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Associations between subtypes of childhood trauma, protective factors, and substance use among adolescents in high levels of care

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Abstract

Childhood abuse and neglect are prevalent among adolescents who use substances, yet it is unclear which forms of early life adversity confer the greatest risk and which protective factors mitigate these associations. This study examined associations of general abuse and neglect with adolescent substance use, the effects of abuse and neglect subtypes (i.e., physical, emotional, or sexual), and whether protective factors (i.e., family roles, family affective responsiveness, academic performance, and extracurricular activities) moderated these relationships. Participants were adolescents (N = 324) treated in the McLean Hospital Belmont Adolescent Partial Program between 2022 and 2025 (M_{age} = 16 years; 72% female; 70% White, 16% Latino/a). Abuse and neglect, substance use, and protective factors were assessed using validated youth-report measures. In models examining general trauma dimensions, neglect had a significant association with substance use ($\beta = 0.173$, $p < 0.03$), whereas abuse did not. Among abuse subtypes, emotional abuse had a significant association with substance use ($\beta = 0.186$, $p < 0.003$). Among neglect subtypes, emotional neglect had a significant association with substance use ($\beta = 0.166$, $p < 0.02$). Family roles moderated the association between emotional neglect and substance use ($\beta = 0.187$, $p < 0.01$); more established family roles were associated with lower substance use. Academic performance moderated associations between both general neglect ($\beta = -0.170$, $p < 0.01$) and emotional neglect ($\beta = -0.173$, $p < 0.01$) and substance use, such that higher academic performance buffered risk. Findings suggest that emotional forms of adversity may be particularly relevant to adolescent substance use, and family dynamics and academic functioning may be potential targets for intervention efforts.

Introduction

Early-life adversity (ELA) is a broad term which includes exposure to physical, emotional, and sexual abuse, as well as physical and emotional neglect, violence, poverty, discrimination, and several other forms of adverse experiences in childhood. ELA is prevalent in the United States; over 46% of individuals under the age of 18, or approximately 34 million children, report at least one instance of ELA (Bethell et al., 2017). Strong associations between ELA and poorer mental health, developmental, cognitive, and educational outcomes have been found. Research has traditionally consolidated these vastly different forms of stress exposure when investigating the effects of ELA on humans. In order to take a more a nuanced approach to ELA research, Sheridan & McLaughlin (2014) introduced a framework that differentiates between “threat,” which they define as “presence of a threat to one’s physical integrity” (referenced in this study as physical, emotional, and sexual abuse), and “deprivation,” which they define as “absence of expected cognitive and social input” (referenced in this study as physical and emotional neglect). Differentiating general ELA experiences into abuse, neglect, and their subtypes allows us to parse out which types of adverse experiences may give rise to different forms of psychopathology. Regarding the psychopathological consequences of ELA on adolescents, substance use stands out as a pervasive outcome.

Substance use in adolescents is widespread. The U.S. Department of Health and Human Services’ Substance Abuse and Mental Health Services Administration (SAMHSA) releases an annual National Survey on Drug Use and Health (NSDUH), which is a comprehensive report on substance use and mental health indicators each year. In 2024, among people 12 or older, 16.8% (or 48.4 million people) had a past-year substance use disorder (SUD; Substance Abuse and Mental Health Services Administration, 2025). The report provides notable information about co-occurring substance use and major depressive episodes (MDE) in adolescents. Adolescents aged 12 to 17 who had a past year MDE were more likely to have used substances in the past year or past month compared with their counterparts who did not have an MDE in the past year. This is true across substance types: Adolescents with a past year MDE were more likely than adolescents without a past year MDE to have been past year illicit drug users (32.6 vs. 11.8 percent), marijuana users (25.0 vs. 7.8 percent), or past year misusers of opioids (2.8 vs.1.3 percent), past month binge alcohol users (6.2 vs. 3.0 percent), and tobacco products or nicotine users in the past month (16.9 vs. 4.7 percent; Substance Abuse and Mental Health Services

Administration, 2025). Similar associations were found in adolescents with moderate or severe anxiety symptoms and suicidality.

