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Vulnerability or resilience to early substance use among adolescents at risk: The roles of maltreatment and father involvement

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Abstract

Although research has indicated that maltreated children are at higher risk of adolescent substance use, it remains unclear whether the type and timing of maltreatment affect the likelihood of adolescent substance use. Research has also found father involvement to be a potential protective factor against adolescent substance use, but the role of quality vs. quantity of father involvement as well as gender differences in the effects of father involvement on substance use among at-risk adolescents have not been studied. The current study adds value to the existing literature by filling these gaps in knowledge. We conducted a secondary data analysis with a sample of 685 at-risk adolescents drawn from the Longitudinal Studies of Child Abuse and Neglect. The study found a connection between early childhood (birth to 5) physical abuse and adolescent substance use, but not for later childhood physical abuse or other forms of child maltreatment. The quality of father involvement was found to be a protective factor, regardless of child gender; quantity of father involvement was not significant. Based on these findings, development of intervention strategies focusing on prevention of early childhood physical abuse and promoting positive father-child relationships are important prevention strategies for adolescent substance use. Additionally, professionals working with at-risk adolescents need to be cognizant of the implications of early childhood physical abuse and act accordingly to mitigate the increased potential for adolescent substance use.

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Keywords

child maltreatment; father involvement; adolescents; substance use; at-risk adolescents

Early substance use, defined here as substance use before age 14 (O'Connell et al., 2011), is a serious public health concern that is associated with numerous physical and behavioral health problems, such as later substance use disorders, suicide ideation and attempts, risky sexual behavior, impaired brain function, and death (Moss, Chen, & Yi, 2014; Swahn & Bossarte, 2007; Thoma et al., 2011; Trenz et al., 2012; Wu, Witkiewitz, McMahon, & Dodge, 2010). Early substance use is of particular concern given that it implies longer lifetime exposure to substances and results in a higher likelihood of substance use disorders compared to later onset substance use (Moss et al., 2014). Therefore, preventing the early onset of substance use in adolescence through early intervention programs could prevent the subsequent, worsening substance use problems at a later age.

While we know that adolescents who have experienced child maltreatment are at higher risk of early substance use (Lansford, Dodge, Pettit, & Bates, 2010; Oshri, Rogosch, Burnette, & Cicchetti, 2011; Sartor et al., 2013), it still remains unclear whether maltreatment occurring at different stages of development (e.g., early childhood vs. mid-late childhood) has a differential impact on adolescent substance use. In this paper, early childhood refers to the period from birth to 5 years of age and mid-late childhood is defined as 6 to 12 years of age. Gaining an understanding of the varying effects of maltreatment at different developmental periods will offer valuable insight into the development of well-timed intervention strategies to address substance use. Additionally, while empirical evidence from general population studies suggests positive father involvement as a potential protective factor to mitigate adolescent substance use (Bronte-Tinkew, Moore, & Carrano, 2006; Fosco, Stormshak, Dishion, & Winter, 2012), no known research has examined this among adolescents who have experienced or are at risk of maltreatment. Examining if a similar positive impact of father involvement is found with at-risk adolescents may shed light on factors that foster resilience to substance use within the context of adversity. Thus, the current study extends the extant literature on child maltreatment and adolescent substance use by examining the roles of the developmental timing and type of maltreatment and father involvement in inhibiting or promoting resilience to early substance use.

Child Maltreatment and Adolescent Substance Use

Adolescents who experience any type of child maltreatment such as physical, sexual, and emotional abuse and neglect, are at increased risk for substance use (Lewis et al., 2011; Moran, Vuchinich, & Hall, 2004; Rogosch, Oshri, & Cicchetti, 2010; Shin, Edwards, & Heeren, 2009; Tonmyr, Thornton, Draca, & Wekerle, 2010; Yoon, Kobulsky, Yoon, & Kim, 2017). The developmental traumatology theory (De Bellis, 2002) posits that childhood maltreatment may cause dysregulation of biological stress response systems, which in turn are associated with increased levels of psychopathology, such as depression and posttraumatic stress symptoms, predisposing a child to substance use in early adolescence. Relatedly, self-medication theory (Khantzian, 1997) suggests that people use alcohol and

other drugs to self-medicate negative and overwhelming emotions and psychological distress that may be associated with traumatic events, such as maltreatment. A robust body of literature examined the associations between various forms of child maltreatment and different types of substances used in adolescence (Kristman-Valente, Brown, & Herrenkohl, 2013; Moran et al., 2004; Shin, Miller, & Teicher, 2013; Yoon et al., 2017). Of the various forms of maltreatment, physical abuse and sexual abuse are the most often studied types of child maltreatment, especially when related to alcohol and cigarette use (Tonmyr et al., 2010).

