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## Playing with fire or arson? Identifying predictors of juvenile firesetting behavior

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PLAYING WITH FIRE OR ARSON? IDENTIFYING PREDICTORS  
OF JUVENILE FIRESETTING BEHAVIOR

by

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Bachelor of Science  
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A thesis submitted in partial fulfillment  
of the requirements for the

**Master of Public Health**  
**Department of Environmental and Occupational Health**  
**School of Community Health Sciences**  
**Division of Health Sciences**

**Graduate College**  
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**THE GRADUATE COLLEGE**

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**May 2011**

## ABSTRACT

### **Playing with Fire or Arson? Identifying Predictors of Juvenile Firesetting Behavior**

by

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Firesetting is a complex behavior that spans a wide range of developmental stages in childhood and adolescence and involves varying motivations and intents. A better understanding of this destructive behavior is critical to developing strategies to control its devastating effects. The purpose of this research project was to identify potential predictors of juvenile firesetting behavior by studying youth who were enrolled in a regional firesetting intervention program. Data collected from firesetting assessment instruments completed by parents or guardians of program participants were examined. In the analyses, special emphasis was placed on evaluating associations between juvenile firesetting behavior and the socioeconomic status of the family; family structure and functioning; and select characteristics of conduct disorder or antisociality among children and adolescents enrolled in the program. Statistically significant findings in two areas of the study support empirical evidence reported in the extant literature. Among youth enrolled in the program, results indicate that those who demonstrated increased interest in fire were more likely to engage in more fire-related incidents. The second finding was that youth who exhibited behaviors characteristic of conduct disorder or antisociality were also more likely to be involved in more firesetting events. Additional research into developing appropriate assessment tools and intervention strategies is necessary.

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## CHAPTER 1

### INTRODUCTION

Unintentional injury is the leading cause of death in children between 1 and 18 years of age in the United States. In 2007, fire-related injuries were the second leading cause of unintentional injury mortality among children 5-9 years of age and the third leading cause in children 1-4 years of age (Centers for Disease Control and Prevention [CDC], 2009). Each year, approximately 300 people die as a result of a fire set by a child or adolescent, 85% of the victims are children (Flynn, 2009; Putnam & Kirkpatrick, 2005). The number of injuries and deaths is highest for those under age 5 because they lack the cognitive and physical abilities to extinguish the blaze and independently escape from a burning structure. In 2004, 50% of all fire-related child fatalities and 44% of the fire-related child injuries involved vulnerable preschoolers. The relative risk of fire-related fatality among Black, American Indian and Alaskan Native children was 2.4 to 2.5 times greater than in the general population and in all other children 4 years of age and younger (U.S. Department of Homeland Security, U.S. Fire Administration [USFA], 2008).

Nationally, in 2006, there were 14,500 structure fires caused by children engaged in fireplay resulting in 130 civilian deaths, 810 civilian injuries, and \$328 million in direct property damage; 8,500 were residential fires causing 94% of the deaths, 95% of the injuries, and 61% of the property damage that occurred. The most common sources of ignition of home structure fires are matches and lighters and 42% of these fires started by preschoolers occurred in a bedroom (Flynn, 2009). Young children who are involved in unsupervised fire behavior create significant injury, death, property damage, resident displacement, and economic loss in their communities (Zipper & Wilcox, 2005).

A troubling dimension of fire-related injury and death statistics is that the Federal Bureau of Investigation (FBI) reports that the incidence of fires intentionally set by children under the age of 18 is increasing, with juveniles accounting for more than half of arson arrests in the United States each year. One-third of those cases involve children less than 12 years of age (Kolko, 2002; McCarty & McMahon, 2005; USFA, 2008). The 2008 *Crime in the United States* statistics for Nevada show 220 reported arson arrests with 54% of the cases involving individuals 10-17 years of age (U.S. Department of Justice, Federal Bureau of Investigation [FBI], 2009). Even more concerning is that experts acknowledge the true significance of the problem is unknown because some studies indicate only 40% of juvenile firesetting incidents are reported (Putnam & Kirkpatrick, 2005). The majority are not detected, reported, investigated, or solved and therefore do not appear in any local, state or national fire incident database. A study of 1,241 Massachusetts youth referred for arson-related counseling between 2000-2002 showed only 11% of the cases were found in fire department records (Zipper & Wilcox, 2005). The covert nature of intentional firesetting complicates investigations and results in only 15-19% of the identified cases being solved or cleared by law enforcement agencies each year (FBI, 2009; Kolko, 2002). In addition to the human toll, this pattern of deliberate, destructive behavior is responsible for millions of dollars of damage, most often to residential properties. In general, families with low socioeconomic status are at greater risk because of crowded, substandard housing conditions (USFA, 2008).

Although juvenile firesetting is recognized as a serious and expanding problem, there is a limited body of knowledge regarding this harmful behavior and a relatively small number of studies published in the last decade (Del Bove, Caprara, Pastorelli, & Paciello,

2008; Kennedy, Vale, Khan, & McAnaney, 2006; Kolko, 2002; MacKay et al., 2006; Pollinger, Samuels, & Stadolnik, 2005; Putnam & Kirkpatrick, 2005; Stadolnik, 2000). A major challenge is the lack of a standardized method of defining the scope of juvenile fire involvement because it can be characterized by function, intent, motive, frequency, severity, damages, and consequences which are further influenced by the child's stage of development (Flynn, 2009; Kolko, 2002). Additional research is needed to better understand the complexity and interrelatedness of the variables that contribute to children and adolescents engaging in unsafe and unsanctioned fire-related behavior.

This retrospective, cross-sectional research project examined the presence of select sociodemographic and psychosocial variables which may be prognostic indicators of juvenile firesetting behavior among youth less than 18 years of age and their families who were enrolled in the Partnerships for Youth at Risk (PFYR) juvenile firesetting intervention program conducted in Clark County, Nevada between January 1, 2007 and December 31, 2008. The study sample was selected because the participants were known to have engaged in fireplay, firestarting or firesetting behavior that was significant enough to result in mandated enrollment in the intervention program by a referring agency. PFYR is a multidisciplinary coalition of local, state and federal fire service, law enforcement, juvenile justice, social service, school district, medical, and mental health professionals dedicated to providing prevention, education, assessment, diversion, and intervention services to juveniles and their families who are experiencing problems with fire involvement and other high risk behaviors. The youth firesetting intervention program was established in 2000 and has assisted over 2,000 children who were referred to the program through the Clark County School District (36%), area fire departments

(31%), Department of Juvenile Justice Services (23%), and health care, mental health and social service professionals in southern Nevada (10%). PFYR provides educational opportunities in the community, individual fire risk assessments, and targeted interventions and referrals for youth who have been involved in one or more fire incidents (Safe Kids Clark County & Partnerships for Youth at Risk [SKCC & PFYR], 2010).

The goal of the study was to retrospectively review data obtained through an assessment instrument completed by parents or guardians of children enrolled in the PFYR juvenile firesetting intervention program to analyze and compare the characteristics and risk factors found in the Clark County study population to those previously identified in other research that has been conducted. Based on a review of the literature, particular emphasis was given to select sociodemographic predictor variables. It was expected that children from families with low socioeconomic status; those who lacked stable family structure and functionality; and those who had a history of overt and covert acts of deceitfulness, defiance, and aggression would be more likely to engage in firesetting behavior (Kolko, 2002; MacKay et al., 2006; Pollinger et al., 2005; Putnam & Kirkpatrick, 2005; Sakheim & Osborn, 1994; Stadolnik, 2000; Stickle & Blechman, 2002). There are multiple individual, behavioral, and environmental factors that influence unsupervised fire-related activities by children and adolescents. Gaining a more thorough understanding of the characteristics and motivations of youth who set fires will provide important evidence necessary for the development and proper utilization of more effective strategies to identify at-risk juveniles and to refer them to appropriate

education, intervention, diversion, and treatment resources to protect them, their families, and the community from the potential devastating consequences of unsafe fire behavior.

## CHAPTER 2

### REVIEW OF LITERATURE

#### Typologies of Juvenile Fire-related Behavior

Fire and images of fire are ubiquitous and most children have a natural curiosity about it; especially young children who learn primarily through behaviors that are modeled by those around them. Fire does not always appear dangerous and children may be confused by mixed messages they receive or they may become fascinated by fire when they witness parents who smoke, use fire to cook meals, start fires in the fireplace, and place burning candles on their birthday cake (Gaynor, 2000; Stadolnik, 2000). In several community-based studies, the lifetime prevalence of fireplay among school-aged children and adolescents in the U.S. ranged from 35-45% (Kolko, 2002). A survey of students in grades 4-12 in British Columbia found 62% of males and 51% of females reported current-age fireplay (Del Bove et al., 2008). In terms of actual firesetting, a study conducted in 15 school districts throughout Oregon found 32% of third to eighth grade students reported setting fires outside their homes and 29% admitted setting fires within their homes (Zipper & Wilcox, 2005). In his study of children receiving mental health services at a behavioral health center in Pittsburgh, Pennsylvania, Kolko (2002) found that 19% of outpatients and 35% of inpatients reported firesetting that resulted in property damage. These prevalence rates for youth fire-related behavior reflect one aspect of the complexity of determining the scope and significance of the firesetting problem. Most children will progress through a normal developmental course of exploration and eventual mastery of safe fire behavior. Unfortunately for some, their natural interest in fire may become disastrous if they are not provided age-appropriate

fire-safety education, a safe environment, and proper supervision (Gaynor, 2000). For others, there are serious underlying issues that influence their potentially destructive behavior.

In reviewing the literature, there is inconsistency in the way subject-matter experts and researchers define and categorize firesetting behavior making it difficult to compare findings between studies. Research on juvenile firesetting has evolved from the psychoanalytical theories of the 1940's that were focused on a sexual basis for the behavior to more complex theoretical models that describe multiple individual, behavioral, social, and environmental factors that coexist, overlap, and interact to drive most fire-related behavior (Gaynor, 2000; Gaynor & Hatcher, 1987; Kolko, 2002; Putnam & Kirkpatrick, 2005). The first attempts to assess and classify youth involved in fire-related activities occurred in the mid-1970's. The work done by Dr. Kenneth Fineman created the foundation for the U.S. Fire Administration (USFA) classification system still used today (Gaynor, 2000). Given the nature of juvenile firesetting behavior, there has been a gradual shift toward integrating the perspectives of the fire service, law enforcement, and mental health communities in tackling this problem. Differences are seen in the interpretation and application of the classification scheme between disciplines which makes it more difficult to objectively measure the many elements of firesetting behavior, analyze the data, and compare research findings. It is important to recognize the distinctions between the descriptions of fire behavior, the typologies of children interested or involved in fire-related activities, and the predicted level of risk for future fire involvement (Gaynor, 2000; Putnam & Kirkpatrick, 2005).

Gaynor (2000) describes three typical phases of fire behavior development in children. Interest in fire begins between 3-5 years of age, often expressed as questions about fire or through play with toy stoves and fire trucks as children learn to incorporate the presence of fire into their lives. As they mature, this initial phase is followed by a desire to assist adults with firestarting or by experimenting with ignition sources in a controlled environment. By age 10, most children know the dangers of fire and the basic rules of fire safety. Unfortunately, many fires are started by curious children who lack an adequate understanding of fire and who live in unsafe home environments without appropriate supervision leading to unsanctioned firestarts and devastating consequences. For some youth, unusual fire interest or fascination results in increased fire risk behaviors which may represent a social, behavioral, or psychological problem.

In the juvenile firesetting literature, distinctions are made between the most commonly used terms. *Fire interest* is defined as a generalized preoccupation with fire without direct participation in fire behavior. *Fire involvement* refers to an individual who engages in actual fireplay, firestarting or firesetting. *Fireplay* and *firestarting* typically involve children less than 10 years of age who are motivated by curiosity or experimentation and whose actions are characterized by a low level of intent to inflict harm and an absence of malice. They generally involve one or two episodes that are unplanned, using ignition sources and materials that are readily available, and there is not a specific target. The child usually attempts to extinguish the fire or seek help if it gets out of control (Gaynor, 2000; Putnam & Kirkpatrick, 2005).

*Firesetting* is commonly distinguished from fireplay and firestarting based on the motive, intent, frequency, and severity of the fire behavior (Sakheim & Osborn, 1994).



What may begin as natural fire interest and unsupervised experimental firestarts can evolve into repeated firesetting. Firesetting implies a much higher level of intent to inflict harm and cause destruction and the motivations are far more complex. Typically, intentional firesetting involves a series of planned, purposeful episodes where ignition sources and flammable materials are gathered and hidden until needed for a specific target. The juvenile rarely attempts to extinguish the blaze and may instead retreat to a safe location to watch the fire burn and return to the scene later to observe the destruction (Flynn, 2009; Gaynor, 2000; Putnam & Kirkpatrick, 2005).

A juvenile who sets a fire can be charged with arson if it can be determined the child or adolescent consciously acted with intent to willfully, recklessly, and maliciously destroy property, harm others, or conceal another crime (Gaynor, 2000; Kolko, 2002). The age of criminal intent varies across the country. Nevada Revised Statute 194.010 states any person is capable of committing a crime and being held liable for punishment, except children under 8 years of age and those between 8 and 14 years of age unless there is clear proof that at the time they committed the act they understood it was wrong. Although there are differences in defining age of responsibility and culpability between jurisdictions; the literature shows most hold youth 10-12 years and older accountable for their actions unless there are extenuating circumstances (Zipper & Wilcox, 2005).

The challenge in defining children or adolescents who engage in fireplay, firestarting or firesetting behavior is determining his/her motivation and intent within the context of their stage of development. When does natural curiosity and experimentation become pathological, intentional, reckless behavior? While all unsafe fire behaviors are potentially dangerous and destructive, it is important to understand the differences

between them when assessing youth for future risk and for assigning appropriate interventions, diversions and treatments (Flynn, 2009; Kolko, 2002; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000).

