between-subject factor was participant sex and the dependent variables were the CFI/*Involvement in Fire-Related Activities* and CFI/*Curiosity about Fire* scale scores. Age was significantly related to fire-related thoughts and behaviors $F(2,131) = 4.45$, $p = .01$; Wilks Lambda = .94, partial $\eta^2 = .06$. Table 9 presents data indicating that adjusting for age as a covariate resulted in a significant model for the main effects of sex on fire-related thoughts and behaviors, $F(2, 131) = 5.08$, $p < .01$; Wilks' Lambda = .93, partial $\eta^2 = .07$. Analysis of each independent variable found significant differences for both CFI/ *Curiosity about Fire*, ($F(1, 132) = 9.28$, $p > .01$, partial $\eta^2 = .07$) and CFI/*Involvement in Fire-Related Activities* (F (1, 132) = 5.35, $p = 02$, partial $\eta^2 = .04$), resulting in respective effect sizes that were medium and small (Cohen, 1969). The mean scores for the CFI/ *Curiosity about Fire* and CFI/*Involvement in Fire-Related Activities* variables were higher for males (M = 20.95 and 6.90, respectively) than for females (M = 16.57 and 5.73, respectively).

Psychological Problems and Fire Interest/Activities (Overall Sample)

The third objective of this study was to examine how specific psychological problems are related to fire-specific thoughts and behaviors for youth with a history of fire involvement. The analytic plan for this objective was to identify significant bivariate relations between the CBCL and AQ scales and each CFI scale (CFI/*Curiosity about Fire* and CFI/*Involvement in Fire-Related Activities*) and then regress the variables onto the CFI scale with which there was a significant correlation. This plan also called for these regressions to be hierarchical in order to initially partial out any variance that was related to age.

Psychological Problems and Fire Curiosity. Table 10 presents correlations for all of the CBCL, AQ, and CFI scales. There were three variables significantly related to the

CBCL/*Curiosity about Fire* scale scores – CBCL/*Social Problems* ($r = .17$, $p = .049$), AQ/*Anger* ($r = .22$, $p < .01$), and AQ/*Indirect-Aggression* ($r = .18$, $p = .03$). As stated above, age was not significantly correlated with CBCL/*Social Problems*, AQ/*Anger*, or AQ/*Indirect-Aggression* scale scores; however, it was correlated with CFI/*Curiosity about Fire* scale scores. Based on the aforementioned relationships, a hierarchical multiple regression was conducted. Table 11 presents data for the regression models predicting CBCL/*Curiosity about Fire*. Block 1, with age as the only predictor, was significant ($F(1, 138) = 5.20$, $p = .02$), explaining 2.9% of the variance in the CFI/*Curiosity about Fire* scale scores (Adjusted $R^2 = .029$). Block 2, which added the CBCL/*Social Problems*, AQ/*Anger*, and AQ/*Indirect Aggression* variables, was also significant ($F(3, 135) = 2.72$, $p < .05$), explaining 6.4% of the variance in the CFI/*Curiosity about Fire* scale scores (Adjusted $R^2 = .064$). None of the predictors in the second block had any significant regression coefficients, suggesting that it is the shared variance of social problems, anger, and indirect aggression that is predictive of fire curiosity.

Table 10

Correlations between All CBCL, AQ, and CFI Variables (Overall Sample)

	CBCL[a]				AQ[b]			CFI	
	Internal	External	Social	Thought	Anger	Hostility	Ind. Agg.	Curiosity[c]	Involve[d]
CBCL: Internal	—								
CBCL: External	.49***	—							
CBCL: Social	.53***	.47***	—						
CBCL: Thought	.62***	.52***	.58***	—					
AQ: Anger	.19*	.22**	.22**	.17*	—				
AQ: Hostility	.23**	.17*	.33***	.25**	.63***	—			
AQ: Ind. Agg.	.22**	.25**	.26***	.24**	.65***	.64***	—		
CFI: Curiosity	.14	.08	.17*	.08	.22*	.14	.18*	—	
CFI: Involve	.12	.09	.04	.13	.19**	.20**	.19*	.48***	—