Previous literature has found associations between ELA and substance use in adolescence or adulthood. One longitudinal study found that ELA, especially before age 5, predicted alcohol and cannabis use in adolescence (Lui et al., 2023). Lui and colleagues (2023) proposed that childhood adversity was associated with behavioral problems and lower academic performance, which increased adolescent substance use and lowered high school completion. Another study found that ELA predicted substance use and other mental health disorders in adults (Najman et al., 2022). However, little research has differentiated the subtypes and dimensions of ELA when investigating these associations. Additionally, few studies have explored these concepts among adolescent samples seeking mental health treatment at higher levels of care (e.g., partial hospital level).

In order to understand points of intervention for adolescent substance use, it is important to examine which, if any, protective factors might mitigate the relationship between ELA and substance use in adolescents. By looking for points of vulnerability and factors that predict better outcomes, clinicians can take a more nuanced, informed approach in treating teens who have experienced different types of ELA and may be coping with substance use. Family support or functioning is often considered as a protective factor in the development of adolescent substance use. Past research has found that parental support was inversely correlated with adolescent substance use (Wills & Cleary, 1996), suggesting that a stable relationship with parents may mitigate this behavior. In addition, a study on families of adolescents with substance abuse problems found that disengaged family systems, rejecting or overprotective parenting, and incomplete family structures are all correlated with adolescent substance abuse (Matejevic et al., 2014). Academic performance has also been considered as a protective factor against adolescent substance use. Previous findings have demonstrated that lower academic performance was more prevalent among frequent smokers, binge drinkers, and marijuana users (Cox et al., 2007). Another study found that the correlation between substance use and academic performance was positive at the school level (Andrade, 2014). Finally, adolescent participation in extracurricular activities like sports, hobbies, or clubs may be a protective factor, though conclusions about this interaction remain unclear in the current literature. For instance, some research has found that adolescent participation in certain sports may increase substance use risk, while participation in other sports may decrease this risk (Brellenthin & Lee, 2018; Moore & Werch, 2006). In general, engagement with hobbies was found to be associated with lower odds of binge drinking and marijuana and tobacco use in early adolescence (Bone et al., 2025). More research is needed to understand how adolescent participation in extracurricular activities may affect their engagement in substance use.

While prior research has focused on the direct relationship between ELA and substance use or between protective factors and substance use, here, we sought to innovate by examining the role of these factors as a mediator between ELA and substance use, including examining subtypes of ELA such as threat (i.e., emotional, physical, sexual abuse) and deprivation (i.e., emotional neglect, physical neglect). The present study had three aims.

Aim 1. Examine differences in associations between general abuse (threat) versus general neglect (deprivation) and substance use in adolescents.

Aim 2. Examine unique effects of subtypes of abuse (2.1) and neglect (2.2) predicting substance use.

Aim 3. Examine the following protective factors (e.g., family roles and affective responsiveness, academic performance, and extracurricular activities) and their role in the relationship between ELA and substance use.

Methods

Participants.

Study participants were patients at the McLean Hospital Belmont Adolescent Partial Hospitalization Program who received treatment between August 2022 and September 2025 (N = 324; M_{age} 16 years, SD = 1 years, range = 13–19; 72% female; 70% White, 16% Latino/a) who participated in the IRB-approved McLean Child and Adolescent Routine Evaluation (CARE) measurement-based care initiative. Participants completed self-report surveys at any time between their first and last day of treatment, (with most patients typically discharging after a ten day stay).

Data Exclusion/Inclusion.

Upon referral, patients with active psychosis, medically compromising eating disorders, substance use requiring detoxification, or active suicidality (e.g., with method and/or plan) were referred elsewhere. Data included self-report intake data from patients who opted into CARE. Participants were excluded if they were missing a study ID necessary for merging across datasets or if key demographic covariates (race, biological sex, or Latinx ethnicity) were unavailable. Participants were also excluded if they were missing answers on all items of all relevant measures. Scale scores (e.g., PESQ, CTQ, and FAD subscales) were computed using available item-level data with missing items handled via pairwise deletion (i.e., row sums calculated with available responses), so participants were not excluded solely due to partial missingness on these measures. The final analytic sample consisted of 324 participants with sufficient data across merged datasets and required covariates.

Measures.

