Methamphetamine: Examining Arizona's Drug Endangered Children

by

Amy LaRae Pennar

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Graduate Supervisory Committee:

Alyson F. Shapiro, Chair
Judy Krysik
Robert H. Bradley

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ABSTRACT

Children removed from methamphetamine laboratories are a severely understudied population despite the widespread deprivation parental methamphetamine abuse has on children, particularly in homes where methamphetamine is produced. Arizona's children are uniquely affected by the use and manufacturing of methamphetamine due to the geographic location and landscape of the state. A sample of 144 children removed from their homes during the seizure of methamphetamine laboratories, as part of the Arizona Drug Endangered Children program between 1999 and 2003, was investigated. Results indicate that younger children were more likely to be reported by Child Protective Services as high or moderate risk of further abuse, test positive for methamphetamine, and have maternal alleged perpetrators of abuse. Older children were more likely to be reported as low risk for further abuse, test negative for methamphetamine, and have paternal alleged perpetrators of abuse. Results also show that children initially placed in foster care were more likely to remain in foster care at the final assessment than to be living with a parent or kin. These findings have implications for individuals working with children removed from methamphetamine laboratories, including Child Protective Services case workers, medical personnel, temporary and permanent child caregivers (i.e., *foster care*, *kin care*, *adoptive parents*, and *shelters*), and community members (i.e., *teachers*). Recommendations based on study findings are offered to child and family advocates and interventionists.

For Krzysztof:

My loving husband who encouraged me every step of the way – thank you!

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Introduction

The manufacturing and use of methamphetamine in the United States has deleterious implications for the children living in methamphetamine laboratories. Methamphetamine abuse and manufacturing has exponentially increased across the United States over the last decade. In 2004 the Drug Enforcement Administration (2006) reported 1.4 million Americans abused methamphetamine. In particular, the western and southwestern states are disproportionately affected by methamphetamine abuse (Center for Disease Control, 2007; U.S. Census Bureau, 2005). Arizona is geographically unique from other states that exhibit high levels of methamphetamine abuse, as Arizona also serves as a gateway between the transportation of methamphetamine from the larger super laboratories in California and Mexico to other states across the country (NDIC, 2003). In addition to its geographic proximity to California and Mexico, Arizona's geographical landscape includes a large proportion of rural areas that allow for manufacturing methamphetamine in smaller clandestine laboratories with low risk of being detected.

Across the United States approximately 20% of methamphetamine laboratory seizures are reported to involve children (DEA, 2006). However, Arizona reports an astonishing 35% of methamphetamine laboratory seizures to involve children (Office of Arizona Attorney General, 2006a). In 2000, as a result of the increased use and manufacturing of methamphetamine in Arizona, the Office of the Arizona Attorney General developed the Drug Endangered Children (DEC) program in Maricopa County to investigate and prosecute crimes related to

the illegal use and production of methamphetamine in homes where children reside. From 2000 – 2003, there were more than 1,100 methamphetamine laboratory related seizures in AZ, from which 322 children were removed. From 2000-2007, 138 cases of methamphetamine laboratory seizure were prosecuted involving 241 children (Office of Arizona Attorney General, 2007a).

Clandestine laboratories expose children to caustic chemicals used in the manufacturing process including sulfuric acid, red phosphorous, and iodine (Office of Arizona Attorney General, 2007a). In addition to these harmful chemicals, children living in homes where methamphetamine is manufactured and used are also often exposed to: 1) second hand smoke that leaves methamphetamine residue on surfaces including toys, fabrics, walls, and floors, 2) abuse, 3) neglect, and 4) their parents' drug abusing acquaintances. Residing in a methamphetamine laboratory has negative implications for children's overall health, development, and well-being.

Despite the high rate of child involvement in methamphetamine laboratories, and the widespread deprivation of children whose parents abuse methamphetamine, children removed from methamphetamine laboratories have remained an under examined at-risk population. Few empirical investigations have focused on the affects of methamphetamine use on parenting and child outcomes. Furthermore, a literature review yielded no empirical investigations that examine the relation between child methamphetamine ingestion (i.e., testing positive) and child outcomes, such as child abuse and foster care placements. The purpose of the current investigation is to examine the effects of residing in a

methamphetamine laboratory and testing positive for methamphetamine among a sample of children in the Arizona DEC program. Specifically, between-group comparisons will be conducted among children who test positive and who test negative for methamphetamine and their type of reported abuse, risk of alleged abuse, and resulting foster care placements. Findings from the current investigation may aid service and care providers to more adequately assess the needs of children removed from methamphetamine laboratories.

What is Methamphetamine?

Methamphetamine is a highly addictive stimulant that causes excess amounts of dopamine to be released in the prefrontal cortex of the brain. Dopamine is a primary component in motivation, experiences of pleasure, and motor function (NIDA, 2006). Elevated secretion of dopamine leads to feelings of euphoria in the abuser; however, the elevated levels caused by methamphetamine contribute to long-term deleterious effects such as hallucinations, paranoia, and repetitive and compulsive behaviors (Scott & Dedel, 2006). Clinical research has found prolonged methamphetamine use to be associated with both physiological and psychological deficits that have both short-term and long-term consequences. Short-term effects include increased aggression, agitation, hyperactivity, hypersexuality, insomnia, anxiety, nervousness, hallucinations, and delusions (NIDA, 2006; U.S. DOJ, 2003). Chronic methamphetamine use can also lead to long-term effects that include damage to the frontal lobe of the brain, seizures, respiratory ailments, oral decay, and death (NIDA, 2006; Scott & Dedel, 2006). The damage to the frontal lobe caused by chronic methamphetamine abuse leads

to impaired cognitive functioning and ultimately deficits in behavioral functioning (Homer et al., 2008). The declined behavioral functioning experienced by chronic users leads to a loss of social contact, impaired decision making abilities, depression, and violence (Hall, Hando, Darke, & Ross, 1996; Homer et al., 2008). The short-term and chronic effects of methamphetamine impact the users' daily functioning including adequate care of themselves and their children.

Methamphetamine and Parenting

Many researchers indicate the likelihood of abuse and neglect perpetrated on children by methamphetamine abusing parents and their drug abusing acquaintances; however, empirical investigations examining the impact of parental methamphetamine abuse on children are limited. Much of the information on the maltreatment of children of parents who abuse methamphetamine is gleaned from previous research examining general parental substance abuse. Despite the lack of empirical support, methamphetamine abuse undoubtedly affects one's ability to parent. The physiological and psychological impairments associated with methamphetamine abuse likely result in maladaptive parenting characterized by neglect, abuse, malnourishment, and an inability to provide for their children's basic needs including: adequate housing, medical care, and clothing (DOJ, 2003).

Children living in methamphetamine laboratories are exposed to a chaotic and unhealthy lifestyle (Brown & Hohman, 2006). Children are exposed to toxic and hazardous chemicals that are used during methamphetamine production. Furthermore, parental drug manufacturing places children at risk for exposure to

burns, fires, and explosions. Living or spending time in a laboratory contaminates clothing and hair with methamphetamine and other toxic chemicals. Seized laboratories have tested positive for traces of methamphetamine on the walls, carpet, and furniture (Martyny et al., 2005). Young children are particularly susceptible to accidental ingestion as they spend large amounts of time playing on the floor, frequently insert their hands into their mouths, and have weaker nervous systems. Children can accidentally ingest methamphetamine through needle sticks, second hand smoke, absorption through the skin and swallowing methamphetamine directly (Office of Arizona Attorney General, 2007a).

Children whose parents are methamphetamine dependent are also exposed to their parent's drug abusing acquaintances such as other methamphetamine manufacturers, buyers, and general drug abusing friends. Children are more likely to be physically and sexually abused by their drug abusing parents and other known individuals in the methamphetamine laboratory environment (DOJ, 2003). Children from addicted families in Arizona were reported to be three times more likely to experience physical and/or sexual abuse than children in the general population (Office of Arizona Attorney General, 2006b).

Methamphetamine and Child Physical Well-being

Research examining the physiological effects of methamphetamine exposure during childhood is limited. Despite the relatively small amount of research available, findings examining the impact of methamphetamine on children's physiology are consistent. Children exposed to methamphetamine are reported as exhibiting respiratory, dermatologic, and dental problems (CA, DEC

website) and agitation, tachycardia, and externalizing behaviors (Asanbe, Hall & Bolden, 2008; Kolecki, 1998; Matteucci, Auten, Crowley, Combs, & Clark, 2007). Children's physical well-being may also be compromised by exposure to interpersonal violence (Sprang, Clark, & Staton-Tindall, 2010), and physical and sexual child abuse (Hanson et al., 2006; Kyle & Hansell, 2005). Despite the small body of literature on childhood exposure to methamphetamine, these investigations do provide understanding to the overall physical risk factors children face when residing in these unhealthy living environments.

Parental Methamphetamine Abuse and Child Maltreatment

Child abuse and maltreatment is a sociological concern that has warranted the attention of researchers, social workers, policy makers, and other individuals who interact with children such as teachers and community members (Seng & Prinz, 2008). Over the last five decades researchers have examined many aspects of child maltreatment with particular emphasis on the developmental outcomes associated with maltreatment. The National Institute of Justice (NIJ) (2007) defines child maltreatment as physical abuse, sexual abuse, or emotional abuse and neglect.