Note. CBCL = Child Behavior Checklist; Internal = *Internalizing* scale; External = *Externalizing* scale; Social = *Social Problems* scale; Thought = *Thought Problems* scale; AQ = Aggression Questionnaire; Anger = *Anger* scale; Hostility = *Hostility* scale; Ind. Agg. = *Indirect Aggression* scale; CFI = Children's Firesetting Interview; Curiosity = *Curiosity about Fire* scale; Involve = *Involvement in Fire-Related Activities* scale.
[a]$n = 186$. [b]$n = 186$. [c]$n = 140$. [d]$n = 175$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 11

Regression Model Predicting CFI/Curiosity about Fire (Overall Sample)

Variable	B	SE B	β	*Adjusted* R^2	*F* value
Block 1				.029	5.20*
Age	-.74	.33	-.19*		
Block 2				.064	2.72*
Age	-.59	.33	-.15		
CBCL/*Social Problems*	.22	.16	.12		
AQ/*Anger*	.25	.15	.18		
AQ/*Indirect Aggression*	.03	.16	.02		

Note. CFI = Children's Firesetting Interview; CBCL = Child Behavior Checklist; AQ = Aggression Questionnaire.
* $p < .05$

Psychological Problems and Fire-Related Activities. There were three variables significantly related to the CFI/*Involvement in Fire-Related Activities* – AQ/*Anger* ($r = .19$, $p = .01$), AQ/*Hostility* ($r = .20$, $p < .01$), and AQ/ *Indirect-Aggression* ($r = .19$, $p = .01$). As stated above, age was not significantly correlated to the CFI/*Involvement in Fire-Related Activities,* AQ/*Anger* or AQ/*Indirect-Aggression* scale scores*;* however, it was correlated with AQ/*Hostility*. Based on the aforementioned relationships, a hierarchical multiple regression was conducted. Table 12 presents data for the regression models predicting CFI/*Involvement in Fire-Related Activities*. Block 1, with age as the only predictor, was not significant ($F(3, 173) = .62$, $p = .43$). Block 2, which added the AQ/*Anger*, AQ/*Hostility*, and AQ/*Indirect-Aggression* variables, was significant ($F(3, 170) = 3.40$, $p = .02$), explaining 3.8% of the variance in CFI/*Involvement in Fire-Related Activities* (Adjusted $R^2 = .038$). Similar to the analysis of fire curiosity, none of the predictor variables in the second block had any significant regression coefficients, again suggesting that the model relies on the shared variance of its predictor values.

Table 12

Regression Model Predicting CFI/Involvement in Fire-Related Activities (Overall Sample)

Variable	B	SE B	β	*Adjusted* R^2	*F* value
Block 1				-.002	.62
Age	.08	.10	.06		
Block 2				.038	3.40*
Age	.13	.10	.10		
AQ/*Anger*	.04	.05	.07		
AQ/*Hostility*	.06	.04	.13		
AQ/*Indirect Aggression*	.04	.05	.07		

Note. CFI = Children's Firesetting Interview; AQ = Aggression Questionnaire.
* $p < .05$.

Psychological Problems and Fire Interest/Activities (Separated by Sex)

The fourth objective of this study was to examine how relationships between specific psychological problems and fire-specific thoughts and behaviors may differ for male and female youth with a history of fire involvement. The analytic plan for this objective was identical to that of the third objective, with the exception that all planned analyses were conducted separately for each sex.

