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Child Maltreatment, Fathers, and Adolescent Alcohol and Marijuana Use Trajectories

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Abstract

Background: Little is known about heterogeneity in developmental trajectories of alcohol and marijuana use among at-risk youth.

Objective: This study aims to examine how child maltreatment and father structural factors at different stages in the life course are associated with different patterns of alcohol and marijuana use trajectories.

Methods: A sample of youth (N = 903) were drawn from the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN). Latent class growth analysis was employed to assess heterogeneity in patterns of adolescent alcohol and marijuana use. In addition, binary logistic regression analysis was performed to examine child maltreatment and father structural factors across different developmental stages as predictors of membership in the identified alcohol and marijuana use trajectory classes.

Results: For both alcohol and marijuana use, two distinct latent classes were identified: *stable no/low alcohol use* (74%) vs. *increasing alcohol use* (26%); *stable no/low marijuana use* (85%) vs. *increasing marijuana use* (15%). Emotional abuse during early childhood and physical abuse during adolescence predicted membership in the *increasing alcohol use* and the *increasing marijuana use* classes. The presence of father in the home during early childhood was associated with lower likelihood of being in the *increasing alcohol use* class.

Conclusions: Our findings highlight the importance of understanding the etiology of adolescent substance use through a developmental lens. Screening of exposure to child maltreatment across different developmental stages and interventions promoting father engagement during early childhood might help mitigate the risk of adolescent alcohol and marijuana use.

Keywords

child maltreatment; fathers; alcohol; marijuana use; adolescence; longitudinal

General population studies have found that father absence and a having non-biological father in the home are both risk factors for alcohol and marijuana use among adolescents (Blum et al., 2000; Cavanagh, 2008; Luk, Farhat, Iannotti, & Simons-Morton, 2010). However, studies have yet to investigate whether fathers' presence plays a protective role among youth who are at-risk of child maltreatment or how father structural factors at different stages in the life course are associated with different patterns of alcohol and marijuana use trajectories. Additionally, studies have not investigated whether the negative effects of child maltreatment across different developmental stages supersede the protective effects of having a father in the home. Identification of specific developmental stages related to maladaptive substance use trajectory patterns may aid the development of targeted and well-timed interventions to prevent adolescent alcohol and marijuana use. This study will begin to fill these gaps in the literature.

According to the US Census Bureau (2017), the number of children without fathers in the home has doubled from 1960 to 2017. In addition, the number of mothers who never married has rapidly increased since 1960. Thus, today's youth are more likely to grow up without their biological fathers in the home. The likelihood of growing up without a biological father in the home is even higher for at-risk youth, including maltreated youth, who are more likely to have nontraditional family structures (Bellamy, 2009). While many youths may have their mother's boyfriend or husband as a father figure, biological fathers' genetic ties to their children may produce stronger investments in caring for their children (Testa, Snyder, Wu, Rolock, & Liao, 2014). This seems to be confirmed by the extant literature, which found that compared to living with two biological parents, living with a step-parent or mother's boyfriend increases the likelihood that children drink alcohol (Brown & Rinelli, 2010; Perra, Fletcher, Bonell, Higgins, & McCrystal, 2012) and use marijuana (Cavanagh, 2008; Perra et al., 2012).

Theoretical Framework

Developmental psychopathology (Sroufe & Rutter, 1984; Cicchetti, 2016) and Elder's life course paradigm (1998) provides the conceptual scaffolding for this study. The developmental psychopathology perspective (Sroufe & Rutter, 1984) stresses that early adverse life experiences—such as child maltreatment—may contribute to later psychopathology and adverse developmental outcomes (e.g., substance use during adolescence). It also emphasizes that people's similar negative experiences can result in heterogeneous outcomes (referred to as multifinality), depending on a host of risk and protective factors that surround them. Thus, this perspective underscores the importance of examining developmental outcomes within the context in which one's development takes place, through an interplay between the individual and their changing environment, such as family relations and caregiving environment (Cicchetti, 2016; Cicchetti & Toth, 2005). Drawing from this perspective, child maltreatment and family structural risk factors (e.g.,

father absence and non-biological father relationships) may play important roles in shaping heterogeneous developmental outcomes (e.g., patterns of substance use) during adolescence.

Additionally, Elder's life course paradigm (1998) emphasizes that the timing of experiences and influential events (e.g., child maltreatment, father absence) will have different developmental impacts depending on the developmental period (e.g., infancy/toddlerhood, early childhood, middle childhood, adolescence) in which it occurs. In other words, earlier events may be more influential in the foundation of subsequent development (Sroufe & Rutter, 1984). Building on the primary concepts of the developmental psychopathology perspective and Elder's life course paradigm, a significant body of research using general populations has identified that child maltreatment, as well as father structural risk factors (e.g., absence, non-biological relationships), are associated with increased risks for adolescent substance use (Blum et al., 2000; Cavanagh, 2008; Luk et al., 2010).

Finally, the developmental psychopathology perspective and Elder's life course paradigm both consider that factors related to social structure—such as family resources (i.e., income) and race—may have distinct effects at different stages of development. According to the life course paradigm, earning a lower income can produce economic pressures for a family and may negatively impact parenting. In particular, lower income families may struggle to monitor their children because their time must be devoted to generating income for the family. Research has found that Black families disproportionately have lower incomes than White families (Elder, Eccles, Ardelt, & Lord, 1995). On the other hand, developmental psychopathology scholars caution against solely focusing on the deficits associated with minority group status, including being Black, and urge researchers to also elucidate factors related to resilience (Cicchetti & Toth, 2005). In this vein, we think it is important to highlight the lower rates of alcohol and marijuana use that have been found among Black youth (Banks & Zapolski, 2018).