Physical abuse. Child physical abuse is defined as physical injury to a child (Arizona Department of Economic Security (DES), 2011). Physical injuries incurred by children range from mild, such as scratches, to severe, such as broken bones. Regardless of intention, any child injury that results from physical contact is considered physical abuse (DES, 2011). Physical abuse in the home environment can be perpetrated by an array of child caregivers such as parents,

extended family members, and baby sitters. Findings in the child maltreatment literature are generally conclusive that child physical abuse is associated with poor developmental outcomes.

Child welfare workers report children removed from methamphetamine laboratories had a high incidence of physical abuse perpetrated by their parents or their parents' drug using associates (Haight, Jacobsen, Black, Kingery, Sheridan, & Mulder, 2005). In support of these findings, children from methamphetamine addicted families in Arizona were reported to be three times more likely to have experienced physical abuse than children in the general population (Office of Arizona Attorney General, 2006b). Collectively, these findings suggest a high potential for child physical abuse perpetrated by parents, guardians, and other adults present in the child's environment.

Ammerman et al. (1999) examined 290 boys, 10-12 years of age, of fathers and mothers with and without previous substance abuse disorders. The Child Abuse Potential Inventory was utilized to measure parents' proclivity to engage in physical abuse. The authors found significant differences in the proportion of elevated potential for physical abuse among both fathers and mothers with histories of substance abuse when compared to parents' without histories of substance abuse. These results indicate a propensity for parental physical abuse perpetrated on children whose parents have substance abuse disorders.

In an examination of abusive home environments, Bank and Burraston (2001) found abusive home environments to contribute to maladjustment in

adolescence and early adulthood. Bank and Burraston also found early child physical abuse to be correlated with later adolescent drug use, interpersonal aggression and violence. In addition to later externalizing behaviors, research has also found links between child abuse and later internalizing behaviors. Cullerton-Sen et al. (2008) found that children who have been physically abused interpret aggression as an appropriate problem solving and coping skill. They hypothesize that children who experience chronic physical abuse are emotionally socialized to aggressive physical interactions and therefore learn to interpret social interactions as negative and hostile and respond accordingly.

Derauf et al. (2007) found substance abuse to contribute to the likelihood of child maltreatment. Children of methamphetamine abusing parents are likely to endure the same developmental outcomes as other physically abused children, namely a higher likelihood of later drug use, aggression, externalizing behaviors, and delinquency. However, in addition to these negative outcomes, children from methamphetamine laboratories are more likely to suffer medical ailments that compromise their physical well being including neurological damage and respiratory problems (Office of Arizona Attorney General, 2007b). Children of methamphetamine abusing parents are uniquely at-risk for physical abuse as their parents are more likely than non methamphetamine abusing parents to physically abuse their children and neglect the home environment which leads to child physical exposure to harmful chemicals and substances.

Sexual abuse. Sexual abuse, defined as touching, penetrating, indecent exposure including exposing the child to pornography, incest, child prostitution,

child molestation, or the exploitation of a minor (DES, 2011; Maricopa County Interagency Council, 2008), has been related to parental substance abuse. Among a sample of 749 children removed from their homes and placed in foster care, 4.5% experienced sexual abuse, and 28% of these children had parents who exhibited substance abuse (Takayama, Wolfe, & Coulter, 1998). Although this research is not specific to children exposed to parental methamphetamine abuse, it provides insight into the experiences of children of parents with general substance abuse disorders.

In a qualitative investigation of 18 children removed from methamphetamine laboratories, a small proportion of children self-reported being sexually abused by their step-fathers, mothers' boyfriends, or other drug abusers present in the home (Haight et al., 2007). Although this investigation found children self-reported sexual abuse, research investigating sexual abuse, parental methamphetamine abuse, and child outcomes is limited. Despite limited empirical support, the Office of the Arizona Attorney General (2006b) reported children of methamphetamine abusers are three to four times more likely to be sexually abused than children of non- methamphetamine abusers. These findings may be better understood when taking into account the effects of methamphetamine on the abuser. One side effect of methamphetamine abuse is hypersexuality, whereby abusers engage in high coital frequency (Haight et al., 2005). Parents or other adult abusers in the child's environment who are experiencing a proclivity to engage in coitus, coupled with limited cognitive functioning (Homer et al., 2008), may place children in these environments at-risk for sexual abuse.

Emotional abuse. Unlike physical or sexual abuse, emotional abuse, defined as a mental injury occurring from blaming, belittling, rejecting, and withholding love (DES, 2011), is difficult to prove. Although emotional abuse is challenging to prove due to a lack of physical evidence, it does pose serious long-term consequences for child development and well-being. Research has shown that emotionally abused children frequently display low self-esteem, anti-social behaviors, and delinquency (U.S. DOJ, 2003). Furthermore, parental methamphetamine abuse has been associated with children's fears of abandonment (Brown, & Hohman, 2006).

Researchers have also investigated parental quality during methamphetamine use. Wells (2009) found parental substance abuse was related to parental insensitivity to their child's needs. Ammerman et al. (1999) found parents with a history of substance abuse to exhibit low frustration tolerance, anger, and aggressive impulses when interacting with their children. In a qualitative study Haight, Carter-Black, & Sheridan (2009) examined parental behaviors while abusing methamphetamine. Mothers reported strong overreactions to their children's behaviors, particularly in otherwise benign situations. For example, one mother reported screaming at her children for leaving dirty dishes in the sink. Methamphetamine abusing mothers' also reported isolating their children and not allowing them to participate in activities in an effort to avoid detection of their substance abuse. These investigations elicit the potential for child emotional abuse perpetrated by parental substance abusers. Furthermore, given that parents report isolating and punitive behaviors during

parent-child interactions, researchers may expect children from these environments to display many of the externalizing and internalizing behavior problems associated with emotional abuse.

Neglect. Neglect is the most common type of child maltreatment, but does not receive as much attention compared to physical or sexual abuse as these types of maltreatment present more immediate physical dangers (Kotch et al., 2009). Neglect is defined as a failure or unwillingness to provide for a child's basic needs such as food, shelter, supervision, clothing, and medical care (DES, 2011). Bank and Burraston (2001) report neglectful supervision to be associated with childhood injury and trauma. Altschuler (2005) examined 11 children removed from drug involved homes and found 80% of children had prior histories of abuse and neglect.

Children of methamphetamine abusing parents and children living in methamphetamine laboratories are exposed to chaotic and unhealthy lifestyles (Brown & Hohman, 2006). Substance abusers often spend large quantities of time searching for, producing, and using drugs. While parents are in search of methamphetamine, they have reported leaving their children unattended or in the care of unfit babysitters such as other drug abusers (Brown & Hohman, 2006; Haight, Carter-Black, & Sheridan, 2009). During methamphetamine binges, parents are unable to maintain their homes. Homes are commonly without electricity and running water, have poor ventilation, and have unusable toilets and showers (Hohman, Oliver, & Wright, 2004). Children's play areas are often infested with bugs, dirty clothes, trash, and hypodermic needles (U.S. DOJ, 2003).

The parents' inability to competently provide for their child's basic needs is evident in the child's poor hygiene, inconsistent school attendance, and injuries obtained from hazards in their home environment. While withdrawing or coming down from their high, parents report hiding from their children in other rooms and experience feelings of apathy or anger toward their children's bids for attention (Brown & Hohman, 2006).

Children of parents who use or manufacture methamphetamine often experience physical deprivation as a result of parental neglect. The accidental ingestion of methamphetamine and the biohazard chemicals used to produce methamphetamine also result from parental neglect and lack of adequate supervision. In an examination of the medical complications associated with accidental methamphetamine ingestion among 18 children, Kolecki (1998) found children to exhibit symptoms of tachycardia (accelerated heart rate not induced by exercise) (100%), agitation (50%), vomiting (33%), and inconsolable crying and irritation (33%). Farst et al. (2007) presented two case reports of children admitted to the emergency department with severe esophageal burns. It was determined that the extensive burns resulted from the ingestion of sulfuric acid that was obtained in a home methamphetamine laboratory. In a toxicology screen, both children also tested positive for methamphetamine. Other physical deficits resulting from gross parental neglect for children's health and well-being include anemia, neurological damage, and respiratory problems (Office of Arizona Attorney General, 2007b).

Methamphetamine and Foster Care

The devastation of the family that results from methamphetamine addiction also has implications for the larger community. Neglect, physical and sexual abuse, and parental incarceration all force large numbers of children into the foster care system. Foster care has been defined as out-of-home placements for children who cannot remain with their biological parents or current legal guardian (Bass, Shields, & Behrman, 2004). This definition encompasses foster homes, kin care, crisis nurseries, shelters, and emergency receiving homes. Parental substance use relates to foster care in four ways: the number of foster care placements, longer duration spent in foster care, higher rates of foster care reentry, and lower rates of reunification with the biological parents.