The Childhood Trauma Questionnaire Short-Form (CTQ-SF). Abuse was measured via the physical, sexual, and emotional abuse subscales of the youth-report Childhood Trauma Questionnaire. The Childhood Trauma Questionnaire Short-Form (CTQ-SF; Bernstein et al., 2003) is a 28-item self-report inventory which asks about experiences of abuse and neglect in childhood and adolescence. Items on the CTQ-SF are rated on a 5-point Likert scale with responses ranging from Never True to Very Often True and includes five subscales of physical, sexual, and emotional abuse, and physical and emotional neglect. Items on the physical abuse subscale include statements like, “People in my family hit me so hard that it left me with bruises or marks,” items on the sexual abuse subscale include statements like, “Someone tried to touch me in a sexual way or tried to make me touch them,” and items on the emotional abuse subscale include statements like, “People in my family called me things like ‘stupid,’ ‘lazy,’ or ‘ugly.’”

The Personal Experience Screening Questionnaire (PESQ). The Personal Experience Screening Questionnaire assessed youth-reported alcohol and substance use. The Personal Experience Screening Questionnaire (PESQ; Winters, 1991) is a 40-item adolescent alcohol and other drug abuse screening scale used to indicate need for further, more comprehensive drug use evaluation and to screen for severity of consequences of alcohol and drug use, as well as tendencies to fake sobriety or hide alcohol and drug use from others. Example items include “How often have you made excuses to your parents about your alcohol or drug use?” and “When using alcohol or other drugs, how often have you found out things you said or did while using or drinking that you did not remember?” Other questions ask about the context in which the adolescent is usually engaging in this behavior or with whom.

Youth Self-Report (YSR). The Youth Self-Report (YSR; Achenbach, 1991) is a 112-item instrument designed to assess behavioral competency and problems in children and adolescents. Responses are rated on a 3-point scale with responses ranging from Not true to Very true/often true, based on the preceding 6-months. The questionnaire contains several social competency items that measure the child’s participation in hobbies, games, sports, jobs, chores, friendship, and activities. Items of interest as protective factors in this study included questions about **extracurricular activities** (e.g., “Do you belong to any organizations, clubs, teams, or groups?” and “Do you have hobbies or participate in activities and games, other than sports? For example: cards, books, piano, cars, computers, crafts, etc”) and **academic performance** (e.g., “Rate academic performance in the above subject”).

*Family Assessment Device (FAD).*The McMaster Family Assessment Device (FAD; Epstein et al., 1983) is a 60-item self-report measure used to evaluate families according to the McMaster Model of Family Functioning. To address specific gaps in previous literature, subscales examined as protective factors on the FAD include family roles and affective responsiveness. The subscale for **family roles** included items like "We make sure members meet their family responsibilities," and "When you ask someone to do something, you have to check that they did it." The subscale for **affective responsiveness** included items like "We are reluctant to show our affection for each other," and "We cry openly."

Sociodemographic covariates. The following sociodemographic variables were included as covariates in all models: sex assigned at birth (1 = Male, 2 = Female), race (Multiracial, American Indian/Alaska Native, Asian, Black, White, Native Hawaiian/Pacific Islander, Do not know, or Other), ethnicity (0 = Not Latinx, 1 = Latinx), and age (in years).

Analytic Plan

Analyses were deployed in R (R version 4.5.2, 2025-10-31) (R Core Team, 2023) using SEM with maximum likelihood estimation and the package "lavaan" (Rosseel, 2012). Model fit was examined using canonical fit indices and guidelines including the root mean square error of approximation (RMSEA; value of 0.6 or below), comparative fit index (CFI; value of 0.90–0.95 or higher), Tucker–Lewis index (TLI; value of 0.90–0.95 or higher), and standardized root mean square residual (SRMR; value of 0.08 or below) (Bainter & Howard, 2016; Bentler, 1990; Kline, 2023).

Aim 1. To examine differences in associations between general childhood abuse versus general childhood neglect and substance use. Linear regression models in the SEM framework analyzed the influence of childhood abuse and neglect on substance use. Models considered both childhood abuse and neglect simultaneously to account for the overlap between these constructs.