Physical abuse as a strong predictor of many categories of adolescent substance use, including alcohol, cigarette, and drug use, has been discussed in numerous studies (Kristman-Valente et al., 2013; Shin et al., 2009). Experience and frequency of physical abuse before age 12 were associated with both the initial level and an increase of heavy episodic drinking in young adulthood, after accounting for other potential factors (Shin et al., 2013). Similarly, adolescents who were physically abused before age 18 showed increased adolescent smoking frequency (Kristman-Valente et al., 2013). Moran et al. (2004) suggested that physical abuse was related to tobacco, alcohol, and illicit drugs use for 10^{th} through 12^{th} graders from rural areas.

A substantial body of literature has examined associations between child sexual abuse and adolescent substance use resulting in mixed findings. Some studies suggest that sexual abuse leads to various types of substance use, such as alcohol abuse (Hamburger, Leeb, & Swahn, 2008), smoking (Howard & Wang, 2005), and illicit drug use (Champion et al., 2004). In these studies, sexual abuse increased preteen alcohol use initiation, heavy episodic drinking, marijuana use, and heavy cigarette use, especially for girls (Hamburger et al., 2008; Howard & Wang, 2005). However, other studies suggest that sexual abuse does not affect alcohol, marijuana and drug use (Lo & Cheng, 2007). Kristman-Valente et al. (2013), for example, reported that sexual abuse before age 18 did not affect the risk of having ever smoked cigarettes in adolescence. The effects of sexual abuse on adolescent substance use remains unclear due to the mixed results of previous studies.

Compared with physical abuse and sexual abuse, emotional abuse and neglect have received relatively little attention in prior research on adolescent substance use (Tonmyr et al., 2010), but indicate a less direct impact on adolescent substance use than other types of maltreatment. Moran et al. (2004) reported that although physical abuse, sexual abuse, and emotional abuse all showed significant effects on adolescent substance use, the effects of emotional abuse were much weaker than that of physical abuse or sexual abuse. One study found that emotional abuse and neglect appear to influence adolescent substance use indirectly via poor mother-child relationship quality (Yoon et al., 2017). Adolescents who experience neglect have also been found to be at higher risk of being influenced by social pressure for alcohol use and developing alcohol use disorders (Clark, Thatcher, & Maisto, 2004). The current study extends the existing research by examining all four types (i.e., physical abuse, sexual abuse, emotional abuse, and neglect) of maltreatment as predictors of substance use during early adolescence.

The Role of the Timing of Maltreatment

Theoretical (e.g., developmental psychopathology; Sroufe & Rutter, 1984) and empirical (Lansford et al., 2010; Thornberry, Ireland, & Smith, 2001) evidence suggests that the timing of maltreatment may have distinct effects on child outcomes. The developmental psychopathology perspective provides valuable insight into understanding how maltreatment at different developmental periods may have varying influences on child development. Developmental psychopathology (Cicchetti & Toth, 1995; Sroufe & Rutter, 1984) posits that early life experiences play an important role in shaping later adaptation and functioning with an emphasis on early childhood as a critical period for successful development (Sroufe & Rutter, 1984). According to this perspective, achievement of developmentally-relevant tasks set the stage for subsequent successful development; therefore, failure in early developmental tasks can increase the likelihood of continued failure and maladaptation in later life (Sroufe & Rutter, 1984). Building on this perspective, children who experience maltreatment in the early years of life (the first five years) may be at risk of experiencing behavioral maladaptation in later years, such as substance use during adolescence.

Findings from some empirical studies (Keiley, Howe, Dodge, Bates, & Pettit, 2001; Lansford et al., 2002, 2007, 2010; Manly, Kim, Rogosch, & Cicchetti, 2001) support the idea in developmental psychopathology that early childhood may be a critical developmental period, with early childhood maltreatment (the first five years) being associated with later negative developmental outcomes. For instance, Lansford et al. (2010) found that physical abuse experienced in the first five years of life predicted use of tobacco, alcohol, marijuana and other drugs for girls at age 12.

In contrast to these findings and the developmental psychopathology perspective, some studies found that later maltreatment had a stronger impact than earlier maltreatment on adolescent substance use (Shin, Chung, & Rosenberg, 2016; Thornberry et al., 2001). In a sample of 738 at-risk adolescents, maltreatment during adolescence (between ages 12–17)—but not early childhood (birth to 5) or mid-late childhood (between ages 6–11)—was associated with adolescent drug use and alcohol-related problems (Thornberry et al., 2001). Similarly, Shin and colleagues (2016) found that physical abuse during adolescence (between ages 10–18) was associated with greater monthly drinking frequency whereas physical abuse during preschool (ages 0–5) and middle childhood (between ages 6–9) was not predictive of alcohol use in young adulthood. In contrast to these findings indicating no significant link between mid-late childhood maltreatment and adolescent substance use, Yoon and colleagues (2017) found that neglect during mid-late childhood (ages 6–12) was associated with adolescent substance use vs. poor mother-child relationships. However, this study was limited in that it did not include early childhood neglect in the model, and thus the relative effects between early childhood neglect vs. mid-late childhood neglect on adolescent substance use was not determined. Overall, there have been very few studies examining the role of mid-late childhood maltreatment on adolescent substance use. Much of the prior research has combined early childhood and mid-late childhood into preadolescence/childhood maltreatment (e.g., Jones et al., 2013; Shin et al., 2016) or solely focused on early childhood maltreatment (e.g., Lansford et al., 2010). Taken together, sparse research has investigated potential unique effects of maltreatment during mid-late childhood. Few