Parental substance abuse has been identified as a risk factor for child foster care placements (Vanderploeg et al., 2007). Brown and Hohman (2006) conducted a study on the effects of methamphetamine on parenting and found that 40% of their subjects' children were in foster or kin care. Once a methamphetamine laboratory is seized, children are placed in temporary foster care while the preliminary prosecution of their parents takes place. Most parents are charged with and incarcerated for child endangerment. Incarcerated parents whose children were in foster care were more likely to have higher rates of substance abuse when compared to other parents whose children are in foster care (Hayward & DePanfilis, 2007). Children of incarcerated methamphetamine abusers are therefore more likely to be in foster care because of their parent's drug addiction and are also more likely to have parents with higher drug dependence

when compared to other foster children. This concept is pivotal because parental substance abuse is associated with longer durations in foster care (Vanderploeg et al., 2007) and slower rates of reunification (Wulczyn, 2004). Children with prolonged stays in foster care are more likely to experience multiple placements (Bass, Shields, & Behrman, 2004), and their probability of exiting the foster care system decreases as their length of stay increases (Wulczyn, 2004).

Reunification of children with their biological parents is the main goal of foster care (Wulczyn, 2004); however, children placed in foster care because of parental drug abuse are less likely to exit the foster care system (Vanderploeg et al., 2007). The success of reunification is reliant on the parent changing the home environment and maintaining drug abstinence. Although the majority of children are eventually reunified (Wulczyn, 2004), children of substance abusers are more likely to re-enter the foster care system than are children of non-substance abusers (Vanderploeg et al., 2007).

Method

The current research was an examination of data from the Office of Arizona Attorney General and their collaborative partners: Department of Economic Security (DES) – Division of Children, Youth, and Families (DCYF), Child Protective Services (CPS), local law enforcement, and a local hospital with an extensive pediatric department. The current investigation examined descriptive statistics on this understudied population and conducted analyses to determine the relationships between residing in a methamphetamine laboratory and measures of child wellbeing, including: drug test results, type of alleged abuse, risk of alleged

abuse at the time of the CPS report, and foster care placements. Research procedures for the secondary data analysis of human subjects in this sample were approved by the Arizona State University Institutional Review Board (IRB), and the Arizona DCYF IRB.

Participants

The children included in this investigation were removed from 85 methamphetamine laboratories in Arizona and were a part of the DEC program between 1999 and 2003. The sample consisted of 144 children between 13 days to 17 years of age. Detailed descriptive statistics are presented in the results section.

Procedures

Upon laboratory seizure all children residing in the home were removed by CPS and placed in temporary foster care, including: kin care, foster homes, crisis nurseries, and emergency receiving homes for infants. Once removed, if one did not already exist, a CPS case report was originated for each child removed. Prior to placement, children were decontaminated (i.e., their clothes were changed and they were provided a bath) to remove any potential methamphetamine on their skin or clothes. In most cases, children were taken to a local hospital for a routine medical examination and screened for physical and/or sexual abuse prior to placement. In some circumstances, children were placed into care prior to receiving a medical evaluation. In addition to a medical exam, children removed from the methamphetamine laboratory were screened for methamphetamine using a urine toxicology screening that tests for traces of methamphetamine present in urine. Urine samples were collected by CPS or medical staff at the hospital within

12 hours of removal from the laboratory; however, not all samples were able to be collected within this time frame and samples up to 48 hours post removal were accepted and screened. Once placed into foster care, CPS was responsible for following up with each child to evaluate their current placement. Overtime foster care outcomes included kin care, institutional foster care (i.e. foster homes, group homes, shelters, and emergency receiving homes), or reunification.

Measures

CPS case report data. CPS case report data contains information for each child removed from a methamphetamine laboratory by the DEC program. For each child, the file contains their history of CPS calls, the perpetrators' relationship to the child, the type of alleged maltreatment, the risk of further maltreatment, and the circumstances of the CPS call that are tracked by specific situations including child abandonment, substance abuse contributing to the maltreatment, and domestic violence. Also contained in this report are the outcomes of the CPS investigation of the alleged maltreatment including but not limited to: unsubstantiated maltreatment, pending substantiation of maltreatment, and substantiated maltreatment.

CPS case tracking form. The CPS case tracking form is composed of 16 total items that include: the child's date of birth, the date of the CPS report, the number of children removed during the laboratory seizure, and applicable dates related to granted guardianship, severance from their caregivers, and adoption.

Methamphetamine lab tracking form. The methamphetamine laboratory tracking form contains 16 items that include: initial drug test results, initial foster

care placement date and location, current placement at the time of data acquisition including foster homes, kin care, reunification with the parents, and the date the file was closed if it occurred prior to the acquisition of data. Also reported in the methamphetamine laboratory tracking form are the outcomes of the parents' prosecution for child abuse, drug abuse, and subsequent incarceration. Although not all cases were prosecuted or substantiated prior to the acquisition of data, 83% of child cases were substantiated.

Research Objectives and Data Analytic Plan

1. As relatively little is known about children removed from methamphetamine laboratories, descriptive statistics were analyzed, including: children's age, the mean number of children removed across laboratories, initial care placements, ending care placements, drug test results, risk of further abuse at the time of the CPS report, adult alleged to have perpetrated the abuse, and the percentage of children who were legally severed from their parents.
    a. The means and standard deviations, including range, were calculated for children's age, the number of children removed across laboratories, and the amount of time between children's initial and ending care placements.
    b. The percent of children in each category of the following variables were calculated: initial care

placements, ending care placements, drug test results, type of alleged abuse, risk of further abuse at the time of the CPS report, adult alleged to have perpetrated the abuse, and children who were legally severed from their parents.

2. Beyond descriptive statistics, existing relationships between the children's age, risk of further abuse at time of removal, adult alleged to have perpetrated the abuse, and drug test results were examined. To accomplish this, one-way analysis of variance (ANOVA) and chi-square test statistics were conducted. Any emerging relationships were further examined with logistic regression. Positive drug test results were hypothesized to be significantly related to higher reported risk of further abuse at the time of the report, as a positive drug test was hypothesized to be indicative of a more harmful environment. Age was hypothesized to be related to positive drug test results, such that younger children would be more likely to test positive for methamphetamine than older children due to more time spent in the home, frequency of time spent playing on the floor, and higher skin to weight ratios.

    a. Differences in children's age by their drug test results were examined using ANOVA.

b. ANOVA was utilized to examine differences in children's age by their reported risk of further abuse at the time of the CPS report.

c. Differences in children's age by the alleged perpetrators' relationship to the children were examined with ANOVA.

d. A chi-square test statistic was conducted to examine the relation between the risk of further abuse and the adult perpetrating the abuse.

e. The relation between risk of further abuse and the child's drug test results was examined using a chi-square test statistic.

f. The relation between the type of alleged abuse and the child's reported risk of further abuse at the time of the CPS report was examined using a chi-square test statistic.

g. A chi-square test statistic was conducted to examine the relation between the type of alleged abuse and the adult perpetrating the abuse.

3. Children residing in methamphetamine laboratories are believed to be at an increased risk for child maltreatment, including physical, sexual, and emotional abuse, neglect, and abandonment. Risk for maltreatment was hypothesized

to be related to the risk of children testing positive for methamphetamine exposure during their own drug test given the risk of their environment. Therefore, a logistic regression was used to analyze the relation whereby greater risk of further maltreatment at time of removal predicted a positive drug test result.

4. As parental substance abuse is related to longer stays in foster care and lower parent-child reunification, children removed from methamphetamine abusing parents were also believed to be more likely to remain longer in foster care. In environments where the child tested positive for methamphetamine, it was hypothesized that these children would be even less likely to experience reunification when compared to children of methamphetamine abusing parents who tested negative for methamphetamine. A logistic regression analyzed the relation whereby positive drug test results predicted the child to still be in foster care rather than reunified with their parents or adopted at the final CPS follow-up time point.

5. Some children refused the drug test and others did not have reported test results. It was hypothesized that differences would emerge between the four groups of children, whereby negative, positive, not recorded, and refused test

would: a) account for a portion of the variance in the risk of further abuse at removal, and b) would predict ending care placements.

Results

Descriptive statistics were analyzed to determine the demographic composition and characteristics of the sample of children removed from methamphetamine laboratories in Arizona. Preliminary analyses, including analyses of variance and chi-square test statistics, were then conducted to determine the relationship between child age, risk of alleged abuse, drug test results, perpetrators' relationship to the child, and initial and ending foster care placements. Significant relationships were further examined with logistic regression. All analyses were conducted in SPSS 16 (SPSS, 2007).

Demographics

Children's ages ranged from 13 days to 17 years with an average age of 7 years (M = 6.99, SD = 4.67). A mean of 1.87 (SD = .96) children were removed per laboratory (N = 85). Seventy-four percent of children were indicated to be at high risk at the time of the Child Protective Services (CPS) report. Overall, alleged perpetrators were 50.8% mothers, 34.1% both mothers and fathers, 11.1% fathers, and 4% another relative. Approximately 13% of children tested positive for methamphetamine. Of the 144 child cases, 83% resulted in substantiated abuse. All children were reported as experiencing neglect, and 2.7% of children were also reported as experiencing physical abuse. For results of all descriptive statistics (research objective 1) see Tables 1 and 2.