Aim 2. To examine unique effects of subtypes of abuse and neglect predicting substance use. Linear regression models within an SEM framework considered the impact of subtypes of abuse and neglect on substance use. The three abuse subtypes (i.e., physical, sexual, emotional abuse) were considered in a model together, while the two neglect subtypes (i.e., physical, emotional neglect) were considered in a separate model.

Aim 3. To examine which protective factors moderate the relationship between subtypes of abuse/neglect and substance use. Linear regression models within an SEM framework considered the moderating effect of four protective factors (family roles, family affective responsiveness, academic performance, extracurricular activities) on the association between childhood trauma subtypes and substance use. Only abuse and neglect subtypes that emerged as significant in Aim 1, Aim 2.1 and 2.2 were examined for moderation. To probe moderation effects, simple slopes were plotted using the packages {interactions} and {jtools}.

Results

Descriptive statistics (Table 1) and bivariate Pearson correlations (Table 2) were derived to describe the sample and report associations between dimensions of childhood trauma (i.e., abuse and neglect), substance use, and demographics (e.g., age, sex assigned at birth, race, and ethnicity). The average age in our sample was 16 years (SD = 1) with 72% of the sample being biologically female.

Table 1

Study Sample Demographics

Characteristic	**N = 324**[1]
Age (years)	16 (1)
Sex	
Male	92 (28%)
Female	231 (72%)
Race/Ethnicity	
American Indian or Alaskan Native	2 (0.6%)
Asian	22 (6.9%)
Black or African American	9 (2.8%)
White	224 (70%)
Do not know	4 (1.3%)
Other	8 (2.5%)
Hispanic or Latino/a	
Not Hispanic or Latino/a	269 (84%)
Hispanic or Latino/a	52 (16%)
Childhood Abuse	24 (9)
Physical Abuse	6 (2.38)
Emotional Abuse	11.3 (4.9)
Sexual Abuse	6.8 (4.2)
Childhood Neglect	17.9 (6.1)
Physical Neglect	6.6 (3.0)
Emotional Neglect	10.8 (4.4)
Substance Use	46 (15)

[1]Mean (SD); n (%) **Note**: Substance use scores of 30 or higher (males and females ages 12–15) or of 34 or higher (males and females ages 16–18) indicate potential need for substance abuse evaluation referral and/or treatment.

Note

For Childhood Abuse (which includes Emotional Abuse, Physical Abuse, and Sexual Abuse subscales) and Childhood Neglect (which includes Physical Neglect and Emotional Neglect subscales) scores, the higher the score is, the greater the severity of abuse for that scale. The sample range for Childhood Abuse scores is 0 to 67. The sample range for Childhood Neglect scores is 0 to 45.

Table 2
Correlations among Key Study Variables

Age	*Age*	*Sex*	*Race*	*Hispanic or Latino/a*	*Phys. Abuse*	*Emo. Abuse*	*Sexual Abuse*	*Phys. Neglect*	*Emo. Neglect*	*Substance Use*
Sex	**-0.04**									
Race	**-0.11**	**-0.08**								
Hispanic or Latino/a	**0.10**	**0.02**	**0.09**							
Phys. Abuse	**-0.07**	**-0.00**	**-0.07**	**0.19*****						
Emo. Abuse	**-0.05**	**0.18****	**-0.04**	**-0.00**	**0.44*****					
Sexual Abuse	**0.08**	**0.20*****	**-0.05**	**0.12***	**0.32*****	**0.31*****				
Phys. Neglect	**0.00**	**-0.00**	**0.00**	**0.07**	**0.42*****	**0.47*****	**0.31*****			
Emo. Neglect	**-0.06**	**0.08**	**-0.07**	**-0.01**	**0.33*****	**0.65*****	**0.20*****	**0.57*****		
Substance Use	**0.11**	**0.07**	**0.04**	**0.05**	**0.09**	**0.20*****	**0.12***	**0.18****	**0.20*****	
Computed correlation used Pearson-method with pairwise-deletion.										

Aim 1. General Childhood Trauma Predicting Substance Use

In a model with both general subtypes of childhood trauma predicting substance use, only childhood neglect ($\beta = 0.173$, $p < 0.03$) and not childhood abuse ($\beta = 0.080$, $p = 0.30$) significantly predicted of substance use, indicating that more experiences of childhood neglect were associated with higher rates of substance use.