empirical studies examining the role of mid-late childhood maltreatment in adolescent substance use as well as mixed results from the few existing studies on this topic point to the need for further investigation to disentangle the association between the timing of maltreatment (especially mid-late childhood) and adolescent substance use.

Father Involvement and Adolescent Substance Use

Although adolescents who experience child maltreatment are at increased risk for adolescent substance use, not all adolescents with a history of child maltreatment use substances during early adolescence. Therefore, a relevant and important area of inquiry pertains to promotive factors that may be associated with resilience to early substance use, especially among adolescents who have experienced or are at risk of maltreatment. Investigating promotive factors that may protect adolescents from early substance use is important given that it can directly point to the target areas that need to be reinforced through intervention programs.

A number of theories of child development—including Bowlby's attachment theory (1988), Belsky's process model of parenting (1984), and Bronfenbrenner's ecological theory (1979)—suggest that caregivers' (including fathers') sensitive and responsive parenting promotes healthy child development. Fathers function as microsystem resources from which children can benefit and earn positive experiences essential for healthy development (Bronfenbrenner, 1979). A growing body of research on parent-child relationships and children's development indicates that fathers make unique and important contributions to children's development (Lamb, 2010). Theoretical advances (e.g., Paquette, 2004) further highlight the potentially complementary roles of mothers and fathers in children's development, with high father engagement and strong father-child relationships posited as especially important for fostering greater self-regulation among children. Given that some ways in which child maltreatment may increase the risk for adolescent substance use involve dysregulation of stress response systems (De Bellis, 2002) and self-medication (Khantzian, 1997), fathers' roles in fostering greater self-regulation may be especially protective for children who have experienced child maltreatment and are therefore at greater risk for substance use. There is some evidence that fathers, through involvement with their children, play an important role in reducing the risk of adolescent substance use (Bronte-Tinkew et al., 2006; Fosco et al., 2012; Jordan & Lewis, 2005; Profe & Wild, 2017). Building on prior social science research on father involvement (D'Andrade & Sorkhabi, 2016; Yoon et al., 2018), the current study defines father involvement with regard to its quantity and quality. The quantity of father involvement refers to the father's engagement in day-to-day shared activities with the child. The quality of father involvement refers to the level of closeness, trust, emotional support, and affection in the father-child relationship.

In previous research, a positive father-child relationship was found to decrease the likelihood of adolescent alcohol use among 1,027 African American adolescents in grades 7 through 12 (Jordan & Lewis, 2005). Similarly, father-child connectedness was related to reductions in problem behaviors, including adolescent substance use, among 179 racially/ethnically diverse public middle school students (Fosco et al., 2012). Although general population studies (Bronte-Tinkew et al., 2006; Fosco et al., 2012) found that greater father involvement, including positive and close parent-child relationship quality, may protect the

child from substance use during adolescence, this association has not been examined within the context of child maltreatment. It is important to examine the role of father involvement in promoting resilience to substance use with a high-risk group of adolescents (i.e., child welfare-involved adolescents, adolescents at risk of maltreatment) because they represent a unique population with a complex family structure, process, and dynamic. The implication that the role of father involvement may look different in this population needs to be explored.

Finally, theoretical models of father-child relationships highlight the importance of considering child gender in father-child relations, because fathers may interact with boys and girls differently, and boys and girls may in turn respond differently to the same behaviors of fathers (Cabrera, Fizgerald, Bradley, & Roggman, 2014). Some empirical studies have also highlighted that there may be some gender differences in the association between father involvement and adolescent outcomes (Bronte-Tinkew et al., 2006; Luk, Farhat, Iannotti, & Simons-Morton, 2010). More specifically, studies have reported that the positive impact of father involvement is stronger for boys than for girls. The positive and protective role of the father-child relationship on adolescent substance use was stronger for boys than for girls in a nationally representative sample of 5,345 adolescents who lived with two parents in the United States (Bronte-Tinkew et al., 2006). Using a national sample of 1,308 adolescents (10^{th} grade), Luk et al. (2010) found that father communication showed a protective effect against marijuana use in boys, but not in girls. In contrast to these findings, some studies found no significant gender differences in the relation between father involvement and adolescent substance use (Fosco et al., 2012; Jordan & Lewis, 2005). Results from a longitudinal study of 179 adolescents followed from 6^{th} through 8^{th} grade indicated that father-child connectedness was associated with reduced problem behavior, including substance use, over time for both genders (Fosco et al., 2012). Given the inconsistent findings from prior studies, further investigation is needed to gain a better understanding of the gender differences in the association between father involvement and adolescent substance use.