Child Maltreatment and Alcohol/Marijuana Use

Child maltreatment has been identified as a strong risk factor for adolescent alcohol use (Sartor et al., 2018; Shin, Edwards, & Heeren, 2009). In Mills et al.'s (2014) 14-year longitudinal study, neglect and/or emotional abuse—grouped together due to considerable conceptual overlap (e.g., failure to provide the child with affection)—increased the likelihood of heavy alcohol use in adolescence (age 14), compared to other types of maltreatment (e.g., physical abuse, sexual abuse, and the combination of physical and neglect/emotional abuse). However, Shin and colleagues (2013) demonstrated that youth who have been physically abused and neglected in childhood are at greater risk of heavy episodic drinking during young adulthood (ages 24–32). Using cross-sectional data, Oshri et al. (2012) found that sexual abuse was associated with adolescent alcohol use and dependence symptoms at age 16.

Likewise, the effects of child maltreatment on adolescent marijuana use have been reported in several previous studies (Handley, Rogosch, & Cicchetti, 2015; Oshri, Rogosch, Burnette, & Cicchetti, 2011). For example, Dubowitz and colleagues' (2016) longitudinal study examined the association between child maltreatment (i.e., type and extent) and marijuana

use at ages 12, 14, 16, and 18 among maltreated youth, and found that physical and sexual abuse were associated with marijuana use in a bivariate level. However, only sexual abuse significantly predicted marijuana use after controlling for other types of abuse. Mason and colleagues (2017) also identified that experiencing sexual abuse is associated with greater levels of adolescent marijuana use (mean age = 18 years), although this study did not take other types of abuse into account. Casanueva et al. (2014) found that physical abuse predicted escalating marijuana trajectories (age 13 at T1, age 18 at T2, and age 21 at T3). Thus, studies examining the effects of child maltreatment types on adolescent alcohol or marijuana use have yielded inconsistent findings.

In addition to these mixed findings on the link between the type of maltreatment and adolescent alcohol and marijuana use, relatively little research has examined whether the developmental stage at which child maltreatment occurs predicts adolescent substance use trajectories. Shin and colleagues (2016) examined the association between the timing of physical abuse and later alcohol use in young adulthood. The results showed that physical abuse during adolescence (ages 10–18) and during both childhood (birth through age 9) and adolescence were associated with higher levels of alcohol use frequency; whereas physical abuse in childhood alone was not significantly associated with frequency of alcohol use in early adulthood (ages 18–25). Thornberry et al. (2010) also found that maltreatment in adolescence (ages 12–17), but not maltreatment in childhood (birth to 11), significantly predicted alcohol use at ages 21–23. Although these studies provided valuable insight into the role of the timing of maltreatment in explaining adolescent substance use, they were limited in the following ways. First, they have simply and broadly categorized the timing of maltreatment experiences into only two groups (i.e., childhood vs. adolescence); potentially missing unique and distinct characteristics that can be observed across a wide range of developmental stages: infancy, toddlerhood, early childhood, mid-late childhood, pre-adolescence, and mid-late adolescence. Second, the specific combination of timing and type of child maltreatment, and its association with adolescent alcohol and marijuana use trajectories, remains unclear. To the best of our knowledge, this is the first study to examine the role of the timing of maltreatment in predicting heterogeneous patterns of alcohol and marijuana use.

Alcohol and Marijuana Use Trajectories

Several empirical studies using general populations have suggested the heterogeneity in patterns of alcohol and marijuana use trajectories (Cheadle & Whitbeck, 2011; Kosty, Seeley, Farmer, Stevens, & Lewinsohn, 2017; Lee, Brook, De La Rosa, Kim, & Brook, 2017). Studies of alcohol use trajectories have identified three to four typical trajectory patterns. Sher and colleagues (2011) found the following trajectories in a longitudinal study: non-using, chronic use, escalating, and decreasing. They indicated that the decreasing trajectory was less likely to be reported in early- or mid-adolescence because of the low base rates of alcohol use (mean age = 18 years). In line with this view, Lee et al.'s (2017) longitudinal study indicated three different trajectories of adolescent alcohol use among minority youth (i.e., African Americans and Puerto Ricans): increasing alcohol use, moderate alcohol use, and no/low alcohol use. Cheadle and Whitbeck's study (2011), using a North American indigenous community sample ages 10–14 assessed at five data time

points, also found three different trajectories: abstainers, early-onset (alcohol consumption after age 11), and adolescent-onset (sharply increased alcohol consumption at age 13). The heterogeneous trajectory patterns of marijuana use in adolescence have also been identified in previous studies (Flory, Lynam, Milich, Leukefeld, & Clayton, 2004; Windle & Wiesner, 2004). Kosty and colleagues (2017) found three distinguishing patterns of marijuana use disorder trajectories from adolescence through early adulthood (ages 14–30) in a community-based sample: persistent increasing risk over time, maturing out, and stable low risk over time.

Unfortunately, studies using person-centered approaches to identify adolescent substance use trajectories have generally neglected high-risk youth, such as maltreated youth or youth at risk of maltreatment. Given that child maltreatment has been closely linked to adolescent substance use (Snyder & Smith, 2015; Tonmyr, Thornton, Draca, & Wekerle, 2010; Yoon, Kobulky, Yoon, & Kim, 2017), examining the levels and trends of heterogeneity in alcohol and marijuana use among this population may be meaningful. The unique trajectories of the high-risk population will inform preventive interventions for alcohol and marijuana use in adolescents who have been maltreated.