The most common classification scheme for juveniles who engage in unsupervised and unsanctioned fire-related behavior includes four categories described by Robert Stadolnik (2000). The subtypes are organized by the shared characteristics of the youth which include their behavioral and psychological traits, physical and social environmental conditions, and the elements of the fire incidents. The groupings differ primarily by what motivates the child or adolescent to act and include: curiosity-motivated, crisis-motivated, delinquent, and pathologic (Kolko, 2002; Putnam & Kirkpatrick, 2005; Sakheim & Osborn, 1994).

Curiosity firestarters are typically less than 10 years of age and approximately 90% are boys. These children tend to be more impulsive, aggressive, and mischievous than their peers and are often described as hands-on learners who lack sufficient understanding of the dangers of fire. They do not intend to cause harm and they are remorseful about their actions. The curious firestarter's environment includes lapses in adult supervision that allow access to ignition sources, such as matches and lighters; often at least one parent smokes; frequently parenting skills are inadequate to manage the child's behavior; and the parents themselves have limited fire safety awareness. The one or two fire events that occur are opportunistic, most often being started in or around the home with materials that are readily available (Gaynor, 2000; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000; Stadolnik, 2000).

Crisis-motivated firesetting can occur at any age, but it is predominantly found in boys between 6-12 years old. Consciously or unconsciously, these youth attempt to draw attention to themselves as a means of coping with an underlying intrapersonal or interpersonal problem. They are often described as lacking social skills, experiencing feelings of powerlessness, and having difficulty communicating with others. Many have a history of neglect or emotional, physical or sexual maltreatment. These children convey little remorse or understanding about the potential impact of their actions on others. They live in varied socioeconomic environments and are typically exposed to major family stressors such as: the death of a close family member, separation or divorce, inconsistent discipline, domestic violence, or parental drug or alcohol abuse. The family system is unable to provide support for the child. Often the targets of the fires are symbolic as they attempt to communicate their feelings about the crises in their lives. Generally, they do not set fires to harm others, but they also do not give adequate consideration to the negative consequences of their actions (Gaynor, 2000; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000; Stadolnik, 2000).

Delinquent firesetters tend to be older children and adolescents aged 10-17 years. Up to 30% of this group is female which is not seen in the other three categories. These individuals are described as having low self-esteem, deficient social skills, limited problem-solving abilities, poor academic performance, and a higher prevalence of overt and covert acts of dishonesty, defiance and aggression. A large number of these juveniles meet the criteria for conduct disorder or oppositional defiant disorder (Stadolnik, 2000). They express little recognition or appreciation of the risks of their fire behavior to themselves or others. The home environment is typically unsafe and often includes

substance abuse, domestic violence, maltreatment, and inconsistent or harsh punishment from their parents. The fires are typically set away from home on public or private property with an increased use of accelerants with the intent of causing damage to a specific target. Often these fires provide external reinforcement for the firesetter due to the peer group dynamics and influence (Gaynor, 2000; Putnam & Kirkpatrick, 2005; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000; Stadolnik; Zipper & Wilcox, 2005).

The final category is the pathologically motivated firesetter who is most commonly a 13-17 year old male with a history of multiple cognitive, neurologic, and emotional disorders which may include paranoia, hallucinations or delusions. They often have a history of early fascination or fixation on fire and their behavior is unpredictable. Typically, their environment is chronically chaotic, violent, and abusive; often with a significant family history of mental illness. The fire incidents are usually numerous and set in a secretive and ritualistic manner. Individuals who fit into this category are rare (Gaynor, 2000; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000; Stadolnik, 2000).

Gaining a better understanding of the multiple factors that contribute to firesetting behavior is essential to being able to identify juveniles who are at greatest risk for starting fires, but also to differentiate between those who have little, definite, or extreme risk of future firesetting or recidivism. These three levels of risk outlined by the U.S. Fire Administration overlap with Stadolnik's descriptions of the individual, social, and fire incident characteristics of the subtypes of youth who engage in fireplay, firestarting and firesetting behavior (Gaynor, 2000; Sakheim & Osborn, 1994).

Children and adolescents who are motivated by curiosity or experimentation account for 60-70% of unsupervised juvenile firestarts. In general, these youth do not exhibit

serious physical, psychological or intellectual difficulties and their family and social relationships are relatively stable. The majority of these children are at little risk for future fire involvement if they receive appropriate fire safety education and the parents and guardians follow recommendations for providing a safe environment with proper supervision (Gaynor, 2000).

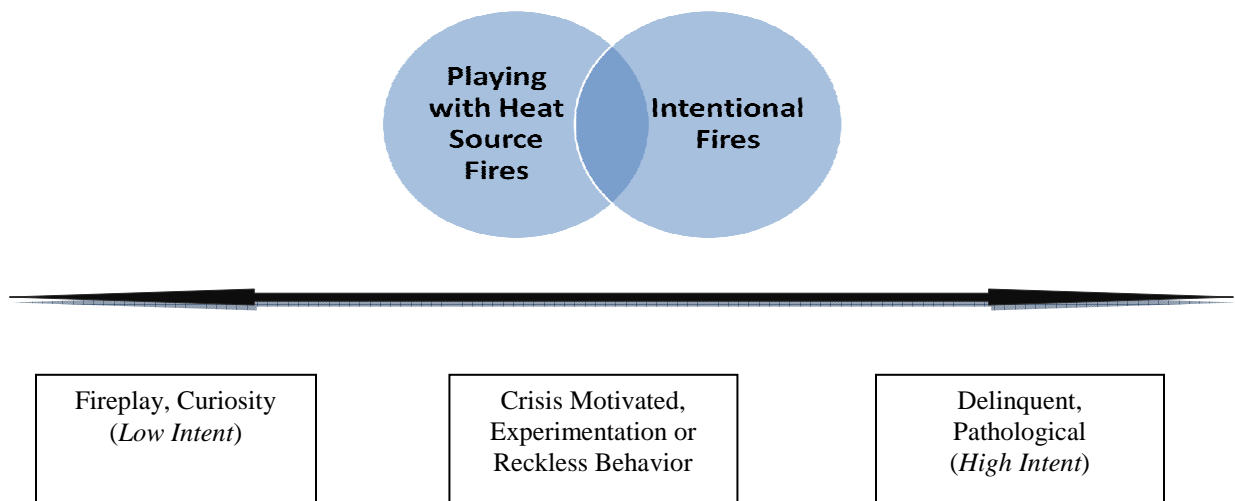
The definite risk category includes children and adolescents who have a history of firesetting and who are very likely to be involved in future episodes. Approximately 30-40% of firesetting youth fall into this group which is divided into two subcategories: troubled and delinquent juveniles. The troubled or crisis-motivated juvenile sets fires in response to acute or chronic emotional conflicts which may represent a release of anger or frustration or may be an attempt to draw attention to their stressful situation.

Firesetting by delinquent youth is typically one of several acts they commit that violate social norms. A combination of personality deficits and negative peer pressure contribute to repeated, intentional, high risk fire behavior. Both troubled and delinquent youth firesetting activities are strongly influenced by serious underlying psychological issues that must be addressed in order to control the potentially dangerous behavior. Early identification, assessment, intervention or treatment is essential in helping these juveniles and reducing the likelihood of future fire involvement. Children and adolescents in the definite risk category present the greatest challenges because successful interventions and treatments involve the entire family and can be very resource intensive (Gaynor, 2000; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000; Stadolnik, 2000).

Fortunately, only 1% of juveniles are considered pathological firesetters and are classified as an extreme risk. Most often these individuals suffer from severe mental

illnesses such as schizophrenia, psychotic disorders, or organically impaired disturbances. Fixation on fire or sensory reinforcement may be a part of their disorder which results in repetitive episodes causing them to be a danger to themselves or others. Depending upon the severity of the psychopathology, the management of these youth can include outpatient psychotherapy, pharmacologic therapy, or placement in a mental health institution or highly structured juvenile correctional facility (Gaynor, 2000; Putnam & Kirkpatrick, 2005; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000; Stadlnik, 2000).

Figure 1 is a speculative model, created by Flynn (2009), that depicts the continuum of fire-related behavior described by Stadlnik taking into account both the motivation and intent of the firestarter.



*Figure 1.* Flynn Continuum of Youth Fire-Related Behavior Model

<sup>1</sup>From "Analysis Issues Associated with Children Playing with Fire," by J. D. Flynn, 2009, National Fire Protection Association, p. 3. Copyright 2009 by the National Fire Protection Association. Reprinted with permission by the author.

Appropriate evaluation of fire-related behavior is important for the individual, their family and the community. A systematic assessment of fire-related behavior is further

complicated by the wide range of developmental stages in childhood and adolescence. The literature shows firesetting results from a complex interplay of biological, psychological and social processes that evolve over time and are influenced by the stages of development. As the child matures, the constellation of personality variables that contribute to firesetting can be impacted by changes in the child's family and social environment which may set the stage and reinforce the dangerous behavior (Kolko, 2002; Sakheim & Osborn, 1994). A lack of understanding of the potential significance of the problem and a fear of stigmatizing youth early in their lives influence parental and professional reporting, investigating, identifying, and responding to firesetting behavior (Zipper & Wilcox, 2005). The issue is multifaceted and requires a multidisciplinary approach to more thoroughly examine the many pathways that lead to high risk fire behavior over the course of time and to develop strategies that specifically target the needs of the individual at a critical point in their lives (Kolko, 2002).

### Individual Traits and Psychosocial Correlates

In general, youth firesetters are a fairly heterogeneous group, however, a number of common patterns have been identified. During the last two decades, three broad areas of interest have emerged regarding risk factors associated with youth firesetting: individual traits; family characteristics; and environmental conditions (Kolko, 2002; McCarty & McMahan, 2005; Putnam & Kirkpatrick, 2005; Slavkin & Fineman, 2000). Firesetting is predominantly a male behavior, accounting for 75-85% of reported events. Through the years, there has been an increase in female involvement in the older age groups, with some studies reporting females being responsible for up to 30% of fire incidents among

13-17 year old firesetters. Children of all ages, beginning as early as age 3, engage in fire-related behavior. The data indicate higher incidence of fireplay or firesetting among 3-5 year olds and 12-17 year olds most likely due to developmental issues associated with increased curiosity, experimentation, and growing independence (Stadolnik, 2000). Dittmann (2004) reported that fireplay tends to decrease during the elementary school years when children are exposed to fire safety education and firesetting increases during the teen years due to impulsivity and risk-taking behavior often seen in adolescence. Studies have shown the brain continues to develop during adolescence and that one of the last areas to mature is the prefrontal cortex which is associated with risk assessment and decision-making. These findings provide a biologic basis for understanding why adolescents are vulnerable to high risk behaviors as they gain independence and are exposed to greater challenges in their social and cultural environment (Hazen, Schlozman, & Beresin, 2008).

Beyond the basic demographic description of these youth, there are recurring patterns of individual characteristics among moderate to high risk firesetters reported in the literature. Intentional misuse of fire is rarely an isolated behavior, but is often associated with diverse maladaptive psychosocial factors and likely correlates that vary depending on the developmental stage and a number of other variables, including the severity and persistence of the firesetting. The most common individual behaviors identified include: overt and covert acts of deceitfulness, defiance, and aggression; sociality deficits; and substance use. MacKay, Paglia-Boak, Henderson, Marton, & Adlaf (2009) surveyed almost 4,000 students in grades 7-12 to examine differences between non-firesetters and firesetters. The firesetters were categorized into groups based on the frequency of their



firesetting behavior in the preceding 12 months. All of the firesetters were more likely than non-firesetters to report psychological distress, delinquent behavior, and recreational drug use. Those in the high frequency firesetting group ( $\geq 3$  incidents in the preceding year) had the highest relative risk ratios on measures of elevated psychological distress (RRR = 2.25), suicidal intent (RRR = 2.16), high sensation-seeking (RRR = 2.45), delinquent acts (RRR = 4.73), and frequent cannabis use (RRR = 2.55) as compared to non-firesetters and lower frequency firesetters. One exception was the measure of binge alcohol drinking which was higher for the low frequency group (RRR = 2.47) than the high frequency group (RRR = 2.10). In general, as the frequency of firesetting increased so did the number and significance of the risk factors and problem behaviors. In a study involving juveniles enrolled in an outpatient juvenile firesetting program MacKay et al., (2006) found a significant positive correlation between antisocial behavior, as measured by the Child Behavior Checklist, and the severity and persistence of firesetting behavior. According to research conducted by Kolko (2002), children hospitalized with mental illness who had a history of firesetting had higher levels of externalizing and antisocial behaviors, including aggression, hostility and impulsivity than those who had not engaged in firesetting. They were also found to have lower levels of sociability when compared to their peers. Deficits in social interaction skills have been associated with severe firesetting behavior and have been identified as a strong predictor of recidivism (Sakheim & Osborn, 1994; Slavkin & Fineman, 2000). Del Bove et al., (2008) also reported poor social skills, heightened aggression, antisocial/delinquent behavior, and hyperactivity and impulsivity among firesetters within a clinical psychiatric setting. These authors and others acknowledge firesetting often coexists with other acts that

violate the rights of others or basic societal norms, but the presence of the behavioral characteristics of conduct disorder or delinquency alone does not sufficiently explain high risk firesetting in all youth firesetters. As previously indicated the individual and family characteristics are often interrelated and must be examined simultaneously.