Other Factors Influencing Adolescent Substance Use

In addition to child maltreatment and father involvement, various child and family level factors may affect early substance use. At the individual level, child race has been consistently suggested as an important predictor of adolescent substance use, with White U.S. adolescents showing higher rates of substance use (especially cigarette use) compared to African American and Hispanic adolescents (Johnston et al., 2018). Child internalizing problems (e.g., anxiety and depression) and externalizing behaviors (e.g., aggression, delinquency) have been noted as mediators through which childhood maltreatment affects adolescent substance use (Kobulsky, Holmes, Yoon, & Perzynski, 2016; Lewis et al., 2011). At the family level, parental substance use has been associated with both increased likelihood of child maltreatment (Young, Boles, & Otero, 2007) and higher rates of offspring (i.e., maltreated youth) substance use (Schuck & Widom, 2001; Widom, Ireland, & Glynn, 1995). Previous studies have yielded mixed findings on the association between socioeconomic status (SES) and adolescent substance use (Goodman & Huang, 2002; Hanson & Chen, 2007). A review paper summarizing the findings of 44 empirical studies

indicated that, low SES was associated with greater cigarette use, but such an association was not clear in the connection between SES and alcohol/marijuana use (Hanson & Chen, 2007). On the contrary, low SES was associated with greater marijuana use, cigarette smoking, and cocaine use among White adolescents in a cross-sectional study using the National Longitudinal Study of Adolescent Health (AddHealth) data (Goodman & Huang, 2002).

The Current Study

This study aims to understand risk and resilience factors that are associated with early substance use to aid the development of more effective strategies to address this significant social issue better. Specifically, this study contributes to the existing body of knowledge on the relations among child maltreatment, father involvement, and adolescent substance use by a) examining the effect of the timing and type of maltreatment (early childhood: 0–5 vs. mid-late childhood: 6–12); b) investigating the role of the quantity and quality of father involvement; and c) exploring potential gender differences in the effects of father involvement on early substance use among adolescents at risk of maltreatment. We hypothesized that early childhood maltreatment would be associated with a greater likelihood of early substance use. We also hypothesized that both the quantity and quality of father involvement would be associated with a lower likelihood of early substance use. Given the inconsistent findings from prior research on gender differences in the association between father involvement and adolescent substance use, no specific hypotheses regarding gender differences were formulated.

Methods

Sample

The study sample was drawn from the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN; Larrabee & Lewis, 2016). The original LONGSCAN sample includes 1,354 children and families who were recruited from five study sites in the United States: Eastern (EA), Midwest (MW), Northwest (NW), Southwest (SW), and Southern (SO). The five sites represent various levels of risk and exposure to maltreatment. The MW (n = 245), NW (n = 254), and SW (n = 330) sites recruited the participants based on their prior involvement with Child Protective Services (CPS). The EA site (n = 282) included low income, inner city children and the SO site (n = 243) included adolescents who were identified as a high-risk group for child maltreatment at birth based on the state public health tracking system. Data were collected when adolescents were ages 4, 6, 8, 12, 14, 16, and 18 (July 1991–January 2012). Interviewer-administered face-to-face interviews were conducted for the ages 4, 6, and 8 assessments. Starting from the age 12 assessment, the Audio Computer-Assisted Self-Interview (A-CASI) format was used in order to protect the study participants' privacy and confidentiality in responding to highly sensitive items and also to ensure the uniformity of data collection methods across the study sites (Larrabee & Lewis, 2016).

For the current study, we used the data collected at ages 12 and 14. The analytic sample was restricted to adolescents who reported having a father/father figure, regardless of residential status, because the main construct of interest was the quantity and quality of father

involvement. Adolescents who were excluded (n = 669) due to the absence of a father/father figure were more likely to be White (28.9 % analytic sample vs. 23.3% excluded sample, χ^2 (1) = 5.471, p = .019) than adolescents in the study sample (n = 685). No statistically significant differences were found on other variables including gender and the type of maltreatment.

Measures

Substance use.—Adolescent substance use was measured at age 14 with The National Institute of Mental Health Diagnostic Interview Schedule for Children-Youth (NIMH-DISC-Y; Shaffer et al., 1996). Using an audio-computer assisted self-interview (A-CASI) format, adolescents reported their use of substances in the past year, including alcohol, cigarettes, marijuana, and other illegal drugs (e.g., inhalants, stimulants, sedatives/tranquilizers, opiates, heroin, cocaine or crack, PCP, or other substances utilized to get high). Due to low frequencies of substance use endorsement, the data were dichotomized (0 = *no substance use in the past year*, 1 = *any substance use in the past year*).