The Current Study

The current study contributes to the existing body of literature by examining the impact of child maltreatment and father structural factors on alcohol and marijuana use trajectory patterns. This research will provide valuable information about sensitive windows of time in a child's lifespan when fathers and/or maltreatment have the strongest influence on shaping various pathways to adolescent alcohol and marijuana use. We address three main research questions: 1) Is there heterogeneity in adolescent alcohol and marijuana use trajectories?; 2) Does child maltreatment (i.e., physical abuse, sexual abuse, emotional abuse, neglect [physical neglect/deprivation of basic needs, inadequate supervision]) at four developmental stages (i.e., infancy/toddlerhood [ages 0–2], early childhood [ages 3–5], middle childhood [ages 6–11], adolescence [ages 12–18]) predict patterns of adolescent alcohol and marijuana use trajectories?; and 3) Do father structural factors (i.e., presence, type/biological relations) at four developmental stages (i.e., infancy/toddlerhood, early childhood, middle childhood, adolescence) predict patterns of adolescent alcohol and marijuana use trajectories? As an exploratory aim, we also examined the interaction effects between father presence and child maltreatment at each developmental stage on patterns of adolescent alcohol and marijuana use trajectories.

Methods

Sample

The sample for this study was drawn from the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN), which is a multisite cohort study ($N = 1,354$) that investigates the long-term effects of child abuse and neglect on child development. LONGSCAN involves five study sites: Eastern, Midwest, Northwest, Southwest, and Southern. All five study sites share study constructs, measures, data collection methods, and data management strategies. Data were collected from children and caregivers through face-to-face interviews at child

ages of 4, 6, 8, 12, 14, 16, and 18 from July 1991 to January 2012. The analytic sample of the current study included 903 adolescents who completed at least two waves of age 12, 16, or 18 assessments and had no missing value on any of potential predictor variables. Adolescents in the analytic sample were more likely to be Black and live with mothers who have no spouse or partner, compared to the adolescents in the full sample. No other differences were found in study variables between the full sample and the analytic sample.

Measures

Dependent Variables

Alcohol and marijuana use.: Alcohol consumption was assessed at ages 12, 16, and 18, using youth self-report of alcohol use in the past year (i.e., alcohol use between ages 11–12; alcohol use between ages 15–16; alcohol use between ages 17–18). Adolescents reported the number of days they had at least one drink of alcohol (i.e., beer, wine, wine coolers, malt liquor, or hard liquor) in the past year using the 4-point response scale: 0 = *0 days*, 1 = *1 to 3 days*, 2 = *4 to 20 days*, 3 = *more than 20 days*. Similarly, marijuana use was assessed at ages 12, 16, and 18, using youth self-report. Using the same response scale, adolescents reported the number of times they smoked marijuana (weed, pot, or grass) in the past year. Age 14 alcohol and marijuana use variables were not available from the dataset.

Independent Variables

Child maltreatment.: The type and timing of child maltreatment was measured using administrative child welfare data (i.e., Child Protective Services [CPS] records). While the LONGSCAN baseline data were collected when children were 4 years of age, maltreatment variables in the LONGSCAN dataset included CPS data that included child maltreatment reports made to CPS from birth to age 18. Highly trained LONGSCAN coders reviewed and coded abstracted maltreatment allegation narratives from CPS records, using the modified maltreatment classification system (MMCS; English, Bangdiwala, & Runyan, 2005). The MMCS is a highly recognized and empirically validated coding system to evaluate child abuse and neglect in childhood and adolescence. In the LONGSCAN sample, inter-rater reliability of the MMCS was acceptable (Kappas >.70; Larrabee & Lewis, 2016). Four non-mutually exclusive maltreatment categories were created: sexual abuse, physical abuse, emotional abuse, and neglect. The four maltreatment types were coded *yes* (=1) or *no* (=0) for each developmental stage: infancy/toddlerhood (ages 0–2); early childhood (ages 3–5); middle childhood (ages 6–11); adolescence (ages 12–18). Maltreatment type variables at individual developmental stages were coded ‘*yes*’ if at least one report of the particular maltreatment type was made to CPS during the developmental stage (i.e., early childhood sexual abuse was coded ‘*yes*’ if at least one sexual abuse report was made between the ages of 3 and 5).

Father structural factors.: Father presence in the home and father type/biological relations were measured using the mother report of household composition at each wave. Father structural variables (i.e., father presence [0 = *non-biological father*, 1 = *biological father*]; father type [0 = *non-biological father*, 1 = *biological father*]) were coded for each

developmental stage: infancy/toddlerhood (ages 0–2); early childhood (ages 3–5); middle childhood (ages 6–11); adolescence (ages 12–18).

Control Variables—Control variables included gender (0 = *male*, 1 = *female*) and race reported by the caregiver at baseline (i.e., child age 4). Race was dummy coded (White, Hispanic, Others), using Black (the largest racial group in the current sample; 54.5%) as the reference group. Household income reported at each assessment point by the caregiver was recoded into a dichotomous variable (0 = *above the federal poverty level at all time points*, 1 = *below the poverty level at any point during the study period*).

Data Analysis

Latent class growth analysis (LCGA) was employed to assess heterogeneity in patterns of adolescent alcohol and marijuana use. LCGA, is a person-centered, sophisticated analytical method that has unique advantages over a traditional variable-centered approach (e.g., regression), such as an identification of unobserved sub-groups of individuals who exhibit distinct patterns of developmental trajectories. Adolescents' self-reported number of days using alcohol and marijuana over the past year, examined at ages 12, 16, and 18, were utilized in a series of unconditional LCGA models. LCGA belongs to the big family of growth mixture modeling (GMM) that assumes all intercepts and slope variances are fixed to zero (Jung & Wickrama, 2008). In this study, LCGA is advantageous over other longitudinal analytical models—such as GMM and longitudinal latent class analysis (LLCA)—in terms of simplicity, yet with no cost of accuracy when handling ordinal data (Feldman, Masyn, & Conger, 2009). The optimal number of classes was determined by a set of indices, including: model fit indices, class size (> 5% of the total sample), interpretability, classification accuracy (entropy), endorsement from theory, and prior studies (Jung and Wickrama, 2008). Three fit indices were utilized in this study: Bayesian Information Criterion (BIC), the Vuong-Lo-Mendell-Rubin Likelihood Ratio test (LMR-LRT), and Parametric Bootstrapped Likelihood Ratio (BLRT). Jung and Wickrama (2008) suggest that a smaller value of BIC and significant LMR-LRT and BLRT, are indications of good model fit. Once the optimal number of classes was obtained, the plots were examined to interpret the trajectories (i.e., latent classes) and name each class.