Psychological Problems and Male Fire Curiosity. Table 13 presents correlation data for all CBCL, AQ, and CFI scales for the males in this study. There were two variables significantly related to male CBCL/*Curiosity about Fire* scale scores – AQ/*Anger* ($r = .23$, $p = .015$) and AQ/*Indirect Aggression* ($r = .21$, $p = .03$). Age was not significantly correlated with male AQ/*Anger* ($r = -.12$, $p = .18$) or male AQ/*Indirect-Aggression* ($r = -.13$, $p = .13$) scale scores. However, age did approach a significant relationship with male CFI/*Curiosity about Fire* scale scores ($r = -.19$, $p = .05$). Based on the aforementioned relationships, a hierarchical multiple regression was conducted. Table 14 presents data for the regression models predicting male CBCL/*Curiosity about Fire*. Block 1, with age as the only predictor, approached

significance ($F(1, 106) = 3.86$, $p = .05$). However, Block 2, which added the AQ/*Anger* and AQ/*Indirect Aggression* variables, was not significant ($F(2, 104) = 2.67$, p = .07).

Table 13

Correlations between All Male CBCL, AQ, and CFI Variables

	CBCL[a]				AQ[b]			CFI	
	Internal	External	Social	Thought	Anger	Hostility	Ind. Agg.	Curiosity[c]	Involve[d]
CBCL: Internal	—								
CBCL: External	.48***	—							
CBCL: Social	.57***	.49***	—						
CBCL: Thought	.65***	.51***	.59***	—					
AQ: Anger	.21*	.29**	.19*	.19*	—				
AQ: Hostility	.29**	.25**	.35***	.30***	.61***	—			
AQ: Ind. Agg.	.24**	.31***	.25**	.26**	.63***	.67***	—		
CFI: Curiosity	.12	.06	.18	.11	.23*	.17	.21*	—	
CFI: Involve	.14	.10	.05	.15	.20*	.20*	.22*	.50***	—

Note. CBCL = Child Behavior Checklist; Internal = *Internalizing* scale; External = *Externalizing* scale; Social = *Social Problems* scale; Thought = *Thought Problems* scale; AQ = Aggression Questionnaire; Anger = *Anger* scale; Hostility = *Hostility* scale; Ind. Agg. = *Indirect Aggression* scale; CFI = Children's Firesetting Interview; Curiosity = *Curiosity about Fire* scale; Involve = *Involvement in Fire-Related Activities* scale.
[a]*n* = 133. [b]*n* = 133. [c]*n* = 108. [d]*n* = 125.
* p < .05. ** p < .01. *** p < .001.

Table 14

Regression Model Predicting Male CFI/Curiosity about Fire

Variable	B	SE B	β	*Adjusted* R^2	*F* value
Step 1				.026	3.86[†]
Age	-.78	.40	-.19		
Step 2				.056	2.67
Age	-.60	.40	-.15		
AQ/*Anger*	.23	.18	.16		
AQ/*Indirect Aggression*	.15	.19	.09		

Note. CFI = Children's Firesetting Interview; AQ = Aggression Questionnaire.
* p < .05. ** p < .01. *** p < .001. [†]*p* = .05.

Psychological Problems and Male Fire-Related Activities. There were three variables significantly related to male CBCL/*Involvement in Fire-Related Activities* – AQ/*Anger*: (r = .20, p = .03), AQ/*Hostility* (r = .20, p = .03), and AQ/ *Indirect-Aggression* (r = .22, p = .01). Age was not significantly correlated with male CFI/*Involvement in Fire-Related Activities* (r = .07, p = .47), AQ/*Anger* (r = -.12, p = .18), or AQ/*Indirect-Aggression* (r = -.13, p = .13) scale scores. However, age was correlated to AQ/*Hostility* (r = -.19, p = .03). Based on the aforementioned relationships, a hierarchical multiple regression was conducted. Table 15 presents data from the regression models predicting male CBCL/*Involvement in Fire-Related Activities*. Block 1, with age as the only predictor, was not significant (F(1,123) = .53, p = .47). Block 2, which added AQ/*Anger*, AQ/*Hostility*, and AQ/*Indirect-Aggression* variables, was significant (F(3, 120) = 2.70, p < .05), explaining 3.6% of the variance in male CFI/*Involvement in Fire-Related Activities* (Adjusted R^2 = .036). However, because none of the predictor variables in the second block had any significant regression coefficients, this model seems to be detecting the variance that is shared by anger, hostility, and indirect aggression.