Child maltreatment.—Child maltreatment was assessed using the CPS records from birth to age 12. The LONGSCAN coders reviewed and coded CPS allegation narratives using the modified maltreatment classification system (MMCS; English, Bangdiwala, & Runyan, 2005), which has high inter-coder reliability (Kappas > .70) (Larrabee & Lewis, 2016). For the purpose of this study, four types of maltreatment (i.e., physical abuse, sexual abuse, emotional abuse, neglect) at two developmental stages (early childhood: 0–5 vs. mid-late childhood: 6–12) were assessed using the frequency of CPS allegations of each type of maltreatment at each developmental stage.

Father involvement.—The quality of father involvement (adolescent's perceived quality of the relationship with the father) was assessed at age 12, using a self-report, 6-item scale (e.g., "How close do you feel to your father" "How much you think he cares about you?" "Does he understand you?") which was adapted from the Add Health Study (Resnick et al., 1997). Adolescents responded to each item on a 5-point response scale (1 = *not at all/never* to 5 = *very much/always*). The responses were summed to create a total score for the quality of father involvement, with higher scores indicating a higher quality of father-child relationships. Cronbach's α was .87 for this study sample.

The quantity of father involvement (i.e., father's engagement via shared activities in the past month) was measured at age 12 using a self-report 9-item scale. The nine items (e.g., "In the past four weeks: Have you gone shopping with him? Have you played a sport with him?") were adapted from the Add Health Study (Resnick et al., 1997). Adolescents responded to each item using a binary response option (0 = *no* vs. 1 = *yes*). The responses were summed to create a total score for the quantity of father involvement, with higher scores indicating a higher quantity of involvement. Cronbach's α was .71 for this study sample.

Control variables.—Control variables included adolescent sex (0 = *male*, 1 = *female*), race (*White, Black, Hispanic, Other*), father characteristics (i.e., residential status, biological relationship), mother involvement, caregiver education, caregiver employment, food stamp

receipt, perpetrator-child realtionship, and adolescent internalizing and externalizing behavior problems, all of which have been associated with adolescent substance use or child maltreatment in the previous literature (Drake & Zuravin, 1998; Mandara & Murray, 2006; Miech, Johnston, O'Malley, Bachman, & Schulenbery, 2016; Pelton, 1978; Scalco et al., 2014). The father's residential status was measured by asking the adolescent if he or she has a father/father figure living in the home (0 = *no*, 1 = *yes*). The nature of the relationship with the father/father figure was reported by the adolescent and dichotomized (0 = *non-biological*, 1 = *birth/natural father*). The quality (α = .84) and quantity (α = .70) of mother involvement was measured at age 12, using identical measures as for father involvement. Caregiver education (0 = *less than high school*, 1 = *high school degree or more*) and caregiver employment status (0 = *unemployed*, 1 = *employed*) was reported by the primary caregiver at age 12. The receipt of food stamp was also measured at age 12 by asking the caregiver if he/she was receiving food stamps at the time of assessment (0 = *no*, 1 = *yes*).

The perpetrator-child relationship was measured using the MMCS (English et al., 2005) and coded as 1 = *child maltreatment perpetrator was the mother* if adult female parent (e.g., biological mother, stepmother, adoptive mother) was indicated as the perpetrator of maltreatment in any maltreatment cases reported to CPS from child's birth to age 12. Adolescent internalizing (α = .90) and externalizing (α = .93) behavior problems were measured at age 12 using the Child Behavior Checklist (CBCL; Achenbach, 1991), which is a caregiver-report of emotional and behavior problems.

Data Analysis

Preliminary data analysis, including univariate descriptives and bivariate correlations were conducted using SPSS v.23. Bivariate correlations among study variables were calculated to check multicollinearity among predictors, with correlation above .80 as a warning sign for multicollinearity (Allison, 1999, p. 64). Bivariate correlation results indicated no signs of multicollinearity (mid-late childhood physical abuse and mid-late emotional abuse had the highest r, which was .58). Generalized estimating equations (GEE) modeling was performed to examine the association between the timing of maltreatment and early substance use (*research question 1*), associations of the quantity and quality of father involvement with early substance use (*research question 2*), and the interaction effects of gender and father involvement on early substance use (*research question 3*). The GEE approach was used to accommodate the possible issue of non-independent observations produced by the clustering nature of the data used in the study (e.g., clustering by five study sites). The GEE method effectively accounts for within-cluster correlation (Hardin & Hilbe, 2003) and yields more efficient and unbiased parameter estimates compared to traditional regression methods, such as ordinary least squares regression or binary logistic regression (Ballinger, 2004). All study variables contained less than 3% missing cases, with the quantity of mother involvement having the most missing cases (n = 19, 2.8%). Missing data were handled using multiple imputations with a fully conditional specification method.