Binary logistic regressions were performed to examine child maltreatment and father structural factors across different developmental stages as predictors of membership in the identified classes. To build the model, stepwise selection methods (James, Witten, Hastie, & Tibshirani, 2013) were utilized to choose covariates and interaction effects between maltreatment variables and father variables for inclusion in regression models. For choosing an optimal model without compromising the model accuracy, stepwise regression is preferred over other penalized regressions (e.g., ridge or lasso regression) for data containing a relatively large number of predictor variables (Bruce & Bruce, 2017). Although there are different stepwise selection approaches (including forward selection, backward elimination, and sequential replacement), they typically recommend the same model. With respect to model selection criteria, both Akaike information criterion (AIC; Akaike, 1973) and BIC (Gelfand & Dey, 1994) are widely used for choosing best predictor subsets in regression and evaluating non-nested models. While both are penalized-likelihood criteria, they are distinct

philosophically and mathematically. For practice research, their only difference is the size of the penalty. The BIC penalizes the number of parameters in the model to a greater degree than AIC, which in turn, would favor a more parsimonious model (Gelman, Lee, & Guo, 2015). In contrast, the AIC favors predictability at the potential cost of complexity (Akaike, 1981). In either AIC or BIC, a smaller value indicates better model fit (Burnham & Anderson, 2004). Since the priority of this study is to identify useful predictors, the AIC criterion was chosen to compare competing models and select the optimal one. Missing data on outcomes were handled using full information maximum likelihood (FIML). FIML is considered one of the most robust methods to address missing as it allows respondents with missing data to be included in the analyses for unbiased inference (Raykov, 2005). There was no missing data on predictors and control variables.

Results

Sample Characteristics

Table 1 presents sample characteristics and the descriptive statistics of the study variables. A little over half (52.9%) of the sample was female and Black (54.5%). In terms of alcohol or marijuana use, the majority of the adolescents reported no alcohol use (95.7%) or marijuana use (98.1%) at age 12. At age 16, about 70% of the adolescents still reported no alcohol use and 78.4% reported no marijuana use. At age 18, about 45% of the adolescents indicated they drank alcohol in the past year, with 22.6% reporting 1 to 3 days, 13.7% reporting 4 to 20 days, and 8.2% reporting more than 20 days. About 30% endorsed having smoked marijuana in the past year, with 11.7% reporting 1 to 3 days, 6.4% reporting 4 to 20 days, and 12.1% reporting more than 20 days of smoking marijuana.

Patterns of Alcohol Use Trajectories

Model fit indices for the alcohol use LCGA models are summarized in Table 2. The fit indices yielded conflicting evidence as to the optimal number of classes for alcohol use trajectories. The BIC value was smallest in the 2-class model, supporting the 2-class model as the best fit. On the contrary, the LMR and BLRT statistics in 3-class model were significant, indicating that adding a third class significantly improved the model fit. However, one of the classes in the 3-class model had inadequate class size (i.e., only 1% of the total sample was in this group). Thus, based on the class sizes and BIC value, the 2-class model was selected as the final model.

The two classes were named: 1) *Stable no/low alcohol use* and 2) *increasing alcohol use* (Figure 1). The *stable no/low alcohol use* class (74%) included adolescents who showed no alcohol use or consistently low levels of alcohol drinking throughout the study period. Adolescents in the *increasing alcohol use* class (26%) showed gradually increasing levels of alcohol consumption over time.

Patterns of Marijuana Use Trajectories

The model fit indices for marijuana smoking LCGA models (Table 3) indicated the 2-class model as the best-fitting model. The 2-class model had the smallest BIC value, and significant LMR and BLRT values. Thus, the 2-class model was selected as the optimal

model for adolescent marijuana use trajectories. The 2 classes were named based on the patterns of marijuana use over time (see Figure 2). The *stable no/low marijuana use* class (85%) included youth who consistently showed no or limited use of marijuana across the three data collection time points. The *increasing marijuana use* class (15%) consisted of youth who started with no/low use but then showed increasing use of marijuana over time.

Predictors of Alcohol Use Trajectory Patterns

Table 4 displays the result of binary logistic regression analysis examining child maltreatment and father structural factors across various developmental stages as predictors of membership in the identified alcohol use trajectory classes. The *stable no/low alcohol use* class was used as a reference group in analyzing and interpreting the model.

Compared to the *stable no/low alcohol use* group, adolescents who experienced emotional abuse during early childhood had 2.56 times higher odds of membership in the *increasing alcohol use* group. Physical abuse during adolescence was also associated with 1.71 times higher odds of membership in the *increasing alcohol use* group. The presence of father in the home during early childhood was associated with lower likelihood of being in the *increasing alcohol use* group (OR: .57, 95% CI: .33–.96). Adolescents who were female, Black, or from families with below-poverty income were less likely to be in the *increasing alcohol use* group.