The family characteristics most commonly observed include evidence of family instability and dysfunction, inconsistent and extreme forms of discipline, limited supervision, parental disengagement, and parental stress and psychopathology (Kolko, 2002; Putnam & Kirkpatrick, 2005; Root, MacKay, Henderson, Del Bove, & Warling, 2008; Slavkin & Fineman, 2000). McCarty & McMahon (2005) studied 361 children from four different geographic areas in the U.S. over two developmental periods, early elementary school years and late elementary school years, and classified them into four categories based on their firesetting behavior. Of particular interest was the finding that children who were classified as persistent firesetters demonstrated greater exposure to parental depression, interparental conflict, and ineffective discipline as compared to the other groups. Becker, Stuewig, Herrera, & McCloskey (2004) conducted a 10 year prospective study of mothers who had been abused by their partner and their children to examine the relationship between family risk factors and adolescent outcomes. They used a high risk community sample without preselection of children with known behavior problems and a comparison group of mothers and children recruited from the community at large. The findings indicated children from homes with marital violence, paternal pet abuse, and paternal alcohol use were more likely to engage in firesetting. In addition, even after controlling for conduct disorder through regression analysis, the researchers found the firesetters were at 3 times (95% CI = 1.3-6.7) higher risk for juvenile court

referral and at 3.3 times (95% CI = 1.4-7.6) higher risk for arrest for a violent crime than the non-firesetters. Several other studies have identified that even within samples of delinquent youth those who engage in firesetting are found to exhibit more severe acts of defiance and aggression. Firesetting may be a marker for more seriously disturbed youth (Root et al., 2008; Sakheim & Osborn, 1999; Stickle & Blechman, 2002). Root et al. (2008) studied a long-held belief that child maltreatment is a risk factor for firesetting behavior by comparing two groups of firesetters; one with a history of maltreatment and another without. They found children with a history of at least one form of abuse were more frequently involved in fire incidents, used a greater variety of ignition sources and targets, were more likely to experience a family stressor that motivated the firesetting, and had a greater likelihood of recidivism than the non-maltreated group. Regarding other family stressors, some studies have found troubled or delinquent youth with severe or persistent firesetting behavior are more likely to live in a single parent household in the low to middle socioeconomic income range (Gaynor, 2000; MacKay et al., 2006).

The environmental conditions that contribute to fire misuse include neglectful home environments with inadequate supervision that allow children and adolescents with increased fire interest to engage in unsafe fire behavior. Several studies have shown that heightened fire interest and greater involvement in fire-related acts, such as hiding ignition sources or pulling fire alarms, are associated with increased frequency and versatility of unsanctioned fire activity and may be important predictors of firesetting severity and recidivism (Kennedy et al., 2006; Kolko, Herschell, & Scharf, 2006; MacKay et al., 2006). Initial curiosity about fire may become persistent firesetting in individuals who derive internal or external reinforcement for the behavior (Slavkin &

Fineman, 2000). Identifying children or adolescents with abnormal levels of fire interest may have predictive value for future or subsequent episodes of high risk fire behavior and provide guidance for prevention, intervention and treatment decisions.

Firesetting is a complex behavior that occurs with varying degrees of severity and is associated with a broad array of interrelated biological, psychological, cognitive and social variables that change throughout the developmental stages in childhood and adolescence. Often firesetting behavior co-exists with conduct disorder and other psychological or behavioral problems that operate within the context of the youth's social environment making it difficult to tease out the variables that influence each behavior individually. In addition, there are a number of confounding or intervening variables to be considered, including race/ethnicity, age, gender, and socioeconomic status.

The significance of the juvenile firesetting problem as identified in the current literature requires a public health approach to more accurately define the problem; identify and describe the risk factors leading to this behavior; and to design, implement, and evaluate cause-specific prevention, intervention and treatment strategies to reduce the incidence and consequences of fire-related injuries and deaths. In an effort to contribute to the existing body of knowledge, this study examined the characteristics, circumstances, and potential predictors of juvenile firesetting among children and adolescents enrolled in a regional juvenile firesetting intervention program. The focus was to compare select sociodemographic, psychosocial and behavioral characteristics within the study sample and compare the findings with those published in the literature.

## CHAPTER 3

### METHODOLOGY

This research project involved retrospective analysis of data extracted from de-identified risk assessment questionnaires completed by parents or guardians of children or adolescents who were enrolled in the PFYR juvenile firesetting intervention program during a two year period. An applied, descriptive, mixed methods approach was used to identify and describe the characteristics of juveniles who engaged in fireplay, firestarting or firesetting behavior. The goal of the study was to contribute to a better understanding of the characteristics of children who set fires; identify possible prognostic indicators of fire-related behavior; use the information to develop effective strategies to recognize at-risk youth before they act; and encourage appropriate use of limited education, intervention, and therapeutic resources that are necessary in addressing youth firesetting.

#### Study Population

The sampling strategy for this study was a nonprobability, convenience sample selected from an accessible population of individuals enrolled in the PFYR firesetting intervention program in Clark County, Nevada.

- Inclusion Criteria: Children and adolescents less than 18 years of age who were enrolled in the PFYR program and at least one parent or guardian who completed the youth firesetting intervention program research questionnaire between January 1, 2007 and December 31, 2008.
- Exclusion Criteria: Individuals who had a history of firesetting behavior, but were not enrolled in the PFYR program; and participants in the PFYR program

who did not complete the youth firesetting intervention program research questionnaire between January 1, 2007 and December 31, 2008.

The 187 participants were children and adolescents who had engaged in fireplay, firestarting or firesetting behavior and were referred to the program by fire, law enforcement, juvenile justice, education, and clinical professionals following a formal assessment of their fire-related behavior. At least one parent or guardian must accompany the juvenile throughout the program. Once enrolled, the children and their parents or guardians are required to complete 12 hours of classroom training, mandatory homework assignments, a two hour supervised visit to the University Medical Center Burn Center, and a minimum of two hours of mental health evaluation. The goals and objectives of the program are to assist the youth and their families in developing strategies to address a variety of high risk behaviors, not just firesetting. It typically takes about six weeks to complete the program which is offered free of charge.

Following the initial orientation, parents or guardians were asked to complete a self-administered, 68 item fire risk assessment survey related to their child and his/her behavior. This was accomplished during one of the initial classroom sessions and according to program administrators all adult participants complied. They were instructed to answer the questions to the best of their ability but they were not required to answer all of the questions resulting in large numbers of missing values for some questions. The questions with the highest non-response rates were those requiring a free text response for clarification of a yes/no answer; those requesting information from a time period greater than the previous two years; and those requesting specific medical information. Significant differences in the proportion of non-responses to these types of

questions based on categories of youth firesetting behavior were not observed. The only questionnaires excluded were those that fell outside the dates of the study period. All data were de-identified to protect the confidentiality of the program participants and their families.

## Research Question, Objectives, and Hypotheses

### Research Question

Are socioeconomic status, family structure and function, and select behaviors characteristic of conduct disorder or antisociality of a child or adolescent associated with juvenile firesetting behavior among youth less than 18 years of age who were enrolled in the Partnerships for Youth at Risk (PFYR) juvenile firesetting intervention program in Clark County, Nevada?

### Objectives

- Objective 1: To compile, organize, and analyze data obtained from the PFYR program to determine if there are identifiable characteristics, circumstances, or risk factors for juvenile firesetting behavior in youth less than 18 years of age; with a focus on select predictor variables, to include socioeconomic status, family structure and function, and psychosocial behaviors.
- Objective 2: To contribute new information to the existing body of knowledge to assist in the development of evidence-based diagnostic screening tools to identify firesetting behavior.

- Objective 3: To contribute new information to assist in designing, implementing, and evaluating cause-specific prevention and intervention strategies to reduce the incidence and consequences of fire-related injuries and deaths.

### Hypotheses

$H\emptyset_1$ : The socioeconomic status of a child or adolescent enrolled in the PFYR juvenile firesetting intervention program does not have an effect on their firesetting behavior.

$HA_1$ : A child or adolescent enrolled in the PFYR juvenile firesetting intervention program who comes from a family with low socioeconomic status is more likely to engage in more firesetting incidents.

$H\emptyset_2$ : The structure and function of the family of a child or adolescent enrolled in the PFYR juvenile firesetting intervention program does not have an effect on their firesetting behavior.

$HA_2$ : A child or adolescent enrolled in the PFYR juvenile firesetting intervention program who lives in a stressed or unstable, single or dual parent household is more likely to engage in more firesetting incidents.

$H\emptyset_3$ : Evidence of behaviors characteristic of conduct disorder or antisociality of a child or adolescent enrolled in the PFYR juvenile firesetting intervention program does not have an effect on their firesetting behavior.

$HA_3$ : A child or adolescent enrolled in the PFYR juvenile firesetting intervention program that has a history of exhibiting behaviors characteristic of conduct disorder or antisociality is more likely to engage in more firesetting incidents.

Based on the literature, it was expected the analysis of the data would reveal an association between juvenile firesetting behavior and low socioeconomic status of the



family; a stressed or unstable family environment; and evidence of behaviors characteristic of conduct disorder or antisociality among youth enrolled in the PFYR program. Other stressors in the lives of these children or adolescents examined were child abuse or neglect; exposure to disturbing events, such as death or forced separation of a loved one; or being a victim of bullying. It was projected the majority of the participants would be males between the ages of 8-14 years.

### Measurements

This retrospective, cross-sectional study examined select demographic, socioeconomic, and psychosocial data extracted from questionnaires completed by parents or guardians of youth enrolled in the PFYR firesetting intervention program to determine if there were associations between these variables and fire-related behavior. The enrollment of the participants in the program was mandated by fire service, law enforcement, juvenile justice or school district authorities. The PFYR program administrators reported the children and adolescents were evaluated using a series of assessment instruments including the modified comprehensive fire risk assessment tool designed for parents and guardians. The PFYR adult questionnaire for parents or guardians was created by compiling key elements from two well-known instruments used nationally. The original surveys were developed by Kenneth R. Fineman and the Colorado Juvenile Firesetter Prevention Program (Gaynor, 2000) and the Oregon SOS Fires: Youth Firesetting Intervention Program (SOS Fires: Youth Intervention Program [SOS Fires], 2004). Revisions to the PFYR adult fire risk survey recommended by representatives from partner organizations in Clark County were incorporated as a means

of capturing additional information regarding the child's medical history to examine other possible predictors.

The parent/guardian fire risk assessment questionnaire served as the only data source for this study. It was a 68 item instrument composed of 6 questions with Likert scale responses, 53 closed-ended questions with a free response section for additional comments, and 9 open-ended questions. The tool provides the opportunity for parents or guardians to assess their child in the following areas: fire knowledge, interest, and involvement; family structure and functionality, including parent/stepparent/child relationships; select behavioral characteristics, such as deceitfulness, anger, aggression, and sociality; life event stressors; medical and mental health history; demographics; and socioeconomic status.

The study data were obtained from the PFYR adult firesetting risk assessment instruments completed in 2007 and 2008. According to program administrators, each parent or guardian provided informed consent for collection and analysis of data to be used to study the youth firesetting problem and to assist fire, law enforcement, juvenile justice professionals, educators and clinicians in developing strategies to combat the problem. The participant-related records were securely maintained in the PFYR office located within Henderson Fire Department in Henderson, Nevada.

In the early stages of data analysis, it was determined that approximately 50% of the 68 questions in the adult questionnaire would be excluded because the questions were too vague (e.g., Do you remember any problems with child's eating, sleeping, or crying?); were unrelated to the topic being studied (e.g., If children are the age of 6 & under, & weigh 60 lbs or less, are they in a booster or car seat while traveling in a car?); or were

medical questions that required validation with medical records which were not available in order to determine if the responses were meaningful (e.g., Wife died 3x during birth). The medical questions also had very high non-response rates, most greater than 50%. The remaining questions included in the analysis were those most closely related to the three hypotheses being examined. Where possible the missing values were imputed and the dataset was further evaluated and found to be not normally distributed giving direction to the types of nonparametric tests that would be used for analysis of association and significance.

The next step involved exploratory factor analysis to identify separate component variables within the dataset that were related and could be grouped into single composite measures (Costello & Osborne, 2005). The alpha-factoring extraction method was employed which is based on the reliability of common factors. Bartlett's test of sphericity was significant ( $\chi^2 = 644.31$ ,  $df = 276$ ,  $p < .001$ ) and the Kaiser-Meyer-Olkin measure of sampling adequacy was acceptable at .59 (C. L. Cross, personal communication, January 27, 2011). A total of nine factors had eigenvalues  $>1$ . The proportion of variance explained by each of the first seven factors ranged from 11.70% to 5.15 %, respectively. The cumulative proportion of variance explained by these seven factors was 51.13%. The scree plot showed a break or elbow at the fifth data point and then the line flattened out. After examining the factor loadings, which ranged from .34 to .80, a total of five factors were retained that met all of the criteria (Costello & Osborne, 2005). Crossloading between two factors occurred with only one variable. Based on these findings, four composite measures were created: the Firesetting Scale, Family Environment Scale, Parent Fire Safety Perceptions Scale, and the Youth Psychosocial

Correlates Scale. The reliability of each scale was evaluated with the Cronbach's alpha test and was found to be acceptable. The selection of the components for each scale was not only supported by the findings of the exploratory factor analysis, but also by evidence in the literature and consensus from an expert panel. The members of the panel who reviewed the variables included two biostatisticians, an injury epidemiologist, medical sociologist, and child development specialist who agreed the selection of the items for each scale seemed logical and appropriate.

### Outcome Variables

The outcome variables in this study were items measuring juvenile fire-related behavior. The literature tends to differentiate between fireplay, firestarting and firesetting based on the intent and motivation of the child or adolescent (Gaynor, 2000; Kolko, 2002; Putnam & Kirkpatrick, 2005; Slavkin & Fineman, 2000). The detail necessary to make these distinctions between the specific types of fire-related behavior was not captured in the PFYR parent survey. It was also difficult to classify the severity of the behavior based on the frequency of incidents alone because several correlates typically considered when making the determination of severity were not sufficiently measured in the questionnaire (Sakheim & Osborn, 1999). Results of the fire incident investigation and mental health assessment of the youth were not available for analysis but would have provided pertinent data related to intent, motivation, and possible psychopathology which are necessary elements in defining the severity of fire-related behavior.

In this study, the children or adolescents were identified as having been involved in one or more fireplay, firestarting or firesetting incidents significant enough to result in

referral to the PFYR firesetting intervention program by fire service, law enforcement, juvenile justice, school district, or mental health professionals. The outcome variables selected were survey items measuring the juvenile's fire behavior expressed as a composite scale representing a summation of responses related to the child's interest in playing with fire, matches or lighters (from 1 = strongly disagree to 9 = strongly agree); and the number of fire-related incidents reported (1- ≥ 5). All questions were reviewed and the responses were recoded to ensure they measured in the same direction with 0 representing less affect and 1 representing more affect on firesetting behavior. The number of times each participant had engaged in fire-related behavior was recoded into five categories: 1 = one time, 2 = two times, 3 = three times, 4 = four times, 5 = five or more times. The selection of the variables included in the firesetting composite scale was supported by exploratory factor analysis and literature that identified the child's interest in fire and the frequency of fire involvement as important factors in broadly determining the significance of fire-related behavior (Dadds & Fraser, 2006; Gaynor, 2000; Kolko, 2002; MacKay et al., 2006; Sakheim & Osborn, 1994). The Firesetting Scale had a range of 1-6 ( $M = 3.40$ ;  $SD = 1.85$ ) and was moderately reliable with a Cronbach's alpha of .65.