Results

Sample Characteristics

Sample characteristics and descriptive statistics of key study variables are summarized in Table 1. Just over half of the adolescents were boys (51.09%, n = 685). The majority of the participants were Black (53.14%), followed by White (28.91%), Other (11.82%), and Hispanic (6.13%). Most of the adolescents (73.43%) in the study reported living with a father/father figure in the home. Regarding the exact relationship with the father/father figure, about 40% reported that their father is a biological father and the remaining 60% reported that they have a non-biological father (i.e., stepfather, adoptive father, mother's boyfriend, grandfather, or other male relatives). About 75% of the participant had a mother with a high school degree or more education, 54% had an employed (either full-time or part-time) caregiver, and 34% lived in a household receiving food stamps. The frequency of CPS allegations varied by the type of maltreatment and developmental stage, with early childhood sexual abuse being the lowest frequency and mid-late childhood neglect being the highest.

Child Maltreatment and Father Involvement as Predictors of Early Substance Use

Table 2 displays the results of the GEE analysis for early substance use. Model 1 included child maltreatment and father involvement as focal predictors along with a set of control variables. Adolescents who experienced childhood physical abuse during early childhood (ages 0–5) had 1.72 times higher odds of early substance use when controlling for other types of maltreatment during early or mid-late childhood and other confounding variables (OR = 1.72, $p = .026$). No other types of maltreatment in early childhood or mid-late childhood significantly predicted early substance use.

The quality of father involvement was negatively associated with early substance use. For every one point higher on the quality of father involvement scale, the odds of early substance use decreased by 6% (OR = .94, $p = .042$). The quantity of father involvement was not significantly associated with early substance use, after controlling for other covariates. White adolescents had approximately two times higher odds of early substance use than Black adolescents (OR = 1.97, $p = .016$). The quality or quantity of mother involvement were both not significantly associated with early substance use. Adolescents who had a mother with a high school degree or more education had a lower likelihood of early substance use than adolescents whose mother had a less than high school education (OR = .53, $p = .024$).

Gender Interaction Effects

Model 2 included two interaction terms (gender x quality of father involvement, gender x quantity of father involvement) to examine gender differences in the effects of father involvement on early substance use. The results from Model 2 indicated no significant gender moderating effects either for the quality of father involvement (OR = 1.08, $p = .156$) or quantity of father involvement (OR = .84, $p = .089$). Early childhood physical abuse and the quality of father involvement remained significant predictors of early substance use, even after adding the interaction terms into the model. Similar to the results from Model 1, early

childhood physical abuse predicted higher odds of early substance use (OR = 1.74, $p = .023$) while the quality of father involvement predicted lower odds of early substance use (OR = .91, $p = .014$).

Discussion

This study contributes to the existing literature by filling some of the gaps in our understanding of the roles played by the timing of maltreatment as well as the quality and quantity of father involvement in early substance use among adolescents at risk of maltreatment. In line with the developmental psychopathology perspective (Sroufe & Rutter, 1984) and prior empirical research (Lansford et al., 2010), the positive association of early childhood physical abuse with later substance use in early adolescence was also supported by this study. Exposure to physical abuse during the early years of life may be particularly detrimental because this period represents a critical time for the development of emotional regulation skills and brain functioning. Children who experience physical abuse during this sensitive period may fail to develop adaptive coping strategies or emotional regulation skills to deal with posttraumatic distress associated with physical abuse, and instead use substances to self-medicate their overwhelming emotions and stress (Hovdestad, Tomnyr, Wekerle, & Thornton, 2011). Interestingly, physical abuse in mid-late childhood (ages 6–12) was not related to substance use at age 14. This finding may be because children obtain more resources (i.e., teachers, peers) and better capacity to address their physical abuse experiences and abuse-related trauma as they enter school and interact with others (Klika, Herrenkohl, & Lee, 2013; Watts, 2017).

We found no relations between adolescent substance use and the other maltreatment types (sexual abuse, emotional abuse, neglect), regardless of the developmental period in which maltreatment occurred. These findings largely contradict prior studies that found childhood sexual abuse, emotional abuse, and neglect as significant predictors of adolescent substance use (Moran et al., 2004; Shin et al., 2013; Tonmyr et al., 2010). This discrepancy may be due to our focus on a high-risk population (adolescents at risk of maltreatment vs. community samples in previous studies), use of CPS data (adolescent self-report of maltreatment was utilized in prior research), and consideration of the timing of maltreatment. Additionally, our focus on early adolescence—with consequently relatively low substance use endorsement rates in our sample—compared to prior studies' focus on mid to late adolescence (Moran et al., 2004; Shin et al., 2013), may account for the lack of significant associations found in our study. Consequently, more research is needed to clarify the role of the timing of maltreatment on early substance use, yet our findings indicate early childhood physical abuse as a salient risk factor for early substance use, highlighting the importance of early childhood maltreatment prevention efforts.