Aim 2. Abuse & Neglect Subtypes

In a model with emotional, physical, and sexual abuse predicting substance use, only emotional abuse ($\beta = 0.186$, $p < 0.003$), and not physical abuse ($\beta = -0.00$, $p = 0.996$) or sexual abuse ($\beta = 0.045$, $p = 0.509$) significantly predicted of substance use. In a model with emotional and physical neglect predicting substance use, only emotional neglect ($\beta = 0.166$, $p < 0.02$), and not physical neglect ($\beta = 0.079$, $p = 0.260$), significantly predicted substance use.

Aim 3. Protective Factors

Based on the previous models, the significant predictors of substance use that emerged were a) general neglect, b) emotional abuse, and c) emotional neglect. A model considering the moderating effect of family roles on emotional neglect found a significant moderation ($\beta = 0.187$, $p < 0.01$) such that with more stable, structured family roles, adolescents were less likely to use substances despite emotional neglect (Fig. 1).

Figure 1

Graph of the Interaction Between Emotional Neglect, Family Roles, and Substance Use

A model considering the moderating effect of academic performance on general childhood neglect found a significant moderation ($\beta = -0.170$, $p < 0.01$) such that under higher academic performance, adolescents were less likely to engage in substance use despite experiences of general neglect (Fig. 2).

Figure 2

Graph of the Interaction Between General Neglect, Academic Performance, and Substance Use

Graph of the Interaction Between Emotional Neglect, Academic Performance, and Substance Use

Models considering the moderating effect of family affective responsiveness and extracurricular participation on the impact of general neglect on substance use found no significant interaction. Full model output can be found in the supplemental R Markdown HTML file.

Discussion

The present study examined associations between childhood trauma and adolescent substance use, as well as potential protective factors that may moderate these associations. Across models, general childhood neglect emerged as the more consistent predictor of substance use. When general abuse and general neglect were considered simultaneously, only general neglect was significantly associated with substance use. Among abuse subtypes, only emotional abuse was significantly associated with substance use, whereas physical and sexual abuse were not. Similarly, within neglect subtypes, emotional neglect emerged as a significant predictor, while physical neglect did not. Lastly, we examined whether protective factors moderated the association between trauma and substance use. Moderation analyses focused on general neglect, emotional abuse, and emotional neglect as these were significant predictors in earlier models. Results indicated that stable and structured family roles buffered the association between emotional neglect and substance use, such that adolescents reporting greater family role stability were less likely to engage in substance use despite experiences of emotional neglect. Similarly, higher academic performance moderated the association between general neglect and substance use. Higher academic performance also moderated the association between emotional neglect and substance use. In contrast, family affective responsiveness and extracurricular participation did not significantly moderate these relationships.

Overall, findings suggest that neglect – particularly emotional neglect – may represent a more robust risk factor for adolescent substance use than does abuse. In addition, specific subtypes of trauma – particularly emotional neglect and emotional abuse – may be more strongly linked to adolescent substance use than other forms of childhood trauma. Finally, family dynamics (i.e., family roles) and certain contextual strengths (i.e., academic performance) may mitigate risk in the context of general or emotional neglect.

The significant association between general neglect and substance use in adolescents found in Aim 1 replicates previous literature that examined connections between ELA and substance use (Lui et al., 2023; Najman et al., 2022), while underscoring that neglect-related ELA was particularly related to substance use risk. Although abuse has historically received greater attention in substance use research, dimensional models of adversity suggest that deprivation-related experiences such as neglect may uniquely disrupt cognitive control systems implicated in substance use risk (Sheridan & McLaughlin, 2014). Neglect could be impacting executive functioning or reward systems, making it

more difficult to resist rewarding stimuli such as substances. One study found that childhood neglect, but not abuse, was associated with impaired neural reward-prediction-error (RPE) representation (Aloi et al., 2024). In another study, the relationship between childhood neglect and early adulthood substance use was found to be mediated by cognitive traits such as delayed reward discounting and impulsivity (Oshri et al., 2018). Individuals who have experienced neglect may have difficulty accurately learning from rewards, which could lead to maladaptive reward-seeking patterns such as substance use.