Predictors of Marijuana Use Trajectory Patterns

Similarly, Table 5 displays the result of binary logistic regression analysis examining child maltreatment and father structural factors across various developmental stages as predictors of membership in the identified marijuana use trajectory classes. The *stable no/low marijuana use* class was set to be the reference group in analyzing and interpreting the model.

Compared to the *stable no/low marijuana use group*, neglect during infancy/toddlerhood was associated with lower odds of membership in the *increasing marijuana use* group. Adolescents who experienced emotional abuse during early childhood were approximately 6 times more likely to be in the *increasing marijuana use* group. Physical abuse during adolescence was associated with 1.87 times higher odds of membership in the *increasing marijuana use* group. Adolescents who were male also had higher likelihood of being in the *increasing marijuana use* group. White adolescents were more likely to be in the *increasing marijuana use* group than Black adolescents.

Interaction Effects between Father Presence and Child Maltreatment on Marijuana Use Trajectory Patterns

There were significant interaction effects between father presence and child maltreatment on trajectory patterns of adolescent marijuana use (see Table 6). Three significant interaction terms were noted: Middle childhood father presence $\times$ Middle childhood physical abuse; Middle childhood father presence $\times$ Middle childhood emotional abuse; Adolescence father presence $\times$ Adolescence sexual abuse. The association between middle childhood emotional abuse and membership in the *increasing marijuana use* group was stronger for youth who

had their father in the home during middle childhood (see Figure 3). Conversely, the association between middle childhood physical abuse and membership in the *increasing marijuana use* group was attenuated when the father was present in the home during middle childhood (Figure 4). Similarly, the association between sexual abuse in adolescence and membership in the *increasing marijuana use* group was attenuated when the father was present in the home during adolescence (Figure 5).

Discussion

We applied a theoretical framework that blends key components of Elder's (1998) life course paradigm and the developmental psychopathology perspective (Cicchetti & Toth, 2005) to examine how father presence and child maltreatment at different developmental stages influence alcohol and marijuana use trajectories at ages 12, 16, and 18. We also differentiated fathers who were biologically related to the child from stepfathers or mothers' live-in boyfriends because we suspected that the protective effect would be stronger for biological fathers who may be more likely to closely monitor their children (Testa et al., 2014).

We found two latent classes/subgroups (*stable no/low use* class and *increasing use* class) for both alcohol and marijuana trajectories. These findings are inconsistent with previous studies in which three to five classes were identified (Cheadle & Whitbeck, 2011; Flory et al., 2004; Sher et al., 2011; Windle & Wiesner, 2004). The smaller number of trajectory patterns (i.e., subgroups) identified in our study may be attributed to the fact that our sample was younger (age 12 at the first outcome assessment) and had lower endorsement rates of alcohol and marijuana use, which resulted in little variation in outcomes at baseline. Furthermore, our sample was primarily Black youth and a systematic review of the literature found that Black youth have lower substance use rates compared to White youth (Banks & Zapolski, 2018). Because our study relied on self-reported alcohol and marijuana use it is possible that participants underreported their substance use, but this would also be true of the population-based studies we cited.

Consistent with previous studies (Shin, 2012; Mills et al., 2014), we found that early childhood emotional abuse (e.g., verbal aggression, yelling, name calling, threatening violence) shapes the longitudinal course of both alcohol and marijuana use, with these adolescents more likely to be in the increasing alcohol and marijuana use groups. This finding is consistent with the developmental psychopathology perspective, which emphasizes the influences of early childhood experiences on later adaptation/maladaptation (Cicchetti & Toth, 1995). Experiences of emotional abuse in early childhood may be especially detrimental to the development of healthy emotional regulatory skills, which may then lead to unhealthy stress coping strategies, such as alcohol consumption or marijuana smoking during adolescence (Oshri et al., 2011).

We also found that physical abuse during adolescence predicted membership in increasing trajectories for both alcohol and marijuana use. This finding supports prior research that found physically abused adolescents being more likely to show increasing alcohol (Shin et al., 2009, 2013) and marijuana use (Casanueva et al., 2014) over time. Physically abused

adolescents have been reported to have higher levels of trauma symptoms and externalizing problems (Yoon, Barnhart, & Cage, 2018) which are salient predictors of adolescent substance use (Rogosch, Oshri, & Cicchetti, 2010). Adolescents who experience physical abuse may use alcohol and marijuana to cope with trauma symptoms (Khoury, Tang, Bradley, Cubells, & Ressler, 2010).

Having a father or father figure present in the home during early childhood may confer a number of benefits beyond the provision of economic resources, which were at least in part accounted for in the present study. Early childhood is the time when parent-child attachment relationships are formed, and these relationships are critical to the development of self-regulation in children (Pallini et al., 2018). Initially, parents serve as external regulators of children's emotions, cognitions, and behaviors, and with sensitive and responsive care parents gradually foster children's abilities to regulate themselves (Cicchetti, 2016). Recent evidence indicates that fathers' parenting predicts children's self-regulation above and beyond mothers' parenting (Bridgett et al., 2018). In turn, stronger self-regulation skills developed with the aid of fathers in early childhood may prevent alcohol use during adolescence (O'Connor & Colder, 2015). Although beyond the scope of the present study, it may be valuable to examine how the father's continued presence (or continued absence) across all developmental stages would be associated with adolescent substance use. Our post-hoc analysis indicated that only 3% of the youth had their father in the home consistently through all stages from birth to adolescence, with about 54% of the youth having the father entering and exiting their lives across the development stages and about 43% never having had the father in the home. We found no differences in the patterns of alcohol or marijuana use trajectories across these groups.