This study also accentuates the important role played by the high quality of father involvement in understanding early substance use among adolescents at risk of maltreatment. We found that it was the quality, not the quantity, of father involvement that had a significant negative association with early substance use, even after controlling for mother's involvement. This finding is in line with Bowlby's attachment theory (Bowlby, 1988) that emphasizes the importance of the caregiver's sensitive and responsive caregiving

in building a positive parent-child relationship, which in turn affects positive child development. Furthermore, our findings corroborate prior empirical studies that found an inverse association between a high-quality father-child relationship and adolescent substance use (Barton, Kogan, Cho, & Brown, 2015; Bronte-Tinkew et al., 2006; Fosco et al., 2012), but extend the findings to an at-risk sample of adolescents.

Additionally, we found no gender differences in the association between father involvement and adolescent substance use. This finding is not consistent with some prior studies that found a stronger effect of father involvement for boys (Bronte-Tinkew et al., 2006; Luk et al., 2010), but is consistent with other studies that reported no significant gender differences in the relation between father involvement and adolescent substance use (Fosco et al., 2012; Jordan & Lewis, 2005). Our results suggest that regardless of gender, having a positive, high-quality relationship with a father or father-figure serves as a significant promotive factor for abstaining from substance use during early adolescence for individuals at high risk of child maltreatment.

Lastly, although not the focus of this study, we found it interesting that we did not detect a significant association between mother involvement and adolescent substance use during early adolescence. This finding is consistent with Fosco et al.'s (2012) study that found father-child connectedness, but not mother-child connectedness, as a predictor of reductions in substance use and other problem behaviors among adolescents in early adolescence; yet is inconsistent with the majority of prior studies that reported about an equal, if not stronger, influence of mother involvement (Stanik, Riina, & McHale, 2013; Videon, 2005). It is possible that high quality of father involvement is especially beneficial for an at-risk group of adolescents. At-risk adolescents often face challenging and complex family structures (more specifically father-related structural and relational risks) such as the absence of a father or father figure living in the home, non-biological adult males (e.g., stepfathers, mothers' partners) residing in the home, or exposure to violent father/father figures (Sonenstein, Malm, & Billing, 2002). Thus, the positive impact of the quality of father involvement may be amplified when these vulnerable, high-risk adolescents do have such positive and close relationships with their fathers/father figures. It is also possible that the positive effects of the quality or quantity of mother involvement widely reported in the general population research were not observed in our high-risk sample because the benefits of mother involvement was compromised by the mother's abusive and neglectful acts; in our sample, the majority of child maltreatment perpetrators were the mothers of the adolescents. Further, it should be noted that in most cases, mothers were the primary caregivers and neglect was the most common type of child maltreatment experienced by the adolescents in this study. Prior research has shown that neglect is strongly associated with poverty (Sedlack et al., 2010), which in turn, is closely related to fathers' involvement and financial contributions to the children. However, because we did not account for fathers' financial contributions in our model, we were unable to separate out the influence of father involvement from that of fathers' financial contribution (and associated likelihood of family income/poverty and neglect) on the outcomes. More research is needed to clarify the complex associations of father and mother involvement, financial contributions, family income (poverty), and neglect as well as how these factor interplay with each other to determine the likelihood of early substance use among adolescents at risk of maltreatment.

Strengths and Limitations

This study has some limitations. First of all, we used a dichotomous outcome variable and thus were not able to capture various aspects of adolescent substance abuse such as severity, type, or frequency of substance use. Relatedly, we were not able to assess several maltreatment characteristics, including the severity, frequency, and age of onset for maltreatment. Another limitation is that we were not able to control for potential confounders, such as parental substance use (Kaplow, Curran, & Dodge, 2002), due to the lack of available data. Finally, our sample consisted of adolescents who have been maltreated or were considered to be at risk of maltreatment. Therefore, our findings may not be generalizable to the general population.

Despite these limitations, this study has several noteworthy strengths. First, we expanded the existing literature by considering both the type and timing of maltreatment (i.e., examination of four types of maltreatment during early childhood vs. mid-late childhood), and moving beyond prior maltreatment/substance use research which often combines different types of maltreatment into a universal construct (Gabrielli, Jackson, & Brown, 2016) or various developmental stages into a single time period (Yoon et al., 2017). Second, a relatively large sample size minimized the sampling error and allowed rigorous estimation of the relations among study variables. Third, we used multiple informants in measuring study variables (official records of child maltreatment, adolescent self-report of father involvement and adolescent substance use, caregiver report of behavior problems), decreasing the potential measurement errors and mono-method bias caused by the use of a single reporter. Lastly, we contributed to a more nuanced understanding of the role of father involvement by considering both the quality and quantity of father involvement and examining how they might have distinct associations with early substance use while controlling for maternal involvement. Our findings confirmed the importance of examining these separate and distinct dimensions of father involvement by highlighting the quality, but not quantity, of father involvement as a critical factor associated with resilience against early substance use.