In addition to cognitive effects, early or chronic neglect may also disrupt attachment development, shaping a child's internal working models about whether others are reliable sources of support. When caregiving is inconsistent or rejecting, children may develop insecure attachment styles, which could be associated with later difficulties in emotion regulation, self-concept, and interpersonal functioning (Grummitt et al., 2022). These regulatory and relational vulnerabilities may explain the increased risk for substance use in adolescents who experienced neglect.

In Aim 2, emotional neglect and emotional abuse, but not other subtypes of neglect and abuse, were found to be related to substance use in adolescence. One potential explanation for why emotional neglect, but not physical neglect, was associated with substance use in this sample is that emotional neglect may have a more direct impact on psychological functioning as discussed above. Previous research has shown that emotional neglect specifically is strongly associated with internalizing symptoms in young adults, including depression, anxiety, and stress (Grummitt et al., 2022). These emotional and psychological difficulties may increase vulnerability to substance use as a means of coping with distress or regulating negative affect. In contrast, physical neglect may be more strongly associated with material deprivation or deficits in caregiving that do not as directly contribute to the internal emotional processes linked to substance use. As such, the association between emotional neglect and substance use may operate through affective pathways that are less prominent in experiences of physical neglect.

Regarding emotional abuse and substance use, the finding that *emotional* abuse was the only abuse subtype to predict substance use aligns with prior findings. For instance, one study found that emotional abuse still predicted substance use among adults even after accounting for other trauma exposure and demographic factors (Mandavia et al., 2016). Emotional abuse may exert a particular influence on substance use in adolescence through its impact on psychopathology related to self-concept, chronic shame, and emotion dysregulation (Kuo et al., 2015; Liu et al., 2024). For instance, emotional abuse, rather than physical or sexual abuse, was found to be the most consistent predictor of borderline personality disorder (BPD) symptoms in adolescents, including interpersonal, cognitive, affective, and impulsive symptoms (Kuo et al., 2015). Unlike physical or sexual abuse, which may contribute more broadly to trauma- or PTSD-related symptoms and responses, emotional abuse may more directly influences affective and cognitive processes that are strongly implicated in coping-motivated substance use. Psychopathology that develops in response to emotional abuse – more so than physical or sexual abuse – may be particularly likely to manifest in maladaptive coping behaviors such as substance use. In this way, emotional abuse may confer unique risk by contributing to internalizing symptoms that increase reliance on substances as a means of managing distress.

Our work advances the field's understanding of environmental factors that confer risk of substance use. In this context, it is also important to better understand what factors may mitigate the risk of substance use after experiencing ELA. Consistent with previous findings, stable and structured family roles lowered the likelihood of adolescent substance use in the context of neglect (Matejevic et al., 2014; Wills & Cleary, 1996). More defined family roles – for example, in instances where adolescents are not parentified, or parents serve as a supportive authority figure, may increase stability and care within the home. This emotional stability and care may in turn discourage substance use despite ongoing neglect. The finding that higher academic performance in adolescents moderated the relationship between general neglect and substance use expands on previous literature. Previous studies have established a link between academic performance and substance use (Bugbee et al., 2019; Cox et al., 2007), but the role of academic performance as a moderator between childhood neglect and substance use is a novel finding. Adolescents who perform well in school

may be intrinsically motivated and have a supportive in-school community of peers or trusted adults, likely protecting against substance use. Furthermore, high academic performance may both contribute to and reflect higher self-esteem, executive functioning, and motivation, which may in turn reduce reliance on substances.

One hypothesis for why the associations between general neglect and emotional neglect and substance use were moderated by certain protective factors—while emotional abuse was not— is that protective factors may more effectively compensate for an absence of support (i.e., neglect), than for an active harm or threat (i.e., abuse). Neglect involves the failure to meet a child's emotional or developmental needs, creating deficits that may be partially addressed through supportive relationships, school connectedness, resilience, or other protective factors. These resources may reduce emotional distress and decrease reliance on substances as a coping mechanism. In contrast, emotional abuse involves direct experiences of criticism, rejection, humiliation, or intimidation, which may result in more enduring impairments in self-esteem, emotion regulation, and interpersonal functioning (Korolevskaia & Yampolskaya, 2023). The harmful effects of emotional abuse on substance use risk may be less responsive to the buffering influence of protective factors.