#### Predictor Variables

The primary predictor variables examined were the socioeconomic status of the family, family structure and functioning, and evidence of behaviors related to conduct disorder or antisociality of the child or adolescent enrolled in the firesetting intervention program. Socioeconomic status is generally related to income and assets, level of education, occupation, and living conditions. As a reference point, the U.S. Department of Health and Human Services (2008) set the poverty guideline for a family of seven (the

largest family size in this sample) as \$32,000. For the purposes of this study, socioeconomic status was measured by the family's estimated annual household income as reported on the PFYR questionnaire. The responses were recoded as follows: \$25K or less and \$26K to \$30K = \$30K or less; \$31K to \$40K, \$41K to \$50K and \$51K to \$60K = \$31K to \$60K; \$61K to \$70K and \$71K to \$100K = \$61K to \$100K; \$101K or more remained the same. In addition, the socioeconomic status of the family was further described by select characteristics of the zip code where the family resided. This information was reported for the zip codes with the highest rates of PFYR program participants per 10,000 youth less than 18 years of age. The characteristics included: level of education attained, employment status, median income, and types of housing. The zip code data were obtained from the U.S. Census Bureau American FactFinder, 2006-2008 American Community Survey 3-Year Estimates databases and annual *Las Vegas Perspective* publications which provide more detailed zip code level information about communities in Clark County.

Family structure was based on responses to questions in the PFYR questionnaire regarding family composition. The first series of questions were related to the presence of parents in the home, these included: Are both of the child's parents living in the same home? (0 = no, 1 = yes) Or, are the parents separated, divorced, never married or deceased? (Select one) This question was recoded as a five category, nominal variable: 0 = never married, 1 = married, 2 = separated, 3 = divorced, 4 = deceased. Is there a stepparent in the home? (0 = no, 1 = yes) These responses were recoded into a three category, nominal variable: 0 = single parent in home; 1 = both parents in home;

2 = two parent figures in home, to include stepparents. Questions regarding the non-custodial parent's involvement in the child's life and an assessment of the stepparent-child relationship measured by responses to two questions specifically related to these items (0 = no, 1 = yes, describe briefly = free text response) had high non-response rates (34-35%) and were not useful. The number of "other children in the home" ranged in age from < 1 year to 35 years. Those reported as  $\leq 18$  years of age were included as "other children in the home" along with parents and stepparents when measuring family size. To simplify references to the different types of parent-figures represented in the sample, parents, stepparents and guardians will be referred to as parents from this point forward.

The survey items that would have been useful to assess family function; such as the number of times the family had moved in the preceding one and three year periods and the methods of discipline the parent used when addressing the juvenile's fire-related behavior were vague and had high non-response rates (38-59%). Exploratory factor analysis produced a factor that included three variables related to the family environment, these included: if the parent(s) or child had been involved with child protective services (0 = no, 1 = yes, describe briefly = free text response), if the parent(s) believed the child had been a victim of neglect, physical or sexual abuse (0 = no, 1 = yes), and if there were other children in the home that had "played with fire" (0 = no, 1 = yes). These items were summed into a composite measure, Family Environment Scale; with a range of 0-3 ( $M = .52$ ;  $SD = .74$ ) and marginal reliability with a Cronbach's alpha of .50. The decision was made to retain the measure for analysis, but to also examine the relationship between the individual components and the Firesetting Scale.

Another element of the family environment examined was the parents' attitudes and beliefs about their child's knowledge of fire safety. A factor with five component variables was identified during exploratory factor analysis and a composite measure was created which included the following items: if the parent thought the child understood the dangers of fire; that the parent had adequately discussed the dangers of matches and lighters; that the child had been taught about the dangers of fireplay at school; that the parent did not expect the child would start a fire; and that the parent was surprised the child set a fire (0 = no, 1 = yes). These items were summed into a composite measure; the Parent Fire Safety Perceptions Scale. The scale had a range of 0-5 ( $M = 4.18$ ;  $SD = 1.07$ ) and marginal reliability with a Cronbach's alpha of .54. Given the poor coefficient of reliability, the components were also analyzed individually to examine their relationships with the outcome variable.

The final grouping of predictor variables was related to evidence of behaviors characteristic of conduct disorder or antisociality on the part of the child or adolescent and select mental health stressors. The term "antisocial behavior" was used throughout the juvenile firesetting literature when authors described a complex of behaviors exhibited by a child or adolescent that violated the rights of others or basic societal norms. According to the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, a person cannot be diagnosed with antisocial personality disorder until at least 18 years of age (Samenow, 2001). The term "conduct disorder" should be used instead when describing a child or adolescent who engages in a repetitive and persistent pattern of overt or covert deceitful, defiant, destructive or aggressive behaviors without regard for themselves or others (Mental Health America [MHA], 2010;



Samenow, 2001). The latent relationship between mental health risk factors and behavioral manifestations of conduct disorder may be difficult to distinguish.

Based on exploratory factor analysis and evidence in the literature, two factors were identified that grouped nine conceptually correlated psychosocial independent variables. The measurement of conduct disorder or antisociality and mental health stressors included survey items expressed as a composite scale representing a summation of responses related to reports of select deceitful or aggressive behaviors and an assessment of mental health risk factors. The Youth Psychosocial Correlates Scale included questions related to truancy; being mean to other children or family members; bullying; being cruel to animals; blaming others for their actions; not assuming responsibility for their negative behavior and its consequences; reports of “behavior challenges” from teachers or others in the preceding two years; being a victim of bullying; and reports of the child experiencing a disturbing event in the preceding year (0 = no, 1 = yes, describe briefly = free text response). The scale had a range of 0-9 ( $M = 2.48$ ;  $SD = 1.85$ ) and was moderately reliable with a Cronbach’s alpha of .65. Questions related to the child’s dishonesty and involvement in the juvenile justice system (0 = no, 1 = yes) were initially considered as scale components because they were identified in the literature as behaviors often found in youth with conduct disorder or antisociality; however they negatively impacted the reliability test results and were removed. The association between these items and firesetting behavior as measured by the Firesetting Scale were examined individually. The questions specifically related to the youth’s mental health history had high non-response rates (38-81%), vague responses, and were not useful.

## Statistical Approach - Data Analyses

The sample size was 187 participants. Data obtained from the PFYR firesetting risk assessment instruments were entered into an Excel spreadsheet, exported and stored for analysis using SPSS 18.0 software. Data were reviewed to identify and correct entry errors and some variables were recoded to ensure uniformity of measurement.

Descriptive statistics for measures of central tendency and dispersion of the predictor and outcome variables were performed initially; specifically, mode, median, mean, range, and standard deviations, as appropriate for the type of variable and level of measurement for each predictor and outcome variable. Statistical tests for normality, Shapiro-Wilk and graphical plots showed the data were not normally distributed. Nonparametric measurement of association between the outcome variable and the binary predictor variables was performed using Pearson's point-biserial correlation. Spearman rank correlation coefficient procedure was used for the predictor variables with more than two response categories. The Mann-Whitney U test was performed to determine if significant differences existed between the Firesetting Scale and the binary predictor variables and Kruskal-Wallis one-way analysis of variance by ranks test was used for the predictor variables with more than two categories.

In addition, the four continuous scales were transformed into categorical variables so chi-square analysis could be performed. The Firesetting Scale was recoded to characterize firesetting risk as: 1-2 = Low; 3-4 = Moderate; 5-6 = High. The Family Environment Scale was recoded to indicate the presence of select family stressors: 0 = Low; 1 = Moderate; 2-3 = High. The Parent Fire Safety Perceptions Scale was recoded to signify the parent's perceptions of their child's fire safety knowledge:

0-3 = Poor; 4 = Fair; 5 = Good. The first grouping had a wider range because there were very few responses in the 0-2 categories. The final scale was the Youth Psychosocial Correlates Scale which was recoded to denote the presence of select psychosocial characteristics or stressors: 0-2 = Low; 3-5 = Moderate; 6-9 = High. Cross tabulation of the outcome and predictor variables was performed using chi-square distribution analysis to test the significance of differences between the observed and expected frequencies. For all statistical testing, the level of statistical significance was set at  $\alpha .05$ .

## CHAPTER 4

### RESULTS

#### Sample Characteristics

The de-identified dataset provided by the PFYR program included information collected from fire risk assessment surveys completed by the parents or guardians of 187 youth enrolled in the firesetting intervention program during the two year study period, January 1, 2007 to December 31, 2008 (N = 187). The majority of the study subjects were male (86.6%) and all but one of the female subjects were 10 years of age or older; as typically reported in the literature. To accommodate for small case counts for some years of age, the youth were categorized into three age groups: elementary school-aged, 5-9 years (8.6%), middle school-aged, 10-13 years (49.2%) and high school-aged, 14-17 years (42.2%). According to Stadolnik (2000), there is usually a higher incidence of fireplay or firesetting among 3-5 year olds and 12-17 year olds due to developmental issues associated with increased curiosity, experimentation, and growing independence. Fireplay tends to decrease during the elementary school years when children are exposed to fire safety education (Dittmann, 2004). The differences noted in this sample are likely due to the referral sources for this mandated firesetting intervention program.

The racial composition of the sample was White (47.6%), Hispanic (20.9%), Multi-racial (15.5%), Black (6.4%), Asian/Pacific Islander (5.9%), and American Indian (2.7%). One percent of the sample did not respond to the question regarding race. During this time period, the Nevada State Demographer's office reported the racial/ethnic distribution of youth 5-17 years of age in Clark County to be: White 43.2%, Hispanic 38.0%, Black 10.7%, Asian/Pacific Islander 7.2%, American Indian/Eskimo/Aluet 0.9%.

The demographer did not include a multi-racial category so rates for each racial/ethnic group could not be calculated. One-third of the youth lived in single parent households and approximately one-third of the families had an annual household income of \$30,000 or less (see Table 1).

## Descriptive Statistics and Tests of Association and Significance

### General Characteristics

All of the children and adolescents enrolled in the PFYR program had engaged in at least one episode of fireplay, firestarting or firesetting; 26.7% had been involved in one episode, 18.2% in two, 17.1% in three, 11.8% in four, and 26.2% were involved in five or more episodes, all with varying degrees of severity reported. In 70.6% of the cases the fire department was called, or there was police department involvement, or school district action was taken in the form of suspension or expulsion as a consequence of the fire-related behavior. Property damage occurred in 26.7% of the incidents, but was not well-described. Only five (2.7%) respondents listed injury as an outcome; none were identified as serious and there were no reported deaths. Spearman rank correlation coefficient testing did not show a statistically significant association between the Firesetting Scale and fire incident outcomes (see Table 2). The results of the Kruskal-Wallis test indicated the distribution of composite firesetting scores was the same across all categories of incident outcome; therefore the null hypothesis was retained (see Table 3). The low number of injuries was surprising given the 2007-2008 University Medical Center Burn Registry data included 80 patients less than 18 years of age with burn injuries secondary to fireplay, firestarting or firesetting (M. Martinat, personal

communication, October 21, 2010). These findings suggest there may be significant under-reporting of juvenile fire-related behavior in Clark County, which is consistent with other reports in the literature (Putnam & Kirkpatrick, 2005).

The majority (74.6%) of fire incidents occurred outside, off the family's property; 10.7% were outside, on the family's property; and 14.7 % took place inside a home, school or other building. Among the youngest children (5-9 years), 53% of the incidents occurred outside away from the family's property and of those that occurred inside the home, 83% were in a bedroom. The most common ignition sources were lighters (46.8%), matches (31.4%) or both (21.8%). Those who responded to the question regarding smoking (163/187) indicated that approximately half of the youth lived in a home where at least one person smoked. At the time of the incident, 56% reported the supervising adult was away from home, 44% were inside the home, and 2.4% were at home, but outside. The findings related to the distribution of gender, incident location, access to ignition sources, and lapses in adult supervision are consistent with what has been reported in the literature.

Table 4 presents the Pearson point-biserial correlation matrix showing statistically significant correlations between the Firesetting Scale and select predictor variables related to the areas of primary interest in this study. As a component of the Firesetting Scale, the youth's fire interest was significantly associated with the composite measure ( $r_{pb} = .671, p < .01$ ). As shown in Table 3, the Mann-Whitney U test showed the distribution of the composite firesetting scores was not the same between youth who had shown an interest in fire and those who had not; therefore the null hypothesis was rejected ( $p < .01$ ). In addition, when tested separately fire interest was significantly

associated with the frequency of firesetting incidents ( $r_{pb} = .473, p < .01$ ) and the distribution of fire-related incidents differed between those who showed an interest in fire and those who did not ( $p < .001$ ). The Firesetting Scale was weakly associated with one of the family environment variables related to other children in the home playing with fire ( $r_{pb} = .225, p < .01$ ). The significance of the Mann-Whitney U test result indicated the distribution of the firesetting composite scores differed between families that had other children who engaged in fireplay and those who did not ( $p < .01$ ). There were weak correlations between the Firesetting Scale and several psychosocial variables; such as, the child being mean to others ( $r_{pb} = .162, p < .05$ ); being mean to animals ( $r_{pb} = .233, p < .01$ ); and having a history of behavioral issues reported by teachers or others in the preceding two years ( $r_{pb} = .147, p < .05$ ). The Mann-Whitney U test results were significant for these three variables indicating there were differences in the distribution of the composite firesetting scores across the categories of those children who were or were not mean to others or to animals, or who did or did not have a history of behavioral issues ( $p < .05$ ); the null hypotheses were rejected. Weak correlations were noted between the composite firesetting score and children who bullied others ( $r_{pb} = .160, p < .05$ ) or blamed others for their actions ( $r_{pb} = .151, p < .05$ ), but the Mann-Whitney U test results were not significant, therefore the null hypotheses were retained that the distribution of Firesetting Scale scores was the same across all categories. There was a statistically significant negative association between firesetting composite scores and the parent being surprised by the youth's fire-related behavior ( $r_{pb} = -.174, p < .05$ ). The Mann-Whitney U test result was significant indicating there was a difference in distribution of firesetting

scores between parents who were surprised by the fireplay and those who were not ( $p < .01$ ).