Analysis of Variance

One-way ANOVAs were calculated to further examine the relationship between age, drug test results, children's risk at the time of the CPS call, and the perpetrators' relationship to the child (Research Objectives 2a – 2c). Children's age was significantly related to risk ($F(2,141) = 11.46$, $p < .001$). Specifically, children reported as low risk were older ($M = 11.3$) compared to children reported as high ($M = 6.22$, $p < .001$), or moderate risk ($M = 6.76$, $p < .01$). Mean differences in age between children reported as high and moderate risk were non-significant (see Figure 1). Children's age was also significantly related to the results of the children's drug test ($F(1, 109) = 4.33$, $p < .05$) with children testing negative being significantly older ($M = 7.8$) than children testing positive ($M = 5.4$; see Figure 2). Furthermore, children's age was also significantly related to the perpetrators' relationship to the children ($F(2,118) = 6.19$, $p < .01$). Children whose fathers were the alleged perpetrator ($M = 10.36$) were significantly older than children whose mothers ($M = 6.59$, $p = .001$), and both mothers and fathers were the alleged perpetrators ($M = 5.77$, $p < .001$); however, children whose mothers were implicated in the abuse did not have a significant difference in mean age with children whose mothers and fathers were their alleged abusers (see Figure 3).

Chi-square Test Statistic

The chi-square test statistic was utilized to examine the relation between categorical variables of interest. Specifically, the relation between risk of alleged abuse and the alleged perpetrators' relationship to the child, and risk of alleged

abuse and the child's drug test result were conducted with the chi-square test statistic. Phi was calculated for each chi-square analysis. Furthermore, Yates' corrected chi-square was calculated for all analyses but was only of interest in analyses where a violation of expected cell size existed. Additional chi-square tests were conducted between variables of interest. Chi-square analyses are presented in Tables 3-5.

Relation of risk of abuse and other child variables. Table 3 shows the results from all categorical chi-square analyses examining the relation between children's risk of further abuse at the time of the CPS call and other child variables. Children reported as being in a low risk situation at the time of the CPS report was significantly related to having both a mother and father reported as the children's alleged perpetrators ($\chi^2(1) = 10.68$, $p = .001$). Of all children reported as low risk, nearly three-fourths (73.3%) were children whose alleged perpetrators were both their mothers and fathers. Low risk was moderately related to having both a mother and father as the perpetrators of abuse ($\varphi = .30$; Cohen, 1988).

For children deemed at moderate risk at the time of CPS report, 85.7% had a perpetrator other than their mother ($\chi^2(1) = 9.47$, $p = .002$). A moderate relationship was found between moderate risk and having an alleged perpetrator other than only one's mother ($\varphi = -.28$). Moreover, there is evidence that among children reported to be at moderate risk, they were not likely to have fathers as their alleged perpetrators ($\chi^2(1) = 4.47$, $p < .05$); however, after employing Yates' corrected chi-square to account for the violation in cell size for this analysis, the inverse relationship between moderate abuse and father as perpetrator existed

only at the trend level ($\chi^2(1) = 2.791$, $p < .10$, $\varphi = .19$). Other trend evidence suggested that children with moderate risk have both mothers and fathers as their alleged perpetrators ($\chi^2(1) = 3.226$, $p < .10$, $\varphi = .16$).

High risk at the time of the CPS call was significantly related to having a mother as the alleged perpetrator of abuse ($\chi^2(1) = 27.712$, $p < .001$). Two-thirds of children reported to be at high risk (66.3%) had a mother that was implicated as their alleged abuser. Furthermore, the relation between being high risk and having a mother as the alleged perpetrator of abuse is approaching a large effect size ($\varphi = .48$). Results also indicated that approximately one fourth (26.1%) of children at high risk were children whose perpetrators were both their mothers and their fathers ($\chi^2(1) = 14.965$, $p < .001$). High risk has a moderate relationship with the alleged abuser being both the mother and father ($\varphi = -.35$). Collectively, the preliminary analyses examining the relation between child risk at the time of the CPS report and the adult reported as the alleged perpetrator of abuse indicated that children whose mothers were reported as their abusers were more likely to be at high risk than either children whose abusers were their fathers, or both mothers and fathers.

Although only one-fifth of all children (20.9%) who were reported as high risk tested positive for methamphetamine, nearly all children who tested positive (94.7%) were reported as high risk. Positive drug test results were significantly related to being reported at high risk of abuse ($\chi^2(1) = 4.137$, $p < .05$); however, once accounting for the violation of cell size in this analysis, due to the cell size for testing positive and being either low or moderate risk, the relation existed only

at the trend level ($\chi^2(1) = 3.013$, $p < .10$, $\varphi = .19$). Therefore, partial support was found for the hypothesis that testing positive for methamphetamine was related to reported high risk of abuse at the time of the CPS call. The non-significant results likely reflect low statistical power to detect effects as a relatively small proportion of the sample tested positive for methamphetamine; however, the presence of a trend level effect suggested that testing positive was related to an overall more deleterious, or high risk, environment.

Relation between perpetrators' relationship to child and other child variables. Results for all analyses examining the relation between the alleged perpetrators' relationship to the child and other child variables are provided in Table 4. A non significant trend suggested that mothers reported as the alleged abusers was related to children's positive drug test results ($\chi^2(1) = 3.172$, $p < .10$, $\varphi = .19$). Among the children who tested positive for methamphetamine, 75 percent had their mother, 25 percent had their mother and father, and no children had their father reported as their alleged abusers.

Relation between initial care placement and ending care placement. Table 5 shows all chi-square tests conducted to examine the relationship between children's initial care placements, and their ending care placement at the last recorded CPS follow-up prior to data acquisition. Nearly two-thirds (61.1%) of children who were initially placed into kin care following removal from the methamphetamine laboratory were still residing in kin care at the last point of data collection. Although it is unknown if the family member is the same across time points, the relation between initially being placed in kin care and later

residing in kin care was significant ($\chi^2(1) = 10.847$, $p = .001$, $\varphi = .30$). Initial placement in kin care was also significantly related to not residing in institutional foster care at the final follow-up ($\chi^2(1) = 12.891$, $p < .001$, $\varphi = -.32$). Initial placement in institutional foster care was significantly related to residing in institutional foster care at the final follow-up ($\chi^2(1) = 20.050$, $p < .001$, $\varphi = .40$); however, more than one-third of the children initially placed in institutional foster care were currently no longer residing in institutional foster care. Initial placement with a parent was significantly related to living with a parent during the final report, even after correcting for the violation in cell size, ($\chi^2(1) = 15.686$, $p < .001$, $\varphi = .39$). All children initially placed with a parent were living at home at the final follow-up.

Relation between type of alleged abuse and other child variables. Research objectives 1f and 1g sought to examine the relation between the type of alleged abuse reported to CPS, and the risk of further abuse at the time of the CPS report and the adult accused of abuse, respectively. All children were reported to have experienced neglect, and four were reported as experiencing neglect and physical abuse. As only 2.7 percent of children were reported as physically abused, and no children were reported as sexually or emotionally abused these analyses were not estimable.

Logistic Regression

Categorical dependent variables require the use of logistic regression, part of the generalized linear model that extends linear regression to noncontinuous outcome variables (Cohen, Cohen, West & Aiken, 2003). Because the outcome

variables of interest are all categorical, logistic regression was utilized with both planned analyses, research objectives 3-5, and analyses resulting from significant ANOVA and chi-square test statistics. Odds ratios are presented for all analyses as they are more easily interpreted than the beta coefficients. To obtain the odds ratio expressed as percent change in the outcome variable, 1 was subtracted from the odds ratio and then multiplied by 100, as recommended by Menard (2002).

Risk and testing positive for methamphetamine. Recall that the third research objective focused on the relation between children's risk of abuse and the likelihood of testing positive for methamphetamine. The hypothesis that children with higher reported risk of further abuse at the time of the CPS report would predict children to be significantly more likely to test positive for methamphetamine compared to children reported as moderate or low risk was supported ($B = 1.89$, $p = .035$). According to the odds ratio, being at high risk, compared to low or moderate risk of further abuse, increased the odds of testing positive for methamphetamine by approximately 560% (see Table 6). Moderate risk of further abuse was not significantly related to children's drug test results.

Drug test and ending foster care placement. The fourth research objective was to examine the relation between children's drug test results and their ending foster care placement at the last CPS follow-up prior to the acquisition of data. I hypothesized that children who tested positive for methamphetamine were more likely to remain in kin or institutional foster care, and less likely to be living with a parent at the final follow-up. Alternately, children testing negative for methamphetamine were hypothesized to be more

likely to live with a parent than in kin or foster care at the follow up time point. These hypotheses were not supported (see Table 7).

Drug test as a mediator between risk and ending placement. Research objective 5 aimed to investigate whether children's drug test results mediated the relation between risk at the time of the CPS report and the children's ending care placements. Differences in drug test results (i.e., *negative, positive, refused test,* and *not recorded*) were hypothesized to account for a proportion of the variance in risk and predict ending placement. This analysis was not estimable due to a lack of variation in the data on two of the categories of the drug test variable (i.e., *refused* and *not recorded*). Furthermore, results in research objective 4 yielded a non-significant result for testing positive predicting child ending care placements, which precludes this analysis from being estimated.

Predictors of child risk. ANOVA analyses revealed that risk of abuse at the time of the CPS report was related to mean differences in children's age, such that children who were at high risk were younger than children at low risk. Moreover, high risk was significantly related to mothers' being indicated as alleged perpetrators of abuse. To further investigate the relationships between risk, children's age, and adult perpetrator of abuse - particularly mothers - multinomial logistic regressions were conducted.