There are a few limitations to consider in this study. Although the overall study sample size is large, the sample sizes of participants who have experienced neglect and/or abuse are smaller, making it difficult to find moderations. While this sample represents a population of adolescents at high risk for a variety of maladaptive problems, trauma and/or substance use was not necessarily patients' presenting problem. While this makes findings potentially more generalizable to the general population, future work should consider investigating such questions in samples enriched for trauma and/or substance use. Additionally, the self- and retrospective-report nature of the study's methods run the risk of mono-informant bias in the data. Future studies should combine youth-report with caregiver- or teacher-report measures to avoid shared/common method variance and mono-informant bias (Spector et al., 2019).

Based on the study's findings, further research should be conducted exploring the role of abuse and neglect subtypes on the development of substance use in adolescents. Furthermore, our findings reflect that age may be an important factor, as the older someone was the higher their substance use score was. Investigating the impact of childhood trauma dimensions and subtypes in older adolescents specifically will be crucial in developing treatment interventions against adolescent substance use.

Overall, the nuance discovered in the relationship between ELA and substance use in adolescence – namely that general neglect is a more salient predictor than abuse, that emotional neglect and emotional abuse may be more strongly linked to substance use, and that protective factors have varying effects – implies that interventions among adolescents using substances should be nuanced and targeted. Considering the protective factors of family roles and academic performance may be valuable intervention points to bolster among adolescents who may be at risk for, or already engaging in, substance use. In addition, our results emphasize the importance of understanding the dimensions of ELA an adolescent has experienced. Evidently, subtypes of abuse and neglect may manifest in different behavioral and mental health outcomes among youth utilizing mental health services. When providing care or intervention for adolescents struggling with substance use, it is essential that clinicians consider varying contextual and protective factors that may uniquely shape a patient's presentation and treatment.

Statements & Declarations

Declarations

1. Competing Interests: The authors declare that they have no relevant financial or non-financial interests to disclose.
2. Ethics Approval & Informed consent: This study is a secondary analysis of data from the IRB-approved McLean Child and Adolescent Routine Evaluation (CARE) project. Verbal informed consent was obtained from parents or legal

guardians, and assent was obtained from participating youth as appropriate. All procedures were conducted in accordance with institutional ethical guidelines.

3. Funding: The CARE Initiative is supported in partnership with McLean's Development Department, without support from any industry.
4. Data Availability: The datasets generated and/or analyzed during the current study are not publicly available due to IRB restrictions on patient data. All analytic code and model outputs are publicly available.
5. Author Contributions: K.M. and J.L. led the project and writing of the manuscript. I.K. contributed to the writing of the manuscript and subsequent review process and provided important analytical commentary to strengthen the manuscript. D.D. and P.W. provided feedback on the final manuscript draft for submission. All authors reviewed and approved the final version of the manuscript.
6. Originality and Integrity: The manuscript is original, has not been published previously, and is not under consideration by any other journal. The authors confirm that the results are presented honestly and without fabrication, falsification, or inappropriate data manipulation.