The majority of parents believed their children understood the risks of playing with fire (77%); thought they had adequately discussed the dangers of playing with matches or lighters with their child (89%); and expected their child had been taught fire safety in school (82%). Spearman rank correlation testing did not show a statistically significant association between the Parent Fire Safety Perceptions Scale and fire-related behavior as measured by the Firesetting Scale. The Kruskal-Wallis test result was also not significant indicating the distribution of the firesetting composite scores was the same across all categories of the parents' perceptions of their child's fire safety knowledge composite scores, therefore the null hypothesis was retained. Pearson point-biserial correlation testing showed there were statistically significant correlations between some of the variables related to the parents' perceptions of their child's fire knowledge and the parents' belief they had adequately discussed fire dangers ( $r_{pb} = .155, p < .05$ ) and that their child had been taught fire safety in school ( $r_{pb} = .225, p < .01$ ). Nearly 9 out of 10 parents were surprised their child or adolescent had engaged in fire-related behavior. The relationships between the parent being surprised or not expecting the fireplay or firesetting again related to their belief they had adequately discussed the issue with their child ( $r_{pb} = .231, p < .01$ ); that it had been addressed at school ( $r_{pb} = .226, p < .01$ ); and that they believed the child understood the dangers of fire ( $r_{pb} = .245, p < .01$ ). There was a moderate negative association between parents not expecting the firesetting and believing their child's explanation about the fire incident ( $r_{pb} = -.325, p < .01$ ) indicating



parents who were aware of their child's fire interest and related behavior seemed less likely to believe the child's explanation about the fire incident.

Given the majority of the PFYR program participants were 10 years of age or older (91%) and most experts agree a child should know fire safety and prevention rules by age 10, the parents' expectations that their child understood fire dangers and would not engage in fireplay, firestarting or firesetting were not unrealistic (Gaynor, 2000; Kennedy et al., 2006). The significance of these observed associations was not tested; however, it would be interesting to study the relationship between the parents' knowledge of fire safety, their expectations related to fire safety education for their children, and the effectiveness of fire safety education at home, in school, or other community settings.

#### Socioeconomic Status

Hypothesis 1 provided the basis for examining the relationship between the socioeconomic status of the child or adolescent enrolled in the PFYR program and their fire-related behavior. In general, the literature is mixed regarding the influence of socioeconomic conditions on firesetting with some studies indicating a higher incidence among low income youth and others reporting more activity within middle-class families. More consistent are findings that children and adolescents experiencing stressful family conditions are more likely to engage in high risk firesetting behavior with poverty being one of many components in an unstable family environment that contribute to youth acting out in this way (Gaynor, 2000; McCarty & McMahon, 2005; Zipper & Wilcox, 2005). Consideration was also given to assessing the potential contextual effects of substandard or deteriorating built environments in low income neighborhoods that might

contribute to social disorder and destructive behaviors above and beyond individual risk factors, as has been demonstrated in some research (Stafford & McCarthy, 2006).

In this study sample, the median annual household income range for the families enrolled in the PFYR program was \$31,000 - \$60,000. The distribution of families in each income category was as follows: \$30,000 or less (32.1%); \$31,000 to \$60,000 (30.5%); \$61,000 to \$100,000 (24.6%) and \$101,000 or more (12.8%). The average family size was four with a range of 2-7 (Median = 4). The smallest families, with one child and one parent, made up 8.6% of the sample and the largest families, with five children and two parent figures in the home, represented 5.9% of the sample.

There were 43 different zip codes where the PFYR program participants resided represented in the sample. The top ten zip codes with the highest rates of program participants per 10,000 youth less than 18 years of age were evaluated based on selected socioeconomic characteristics of residents within the zip code; including highest level of education attained, employment status, median income, and types of housing, as shown in Table 5. In 2007-2008, the zip code with the highest rate of firesetters (24.24/10,000) was reported to have a median income of \$54,539 with 59% of the adult population employed. Eighteen percent of adults did not have a high school diploma and 18% had a college degree. Among the top ten, this zip code had the second highest percentage of families living in single family units (93%) and the third highest percentage of owner occupied dwellings (89%). The zip code with the highest median income (\$81,142), highest percentage of single family units (94%) and highest percentage of owner occupied units (92%) had the seventh highest program participant rate (6.23/10,000). Among all zip codes represented in the sample, the zip code with the lowest rate of

program participants (.74/10,000) had a median income of \$65,789 with 65% of the adult population employed. Nineteen percent of adults did not have a high school diploma and 21% had a college degree. In this zip code, 79% of families lived in single family units and 78% of the dwellings were owner occupied.

As a point of reference, the range of median incomes reported for all zip codes in the greater Las Vegas metropolitan area for this time period was \$26,074 to \$100,096. Among the top ten zip codes with the highest rates of PFYR program participants, the median income was reported to be within the middle to upper middle income range (\$40,669 to \$81,142) as found in other studies. Spearman rank correlation testing did not show a statistically significant association between the family's annual household income and fire-related behavior as measured by the Firesetting Scale. The Kruskal-Wallis test result was also not significant indicating the distribution of the firesetting composite scores was the same across all income categories, therefore the null hypothesis was retained. The prediction that there would be a difference between youth who engaged in firesetting based on the low socioeconomic status of their family was not supported. The findings also indicated highest level of adult educational attainment, employment status, and housing type were not good predictors of juvenile firesetting behavior. Based on the basic description of socioeconomic characteristics of the zip codes with the highest rates of program participants, there was not clear evidence that neighborhood conditions contributed substantially to firesetting. These findings reinforce the concept that no single factor, but rather multiple individual, behavioral, social, and environmental factors coexist, overlap, and interact to drive most fire-related behavior (Gaynor, 2000; Kolko, 2002; Putnam & Kirkpatrick, 2005).

### Family Structure and Functioning

Hypothesis 2 stated a child or adolescent enrolled in the PFYR program who lived in a stressed or unstable, single or dual parent household was more likely to engage in more firesetting incidents. In examining family structure it was found 33.5% of the youth were from single parent homes, 37.3% were from homes where both parents resided, and 29.2% were from homes with two adults who were identified as parent figures (parent, stepparent, grandparent or guardian). One percent of the respondents did not provide this information. Pearson point-biserial correlation test results did not show a statistically significant association between the Firesetting Scale and single parent or two parent figure homes (see Table 4). The Mann-Whitney U test result was also not significant indicating the distribution of the firesetting composite scores did not differ between single parent and two parent figure households, therefore the null hypothesis was retained (see Table 3). Of the parents who reported marital status (174/187), 16.7% were never married, 39.6% were married, 7.5% were separated, 29.3% were divorced, and 6.9% reported the other parent was deceased. Of the deceased parents, nine were fathers and three were mothers. The Kruskal-Wallis test result was not significant indicating the distribution of the firesetting composite scores was the same across all categories of marital status, therefore the null hypothesis was retained (see Table 3). The average family size was four, with a range of 1-5 children. The majority of primary caregivers were reported to be male (65.8%) and the median age of all primary caregivers was 42 years with a range of 27-76 years.

The Family Environment Scale was a composite measure that included three possible indicators of stressors within the family; if the parent or child had ever been involved

with child protective services, if the parent had any reason to believe the youth had been a victim of abuse or neglect, and if other children in the home played with fire.

Spearman rank correlation testing did not show a statistically significant association between fire-related behavior as measured by the Firesetting Scale and the composite scores of the Family Environment Scale. The Kruskal-Wallis test result was also not significant indicating the distribution of the firesetting composite scores was the same across all categories of the Family Environment Scale, therefore the null hypothesis was retained. The prediction that there would be a difference between youth who engaged in varying degrees of fire-related behavior and living in a stressful or unstable family environment was not supported.

#### Youth Psychosocial Characteristics

Hypothesis 3 stated a child or adolescent who exhibited behaviors characteristic of conduct disorder or antisociality was more likely to engage in more fire-related incidents. Table 6 shows the relative frequency of these types of behaviors among the youth enrolled in the PFYR program. It was interesting to note that half of the children or adolescents had been reported by their teachers or others to have presented “behavior challenges” in the preceding two years; 37.8% had been arrested, cited or jailed for some reason, of the charges specified 78.8% were fire-related; and truancy was reported for 16.6% of the sample. Other behaviors characteristic of conduct disorder reported by the parents included: 32.9% of youth placed blame on others for their actions; 22.5% did not assume responsibility for their negative behavior; 22.6% were mean to others; 10.1% bullied others; and 4.3% were mean to animals. With regard to potential mental health stressors, the parents indicated 42.0% of the children had experienced a disturbing event

in the preceding year, such as the death of a close family member or separation or divorce of the parents; 36.5% had been the victim of bullying; 15.0% of the families had been involved with child protective services; and 6.5% of parents reported they had reason to believe their child had been the victim of some form of abuse or neglect. These were the variables selected to serve as markers of conduct disorder or antisociality and mental health stressors among youth enrolled in the PFYR program for the purpose of examining the potential relationship between these types of behaviors and firesetting. The Youth Psychosocial Correlates Scale was created as a composite measure representing a summation of the parents' responses to questions related to the presence of these behaviors or experiences among their children. In Table 2, the Spearman rank correlation matrix shows an association between the Firesetting Scale and the Youth Psychosocial Correlates Scale ( $r_s = .183, p < .05$ ). Based on the significance of the Kruskal-Wallis test result shown in Table 3, the null hypothesis was rejected indicating the distribution of the firesetting composite scores differed across the categories of the Youth Psychosocial Correlates Scale ( $p < .05$ ). As previously reported, there were also statistically significant associations observed in the Pearson point-biserial correlations matrix (see Table 4) between the Firesetting Scale and several individual psychosocial variables; these included the child being mean to others ( $r_{pb} = .162, p < .05$ ); being mean to animals ( $r_{pb} = .233, p < .01$ ); and having a history of behavioral issues in the preceding two years ( $r_{pb} = .147, p < .05$ ). The Mann-Whitney U test results were significant for these three variables, indicating there were differences in the distribution of the composite firesetting scores across the categories of those children who were or were not mean to others or mean to animals, or who did or did not have a history of behavioral issues ( $p < .05$ ).

These findings support the hypothesis that a child or adolescent who exhibited behaviors characteristic of conduct disorder or antisociality was more likely to engage in more fire-related incidents. The Pearson point-biserial correlation matrix shows several statistically significant correlations between individual psychosocial variables which demonstrate the interrelatedness of these types of behaviors that are characteristic of conduct disorder or antisociality (see Table 4). While interesting, this observation requires further investigation and clinical correlation with a mental health professional on a case-by-case basis in order to be meaningful. Associations were also observed between the composite firesetting scores and children who bullied others ( $r_{pb} = .160, p < .05$ ) or blamed others for their actions ( $r_{pb} = .151, p < .05$ ), but the Mann-Whitney U test results were not significant, therefore the null hypotheses were retained. The conclusion was the distribution of Firesetting Scale scores was the same across groups of youth who bullied others and those who did not, and those who placed the blame for their actions on others and those who did not.

Among the three predictor variable scales, the Youth Psychosocial Correlates Scale was conceptually and statistically the strongest and it was the only one that was significantly correlated with the composite Firesetting Scale. Youth who engage in high risk firesetting behavior are more likely to have higher levels of externalizing behaviors such as heightened aggression, hostility, and impulsivity as compared to their low frequency or non-firesetting peers (Del Bove et al., 2008; Kolko, 2002; Mackay et al., 2006; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000). The observation that youth who were enrolled in the PFYR program exhibited behaviors characteristic of conduct disorder or antisociality lends support to empirical evidence reported in the literature.