Table 15

Regression Model Predicting Male CFI/Involvement in Fire-Related Activities

Variable	B	SE B	β	*Adjusted R^2*	*F* value
Step 1				-.004	.53
Age	.09	.12	.07		
Step 2				.036	2.69*
Age	.14	.12	.10		
AQ/*Anger*	.04	.06	.08		
AQ/*Hostility*	.04	.06	.09		
AQ/*Indirect Aggression*	.06	.07	.12		

Note. CFI = Children's Firesetting Interview; CBCL = Child Behavior Checklist; AQ = Aggression Questionnaire.
* p < .05.

Psychological Problems and Female Fire Curiosity. Table 16 presents correlation data for all CBCL, AQ, and CFI scales for the females in this study. There were no variables significantly related to female CBCL/*Curiosity about Fire* scale scores. Therefore, the planned regression analyses were not conducted.

Table 16

Correlations between All Female CBCL, AQ, and CFI Variables

	CBCL[a]				AQ[b]			CFI	
	Internal	External	Social	Thought	Anger	Hostility	Ind. Agg.	Curiosity[c]	Involve[d]
CBCL: Internal	—								
CBCL: External	.52***	—							
CBCL: Social	.41**	.45**	—						
CBCL: Thought	.57**	.55***	.51***	—					
AQ: Anger	.11	.04	.12	.05	—				
AQ: Hostility	.05	-.02	.11	.07	.66***	—			
AQ: Ind. Agg.	.15	.11	.29*	.17	.69***	.55***	—		
CFI: Curiosity	.24	.07	-.09	-.17	.08	-.05	.04	—	
CFI: Involve	.01	.04	-.18	-.05	.11	.17	.09	.15	—

Note. CBCL = Child Behavior Checklist; Internal = *Internalizing* scale; External = *Externalizing* scale; Social = *Social Problems* scale; Thought = *Thought Problems* scale; AQ = Aggression Questionnaire; Anger = *Anger* scale; Hostility = *Hostility* scale; Ind. Agg. = *Indirect Aggression* scale; CFI = Children's Firesetting Interview; Curiosity = *Curiosity about Fire* scale; Involve = *Involvement in Fire-Related Activities* scale.
[a]*n* = 53. [b]*n* = 53. [c]*n* = 32. [d]*n* = 50.
* p < .05. ** p < .01. *** p < .001.

Psychological Problems and Female Fire-Related Activities. Correlational analyses indicated that there were no variables significantly related to female CBCL/ *Involvement in Fire-Related Activities* scale scores. Therefore, the planned regression analyses were not conducted.

Comparing the Variable Correlations of Males and Females

The correlations among the psychological characteristics, thoughts, and behaviors of youth with fire involvement differed by sex. Table 17 provides a comparison of the significant correlations for males and females. Of the 36 unique correlation combinations available from the 9 CBCL, AQ, and CFI variables, the males in this sample had 27 significant correlations. In contrast, the females in this sample had only 10 significant correlations. Although the males had

17 significant correlations that were unique to their sex, the females did not. Thus, any significant variable correlation seen within the female subset of this sample was also shared by the males.