Conclusions and Implications

This study found a connection between early childhood physical abuse and early substance use among at-risk adolescents. Additionally, the quality of father involvement (i.e., positive and close father-child relationships) was found to be a promotive factor that is associated with resilience to early substance use for both boys and girls. Our findings provide crucial practice implications for early substance use prevention and intervention efforts, which is critical for averting an escalation of substance use problems at later developmental periods. Professionals working with adolescents with early substance use problems should be keenly aware of and help adolescents deal with the negative effects of early childhood trauma appropriately. Adolescents with a history of physical abuse early in life appear to be an important target population for preventive intervention programs for adolescent substance use. Relatedly, preventing early childhood physical abuse would be an important prevention strategy for early substance use in adolescence. Furthermore, our findings point to the quality of father involvement as an important prevention factor for early substance use. Intervention programs that support fathers to build strong, positive, and healthy relationships

with their children are critical in the prevention of early substance use in adolescents at risk of maltreatment.

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Table 1

Descriptives of key study variables (N=685)

	%/M(SD)	*Range (Min-Max)*
Quality of father involvement	24.48 (4.79)	4–30
Quantity of father involvement	3.86 (2.57)	0–10
Early childhood physical abuse	.16 (.52)	0–5
Early childhood sexual abuse	.10 (.34)	0–4
Early childhood emotional abuse	.12 (.39)	0–3
Early childhood neglect	.37 (.79)	0–6
Mid-late childhood physical abuse	.33 (.83)	0–7
Mid-late childhood sexual abuse	.11 (.33)	0–2
Mid-late childhood emotional abuse	.76 (.76)	0–7
Mid-late childhood neglect	1.20 (1.19)	0–10
Male	51.09	
Race[a]		
Black	53.14	
White	28.91	
Hispanic	6.13	
Other	11.82	
Resident father (yes)	73.43	
Biological father (yes)	39.27	
Internalizing problems	50.97 (11.00)	19–83
Externalizing problems	54.68 (10.96)	30–90
Quality of mother involvement	25.98 (3.74)	6–30
Quantity of mother involvement	5.42 (2.24)	0–10
Food Stamp (yes)	34.00	
Caregiver education (more than HS)	74.74	
Caregiver employment (yes)	53.87	
Perpetrator (mother)	89.90	

Note. HS = high school

Table 2

The effects of maltreatment and father involvement on early substance use

	Model 1			Model 2		
Control variables	**B**	**OR**	***p***	**B**	**OR**	***p***
Male	−.145	0.87	.571	−.100	0.90	.697
Race[a]						
White	.677	1.97	.016	.694	2.00	.015
Hispanic	.195	1.22	.728	.183	1.20	.746
Other	−.096	0.91	.820	−.122	0.89	.775
Resident father (yes)	−.280	0.76	.339	−.261	0.77	.378
Biological father (yes)	.171	1.19	.502	.116	1.12	.635
Internalizing problems	−.017	0.98	.234	−.018	0.98	.213
Externalizing problems	.024	1.02	.106	.024	1.02	.107
Quality of mother involvement	−.069	0.93	.070	−.075	0.93	.058
Quantity of mother involvement	−.029	0.97	.705	−.034	0.97	.661
Food Stamp (yes)	−.068	0.93	.828	−.049	0.95	.878
Caregiver education (more than HS)	−.639	0.53	.024	−.668	0.51	.020
Caregiver employment (yes)	.261	1.30	.326	.283	1.33	.294
Perpetrator (mother)	.052	1.05	.848	.038	1.04	.890
Maltreatment						
Early childhood physical abuse	.544	1.72	.026	.555	1.74	.023
Early childhood sexual abuse	.302	1.35	.341	.303	1.35	.341
Early childhood emotional abuse	−.462	0.63	.255	−.485	0.62	.233
Early childhood neglect	.068	1.07	.711	.092	1.10	.621
Mid-late childhood physical abuse	−.014	0.99	.937	.012	1.01	.949
Mid-late childhood sexual abuse	−.064	0.94	.877	−.069	0.93	.868
Mid-late childhood emotional abuse	.305	1.36	.171	.308	1.36	.179
Mid-late childhood neglect	−.146	0.86	.393	−.148	0.86	.399
Father involvement						
Quality of father involvement	−.060	0.94	.042	−.092	0.91	.014
Quantity of father involvement	.062	1.06	.345	.149	1.16	.061
Interaction effects						
Gender* quality of father involvement				.079	1.08	.156
Gender* quantity of father involvement				−.171	0.84	.089

[a]*Note*. reference group is Black; OR = Odds Ratio; HS = high school.