Table 1

*Select Characteristics of PFYR Program Participant Sample*

Variable	n	Percent
Age (Years)	187	
5-9	16	8.6
10-13	92	49.2
14-17	79	42.2
Gender	187	
Female	25	13.4
Male	162	86.6
Race/Ethnicity	185	
American Indian	5	2.7
Asian-Pacific	11	5.9
Black	12	6.5
Hispanic	39	21.1
Multi-racial	29	15.7
White	89	48.1
Parent(s) in Household	185	
Single	62	33.5
Both	69	37.3
Two Parent Figures	54	29.2
Marital Status of Parents	174	
Never Married	29	16.7
Married	69	39.6
Separated	13	7.5
Divorced	51	29.3
Deceased	12	6.9
Family Annual Household Income	187	
Low - \$30K or less	60	32.1
Middle - \$31K to \$60K	57	30.5
Upper Middle - \$61K to \$100K	46	24.6
High - \$101K or more	24	12.8



Table 2

*Spearman Rank Correlation Coefficient Matrix (N = 187)*

	1	2	3	4	5	6	7
1. Firesetting Scale	–						
2. Family Environment Scale	.082	–					
3. Parent Fire Safety Perceptions Scale	-.031	.018	–				
4. Youth Psychosocial Correlates Scale	.183*	.080	-.120	–			
5. Youth Age	-.029	-.087	-.027	-.088	–		
6. Annual Household Income	.100	.008	.111	.027	.155*	–	
7. Fire Incident Outcome	.017	.111	.095	-.022	.128	-.001	–

\*  $p < .05$

Table 3

*Tests of Significance (N = 187)*

Variable	Firesetting Scale	
	Mann-Whitney U Test	Kruskal-Wallis Test
Child understood dangers	.857	
Parent didn't expect fire	.971	
Child showed interest in fire	.001**	
Parents discussed dangers	.472	
Taught fire safety in school	.901	
Parent believed explanation	.935	
Parent was surprised	.008**	
Other child fireplay in home	.002**	
Child truant	.314	
Had disturbing event	.494	
Child mean to others	.035*	
Child mean to animals	.002**	
Child accepts responsibility	.153	
Child blames others	.051	
Child arrested, cited, jailed	.418	
Parent suspects abuse/neglect	.317	
Family CPS involvement	.480	
History of behavioral issues	.044*	
Child bully victim	.353	
Child bullies others	.055	
Parents in same home	.241	
Parent marital status		.076
Annual household income		.365
Fire incident outcome		.471
Family Environment Stressors		.430
Parent Fire Safety Perceptions		.737
Youth Psychosocial Correlates		.010*

\*  $p < .05$ , \*\*  $p < .01$

Table 4

*Pearson Point-Biserial Correlation Matrix (N = 187)*

	1	2	3	4	5	6	7	8	9	10
1. Firesetting Scale	—									
2. Child understood dangers	-.006	—								
3. Parent didn't expected fire	.011	.245**	—							
4. Child showed fire interest	.671**	.052	.075	—						
5. Parent discussed dangers	.055	.155*	.231**	.087	—					
6. Taught fire safety in school	-.019	.225**	.226**	-.014	.127	—				
7. Parent believed explanation	.023	-.082	-.325**	.010	-.083	-.085	—			
8. Parent was surprised	-.174*	.244**	.272**	-.099	.113	.078	.002	—		
9. Other child fireplay in home	.225**	.100	.007	.170*	.079	.036	-.098	-.066	—	
10. Child truant	-.088	-.006	-.040	-.137	-.064	-.015	.024	.034	.021	—
11. Child had disturbing event	.051	.004	.030	.026	.044	.046	.033	.091	.032	.204**
12. Child mean to others	.162*	-.033	.012	.123	.089	-.109	.016	-.074	.027	.060
13. Child mean to animals	.233**	-.071	-.079	.181*	.078	-.044	.080	-.135	-.046	-.018
14. Child does not accept responsibility	-.079	.041	.111	-.082	.062	.036	-.091	.102	.018	-.005
15. Child blames others	.151*	.049	.025	.143	-.037	-.022	.131	-.072	.129	.014
16. Child arrested, cited, jailed	-.061	-.101	-.074	-.152	.010	-.151*	-.054	-.057	-.071	.171*
17. Parent suspects abuse/neglect	.024	.039	-.196**	-.030	.064	-.078	.127	-.097	-.177*	.222**
18. Family CPS involvement	-.055	.103	-.058	-.017	.102	-.118	.144	-.115	.276**	-.062
19. History of behavioral issues	.147*	-.065	-.121	.174*	-.043	.010	.129	-.054	-.031	.125
20. Child bully victim	.065	.004	-.030	-.007	.130	.024	.092	.075	.129	.135
21. Child bullies others	.160*	.037	-.052	.126	-.158*	-.044	.071	-.059	-.050	.166*

\*  $p < .05$ , \*\*  $p < .01$

Table 4, continued

*Pearson Point-Biserial Correlation Matrix (N= 187)*

	11	12	13	14	15	16	17	18	19	20	21
1. Firesetting Scale											
2. Child understood dangers											
3. Parent didn't expected fire											
4. Child showed fire interest											
5. Parent discussed dangers											
6. Taught fire safety in school											
7. Parent believed explanation											
8. Parent was surprised											
9. Other child fireplay in home											
10. Child truant											
11. Child had disturbing event	—										
12. Child mean to others	.153*	—									
13. Child mean to animals	.117	.395**	—								
14. Child does not accept responsibility	-.005	-.103	-.298**	—							
15. Child blames others	.057	.203**	.220**	-.440**	—						
16. Child arrested, cited, jailed	.071	-.050	.001	.047	-.172*	—					
17. Parent suspects abuse/neglect	.095	-.008	.055	-.022	.043	.174*	—				
18. Family CPS involvement	.059	.055	.124	.000	.090	-.056	.299**	—			
19. History of behavioral issues	.211**	.243**	.229**	-.201**	.118	-.004	.049	-.057	—		
20. Child bully victim	.263**	.166*	.102	-.026	.041	.006	.217	.025	.183*	—	
21. Child bullies others	.217**	.309**	.277**	-.274**	.216**	.051	.134	-.026	.213**	.272**	—

\*  $p < .05$ , \*\*  $p < .01$

Table 5

*Select Socioeconomic Characteristics of Top 10 Residential Zip Codes for PFYR Program Participants (N = 187)*

Zip Code	Case Rate <sup>a</sup>	No HS Diploma	College Degree	Unemployed	Employed	Not in Labor Force	Median Income	Single Family Unit	Multi-Family Unit	Mobile Home	Owner Occupied	Renter Occupied
89141	24.24	18%	18%	5%	59%	37%	\$54,539	93%	7%	0%	89%	11%
89014	22.74	9%	34%	4%	68%	28%	\$60,016	44%	56%	0%	53%	47%
89048 <sup>b</sup>	16.57	21%	10%	7%	—	—	\$40,669	43%	8%	49%	80%	20%
89015	14.37	18%	19%	7%	60%	34%	\$59,771	70%	26%	4%	69%	31%
89012	9.00	7%	40%	5%	61%	34%	\$72,301	71%	29%	0%	71%	29%
89134	7.46	7%	39%	5%	36%	59%	\$72,168	84%	16%	0%	91%	9%
89131	6.23	12%	27%	9%	64%	26%	\$81,142	94%	6%	0%	92%	8%
89074	5.82	8%	37%	4%	66%	30%	\$77,678	68%	30%	2%	73%	27%
89084	5.81	11%	6%	2%	65%	32%	\$50,582	84%	16%	0%	82%	18%
89011	5.77	17%	22%	5%	61%	33%	\$63,376	56%	41%	2%	69%	31%

Note. — denotes data not available. From *2009 Las Vegas Perspective*, Metropolitan Research Association, Las Vegas, NV, 2009, pp. 12-19

<sup>a</sup>Case rate per 10,000 youth < 18 years of age <sup>b</sup>Includes 89041, 89060, 89061 for Pahrump, NV because individual zip code data not available

Table 6

*Percent of Select Psychosocial Characteristics among PFYR Program Participants*

Variable	n	Percent
History of behavioral issues	173	50.3
Child arrested, cited, jailed	185	37.8
Child truant	181	16.6
Child blames others	173	32.9
Child does not accept responsibility	173	22.5
Child mean to others	186	22.6
Child bullies others	168	10.1
Child mean to animals	186	4.3
Child had disturbing event	174	42.0
Child bully victim	170	36.5
Family CPS involvement	186	15.0
Parent suspects abuse/neglect	168	6.5

## Chi-square Analyses

Chi-square analyses were performed to test for statistically significant differences between observed and expected frequencies within categories of select predictor variables and levels of firesetting risk among PFYR program participants. As previously described, all four continuous scales were transformed into categorical variables. Chi-square testing was done using the transformed Firesetting Scale and the transformed predictor variable scales (i.e., Family Environment Scale, Parent Fire Safety Perceptions Scale, and Youth Psychosocial Correlates Scale) and twenty-five individual predictor variables.

The testing showed there were no statistically significant differences found between categories within the three predictor variable scales; including the Youth Psychosocial Correlates Scale. This finding was unexpected given that significant differences had been identified through other testing. There were also no significant differences found between categories within the majority of individual predictor variables. There were four predictor variables where statistically significant differences were observed between groups; parents who reported their child or adolescent had shown interest in fire, parents who were surprised by the fire incident, families with other children who had engaged in fireplay, and youth who were mean to animals. According to the parents, nearly half of the juveniles in the sample had shown interest in playing with fire, matches or lighters in the past. In approximately one-quarter of the families, there were other children in the home who had been involved in fire-related activities. Yet, 91% of the parents indicated they were surprised by the fireplay, firestarting or firesetting incident that resulted in the referral to the PFYR intervention program.

Youth Fire Interest and Firesetting Risk

Table 7

*Number of Youth Showing Interest in Fire by Firesetting Risk Category (N = 187)*

	Low Risk	Moderate Risk	High Risk
Child showed fire interest			
No			
Observed	63.0	25.0	10.0
Expected	37.2	28.3	32.5
Percentage	88.7	46.3	16.1
Yes			
Observed	8.0	29.0	52.0
Expected	33.8	25.7	29.5
Percentage	11.3	53.7	83.9

*Note.* Firesetting risk categories based on Firesetting Scale score: low risk = 1-2; moderate risk = 3-4; high risk = 5-6

$\chi^2 = 71.08, df = 2, p < .001$

Significant differences were found between fire interest of youth enrolled in the PFYR program as reported by their parents and the low, moderate, and high risk categories of firesetting ( $\chi^2 = 71.08, p < .001$ ). Thirty-eight percent of the sample was categorized as low risk, 28.9% as moderate risk and 33.1% as high risk. Table 7 shows that within the low risk category the observed value for children who had shown an interest in fire is lower than expected (8.0 and 33.8, respectively). Within the low risk category, a greater percentage of parents reported their children did not have an interest in fire as compared to those who said they did have an interest (88.7% and 11.3%, respectively). In the moderate risk category, the observed value of children showing fire interest is higher than the expected value (29.0 and 25.7, respectively) with a greater percentage of parents indicating their child had an interest in fire as compared to those who did not (53.7% and 46.3%, respectively). The observed value within the high risk category for children who had shown fire interest is greater than the expected value (52.0 and 29.5, respectively). The percentage of youth who had shown an interest in fire



within the high risk group is greater than those who had not shown interest (83.9% and 16.1%, respectively). Based on the cross tabulation results, youth fire interest increased across categories of fire risk with 9% of youth demonstrating fire interest in the low risk group, 32.6% in the moderate risk group, and 58.4% in the high risk group.

Parents Surprised by Firesetting and Firesetting Risk

Table 8

*Number of Parents Surprised by Firesetting by Firesetting Risk Category (n = 179)*

	Low Risk	Moderate Risk	High Risk
Parent surprised			
No			
Observed	2.0	3.0	12.0
Expected	6.3	5.0	5.7
Percentage	3.0	5.7	20.0
Yes			
Observed	64.0	50.0	48.0
Expected	59.7	48.0	54.3
Percentage	97.0	94.3	80.0

Note. Firesetting risk categories based on Firesetting Scale score: low risk = 1-2; moderate risk = 3-4; high risk = 5-6  
 $\chi^2 = 11.82, df = 2, p < .01$

Table 8 shows that significant differences are found between parents reporting they were surprised by their child’s fire-related activity and the low, moderate, and high risk categories of firesetting ( $\chi^2 = 11.82, p < .01$ ). Of those responding to this question, 36.9% of the youth were in the low risk group, 29.6% in the moderate risk group, and 33.5% in the high risk group. Within the low and moderate risk categories, the observed value for parents who were not surprised by the fire incident is lower than expected; 2.0 and 6.3, respectively in the low risk group and 3.0 and 5.0, respectively in the moderate risk group. The observed value of parents who were not surprised is two times greater

than the expected value in the high risk group (12.0 and 5.7, respectively). Within the low risk category, a greater percentage (97.0%) of parents reported they were surprised by the fire activity. While only 3% of parents in the low risk group indicated they were not surprised, the percentage increased to 5.7% in the moderate risk group, and 20% in the high risk group. The majority of parents who reported they were not surprised by the fire incident were found in the high risk group (70.6%). Logically, as the risk of firesetting increased the parents reported being less surprised by the behavior.

Families with Other Children who Play with Fire and Firesetting Risk

Table 9

*Number of Families with Other Youth who Fireplay by Firesetting Risk Category (n=167)*

	Low Risk	Moderate Risk	High Risk
<b>Other Youth Fireplay</b>			
<b>No</b>			
Observed	55.0	39.0	34.0
Expected	49.1	36.8	42.2
Percentage	85.9	81.3	61.8
<b>Yes</b>			
Observed	9.0	9.0	21.0
Expected	14.9	11.2	12.8
Percentage	14.1	18.8	38.2

*Note.* Firesetting risk categories based on Firesetting Scale score: low risk = 1-2; moderate risk = 3-4; high risk = 5-6  
 $\chi^2 = 10.41, df = 2, p < .01$

The results of the cross tabulation shown in Table 9 indicate there are significant differences between families who have other children in the home who also engage in fireplay and the firesetting risk categories ( $\chi^2 = 10.41, p < .01$ ). One-third of the youth were categorized in the high risk group, 28.7% in the moderate risk group, and 38.3% in the low risk group. Within the low risk category, the observed value for families with

other children who played with fire is lower than expected (9.0 and 14.9, respectively). Within the low risk category, a greater percentage (85.9%) of parents reported there were no other children in the home who played with fire as compared to those who said there were others who engaged in fire-related behavior (14.1%). The observed value in the moderate risk category is also lower than the expected value (9.0 and 11.2, respectively) and there is a slight increase in the percentage of parents reporting other children playing with fire (18.8%). Within the high risk category, the observed value for children who played with fire is greater than the expected value (21.0 and 12.8, respectively) and the percentage of parents reporting fireplay by others increased to 38.2%. Based on the cross tabulation results, the percentage of families with more than one child involved in fire-related activity increased across categories of fire risk with 23.1% in the low risk group, 23.1% in the moderate risk group, and 53.8% in the high risk group.

Youth Who Are Mean to Animals and Firesetting Risk

Table 10

*Number of Youth who are Mean to Animals by Firesetting Risk Category (n = 186)*

	Low Risk	Moderate Risk	High Risk
<b>Mean to Animals</b>			
<b>No</b>			
Observed	71.0	52.0	55.0
Expected	67.9	51.7	58.4
Percentage	100.0	96.3	90.2
<b>Yes</b>			
Observed	0.0	2.0	6.0
Expected	3.1	2.3	2.6
Percentage	0.0	3.7	9.8

*Note.* Firesetting risk categories based on Firesetting Scale score: low risk = 1-2; moderate risk = 3-4; high risk = 5-6  
 $G^2 = 9.66, df = 2, p < .01$

Table 10 shows statistically significant differences between youth who are mean to animals and the firesetting risk categories ( $G^2 = 9.66, p < .01$ ). The low risk group represented 38.2% of the sample, the moderate risk group 29.0%, and the high risk group 32.8%. Within the low risk category the observed value for children who were mean to animals is lower than expected (0.0 and 3.1, respectively). Within the low risk category, there were no reports of children who were mean to animals. In the moderate risk category, the observed value of children who were mean to animals is the essentially same as the expected value (2.0 and 2.3, respectively) with 3.7% of parents indicating their child was mean to animals. The observed value within the high risk category for children who were mean to animals is greater than the expected value (6.0 and 2.6, respectively). Although greater than the low and moderate risk groups, the percentage of youth who were mean to animals within the high risk group is considerably less than those who were not mean to animals (9.8% and 90.2%, respectively). Based on the cross tabulation results, the percentage of children who were mean to animals increased across categories of fire risk with 75% of the youth who were mean to animals being found in the high risk group. These results should be interpreted cautiously given the small number (8) which represents only 4.28% of the entire sample.