Table 17

Comparison of Significant Variable Correlations for Males and Females

	CBCL				AQ			CFI	
	Internal	External	Social	Thought	Anger	Hostility	Ind. Agg.	Curiosity	Involve
CBCL: Internal	—								
CBCL: External	M / F	—							
CBCL: Social	M / F	M / F	—						
CBCL: Thought	M / F	M / F	M / F	—					
AQ: Anger	M	M	M	M	—				
AQ: Hostility	M	M	M	M	M /F	—			
AQ: Ind. Agg.	M	M	M / F	M	M /F	M / F	—		
CFI: Curiosity	[neither]	[neither]	[neither]	[neither]	M	[neither]	M	—	
CFI: Involve	[neither]	[neither]	[neither]	[neither]	M	M	M	M	—

Note. M = significant correlation for Males only; M/F = significant correlation for both Males and Females; [neither] = no significant correlation for Males or Females; CBCL = Child Behavior Checklist; Internal = *Internalizing* scale; External = *Externalizing* scale; Social = *Social Problems* scale; Thought = *Thought Problems* scale; AQ = Aggression Questionnaire; Anger = *Anger* scale; Hostility = *Hostility* scale; Ind. Agg. = *Indirect Aggression* scale; CFI = Children's Firesetting Interview; Curiosity = *Curiosity about Fire* scale; Involve = *Involvement in Fire-Related Activities* scale.

Discussion

Psychological Characteristics

Overall sample. The youth in the current study had serious and significant mental health challenges. A substantial majority (85%) had clinically significant problems in at least one psychological domain. As expected, many of the participants were rated as having clinically significant externalizing (77%) and internalizing (53%) problems. There was also a proportion of youth who reported significant thought (32%) and social (21%) problems. Analyses found that close to one-third of the sample had clinically significant problems in three or more of these domains. As with previous research (Del Bove et al., 2008; Kolko & Kazdin, 1991), the current study results suggest that youth with fire involvement may uniquely have broad and excessive

deficits in psychological functioning that require specialized attention and intervention. Self-reports from the current study indicated that anger, hostility, and indirect aggression were extremely uncommon. Although these results are not consistent with research finding relationships between fire involvement and vindictiveness, rage (Sakheim & Osborn, 1999), and hostility (Kolko & Kazdin, 1991), it is possible that reported relationships between fire involvement and aggression (Del Bove et al., 2008; Stickle & Blechman, 2002) were captured in the current study by the aggression items contained within the CBCL/*Externalizing* scale. If the results of the current study are replicated, it may indicate the importance of viewing youth fire involvement outside the conceptualization of angry and hostile juvenile delinquents.

When considering the clinical implications of the current study, it is important to view the results within the empirical context of other published research. Findings from Kolko and Kazdin (1989) indicate that the sample of fire-involved youth in the current study have similar levels of fire curiosity and fire-related activities as the fire involved youth in their research. This suggests that the sample in the current study may be representative of other fire-involved children. If this is accurate, then it may be appropriate to generalize the current results to other youth who misuse fires.

As stated above, the sample of youth from the current study were predominantly participants who received mandated fire assessments due to pending out-of-home placements by DCF. Unfortunately, the data collected for the current study did not allow for any clear analysis of the type of proposed out-of-home placement. For this reason, this current study's results cannot be directly compared to other published research. However, reviewing research with similar samples can help put the current study's results into some context. To meet this

objective, the author has reviewed other studies of children with out-of-home placements (i.e., foster care) that measured psychological characteristics using the CBCL.

The current study's CBCL mean *t*-scores are higher than all but one of the eight studies presented by Armsden, Pecora, Payne, and Szatkiewicz (2000), who conducted a literature review of psychological characteristics (CBCL *Internalizing* and *Externalizing* scales) of children in foster care from 1986 to 1998. The current study's CBCL *t*-scores were also higher than the foster care research conducted directly by Armsden et al. (2000); Greeson et al. (2011); Leslie, Hurlburt, Landsverk, Barth, and Slymen (2004); Newton, Litrownik, and Landsverk (2000); and Woods, Farineau, and McWey (2013). All of these studies presented data for the CBCL *Internalizing* and *Externalizing* scales. The study by Armsden et al. (2000) also included the CBCL *Social Problems*, and *Thought Problems* scales. Similar to the *t*-score relationships, the current study's proportion of clinically elevated scores are higher than all of the research conducted by the authors mentioned above, and higher than all but one of the four percentage studies reviewed by Armsden et al. (2000). The overall higher level and proportion of clinical problems for the current study sample suggests that there were psychological characteristics that cannot be accounted for by their impending out-of-home status.