First, age was independently examined as a predictor of risk (see Table 8). Results indicate that age was significantly associated with risk between children reported as high and low risk ($B = .27$, $p < .001$) and moderate and low risk ($B = -.24$, $p < .01$, $e^b = .78$). According to the odds ratio, every one year increase in age

is associated with a 31% increase in the odds that the child will be low rather than high risk, and a 22% decrease in the odds that the child will be moderate rather than low risk. That is, as children age, they are more likely to be reported as low or moderate risk than high risk of abuse. Age was not significantly related to differences in the likelihood of being at high compared to moderate risk of abuse.

Second, adult perpetrator of abuse was independently examined in relation to risk. Results revealed that if the child's mother was the alleged abuser, children were less likely to be reported as low (B = -3.32, p < .01) or moderate (B = -2.47, p < .01) risk than as high risk. Moreover, children whose alleged abusers were fathers, or both mothers and fathers, were more likely to be reported as low or moderate risk than as high risk (see Table 8). Being the child of a mother implicated in abuse, as opposed to the father, or both mother and father, being implicated, was associated with a 96% decrease in the odds that the child would be reported as low risk rather than high risk, and a 91% decrease in the odds that the child would be reported as moderate rather than high risk. Overall, these results revealed that having a mother who was implicated as the alleged abuser was associated with higher risk when compared to children whose alleged abuser was their father or were both mother and father.

Next, age and maternal perpetrators of abuse were examined as predictors of risk in a stepwise multinomial logistic regression (see Table 9). First, age was added as a predictor in Step 1. As in the first regression examining age as a single predictor of risk, results indicated that age (B = .29, p < .001) was significantly related to abuse, such that as children age, they were more likely to be reported as

low risk than high risk. Mothers indicated as alleged abusers were then entered in Step 2. After accounting for children's age, the influence of maternal perpetrators of abuse was significantly related to risk. Children whose mothers were their alleged abusers were less likely to be reported as low risk (B = -3.70, p < .001), and moderate risk (B = -2.53, p < .01), than high risk. After controlling for the influence of age, children whose mothers were their alleged abusers experienced a 97% decrease in the odds of being reported as low risk, and a 92% decrease in the odds of being reported as moderate risk, rather than high risk, respectively.

Finally, in a separate multinomial logistic regression, age and both maternal and paternal perpetrators of abuse were examined as predictors of risk. Two separate analyses were conducted to examine the relation between age and the perpetrators' relationship to the child. In the first analysis high risk was used as the reference category. Child age was added as a predictor in Step 1. The relation between age and moderate and high risk of further abuse was not significant (B = .09, p = .24). In Step 2 mothers and fathers both indicated as alleged abusers were entered. Despite a non-significant relation between age and the perpetrators' relationship to the child, results indicated that children of both maternal and paternal perpetrators of abuse were more likely to be at moderate rather than high risk of further abuse (B = 1.60, p = .01, e^b = 4.95). Having both maternal and paternal perpetrators of abuse was associated with nearly a 400% increase in the odds of being reported as moderate risk compared to high risk of further abuse.

In the second analysis low risk of further abuse was used as the reference category. Child age was added as a predictor in Step 1. Results indicated that age was significantly related to abuse, such that as children age, they were less likely to be reported as moderate risk than low risk of further abuse (B = -.28, p = .01, e^b = .76). Mothers and fathers both indicated as alleged abusers were then entered in Step 2. After accounting for children's age, the influence of having had maternal and paternal perpetrators of abuse was significantly related to risk at a trend level such that children were less likely to be reported as moderate risk than low risk of further abuse (B = -1.61, p = .08, e^b = .20).

Predictors of drug test outcomes. Age and maternal perpetrators of abuse were independently examined as predictors of children's drug test outcomes (see Table 10). Age was significantly related to children's drug test outcomes, such that as children age, they were less likely to test positive than negative for methamphetamine (B = -.12, p < .05). That is, for every year children aged, they were 11% less likely to test positive than negative. A non-significant trend indicated that maternal perpetrators of abuse were related to children's testing positive for methamphetamine (B = 1.07, p < .10). The outcome of children's ingestion of methamphetamine and testing positive upon removal from the home was related to age and having an allegedly abusive mother.

Initial care placements predicting outcome placements. Children's initial care placements following removal from the home were examined as predictors of children's ending care placements at the last CPS follow-up prior to acquisition of the data. This relation was examined to determine whether children

in foster care were more likely to remain in foster care or to be reunified with their parents (see Table 11). Children who were initially placed in kin care were more likely to be living with a family member at the follow-up than in institutional foster care ($B = 2.18$, $p < .001$) or with a parent (at a trend-level; $B = .81$, $p < .10$). Children initially placed in institutional foster care were significantly less likely to be in kin care than to still be in foster care at the ending placement ($B = 2.18$, $p < .001$). Initial placement in institutional foster care was also significantly related to remaining in foster care at the final time point rather than living with a parent ($B = 2.29$, $p < .001$, $e^b = 9.89$). Although more than one-third of children were living with a parent at the final follow-up, children's initial placement in kin care was related to their continued placement in kin care rather than foster care or living with a parent, and children initially placed in institutional foster care were more likely to remain in foster care than transition to kin care or parental care. These findings suggest that children's initial placements were strongly related to their outcome placements: Children remain in the same type of care over time, rather than transitioning to either of the two other types of care analyzed.

Relation between age and the alleged perpetrators' relationship to children. The relation between children's age and the children's alleged perpetrators was examined (see Table 12). As children aged they were more likely to have fathers implicated as abusers ($B = .21$, $p < .01$) than mothers. For every year children aged they were 23% more likely to have a paternal abuser than a maternal abuser. Children's age was not significantly related to the odds of having

both a mother and a father implicated in the abuse, compared to children whose abusers were only mothers.

Discussion

Exposure to methamphetamine and manufacturing of the drug presents a number of physical and psychosocial risk factors to children residing or frequenting these environments. Despite the dangers associated with exposure to methamphetamine, the risk for child abuse and neglect, and implications for State level organizations such as CPS, little research has examined this population of vulnerable children. The goal of this exploratory investigation was to describe the sample of children removed from methamphetamine laboratories in Arizona (i.e. *age*), to examine their overall environments (i.e. *presence of maltreatment, drug test results,* and *abusers relationship to the child*), and to investigate their outcomes (e.g. *foster care placements*).

Collectively, risk of abuse at the time of the CPS report was related to children's age and the adults alleged to have perpetrated the abuse. Children reported as high risk of further abuse were more likely to be younger and have maternal perpetrators. Children reported as low risk of further abuse were more likely to be older and have paternal perpetrators of abuse. Moreover, children testing positive for methamphetamine were younger than children testing negative, but no statistical differences were found between testing positive and the perpetrators' relationship to children. Children who tested positive for methamphetamine were more likely to be reported as high risk rather than moderate or low risk of further abuse. Finally, results also indicate that children's

initial foster care placements are related to their ending care placements such that children in kin or institutional foster care are likely to remain in these care settings overtime rather than living with a parent.

Risk of Further Abuse and Child Age

Child age was significantly related to risk. Overall, children removed from the laboratories were an average of 7 years old; however, examining differences in age by risk revealed that children at high risk and moderate risk (6.2 and 6.8 years, respectively) were younger than children reported as low risk of further abuse (11.3 years). As children age CPS case workers were more likely to rate them as low risk for further abuse. Interestingly, statistical differences were found between high and low, and moderate and low risk children, but differences in age and risk assessments were not significant between high and moderate risk children. This finding was not expected. Given the relation between high and low risk, and moderate and low risk, a linear relation between age and risk for further abuse was anticipated. Nevertheless, both high and moderate risk of abuse was associated with early and middle childhood, whereas low risk of further abuse was associated with early adolescence.

Despite the non-linear relation between age and risk, findings that young children were more likely to be at high risk, and older children were more likely to be at low risk of further abuse were not surprising. Young children often spend more time in the home and in closer proximity to their caregivers than older children. Older children spend more time away from the home (i.e., at school or participating in non-school activities such as play; Hofferth & Sandberg, 2001).

Therefore, given the closer proximity of younger children to the methamphetamine laboratory via their close proximity to caregivers, it is not surprising that their overall risk of further abuse is higher than older children. These findings may also reflect the tendency for CPS case workers to assign risk of further abuse relative to the child's age; however, the DEC protocol does not contain age specific criteria that cover children of all ages. That is, portions of the DEC protocol do have age dependent criteria for assessing risk, but these criteria are used in very specific circumstances and may not apply to all children involved in the DEC program.

It is important for interventionists to note the relatively young age at which most children were removed from the methamphetamine laboratories. During this sensitive time period, children are transitioning from the home to school, and from primarily caregiver-child relationships to peer and teacher-child relationships. Deficits in cognitive or socioemotional development should be screened and monitored by case workers to ensure children's developmental needs are addressed and remediated when possible. Moreover, as parenting quality and child abuse are associated with later drug use (Broman, Reckase, & Freedman-Doan, 2006; Huang et al., 2011), interventionists working with early adolescents removed from methamphetamine laboratories should include a focus on drug prevention.

Perpetrators' Relationship to Children and Child Age

Findings regarding child age were related to the adult perpetrators' relationship to the child. Children of maternal perpetrators were younger than

children of paternal perpetrators at the time of CPS removal from the methamphetamine laboratory. Children of both maternal and paternal perpetrators were also younger than children of only paternal perpetrators. Differences in child age were not found between maternal only and both maternal and paternal perpetrators of abuse.