## CHAPTER 5

### DISCUSSION, LIMITATIONS, AND CONCLUSION

#### Discussion

The goal of this study was to examine data obtained from parents and guardians of children and adolescents enrolled in a community-based firesetting intervention program to identify characteristics, conditions, and correlates of fire-related behavior among the program participants. The purpose was to contribute to the existing body of knowledge to assist in the development of evidence-based screening tools that will drive appropriate utilization of cause-specific prevention and intervention strategies to reduce the incidence of fire-related injury, death and destruction.

In this sample, fireplay, firestarting and firesetting predominantly involved young males. The racial composition of the sample was White (47.6%), Hispanic (20.9%), Multi-racial (15.5%), Black (6.4%), Asian/Pacific Islander (5.9%), and American Indian (2.7%). Race and ethnicity data obtained from the Nevada State Demographer's office did not include a multi-racial category, so rates for each racial/ethnic group could not be calculated resulting in no basis for further evaluation. The age distribution differed slightly from what is typically seen in the literature. Usually, there is a higher incidence of fire-related behavior among preschool age children and adolescents most likely due to increasing curiosity, experimentation, and new-found independence with respect to their stage of development (Stadolnik, 2000). In this study, almost half of the program participants were 10-13 year old middle school youth whom most experts agree should possess basic fire safety knowledge and an understanding of the consequences of their actions (Gaynor, 2000; Kennedy et al., 2006). Nearly 75% of all fire incidents occurred

outside, away from the family's property. These observations raise questions regarding the adequacy of age-appropriate supervision for this age group; how they access ignition sources and combustible materials; and what conditions, intentions or motivations contribute to their behavior. The age differences seen in this sample may be due to the referral sources for this mandated firesetting intervention program which include the school district, fire departments, and the juvenile justice system. The findings suggest further investigation of the circumstances surrounding fire-related behavior in the middle school age group is warranted with implementation of appropriate screening, prevention, and intervention strategies designed to address the underlying issues.

The data indicate a contributing factor in unsanctioned firestarts was the parents' belief their child had been adequately educated about fire safety, either at home or in school, and that they understood the dangers of fire. The Parent Fire Safety Perceptions Scale was intended to measure the relationships between firesetting and elements of the child's fire knowledge and the parents' expectations about the child practicing basic fire safety rules. Although there was not a statistically significant association observed between the Parent Fire Safety Perceptions Scale and the composite firesetting score, there were significant correlations identified between firesetting and individual components of the scale relating to parents not expecting fireplay or firesetting and their belief they had adequately discussed the issue with their child; that it had been addressed at school; and that they believed the child understood fire danger. The cross tabulation results showed as youth firesetting increased the number of parents who were surprised by the behavior decreased. Overall, nearly 90% of parents were surprised their child had engaged in fire-related behavior which is not unusual given the majority of the PFYR

program participants were 10 years of age or older (91%) and should know fire safety and prevention rules. In this sample, the distribution of composite firesetting scores was the same across all categories of parents' perceptions of their child's fire safety competency. These findings generate additional questions about the accuracy of the parents' assessment; the level of their fire safety knowledge and willingness or ability to provide a safe home environment; their expectations related to fire safety education for their children; and the effectiveness of fire safety education at home, in school, or other community settings. For some of these youth, education alone may not be sufficient. It is important to screen for other risk factors and to address specific issues that are identified with appropriate interventions at the individual, family or community level.

In addition to the descriptive analysis of the general characteristics of the sample, there were three hypotheses created to provide the basis for examining the relationships between the outcome and predictor variables. The alternative hypotheses for this study predicted there would be associations between firesetting behavior and socioeconomic status; select elements of family structure and functioning; and evidence of behaviors related to conduct disorder and antisociality among PFYR program participants.

The first hypothesis was that children or adolescents enrolled in the program who were from families with low socioeconomic status would be more likely to engage in more firesetting incidents. It has been shown that overcrowded conditions in substandard housing (USFA, 2008) and potential contextual effects of a deteriorating physical environment in low income neighborhoods may increase the risk of destructive behaviors (Stafford & McCarthy, 2006). In addition, families with limited economic means may not be able to provide adequate supervision for their children while the parents work. For

these reasons, it was expected that low-income youth who experience multiple socioeconomic stressors may engage in more unsafe fire-related behavior. However, the prediction that the family's socioeconomic status would have an effect on the firesetting behavior of juveniles enrolled in the PFYR program was not supported by the data.

Among the program participants, the average family size was four and the median annual household income range was \$31,000 to \$60,000 which was above the \$21,200 poverty guideline for a family of four during this time period (HHS, 2008). Of the top ten residential zip codes with the highest rate of program participants, none had a median annual household income below \$40,000 and more than half had a median income greater than \$60,000. Within the zip code with the highest rate of participants, 93% of residents lived in single family units and 89% of the homes were owner-occupied. The findings also indicated that highest level of education attained by adult caregivers, their employment status, and housing type were not good predictors of juvenile firesetting behavior in this sample. In general, there was not clear evidence that neighborhood conditions, as measured by family socioeconomic status and median annual income per zip code, contributed substantially to fireplay, firestarting or firesetting.

Correlation testing did not show a statistically significant association between family annual household income and fire-related behavior as measured by the Firesetting Scale. The distribution of firesetting composite scores did not differ between categories of family income therefore the null hypothesis was retained. Collectively, the data did not support the first alternative hypothesis.

A confounding factor may be the geographic distribution of program participants was likely influenced by referral patterns into the program. It is possible particular zip codes



may be over-represented because authorities in those areas are more aggressive in reporting incidents and may serve as active members of the community-based PFYR intervention program. The difference in the number of fire-related burn injuries reported in the PFYR surveys as compared to the number of injuries reported in the UMC Burn Registry (M. Martinat, personal communication, October 21, 2010) during this time period indicates there may be significant under-reporting of juvenile firesetting in Clark County which is consistent with other empirical evidence in the literature (Putnam & Kirkpatrick, 2005). The unreported incidents may be occurring in neighborhoods that differ from those represented in this sample and that should be considered when interpreting the results.

Hypothesis 2 stated that a child or adolescent enrolled in the PFYR program who lived in a stressed or unstable, single or dual parent household would be more likely to engage in more firesetting incidents. This hypothesis was not supported by the findings related to the effects of family structure, parental marital status, and select aspects of family environment on a youth's fire-related behavior. Although there is some evidence that juveniles who are involved in persistent forms of unsafe fire-related behavior are more likely to live in a single parent household (Gaynor, 2000; MacKay et al., 2006) the data in this study did not support the previous findings. One-third of the PFYR program participants lived with a single parent, but statistically significant correlations were not found between the Firesetting Scale and single parent or two parent figure households. The distribution of the composite firesetting score was found to be the same between single parent and dual parent homes. Other studies have indicated that changes in the family structure and inter-parental conflict can create instability and contribute to

firesetting behavior (Kolko, 2002; McCarty & McMahon, 2005; Root et al., 2008; Slavkin & Fineman, 2000). In this sample, 40% of parents reported being married, approximately 30% were divorced, and the remainder were never married, separated or the other parent was deceased. Tests of significance showed the distribution of composite firesetting scores did not differ across all categories of marital status. The parents' marital status alone was not a good predictor of fire-related behavior among the youth enrolled in the program.

Other factors that contribute to fire misuse include neglectful home environments with inadequate supervision that allow children and adolescents with increased fire interest to engage in unsafe fire behavior (Kennedy et al., 2006; Kolko et al., 2006; MacKay et al., 2006) and exposure to at least one form of abuse or neglect (Root et al., 2008). The Family Environment Scale was created to measure three possible indicators of stressors within the family: involvement with child protective services, evidence of abuse or neglect, and the presence of other children in the home who played with fire. A statistically significant association was not found between the Firesetting Scale and the Family Environment Scale and the distribution of composite firesetting scores was the same across all categories of the composite Family Environment Scale indicating there were no differences between the groups. An association was observed between the Firesetting Scale and the variable related to other children in the home playing with fire. It was also noted that the distribution of firesetting scores differed between families who reported other children in the home who played with fire and those who did not. This same effect was seen in the cross tabulation results where the number of families reporting other children who played with fire increased between the low risk and high

risk firesetting categories. However, in general there was insufficient evidence to support the prediction that there would be a difference between youth who engaged in firesetting behavior based on them living in a stressful or unstable family environment.

The third hypothesis stated that children or adolescents enrolled in the PFYR intervention program that had a history of exhibiting behaviors characteristic of conduct disorder or antisociality would be more likely to engage in more firesetting incidents. This hypothesis was supported by statistically significant findings related to the composite Firesetting Scale and the Youth Psychosocial Correlates Scale.

The discussion of behavioral characteristics related to juvenile fireplay, firestarting or firesetting is based on the classification scheme created by Stadolnik (2000) and found most frequently in the literature. Even young firestarters who are motivated by curiosity tend to be more impulsive, aggressive, and mischievous than their peers. Crisis-motivated firesetting can occur at any age and is generally a result of youth who consciously or unconsciously attempt to draw attention to themselves as a means of coping with underlying intrapersonal or interpersonal issues. Delinquent firesetters tend to be older children and adolescents who are typically described as having low self-esteem, deficient social skills, limited problem-solving abilities, and a higher prevalence of overt and covert acts of dishonesty, defiance and aggression. A large number of these juveniles meet the criteria for conduct disorder or oppositional defiant disorder; firesetting is one of several acts they commit that violate social norms. Fortunately, pathologically-motivated firesetters who have a history of cognitive, neurologic, and emotional disorders which may include paranoia, hallucinations, delusions and fixation

on fire are rare (Gaynor, 2000; Kolko, 2002; Putnam & Kirkpatrick, 2005; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000; Stadolnik, 2000).

In this study, half of the youth had been reported by their teachers or others to have presented “behavior challenges” in the preceding two year period and more than one-third had been arrested, cited or jailed. The Youth Psychosocial Correlates Scale, a composite measure of behaviors characteristic of conduct disorder or antisociality, showed a statistically significant association with the Firesetting Scale. The distribution of the firesetting composite scores differed across categories of the Youth Psychosocial Correlates Scale. In addition, three individual variables were significantly correlated with the Firesetting Scale; these included children who were mean to others, mean to animals, and had exhibited “behavior challenges” in the preceding two year period. Again, the distribution of composite firesetting scores differed between those who reported the behaviors and those who did not. Although the cross tabulation results were based on a small number, the results showed the percentage of youth who were mean to animals increased across the categories of fire risk with none in the low risk group and the majority in the high risk group. Given all of the results, the null hypothesis was rejected. The findings supported the alternative hypothesis that a child or adolescent enrolled in the program with a history of exhibiting behaviors characteristic of conduct disorder or antisociality was more likely to engage in more firesetting incidents. The results support empirical evidence reported in the literature, but they would be more meaningful if supplemented with clinical correlation by a mental health professional.

When assessing juveniles who engage in unsanctioned, fire-related activities it is important to look at patterns of behavior; firesetting is rarely an isolated symptom, but

more commonly one of several behaviors manifested as part of a complex matrix of psychological, behavioral and social issues. Multiple factors drive most firesetting behavior including individual intentions and motivations, family dynamics, environmental conditions, and sociocultural influences. The complexity of the behavior requires comprehensive, multidisciplinary, individual and family assessments and early identification of those at greatest risk. In particular, crisis-motivated and delinquent youth firesetters are strongly influenced by serious underlying psychological issues that must be addressed in order to control the potentially dangerous behavior. Early identification, assessment, intervention or treatment is essential in helping these juveniles and reducing the likelihood of future fire involvement (Gaynor, 2000; Sakheim & Osborn, 1994; Slavkin & Fineman, 2000; Stadolnik, 2000).

One element of juvenile firesetting behavior that is being examined more extensively is the individual's interest in fire. Several studies have shown that heightened fire interest and greater involvement in fire-related acts, such as hiding ignition sources or pulling fire alarms, are associated with increased frequency of unsupervised and unsanctioned fire activity and may be important predictors of firesetting severity and recidivism (Kennedy et al., 2006; Kolko et al., 2006; MacKay et al., 2006). Identifying youth with abnormal levels of fire interest may have predictive value for future or subsequent episodes of high risk fire behavior. In this sample, fire interest was significantly associated with the frequency of firesetting incidents and the distribution of incidents differed between those who showed an interest in fire and those who did not. Fire interest was also found to be correlated with reports of previous behavioral issues and the presence of other children in the home that played with fire. Additionally, cross

tabulation results showed an increase in fire interest between low risk and high risk firesetters, as measured by the categorized Firesetting Scale. These findings are consistent with data previously reported in extant literature and are worthy of more detailed analysis in the future.

### Limitations

Firesetting is a complex behavior that spans a wide range of developmental stages in childhood and adolescence and is often under-reported. This study was based on a convenience sample drawn from individuals who were mandated to attend the PFYR firesetting intervention program by fire service, law enforcement, juvenile justice or school district authorities because they were involved in at least one fire incident. This sample may not accurately reflect the characteristics of all youth who engage in fire-related behavior; such as those who set fires but are not discovered or reported, those who are not referred to an intervention program, or those who are in residential programs or in custody in detention facilities. For those who were brought to the attention of the authorities, referral patterns into the PFYR program may vary between agencies in southern Nevada and so care should be taken in attempting to generalize the findings to the larger population.