A comparison of CBCL/*Internalizing t*-scores of the current study subgroups with mandated (M = 65.9) and non-mandated (M = 61.5) fire assessments found that their difference was significant (t = 2.57, df = 184, p = .01, two-tailed). A comparison of CBCL/*Externalizing t*-scores of the subgroups with mandated (M = 70.4) and non-mandated (M = 69.5) fire assessments found that their difference was not significant (t = .55, df = 184, p = .58, two-tailed). In both cases it does not appear that the participants with a pending out-of-home placement were more likely to have higher internalizing or externalizing problems. This knowledge in

combination with the data provided by Armsden et al. (2000), Greeson et al. (2011), Leslie et al. (2004), Newton et al. (2000), and Woods et al. (2013) would suggest that the high levels of psychological problems for the current study sample are not related to their pending out-of-home placement.

Comparing males and females. Males and females did not show a significant difference in their levels of internalizing or externalizing problems, suggesting that the significant internalizing and externalizing problems seen in the overall sample may be an equal problem for both boys and girls with a history of fire involvement. These results are slightly different from those presented by Beech (2003), who found that male youth charged with arson presented with more internalizing problems than females, but similar levels of externalizing problems. Researchers have noted sex differences in the prevalence of youth mental health problems, finding internalizing problems to be dominated by females (Crowell, Beauchaine, & Lenzenweger, 2008; Klein, Torpey, & Bufferd, 2008; Weems & Silverman, 2008) and externalizing problems to be dominated by males (Hiatt & Dishion, 2008; Lahey, 2008; Nigg & Nikolas, 2008). Yet, this does not appear to be the case for the current sample, suggesting that there is something unique and distinct about youth who are involved with fire. Within the current sample, males demonstrated significantly higher problems with social difficulties than females. The medium magnitude of the effect size indicates that this is an area for which male treatment may benefit from additional focus. Males had significantly more thought problems than females. Although the effect size was small, it still suggests that the difference may be worth further investigation and additional treatment/focus for males.

Fire-Related Thoughts and Behaviors

Overall sample. A majority of the youth in the current study endorsed at least some level of fire curiosity, thoughts about fire, and enjoyment in reading about fire. Given that prior research has found CFI scales effective in differentiating fire involvement (Kolko & Kazdin, 1989b), it makes sense that a majority of the youth in the current study would have endorsed the CFI items. Although fire-involved and non-fire-involved youth cannot be compared, this study expands upon prior research by providing quantitative information about fire-related thoughts and behaviors that are specific to fire-involved youth. This meets the call from researchers (Kolko & Kazdin, 1986) to study fire involvement in its own right, and not only as a symptom of another disorder. Close to half of the youth in the current study endorsed wanting to play with fire or view fire-related media and approximately one-third reported that fire was magical and an exciting topic. The most favored characteristics of fire were its functionality and visual aspects. The thoughts most often associated with fire were related to candles, colors, and flames. Most participants endorsed having hid fire-starting materials at least once and a significant portion reported doing this three or more times. Close to half of the sample reported having left burn marks on items in their homes. Close to a quarter of the youth reported having had adults outside of the home report them for lighting a fire. A much smaller portion reported having pulled a fire alarm when there was no emergency. Given the existing literature supporting a connection between fire-related thoughts and behaviors and direct fire involvement (Kolko & Kazdin, 1989a, 1989b, 1992; McDonald, 2010), it is likely that the qualities of the characteristics stated above are clinically relevant because they highlight specific areas that can be targeted for intervention and treatment.