Interestingly, neglect during infancy/toddlerhood was associated with lower likelihood of being in the increasing marijuana use class, which is somewhat inconsistent with previous literature that found a connection between childhood neglect and greater substance use in adolescence and emerging adulthood (Shin et al., 2013; Snyder & Merritt, 2015; Snyder & Merritt, 2016). Our findings of neglect during infancy/toddlerhood should be interpreted and compared with other studies with a great caution given that infant neglect—the most common type of child maltreatment with the greatest risk to child well-being—may be much different from neglect during middle childhood or adolescence when children are gaining independence (Bartlett & Easterbrooks, 2015). Using latent class analysis, Snyder and Merritt (2016) found that childhood supervisory neglect increased the odds of membership in the multiple-risk drinkers' class, contradicting our finding that childhood neglect decreased the odds of increasing marijuana use. However, our findings may not be directly compared to Snyder and Merritt's (2016) study due to several important differences between the two studies, including the measurement of neglect. For example, Snyder and Merritt (2016) separated supervisory neglect to assess the specific role of supervisory neglect on later substance use whereas we combined physical neglect (i.e., deprivation of basic needs) and inadequate supervision to create a single neglect variable. Additionally, this study measured neglect during infancy/toddlerhood using official maltreatment reports of neglect made to CPS from birth through 2 years whereas the other study measured maltreatment through retrospective self-report of maltreatment experiences during childhood (birth - age 12). Lastly, our sample consisted of at-risk youth who have experienced or were

at risk of maltreatment whereas the other study focused on young adults in the general population. More longitudinal research is needed to investigate the effects of child neglect during infancy/toddlerhood on adolescent marijuana use. Given that infants are far more likely to be placed in out-of-home placements compared to older children (approximately one quarter of children in foster care in 2017 were two years old or younger; Children's Bureau, November 2018) and that foster or adoptive homes may provide adequate and responsive care to fulfil the needs of neglected children, future studies might benefit from examining placement trajectories as potential mechanisms underlying the association between infancy/toddlerhood neglect and later marijuana use.

Our exploration of interaction effects between father presence and child maltreatment on alcohol and marijuana use trajectory patterns yielded interesting, yet complex, findings. Whereas we found no evidence of interaction effects between father presence and maltreatment on alcohol use trajectories (results not shown; available upon request), we found significant interaction effects on marijuana use trajectories. Both physical abuse during middle childhood and sexual abuse during adolescence were associated with higher odds of membership in the *increasing marijuana use* group, but these associations were weakened if they were living with the father at the time of maltreatment—suggesting protective effects of father presence. This is consistent with prior research that found lower risk of adolescent substance use in youth living with their father/father figure (Barrett & Turner, 2006; Blum et al., 2000), but extends prior findings by showing the buffering effects of father presence against physical abuse in middle childhood and sexual abuse in adolescence. Similar buffering effects were not found for emotional abuse during middle childhood. In fact, it appears that the negative impact of emotional abuse during middle childhood is aggravated by a father presence in the home. Middle childhood is an important developmental stage in which children develop a sense of competence and self-esteem (Erikson, 1968) and father's emotional support may be crucial in achieving these major developmental tasks. The positive, buffering effects of father's emotional support may not be available or as useful when the child is emotionally abused, especially by the father. Examining the perpetrator-child relationship for youth's emotional abuse experience during middle childhood may shed light on understanding this unexpected finding, yet this information was not available from the current dataset. Further investigation is necessary to disentangle the complex relations among father presence, child maltreatment (emotional abuse in particular), and adolescent marijuana use.

Limitations

Several limitations should be noted. First, our sample consisted of youth who have been maltreated or at risk of maltreatment, thus the findings cannot be generalized to the general population. Next, our outcome data solely relied on youth self-reports of alcohol and marijuana use and thus may be prone to response bias (social desirability bias). Relying on youth report in retrospective accounts of past-year alcohol and marijuana use may introduce recall bias. Relatedly, it should be noted that the majority of the adolescents reported no alcohol (95.7 %) or marijuana use (98.1%) at age 12, raising a concern regarding the heterogeneity in alcohol and marijuana use trajectories. Despite the very small portion of the sample endorsing alcohol or marijuana use at age 12, our results supported the two-class

model over the single-class model, as the best-fitting model for both alcohol and marijuana use. These findings offer empirical evidence for the heterogeneous nature of adolescent alcohol and marijuana use trajectories among the study sample, even with the low base rate of alcohol and marijuana use. It should also be noted that the outcome measures used in the study were not administered at age 14, and thus we were unable to include age 14 alcohol and marijuana use in the analysis. Future studies should consider using objective biomarkers and real-time data collection methods (e.g., ecological momentary assessment) to address the aforementioned limitations and increase the reliability and validity in assessing alcohol and marijuana use.

Another limitation of the study is that we did not account for the level and quality of father involvement (e.g., time spent together, closeness, affection) on adolescent alcohol and marijuana use. Although beyond the scope of this paper, the quality of father involvement has been suggested as an important protective factor for behavioral health in children (Yoon, Bellamy, Kim, & Yoon, 2018) and should be considered in future research that aims to understand fathers' influences on adolescent substance use. Similarly, the four non-mutually exclusive maltreatment categories used in the study did not account for potential overlap or conflation of maltreatment types. Furthermore, this study combined two forms of neglect, namely physical neglect (i.e., deprivation of basic needs) and inadequate supervision, to create the neglect variable. Considering previous studies that found a specific link between supervisory neglect and later substance use (Clark, Thatcher, & Maisto, 2005; Snyder & Merritt, 2015), the failure to distinguish these two distinct forms of neglect in the study may have biased the results. Finally, the response scales of the outcome measures were limited in that the response options did not fully capture the wide range and variety of level, frequency, and severity of alcohol and marijuana use in the past year. Unfortunately, because this was a secondary data analysis, we were limited by how the data were collected.