The ability to objectively measure the many elements of firesetting behavior can be problematic. There is inconsistency in the way subject-matter experts and researchers define and categorize firesetting behavior. A significant weakness in this study was the use of secondary data obtained from an existing questionnaire. This sample included young children referred following a single episode of fireplay and adolescents who were

reported to have been involved in more than 20 firesetting incidents. It was difficult to distinguish the severity of firesetting based on the number of incidents alone because the data collection instrument did not include questions that adequately measured motive, intentionality, severity, and outcome. The PFYR parent questionnaire was a compilation of questions from other fire risk assessment tools and had not been validated. The survey was not appropriately structured to capture detailed information on selected variables of interest and proxy measures were used instead; some questions were ambiguous and because it was self-administered there was a significant amount of missing data. In addition, the small sample size (N=187) may have contributed to the null findings.

The only data source for this study was the information provided in the written survey by the parents or guardians of the youth enrolled in the program. This offered only one perspective of a very complex behavior which is often covert in nature. The true extent of the firesetting may not be known to the adult caregiver. In addition, parents or guardians may not be aware of other behaviors or experiences of their child that could contribute to or be a manifestation of underlying psychosocial issues. The data used in the analysis provided only one perspective rather than multiple sources of information such as the youth, a teacher or clinician, and police or fire personnel, which would have created the opportunity for a more thorough evaluation and determination of the reliability of the assessment.

Additional weaknesses include the cross-sectional design of the study which does not allow the temporal sequence of the relationship between the predictor variables and fire-related behavior to be established. Survey respondents may have experienced difficulty remembering details about past events creating the potential for recall bias. Those who

did not complete all of the questions may have done so intentionally and may differ from those who completed all of the questions. Given the nature of the firesetting intervention program, some respondents may have provided more favorable responses because they were aware of the program's intent contributing to response bias (Hulley, Cummings, Browner, Grady, & Newman, 2007).

### Conclusion

Each year fires set by children and adolescents result in the loss of hundreds of lives and cause millions of dollars in property damage. Juvenile firesetting is a complex issue requiring a multidisciplinary approach to better understand the epidemiology of this dangerous and persistent problem. The existing literature documents the challenges researchers encounter in attempting to identify a common personality profile, behavioral pattern, set of family dynamics, and environmental conditions to adequately address unsanctioned and unsupervised fireplay, firestarting and firesetting activities. A major challenge has been the lack of a standardized method of defining the scope of juvenile fire involvement because it can be characterized by function, intent, motive, frequency, severity, damages, and consequences which are further influenced by the child's stage of development (Flynn, 2009; Kolko, 2002). Creating validated screening and assessment instruments is essential in assisting fire, law enforcement, social service, and mental health professionals with early detection and appropriate decision-making regarding client referral for education, counseling, intervention, or treatment depending on the severity of the firesetting behavior. Shrinking financial resources for fire safety education programs and social and mental health services require more accurate



assessment of fire-related behavior problems and wise use of targeted prevention, intervention and treatment strategies. Children and adolescents in the highest risk category often present the greatest challenges because successful interventions and treatments involve the entire family and can be very resource intensive and costly.

This study examined relationships between firesetting behavior and select socioeconomic, family environment, and psychosocial characteristics of children and adolescents enrolled in a community-based firesetting intervention program. The intent of the research was to contribute to the existing body of knowledge related to identifying predictors of juvenile firesetting behavior and to assist in the development of evidence-based screening tools that will drive appropriate utilization of cause-specific prevention and intervention strategies to reduce the incidence of fire-related injury, death and destruction. The knowledge gained will be used to assist the PFYR program in selecting a new parent/guardian fire risk assessment instrument from existing and available tools created by national experts in the field. Future research activities will be enhanced by improving and standardizing data collection instruments.

Findings in two areas of this study lend support to empirical evidence reported in the literature. Among youth enrolled in the PFYR program, results indicate children and adolescents with increased interest in fire are more likely to engage in more fire-related incidents. The second finding was that youth who exhibited behaviors characteristic of conduct disorder or antisociality were more likely to be involved in more firesetting events. More detailed analysis of this sample should be considered in the future, including examination of data collected from the child or adolescent and fire, law enforcement, education, social service, medical, and mental health professionals related

to the case. The additional perspectives are essential to meaningful evaluation of the issue.

Future research should focus on a more comprehensive analysis of risk factors using standardized assessment tools that can more clearly define the relationship between the severity of the firesetting behavior and the various correlates that contribute to unsafe and unsanctioned fire-related activities. Due to limited research in this area, it is difficult for professionals and policymakers to make evidence-based decisions regarding wise expenditures of limited resources to combat this serious and growing problem.

Juvenile firesetting is a complex behavior that occurs with varying degrees of severity and is associated with a broad array of interrelated biological, psychological, cognitive and social variables. Unsupervised, unsanctioned, and unsafe fire-related activity is itself a serious concern, but it may also serve as a marker for other psychological or behavioral problems that also require appropriate attention. Efforts should be focused on early recognition of youth at risk and effective implementation of prevention, intervention, or therapeutic treatment strategies based on the individual needs of the youth and his/her family. Ongoing research and the development of data-driven initiatives are essential in addressing the many facets of juvenile fire-related activities including the potential devastating human and economic impact on the individual, families, and society.

APPENDIX  
SUPPLEMENTAL INFORMATION

## Youth Firesetting Intervention Program

### Research Questionnaire

Child's Name

Date

Please read all response choices first before making selection. Please answer the questions below to the best of your ability. If question does not apply, please write NA. Your information and opinions are very helpful to our understanding of youth. Your time in completing these questions is greatly appreciated. This project is to track trends and to see where we can provide additional services and tools to families and the community. This is confidential information.

#	Questions	Strongly Disagree									Neutral									Strongly Agree								
		1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1	Before this fire, child understood the dangers of playing with fire.	1	2	3	4	5	6	7	8	9																		
2	Before this happened, I did not expect child would start a fire like this.	1	2	3	4	5	6	7	8	9																		
3	Before this fire, child had shown an interest in playing with fire, or matches or lighters.	1	2	3	4	5	6	7	8	9																		
4	Before this fire, I thought we had adequately discussed the dangers of matches and lighters with child.	1	2	3	4	5	6	7	8	9																		
5	Child has been taught about the dangers of fire play at school or daycare.	1	2	3	4	5	6	7	8	9																		
6	Do you believe child's explanation about this latest incident.	1	2	3	4	5	6	7	8	9																		
7	Before this fire, how many times has child previously played with fire? (Circle the best answer):	Never	1	2	3	4	If more than 4, how many times:																					
8	This incident resulted in	Fire Dept. called			Property Damage			Injury			Death			Other:														
9	Did any of the past fires result in the following: (Circle the best answer)	Fire Dept. called			Property Damage			Injury			Death			Other:														
10	What does child normally use to start a fire with: (Circle the best answer)	Matches			Lighters			Both			Other:																	
11	Where did child set this fire?	Outside, on our property; specify where:																										
		Outside, off of our property; specify where:																										
		Inside, please specify the location & room:																										

12	How do you normally react when child has unauthorized use of matches or lighters?		No reaction or response						
			Talked to or yelled at the child						
			Told him not to do it again						
			Disciplined the child (e.g., grounded him)						
			Other – please specify:						
13	I was surprised that child set this fire.	Yes	Why:						
		No							
14	In the past year, has anyone in household done any of the following: (Check all that apply)		lit candles						
			lit fireworks						
			burned trash						
			lit the grill with a lighter or match						
			lit pilot lights with a lighter or match						
			used gasoline inappropriately						
			lit the fireplace with a lighter or match						
15	Where do you normally store:	Matches:							
		Lighters:							
		Gasoline:							
16	Where was the adult caregiver at the time of this current fire incident.		Inside the home, what room:						
			What was the caregiver doing?						
			At home, but outside:						
			What was the caregiver doing?						
17	Age and Gender of Child	Male	Female						
18	Ages & gender of other children in the home	Male	Male	Male	Male	Female	Female	Female	Female
19	Age & gender of primary caregiver(s):	Male	Female	Male	Female				
20	Estimated Annual Household Income (K = \$1000)	\$25K or less	\$26K to \$30K	\$31K to \$40K	\$41K to \$50K	\$51K to \$60K	\$61K to \$70K	\$71K to \$100K	\$101K or More
21	Have other children in the home played with fire.	Yes	If yes, what please list gender and age.						
		No							
22	What children in the home has had medical help for any type(s) of injury? (Burn, broken bones, cuts & scrapes, etc):	If yes, please list	Name		Age & Gender		Injury		Medical Facility
		No							
23	Do you know if child has experimented with "huffing?" (Inhaled aerosol products including gasoline)	Yes	No	If yes, what did they use? Did you seek medical attention?					
24	If children are the age of 6 & under, & weigh 60 lbs or less, are they in a booster or car seat while traveling in a car?	Yes	No						
25	Does the residence have working smoke detectors throughout the house	Yes	No	What rooms?					

26	Is child truant from school	Yes	No	How many times per semester:		
27	Has something happened to the child in the past year that has been disturbing to them or to you? Yes or No	Describe briefly:				
28	In the past 3 years:					
29	In the past 5 years:					
30	Does child display violent tendencies, or have they ever been mean to other children or family members?	Yes	No	Describe briefly:		
31	Does child display violent tendencies, or ever been mean to pets and/or other animals?	Yes	No	Describe briefly:		
32	If the child is in trouble will they take the responsibility for what they did?	Yes	No	Describe briefly:		
33	Will the child place the blame on someone else?	Yes	No	Describe briefly:		
34	Is the child a leader or a follower?	Describe briefly:				
35	Has the child ever been arrested, cited, or been taken to juvenile hall?	Yes	No	If yes, how many times and what were the charges?		
36	Are both the child's parents living in the same home?	Yes	No			
37	Or, are parents (please check):	Separated		Divorced	Never Married	Deceased (which parent):
38	Is the non-custodial parent involved in the child's life?	Yes	No			
39	Is there a step parent in the home, how is the relationship?	Yes	No	Describe briefly:		
40	How many step parents has the child had?					
41	Please tell us what part of the child's explanation of the latest incident you have a hard time believing?	Describe briefly:				

42	Has child moved often, to different homes or schools in the past year – 2005	Number of Homes		Number of Schools		In Last 3 Years (Home & School):			
43	Has child ever been or is currently under the care of a Doctor, Psychologist or Behavior Specialist?	Yes	No	If yes, what type of specialist, for what behavior and for how long:					
44	Was there a diagnosis and/or medication prescribed?	Yes	No	Describe briefly:					
45	If yes, has it helped?	Yes	No	Describe briefly:					
46	Has child ever been the victim of (Check all that apply):	Abuse		Describe briefly:					
		Sexual Abuse							
		Neglect							
47	Or is there a reason to believe they have?	Yes	No						
48	Has child lied to you before:	Yes	No						
49	Have you or the child been involved with child protective services?	Yes	No	Describe briefly:					
50	During pregnancy with child – was it normal or were there any complications?	Normal	Not Normal	Describe briefly:					
51	Was child born full term? If no, how many weeks premature?	Yes	No	Describe briefly:					
52	Regarding the birth, were there any problems?	Yes	No	Describe briefly:					
53	Did the baby experience any of the following? (Circle all that are appropriate)	Caesarian Section	Cord wrapped around neck	Difficulty breathing	Spent time in an incubator/ oxygen	"Blue baby"	Have no information	NA	
54	Before baby was born, did his/her biological Dad or Mom take any prescription medications?	If yes, who and list all meds taken							
55	Before baby was born, how much caffeine or nicotine did his/her biological Dad or Mom typically use each day?	Mom	Caffeine	Nicotine	Other:	Dad	Caffeine	Nicotine	Other:

56	Before baby was born, how much alcohol did his/her biological Dad or Mom typically use each day or week?	Mom	Per Day	Per Week	Other:	Dad	Per Day	Per Week	Other:
57	Before baby was born, what other recreational drugs did his/her biological Dad or Mom use?	Mom	Drug 1	Drug 2	How Often	Dad	Drug 1	Drug 2	How Often
58	After birth, did child seem to develop normally?	Describe briefly:							
59	Do you remember any problems with child's eating, sleeping, or crying?	Describe briefly:							
60	Has child had any behavior challenges reported to you by teachers or others in the last two years? What are the challenges/problems?	Describe briefly:							
61	What activity has child done in the past that resulted in injury to him/her?	Describe briefly:							
62	Have you ever known child to be the victim of one or more bullies:	If Yes, Describe briefly:							
63	Have you ever known child to act like a bully?	If Yes, Describe briefly:							
64	Please Circle Race of Child	White	Black	Asian – Pacific	American Indian	Hispanic	Other:		
65	Please Circle Race of Biological Mother	White	Black	Asian – Pacific	American Indian	Hispanic	Other:		
66	Please Circle Race of Biological Father	White	Black	Asian – Pacific	American Indian	Hispanic	Other:		
67	Is child involved in any organized activities or sports, non-school related	If Yes, Describe briefly:							
68	Comments								

**OFFICE USE ONLY**

Entered into Data Base Date:

Entered by:

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





**Biomedical IRB – Exempt Review  
Approved as Exempt**

**DATE:** February 23, 2010  
**TO:** Dr. Michelle Chino, Center for Health Disparities Research  
**FROM:** Office for the Protection of Research Subjects  
**RE:** Notification of IRB Action by Dr. Charles Rasmussen, Co-chair *CRM*  
Protocol Title: **Playing with Fire or Arson? Identifying Predictors of Juvenile  
Firesetting Behavior**  
OPRS# 1002-3370

This memorandum is notification that the project referenced above has been reviewed by the UNLV Biomedical Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45CFR46.

The protocol has been reviewed and deemed exempt from IRB review. It is not in need of further review or approval by the IRB.

Any changes to the exempt protocol may cause this project to require a different level of IRB review. Should any changes need to be made, please submit a **Modification Form**.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at [OPRSHumanSubjects@unlv.edu](mailto:OPRSHumanSubjects@unlv.edu) or call 895-2794.

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Thesis Title: Playing with Fire or Arson? Identifying Predictors of Juvenile Firesetting Behavior

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