Comparing males and females. There was a significant difference between males and females with respect to fire-related thoughts and behaviors. Specifically, males had both higher fire curiosity and involvement in fire-related activities than their female counterparts. The medium effect size for the sex difference in fire curiosity suggests that addressing fire curiosity in treatment/intervention may be a higher priority for males with fire involvement than for females with fire involvement. The small effect size for sex differences in fire-related behaviors also suggests that this may be an area of fire-related intervention needed more for males than females. Although the results of this study do not conclusively support Roe-Sepowitz and Hickle's (2011) call for sex-based intervention services, it does, at the very least, provide more evidence that fire involvement risk factors for youth appear to present differently across the sexes. If MacKay et al. (2006) are correct in their assertion that fire interest may help sustain fire-involved behaviors, then the sex differences found in the current study would support the importance of assessing these characteristics, especially in males.

Psychological Problems and Fire Interest/Activities

Overall sample. For the overall sample, fire curiosity was related to social problems, anger, and indirect aggression. A regression model confirmed the predictive power of these three constructs and suggested that it is their shared variance that plays a significant role in fire curiosity outcome. Fire-related activities were related to self-reports of anger, hostility, and indirect-aggression. The model tested indicated that it is the shared variance of these three variables that had predictive power for a small amount of variance in the fire-related activities outcome. As noted above, only a small portion of this sample endorsed clinically significant levels of anger, hostility, or indirect aggression, which should not necessarily be taken as an indication that previous research (Del Bove et al., 2008; Sakheim & Osborn, 1999; Stickle &

Blechman, 2002) connecting aggression with fire involvement is inaccurate. Rather, the current study seems to support the notion that when present, anger, hostility, and indirect aggression have some predictive power when examining fire-related thoughts and behaviors. Thus, it is likely useful to assess these characteristics.

Males and females. Although anger and indirect aggression were correlated with male fire curiosity, these characteristics were not helpful in predicting male fire curiosity. The current study did not find any variables that were significantly related to female fire curiosity. Not only were anger, hostility, and indirect aggression related to male involvement in fire-related activities, but these variables were useful in predicting a small amount of its variance. The tested model indicated that it was the shared variance that had significant predictive power. This study did not find any variables that were significantly related to female fire-related activities.

Interrelationships of Behavioral and Psychological Problems for Males and Females

The males in this study had a broad set of behavioral and psychological problems that were interrelated, as evidenced by multiple significant correlations between the CBCL, AQ, and CFI scale scores. In contrast, the females had fewer significant correlations between these scale scores. There were numerous correlations that were specific to the males in this study; however, there were no correlations that were unique to the females. This may suggest that there are distinct behavioral and psychological differences between males and females with fire involvement. However, another possibility is that the apparent sex differences in correlations between behavioral and psychological problems are related to the statistical power of the current study. As stated earlier, the current study had the power to detect between small and moderate effect sizes for the male subgroup and between moderate to large effect sizes for the female subgroup. Thus, it is possible that, with a larger sample size, the current study could have detected smaller effect sizes related to sex. However, even if this had occurred, the current

results would seem to indicate that there would be noticeable sex differences in the strength of the relationships between the tested variables, thus supporting the conceptualization that there are real behavioral and psychological differences between males and females with a history of fire involvement.

Relationship of Age

Age did not generally appear to have a significant relationship with the variables explored in this study. The two exceptions were with hostility and curiosity about fire. Both of these had small negative correlations with age, suggesting that younger youth with a history of fire-involvement may have higher levels of hostility and higher levels of fire curiosity than older youth with a history of fire involvement. Prior research has shown that younger children have more associations with curiosity-based fire involvement and increased fire behaviors. Although the current study did not find age to be related to fire involvement, this may be because it did not include younger participants (ages 3 to 8 years) who accounted for a large portion of the age-related variance found in fire involvement (Chen et al., 2003; Flynn, 2009b). Given that some research has found that older adolescents report less fire involvement than younger adolescents (Slavkin, 2004), it is possible that the current study results support the notion that age is not consistently related to fire involvement for children ages 9 to 18 years.