Implications for Practice and Research

The current study offers several important practice implications for substance use among at-risk adolescents. The finding supports that early childhood emotional abuse plays a significant role in understanding adolescent alcohol and marijuana use. Preventing emotional abuse and promoting healthy emotional regulation skills among young children through parenting education and child maltreatment prevention programs, such as home visiting programs, may be key for addressing adolescent alcohol and marijuana use. Practitioners need to help parents understand and learn the long-lasting damaging impacts of emotional abuse (e.g., verbal aggression) and teach non-violent, effective communication skills they can utilize with their young children. Likewise, trauma-informed interventions should be available to reduce the effects of early childhood emotional abuse.

Another implication derived from our findings is that more attention and resources should be directed towards preventing and addressing physical abuse in adolescence. Our results suggest that physical abuse during adolescence in particular has direct impact on alcohol and marijuana use in adolescence. Behavioral health professionals and practitioners should screen and consider adolescents' ongoing or current exposure to physical abuse when they plan substance use treatment strategies. Evidence-based interventions, such as parent-child

interaction therapy (see www.pcit.org), should also be available for youth who have experienced physical abuse. Furthermore, our findings suggest that father presence in early childhood is an important protective factor against increasing alcohol use in adolescence. Ample research has suggested that various positive aspects of father involvement, such as emotional support, financial support, availability (spending time together), and monitoring of the child's behavior, contributes to the well-being and healthy development of adolescents (Wilson & Prior, 2011). Intervention programs that promote father involvement in early childhood would be important in preventing later substance use in at-risk adolescents.

In terms of research implications, our findings suggest the need for more attention to emotional abuse. Emotional abuse, compared to other forms of maltreatment, has not been widely studied or recognized as a predictor of adolescent substance use; yet our study highlights emotional abuse, especially during early childhood, as a salient risk factor for both alcohol and marijuana use during adolescence. In line with our findings, a recent study found that emotional abuse, in combination with physical and/or sexual abuse, significantly contributed to smoking during adolescence (Lewis et al., 2019). Therefore, future research should rigorously address the effects of emotional abuse—alone and in combination with other types of abuse and neglect—on substance use in adolescence.

Conclusion

This study identified two subgroups of trajectories for alcohol and marijuana use among at-risk youth (stable no/low alcohol/marijuana use class, increasing alcohol/marijuana use class) and found that early childhood emotional abuse, adolescent physical abuse, and early childhood father absence are predictors for increasing substance use. These findings highlight the importance of life course screening of child maltreatment experiences, as the timing of child maltreatment has different influences on substance use. The significant influences of father presence in early childhood was also emphasized by this study. Therefore, interventions that promote father presence and screening of child maltreatment experiences in different developmental stages might help mitigate the risk of adolescent alcohol and marijuana use.

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Figure 1.
Alcohol Use Trajectory Classes.

Figure 2.
Marijuana Smoking Trajectory Classes.

Figure 3. Interaction effects of father presence and emotional abuse in middle childhood on marijuana use trajectory.

Figure 4. Interaction effects of father presence and physical abuse in middle childhood on marijuana use trajectory.

Figure 5. Interaction effects of father presence and sexual abuse in adolescence on marijuana use trajectory.

Table 1.

Sample Characteristics of Key Study Variables (N = 903)

	n	%
Past year alcohol use at age 12		
0 days	863	95.7
1 to 3 days	29	3.2
4 to 20 days	6	0.7
More than 20 days	5	0.5
Past year alcohol use at age 16		
0 days	630	69.8
1 to 3 days	172	19.0
4 to 20 days	70	7.6
More than 20 days	31	3.6
Past year alcohol use at age 18		
0 days	501	55.5
1 to 3 days	204	22.6
4 to 20 days	124	13.7
More than 20 days	74	8.2
Past year marijuana use at age 12		
0 days	884	98.1
1 to 3 days	12	1.3
4 to 20 days	5	0.5
More than 20 days	2	0.2
Past year marijuana use at age 16		
0 days	708	78.4
1 to 3 days	81	9.1
4 to 20 days	57	6.3
More than 20 days	57	6.3
Past year marijuana use at age 18		
0 days	630	69.8
1 to 3 days	106	11.7
4 to 20 days	58	6.4
More than 20 days	109	12.1
Child Maltreatment		
Infancy/toddlerhood physical abuse	132	14.6
Infancy/toddlerhood sexual abuse	44	4.9
Infancy/toddlerhood emotional abuse	45	5.0
Infancy/toddlerhood neglect	269	29.8
Early childhood physical abuse	91	10.1
Early childhood sexual abuse	76	8.4
Early childhood emotional abuse	33	3.7
Early childhood neglect	162	17.9

	n	%
Middle childhood physical abuse	137	15.2
Middle childhood sexual abuse	61	6.8
Middle childhood emotional abuse	71	7.9
Middle childhood neglect	197	21.8
Adolescent physical abuse	101	11.2
Adolescent sexual abuse	38	4.2
Adolescent emotional abuse	71	7.9
Adolescent neglect	115	12.7
Father presence in the home		
Infancy/toddlerhood father presence	91	10.1
Early childhood father presence	276	30.6
Middle childhood father presence	289	32.0
Adolescence father presence	365	40.4
The nature of the relationship with the father/father figure		
Infancy/toddlerhood biological father	85	9.4
Early childhood biological father	179	19.8
Middle childhood biological father	167	18.5
Adolescence biological father	177	19.6
Child's race		
White	227	25.1
Black	492	54.5
Hispanic	61	6.8
Other	123	13.6
Child's gender (male)	425	47.1
Income below federal poverty line	464	51.4

Table 2.