Children typically spend more time with, and are in closer proximity to their mothers than their fathers, particularly prior to the start of formal schooling (Aman-Back, & Bjorkqvist, 2004; Bittman, 1999; Sayer, Bianchi, & Robinson, 2004; Sayer, Gauthier, & Furstenberg, 2004). For child cases involving a maternal abuser, the relation between age and the perpetrators' relationship to the child may also be attributable to the likelihood of single mothers having either formal or informal custody of their children. Following the dissolution of a marital or other relationship, mothers are more likely to obtain primary custody of their children (Kelly, 1994) which may influence the overall amount of exposure the children had to the methamphetamine laboratory in cases of maternal abusers. Furthermore, in cases where fathers are not the primary caregivers, it may take longer for the methamphetamine laboratory to be discovered as children likely spend less time in the laboratory.

Perpetrators' Relationship to Children and Risk of Further Abuse

Findings indicate that CPS case workers' assessments of further risk of abuse were related to the perpetrators' relationship to the children. Children of maternal abusers were more likely to be reported by CPS as high risk of further abuse. Children of both maternal and paternal or only paternal abusers were more

likely to be reported as moderate or low risk rather than high risk of further abuse. Furthermore, a non-significant trend indicated that children of both maternal and paternal abusers were somewhat less likely to be at moderate risk than low risk of further abuse.

Overall, residing in a methamphetamine laboratory is an inherently poor developmental environment for children. However, if low risk of further abuse indicates an overall environment of less risk, these findings illustrate that children's home environments involving paternal abusers are less deleterious than home environments of children in which a father was not implicated in the abuse (i.e., maternal abusers only). These findings support that having a mother implicated in child abuse is associated with poorer child outcomes than having a father implicated in the abuse.

Children of paternal abusers may be at lower risk for further abuse because their mothers', who were not involved with the seizure of the methamphetamine laboratory, may be able to take custody of them, thereby removing them from future harmful situations. Children of both maternal and paternal abusers do not have another parent to take temporary or permanent custody of them. In these child cases, the children are not statistically different in age, yet the presence of their father, in addition to their mother, is related to not being reported as high risk of further abuse, and moderately related to being low risk compared to moderate risk of further abuse. Intuitively it may seem that having both parents involved in the abuse would be associated with higher risk of further abuse; however, these children are more likely to be reported as moderate

or low risk. Therefore, the presence of the father may be a buffer in some way to these already at-risk children.

Child Age, Risk of Further Abuse, and Maternal Abusers

The relation between child age, risk of further abuse, and maternal perpetrators was further examined to test whether the relation between maternal perpetrators of abuse and the child's risk of further abuse were spuriously related to age. Evidence from the multinomial logistic regression model suggests the relation between maternal perpetrators and high risk of abuse is robust, as the relation held even after accounting for children's age. Children of maternal perpetrators were statistically more likely to be reported as high risk for further abuse than children whose perpetrators were either their fathers or both their mothers and fathers. These results illustrate that even after controlling for age, children of maternal abusers were still more likely to be rated as high risk rather than low or moderate risk of further abuse. That is, child age does not entirely account for the relation between high risk of further abuse and having a maternal perpetrator. Beyond the effects of age, having a maternal abuser predicts high risk of further abuse. Surprisingly, even though all children were living in an at risk environment, children of paternal perpetrators, either alone or including their mothers, were at less risk of future abuse than children of maternal abusers. As fathers are implicated in approximately half of all child abuse reports involving biological parents (Sedlak & Broadhurst, 1996), it was unexpected that children whose fathers were implicated in their abuse, either alone or with the children's

mothers, were at less risk of future abuse than children whose abusers were their mothers only.

Child Age and Drug Test Outcomes

As children age they are less likely to test positive for methamphetamine. This finding is not surprising given younger children spend more time in the home, play on the floor and with toys likely to absorb methamphetamine (e.g., dolls or stuffed animals), frequently insert their hands into their mouths, and have larger skin-to-weight ratios (Martyny et al., 2005; Office of Arizona Attorney General, 2007a). Although the data did not allow for testing a possible curvilinear relation between child age and drug test outcomes, it should nevertheless be noted that a potential curvilinear relation between age and children's drug test outcomes may exist. During adolescence children may be more likely to test positive for methamphetamine, not from accidental ingestion as in childhood, but because of their own drug use. CPS caseworkers and interventionists should assess whether older children removed from the methamphetamine laboratories are drug addicted, and provide appropriate treatment.

Drug Test Outcomes and Risk of Further Abuse

Testing positive for methamphetamine was associated with CPS case workers' assessments that children were at high risk for further abuse; however, it should be noted that given the apriori hypothesis, a one-tailed test was calculated and reported. The result of the two-tailed test was a non-significant trend ($p = .07$) which was likely the result of low power given that only 13% of the sample tested positive for methamphetamine. Nevertheless, findings demonstrate that children

who test positive are residing in homes with higher risk of further abuse than children who test negative. These findings may be indicative of an overall more harmful home environment for children testing positive for methamphetamine. Furthermore, these findings may validate the overall accuracy of CPS caseworkers' assessments of child risk of further abuse.

Child Abuse and Maltreatment

Despite being underreported, neglect is the most common type of child abuse (Kotch et al., 2009). Among the sample investigated in this research, CPS case reports most often cited adults with neglect when children were removed from methamphetamine laboratories. A small proportion of these children were also reported as experiencing physical abuse. Whereas previous findings demonstrate a markedly higher rate of physical and sexual abuse among children from this population (Office of Arizona Attorney General, 2006b), the findings of this research do not support previous findings. However, as the present examination only takes into account the abuse associated with the removal time point, it is possible these children have prior CPS case records of physical and sexual abuse. Furthermore, it may be possible that further abuse allegations are made following the mandatory medical evaluation per DEC protocol. These allegations may be reported in a subsequent child file, rather than the case report associated with the specific time point in which children were removed from the methamphetamine laboratory.

Foster Care Placements

Findings regarding children's long-term foster care placements are consistent with previous research demonstrating that children of drug abusers are less likely to be reunified with their parents over time (Vanderploeg et al., 2007; Wulczyn, 2004). Although more than one-third of children were living with a parent at the final follow-up, children's initial placements in kin care were related to their continued placement in kin care rather than foster care or living with a parent. Furthermore, children initially placed in institutional foster care were more likely to remain in foster care than transition to kin care or parental care. These findings suggest that children's initial placements were strongly related to their outcome placements, and that these children remain in the same type of care over time. Findings illustrate the importance of continued intervention in the lives of these children to ensure they are receiving quality care and that their best interests are being supported.

Child Protective Services

Results provide evidence that the department of Child Protective Services is adequately managing these children's cases. First, 83% of these cases were substantiated. In other words, the abuse allegations resulting from the children's removal from methamphetamine laboratories were founded. Second, at the time of data acquisition, 85% of the children's cases were closed, indicating that CPS case workers were actively working to ensure child safety and long-term placement. Last, as aforementioned, the high accuracy (94%) with which CPS case workers correctly identified children who tested positive for

methamphetamine as high risk of further abuse, prior to knowledge of the drug test outcomes, evidences the overall efficacy of the CPS case workers and defined protocol.

Qualifications and Future Directions

The current research was an exploratory investigation of children removed from methamphetamine laboratories in Arizona. Although this research provides insight into the lives of these vulnerable children and may offer important information to child and family professionals working with children from this or related populations, a number of qualifications should be noted. First, this research is yielded from secondary data analyses which are limited by the types of questions that can be answered with the data, as well as the quality of the variables in the data set. Despite inherent limitations to working with all secondary data, the current research does offer meaningful insight into understanding this at risk child population.

Second, the drug test procedure, and implementation of the procedure, used by the DEC protocol may bias the overall proportion of children who test negative for methamphetamine. Although the DEC protocol is to collect urine samples within 12 hours of removal from the methamphetamine laboratory, samples up to 48 hours post laboratory removal were accepted for toxicology screening. Despite the common use of urine toxicology screenings to test drug use or exposure, urine drug tests have a significantly shorter half-life than hair toxicology screenings. Methamphetamine has an estimated half-life of between 9 and 12 hours (Schep, Slaughter & Beasley, 2010). Therefore, methamphetamine

may be less likely to be present in urine samples collected 24-48 hours following removal, particularly if the child has urinated numerous times prior to specimen collection. The number of children with positive drug test results may be underrepresented due to a delay in urine collection and screening. Future studies and the DEC protocol may benefit from either stricter policies regarding time frames for urine collection, or switching to hair toxicology screenings which can indicate drug exposure over much longer periods of time (Bowden & Greenberg, 2010).

A third qualification is that foster care placements were not tracked over multiple time points. Research shows that children of drug abusers are more likely to experience multiple foster care placements over time. The current data only contains two time points. This methodology may underestimate the number of transitions children experience between care giving environments. Future studies would benefit from tracking the number and type of care placements children experience from the time of removal until they are either reunified, adopted, or age out of the foster care system. Employing longitudinal methodology with multiple data points across time will help researchers and interventionists understand the overall caregiving experience of these children and any possible associations between the number of transitions and types of care on child outcomes.