Limitations and Future Research

Participant data in the current study were collected through a retrospective chart review. The youth were given assessment measures for the purposes of clinical intervention, not research. Thus, there was not necessarily an explicit emphasis on a standardized means of collecting demographic (e.g., race/ethnicity, out-of-home placement status) or clinical data. Future research could benefit from a prospective approach that addresses these issues. Given the

existing literature emphasizing the importance of various psychosocial factors (Lambie & Randell, 2011; Lyons et al., 2010), it would also be important for future prospective studies to collect information about the home and school environments of fire-involved youth and add these variables when presenting descriptive, predictive, and mean differential data. A potential limitation of the current study could be the underreporting of fire-related thoughts and activities due the social desirability bias that has been found to be associated with face-to-face interviews (Clark Newman et al., 2002). The current study also lacked the power to detect small effect sizes across its tested variables. Additional studies could benefit from a larger overall sample size and a larger subgroup of females in order to detect smaller effect sizes of sex across various psychological characteristics. However, even if there are smaller effects that are not being detected in the current study, researchers should consider the question of what, if any, clinical utility this knowledge would have for clinicians who are treating children with a history of fire involvement. The current study did not have a clear means of quantitatively assessing youth fire involvement (i.e., number of fires set) or qualitatively assessing what was burned. Future research would benefit from collecting this information, perhaps by using the Fire History Screen by Kolko and Kazdin (1988). Given the apparent psychological difficulties related to social and thought problems, researchers might also consider using measures that tease these constructs apart, in order to provide greater details about specific areas that clinicians can target during treatment.

Treatment Implications

Although the strong association with externalizing problems may correctly lead clinicians to focus on treating the external symptoms of youth who present with fire involvement, the results from the current study also indicate a strong need for a broad treatment approach that

incorporates interventions for internalizing problems, as well as thought and social problems. The sex differences in social and thought problems suggest that males with a history of fire involvement may have a stronger need than females for social skill development and interventions that target strange thoughts and behaviors. Although only a small proportion of the current sample reported significant levels of anger, hostility, and indirect aggression, the presence of these characteristics did appear to play a significant role in predicting fire-related activities. This suggests that there may be benefits from interventions that specifically focus on assessing and appropriately managing anger, hostility, and indirect aggression. When considering the treatment implications related to aggression, it is worth noting that this construct was assessed through measures that collected data in two different formats. Thus, it is possible that the relatively infrequent presence of anger, hostility, and indirect aggression are related to the self-report nature of the AQ. Analysis of fire-related thoughts and behaviors suggests that addressing fire curiosity may be a higher priority when treating males with a history of fire involvement, as opposed to females. Results from the overall sample suggest that younger children with a history of fire involvement may benefit from treatment that addresses hostility and fire curiosity. However, further analysis indicating that age relationships are sex-specific, suggests that this treatment approach may work best for males.

The fire-related thoughts and behaviors of the current sample illustrate the diverse clinical features of youth with a history of fire involvement. Although the data presented support individualized case conceptualizations (as with all clients seeking treatment), they also suggest that it may be beneficial for clinicians to specifically address the curiosity, individual thoughts, and perceived enjoyment associated with fire because these characteristics appear to be at least partially present for a large portion of the youth in the current study. The current study found

that the shared variance of certain psychological characteristics was predictive of fire-related thoughts and behaviors. This supports the conceptualization of youth fire involvement as a complex behavior that cannot be easily broken down into individual predictive components. Thus, the implications for treatment are that clinicians working with this behavior truly need to collect a wide variety of information about their clients because getting information on one or two aspects may not provide enough data points to form an accurate case conceptualization. Root et al. (2008) and Roe-Sepowitz and Hickle (2011) all advocated for mental health professionals to be the primary resource to evaluate youth with fire involvement. The level of psychological complexity evidenced by the current study would seem to support this idea.

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