Model Fit Indices for Alcohol LCGA Models

Model	BIC	LMR	LMR p-value	BLRT	BLRT p-value	Sample in the Smallest class
1-class	3509.366					
2-class	3428.136	96.901	<.001	101.648	<.001	
3-class	3433.886	13.982	.0004	14.666	<.001	
4-class	3453.385	.876	0.3454	.919	.5000	

Note. BIC=Bayesian Information Criterion; LMR=Lo-Mendell-Rubin Likelihood Ratio Test; BLRT=Parametric Bootstrapped Likelihood Ratio.

Table 3.

Model Fit Indices for Marijuana LCGA Models

Model	BIC	LMR	LMR p-value	BLRT	BLRT p-value	Sample in the Smallest class
1-class	2872.839					
2-class	2769.168	118.294	<.001	124.088	<.001	
3-class	2785.154	4.225	0.0548	4.432	0.2857	
4-class	2805.410	1.732	0.0349	1.796	.3750	

Note. BIC=Bayesian Information Criterion; LMR=Lo-Mendell-Rubin Likelihood Ratio Test; BLRT=Parametric Bootstrapped Likelihood Ratio.

Table 4.

Predictors of Alcohol Use Trajectory Groups (Reference group: Stable no/low alcohol use)

Comparison Group	Increasing alcohol use		
	OR	95% CI	P
Infancy/toddlerhood neglect	.73	[.51, 1.03]	.075
Infancy/toddlerhood emotional abuse	1.80	[.93, 3.49]	.081
Early childhood emotional abuse	2.56	[1.19, 5.48]	.016
Adolescence physical abuse	1.71	[1.08, 2.69]	.022
Early childhood father presence	.57	[.33, .96]	.034
Early childhood biological father	1.54	[.86, 2.77]	.149
Sex (male)	1.44	[1.06, 1.94]	.019
Race (reference: Black)			
White	2.49	[1.73, 3.59]	<.001
Hispanic	2.26	[1.26, 4.05]	.007
Other	2.25	[1.44, 3.51]	<.001
Income (Below poverty level)	.70	[.51, .96]	.028

Note. OR= odds ratio

Table 5.

Predictors of Marijuana Use Trajectory Groups (Reference group: stable no/low marijuana use)

Comparison Group	Increasing alcohol use		
	OR	95% CI	P
Infancy/toddlerhood neglect	.55	[.34, .87]	.012
Early childhood emotional abuse	6.08	[2.68, 13.79]	<.001
Early childhood sexual abuse	.55	[.25, 1.21]	.136
Early childhood physical abuse	1.72	[.95, 3.10]	.072
Middle childhood sexual abuse	.53	[.22, 1.26]	.148
Adolescence physical abuse	1.87	[1.06, 3.32]	.031
Early childhood father presence	1.35	[.74, 2.47]	.332
Early childhood biological father	.97	[.50, 1.90]	.935
Sex (male)	2.02	[1.37, 2.97]	<.001
Race (reference: Black)			
White	1.85	[1.15, 2.97]	.011
Hispanic	1.88	[.90, 3.92]	.092
Other	2.05	[1.67, 3.58]	.012
Income (Below poverty level)	.84	[.51, .96]	.387

Note. OR= odds ratio

Table 6.

Interaction Effects between Father Presence and Child Maltreatment on Patterns of Marijuana Use Trajectories
(Reference group: stable no/low marijuana use)

Comparison Group	Increasing marijuana use		
	OR	95% CI	p
Sex (male)	1.97	[1.31, 2.97]	.001
Income (Below poverty level)	0.80	[-.52, 1.24]	.329
Race (reference: Black)			
White	2.01	[1.20, 3.40]	.008
Hispanic	2.23	[0.99, 4.75]	.044
Other	2.03	[1.10, 3.71]	.021
Infancy/toddlerhood father presence	0.62	[0.26, 1.34]	.251
Early childhood father presence	1.52	[0.91, 2.52]	.108
Middle childhood father presence	0.84	[0.47, 1.45]	.521
Adolescence father presence	1.01	[0.62, 1.64]	.966
Infancy/toddlerhood physical abuse	1.05	[0.58, 1.84]	.863
Early childhood physical abuse	1.82	[0.95, 3.42]	.065
Middle childhood physical abuse	1.17	[0.55, 2.41]	.679
Adolescence physical abuse	1.31	[0.52, 3.05]	.555
Infancy/toddlerhood sexual abuse	0.63	[0.22, 1.59]	.357
Early childhood sexual abuse	0.54	[0.22, 1.19]	.148
Middle childhood sexual abuse	0.66	[0.24, 1.59]	.378
Adolescence sexual abuse	3.06	[0.80, 10.52]	.084
Infancy/toddlerhood neglect	0.46	[0.26, 0.79]	.006
Early childhood neglect	1.35	[0.77, 2.33]	.289
Middle childhood neglect	0.99	[0.56, 1.69]	.972
Adolescence neglect	0.80	[0.39, 1.59]	.547
Infancy/toddlerhood emotional abuse	0.90	[0.34, 2.20]	.833
Early childhood emotional abuse	5.81	[2.33, 14.81]	<.001
Middle childhood emotional abuse	0.52	[0.18, 1.35]	.200
Adolescence emotional abuse	1.07	[0.45, 2.44]	.874
Infancy/toddlerhood father presence × neglect	3.60	[0.89, 13.91]	.066
Middle childhood father presence × emotional abuse	11.47	[2.07, 72.45]	.001
Middle childhood father presence × physical abuse	0.13	[0.02, 0.56]	.011
Adolescence father presence × physical abuse	2.66	[0.80, 9.15]	.114
Adolescence father presence × sexual abuse	0.05	[0.01, .047]	.019

Note. OR= odds ratio