Last, given the ongoing nature of the CPS case reports for these children, the findings from this investigation represent the children's outcomes as of the date of data acquisition. It is possible that the results for a given child may change

as their status within CPS changes. For example, approximately 15% of child cases were still open at the time of data acquisition. It is possible that the case files for these children have or will close. In these child cases the status of the case, whether or not the case was substantiated, the child's ending care placement, and the overall number of children either adopted or severed from their caregivers may change. However, as 85% of the cases were closed at the time of data acquisition, the author is confident that the findings represent the characteristics of the overall sample.

Future studies would benefit from including measures of child development. Little research has examined the relation between residing in a methamphetamine laboratory and the impact it has on child development. As methamphetamine is an airborne particulate, children residing in homes where methamphetamine is smoked or manufactured are at risk for accidental ingestion. Future studies should examine the relation between child methamphetamine ingestion and physical, cognitive, and socioemotional development as this research may provide important insight into the short- and long-term deficits children experience as a result of methamphetamine exposure. Moreover, these investigations should also be cognizant of children's stunted development that is not at a deficit level, as these children may experience lower achievement than their potential is or could have been had they not been exposed to methamphetamine.

Future investigations that include measures of parenting quality would also enhance the field's understanding of the environments and developmental

experiences of these children. In addition to comprehending the effects of methamphetamine exposure and child abuse, we need to understand the role of parenting quality on these at risk children's well-being. This is particularly important as parental methamphetamine abuse is likely comorbid with poor parenting.

Future investigations would also benefit from including children's medical evaluation data. In an effort to comprehend the effects of methamphetamine on children's health and well-being, medical information such as children's height, weight, neurological and respiratory functioning, brain development, and oral health may be useful indicators to understand the impact methamphetamine has on child development and well-being.

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Table 1

Descriptive Statistics

Variable	M	SD	Range	N
Age	6.99	4.67	13 days - 17 years	144
Children removed across labs	1.87	0.96	5	85
Time between initial and ending care placements	7.47	7.90	6 days - 33 months	97

Note. *N* = 85 refers to 85 families from which the children were removed.

Table 2

Frequency Statistics

Variable	Frequency	Percent	N
Risk of further abuse[a]			144
High risk	107	74.3	
Moderate risk	17	11.8	
Low risk	20	13.9	
Perpetrator relationship to child			126
Mother	64	50.8	
Father	14	11.1	
Mother and father	43	34.1	
Relative	5	4.0	
Tracking code characteristic			144
Substance abuse	31	21.5	
Multiple substance abusers	85	59.0	
Domestic violence	1	0.7	
Abandonment and substance abuse	1	0.7	
No information	26	18.1	
Methamphetamine drug test			142
Negative	92	63.9	
Positive	19	13.2	
No record	26	18.1	
Refused test	4	2.8	
Positive for marijuana	1	0.7	
Initial care placement[b]			128
Kin care	73	57.0	
Institutionalized foster care	46	35.9	
Parent	9	7.0	
Ending care placement			140
Kin care	61	43.6	
Institutionalized foster care	22	15.7	
Parent	57	40.7	
Outcome of allegation			143
Substantiated	120	83.3	
Unsubstantiated	23	16.0	
Case status			134
Open	20	14.9	
Closed	114	85.1	
Severance from guardian	5	9.5	53
Adopted	5	9.5	53

Note. [a]Highest level of risk for each child across all perpetrators. [b]Percent does not sum to 100 due to rounding.

Table 3

Relation of Risk of Abuse to Other Child Variables

	High Risk			Moderate Risk			Low Risk		
Variable	χ^2	Yates' χ^2	Phi	χ^2	Yates' χ^2	Phi	χ^2	Yates' χ^2	Phi
Perpetrator relation to child (n = 121)									
Mother	27.712***	25.511***	0.479	9.471**	7.799**	-0.280	14.684***	12.643***	-0.348
Father	5.888*	4.383*	-0.221	4.472*	2.791+	0.192	1.189	0.435	0.099
Mother and father	14.965***	13.293***	-0.352	3.226+	2.248	0.163	10.678**	8.877**	0.297
Drug test outcome (n = 112)	4.137*	3.013+	0.192	0.378	0.030	-0.058	3.814+	2.538	-0.185
Initial care placement (n = 128)									
Kin care	0.000	0.000	-0.001	0.745	0.343	-0.076	0.879	0.412	0.083
Institutional foster care	0.001	0.000	0.002	0.850	0.357	0.081	1.040	0.511	-0.090
Parent	0.001	0.000	-0.002	0.003	0.000	-0.005	0.010	0.000	0.009
Ending care placement (n = 140)									
Kin care	0.005	0.000	-0.006	1.181	0.671	0.092	0.881	0.468	-0.079
Institutional foster care	0.529	0.208	0.061	0.141	0.000	-0.032	0.330	0.052	-0.049
Parent	0.215	0.069	-0.039	0.670	0.301	-0.069	1.885	1.245	0.116

+$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 4

Relation Between Perpetrators' Relationship to Child and Other Child Variables

	Mother			Father			Mother and Father		
Variable	χ^2	Yates' χ^2	Phi	χ^2	Yates' χ^2	Phi	χ^2	Yates' χ^2	Phi
Drug test (n = 93)	3.172^{+}	2.265	0.185	3.140^{+}	1.893	-0.184	0.344	0.084	-0.061
Initial care placement (n = 107)									
Kin care	0.412	0.199	-0.062	0.465	0.131	-0.066	1.252	0.832	0.108
Institutional foster care	0.006	0.000	0.008	0.005	0.000	-0.007	0.001	0.000	-0.003
Parent	1.142	0.486	0.103	2.031	0.672	0.138	4.203*	2.750^{+}	-0.198
Ending care placement (n = 118)									
Kin care	0.001	0.000	0.003	0.041	0.000	0.019	0.031	0.000	-0.016
Institutional foster care	0.090	0.000	0.028	0.339	0.561	-0.054	0.007	0.000	0.007
Parent	0.056	0.002	-0.022	0.031	0.000	0.016	0.016	0.000	0.012

$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 5

Relation Between Initial Care Placement and Ending Care Placement

	Kin care			Institutional Foster care			Parent		
Variable	χ^2	Yates' χ^2	Phi	χ^2	Yates' χ^2	Phi	χ^2	Yates' χ^2	Phi
Initial care placement (n = 126)									
Kin care	10.847**	9.693**	0.293	12.891***	11.245**	-0.320	0.356	0.165	-0.053
Institutional foster care	3.170+	2.542	-0.159	20.050***	17.917***	0.399	2.919+	2.288	-0.152
Parent	9.096**	7.128**	-0.269	2.050	0.953	-0.128	18.708***	15.686***	0.385

+$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 6

Results from Logistic Regression Predicting Drug Test from Risk

	Positive drug test				
Predictor	*B*	SE B	Wald	df	e^b
High risk	1.89*	1.05	3.22	1	6.62
Moderate or low risk	0.66	1.09	0.37	1	1.93

Note. Negative is the reference category. e^b = exponentiated b. Significance values are calculated from a one-tailed test. $^*p < .05$.

Table 7

Results From Logistic Regression Predicting End Foster Care Placements From Drug Test

	Institutional foster care					Parent				
Predictor	*B*	SE B	Wald	df	e^b	*B*	SE B	Wald	df	e^b
Positive drug test	-0.54	0.84	0.42	1	0.58	-0.01	0.56	0.00	1	0.99

Note. Kin care is the reference category. e^b = exponentiated b. **p* < .05. ***p* < .01. ****p* < .001.

Table 8

Results From Logistic Regressions Predicting Child Risk

	Low Risk					Moderate Risk				
Predictor[a]	*B*	SE B	Wald	df	e^b	*B*	SE B	Wald	df	e^b
Age	.27***	0.07	15.89	1	1.31	0.03	0.06	0.22	1	1.03
Perpetrators' relationship to child										
Mother	-3.32**	1.06	9.82	1	0.04	-2.47**	0.80	9.64	1	0.09
Father	3.26**	1.22	7.14	1	26.14	2.86**	0.95	8.98	1	17.43
Mother and father	3.33**	1.07	9.66	1	27.96	2.32**	0.83	7.87	1	10.17

[a]Each predictor set was independently analyzed in the model.

Note. High risk is the reference category. e^b = exponentiated b. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 9

Results From Multiple Logistic Regression Predicting Risk

	Low Risk					Moderate Risk				
	B	SE B	Wald	df	e^b	*B*	SE B	Wald	df	e^b
Model 1										
Age	.27***	0.07	15.89	1	1.31	0.03	0.06	0.22	1	1.03
Model 2										
Age	.29**	0.09	10.34	1	1.34	0.06	0.07	0.59	1	1.06
Maternal perpetrator	-3.70**	1.11	11.01	1	0.03	-2.53**	0.80	9.91	1	0.08
χ^2		32.69***								
df		2								

Note. High risk is the reference category. e^b = exponentiated b. The reported chi-square is the difference between the -2loglikelihood values of the two models. *p < .05. **p < .01. ***p < .001.

Table 10

Results From Logistic Regression Predicting Drug Test Outcome

	Positive drug test				
Predictor[a]	*B*	SE B	Wald	df	e^b
Age	-0.12*	0.06	4.25	1	0.89
Maternal Perpetrator	1.07+	0.62	2.99	1	2.92

[a]Each predictor set was independently analyzed in the model.
Note. Negative is reference category. Predictors were independently analyzed in the model. e^b = exponentiated b. $^+p < .10$. $^*p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 11

Results From Logistic Regression Predicting Ending Care Placements

	Institutional foster care					Parent				
Predictor	*B*	SE B	Wald	df	e^b	*B*	SE B	Wald	df	e^b
Initial placement										
Kin care	-2.18***	0.58	13.90	1	0.11	-0.81+	0.42	3.76	1	0.44
Institutional foster care	2.18***	0.58	13.90	1	8.80	-0.12	0.45	0.07	1	0.89

Note. Kin care is the reference category. Kin care and institutional foster care are highly negatively related which led to model non-convergence. Thus each category of initial placement was independently analyzed as a predictor of ending care placement. e^b = exponentiated b. $^+p < .10$. $^*p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 12

Results From Logistic Regression Predicting Perpetrator Relationship to Child

	Father					Mother and Father				
Predictor	*B*	SE B	Wald	df	e^b	*B*	SE B	Wald	df	e^b
Age	.21**	0.08	7.34	1	1.23	-0.05	0.05	0.96	1	0.96

Note. Mother is reference category. e^b = exponentiated b. *$p < .05$. **$p < .01$. ***$p < .001$.

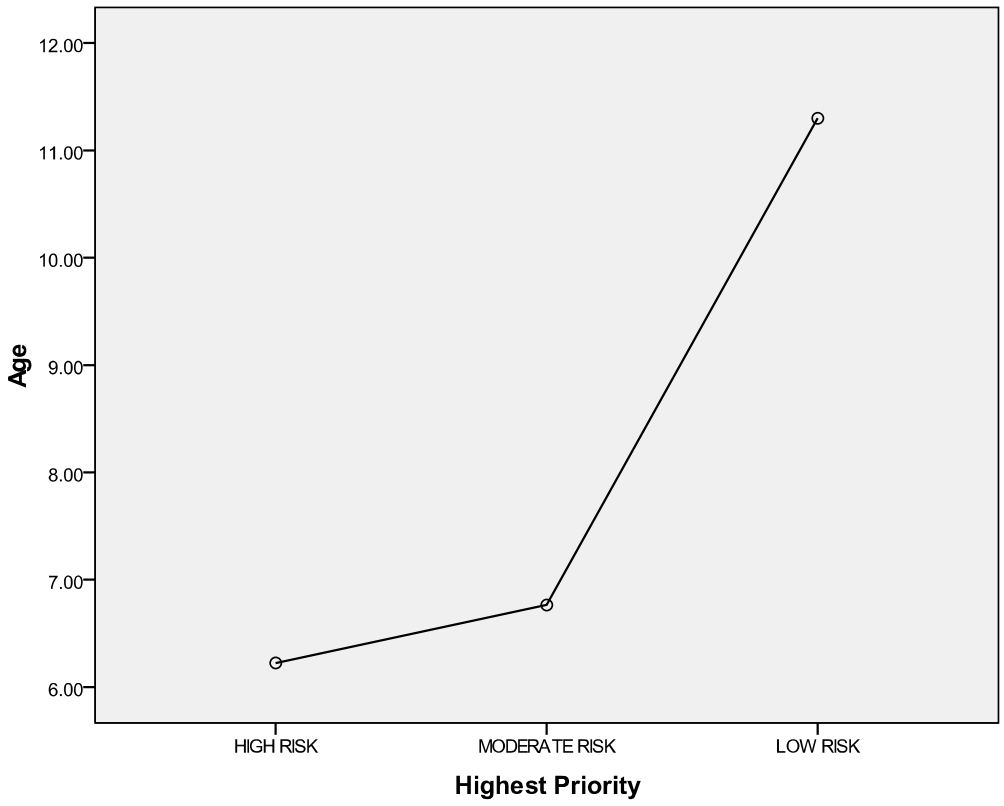

Figure 1. Children's mean age for each category of risk of abuse.

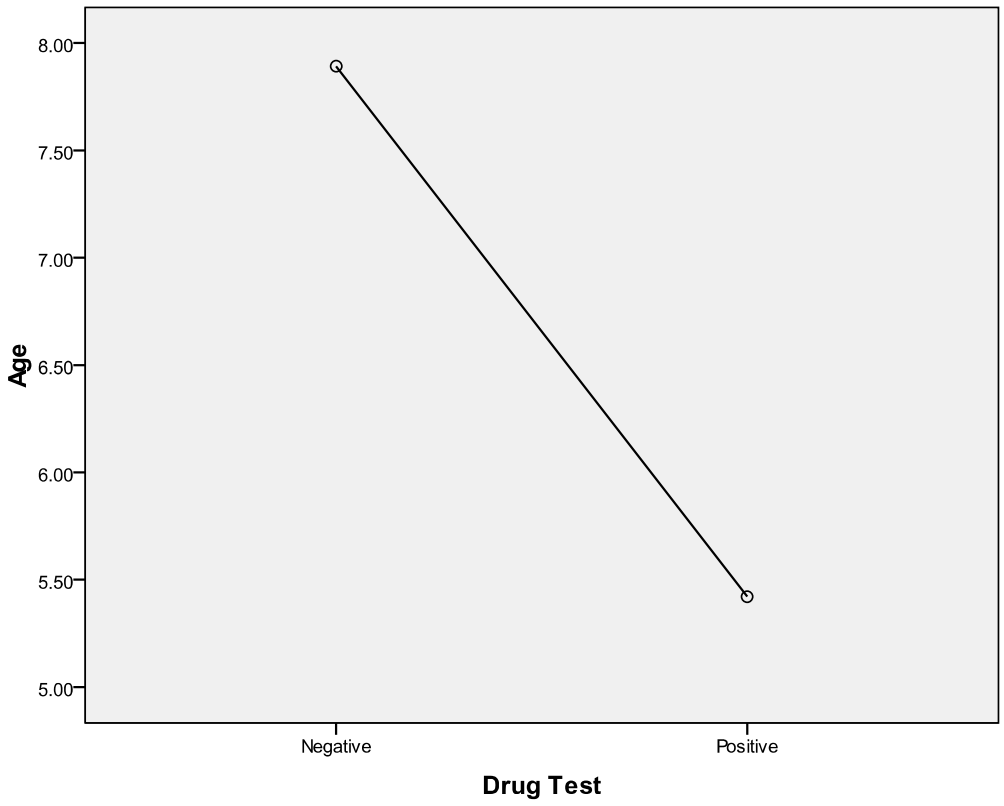

Figure 2. Children's mean age for each category of drug test results.

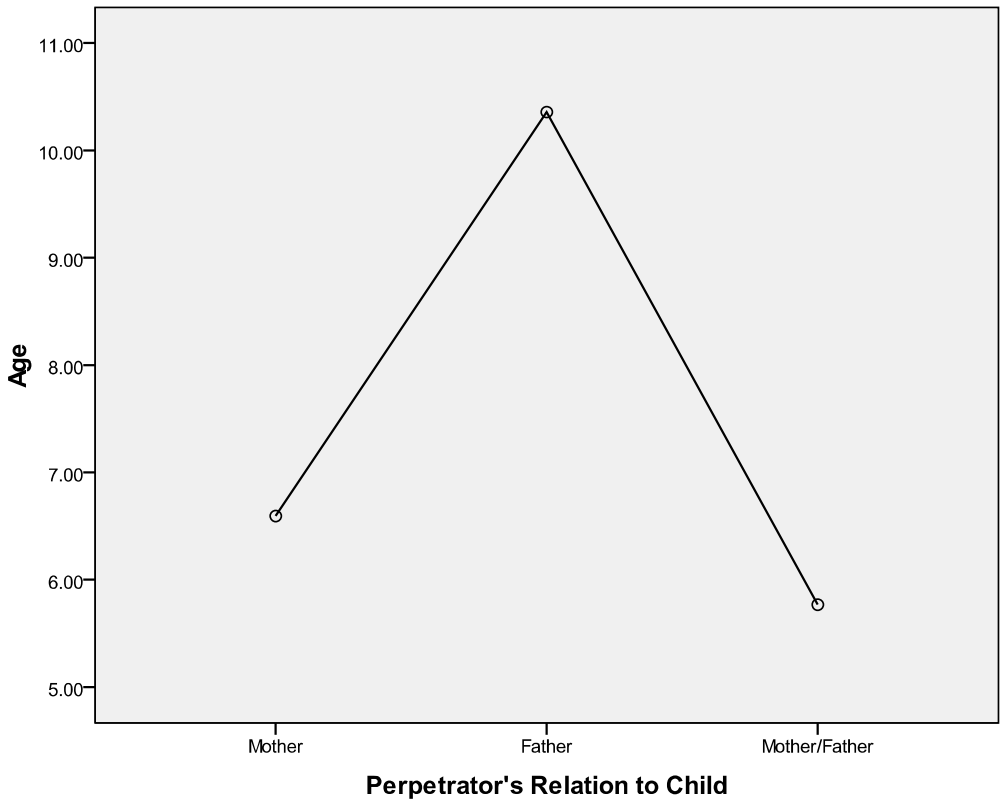

Figure 3. Children's mean age for each category of the alleged perpetrators' relationship to the children.