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Figures

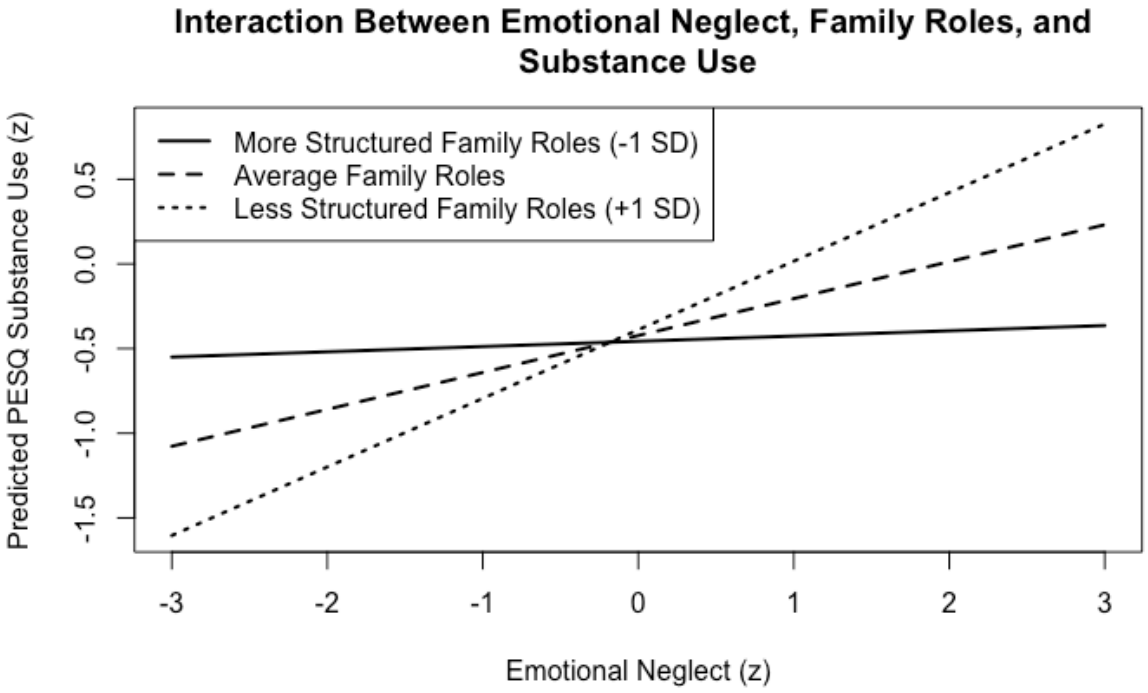
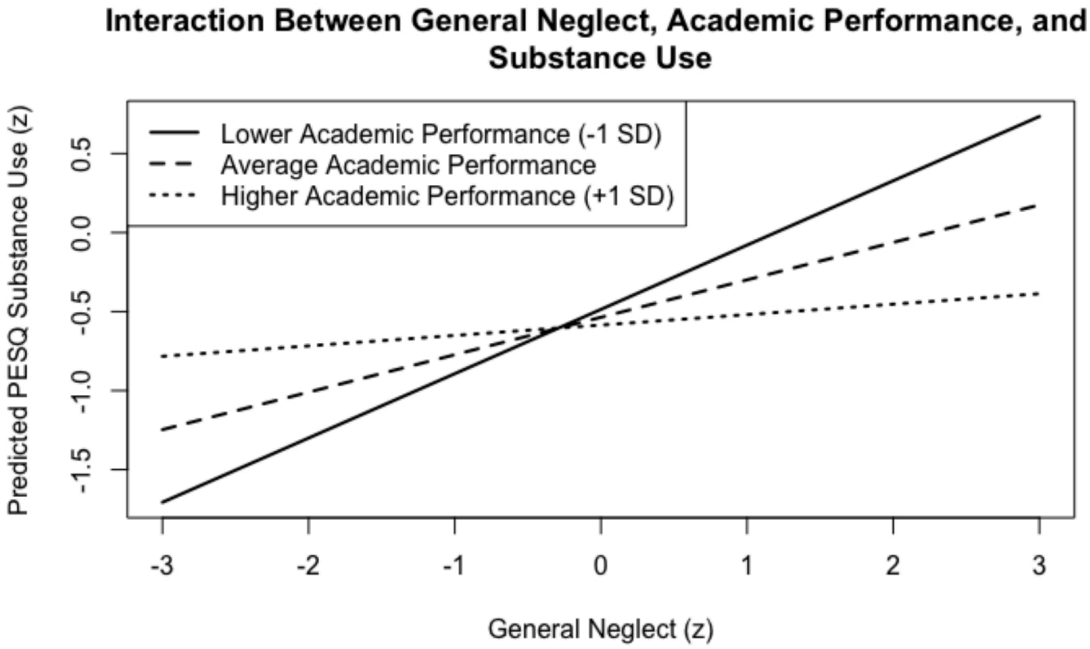


Figure 1

Graph of the Interaction Between Emotional Neglect, Family Roles, and Substance Use



A significant moderation of academic performance under emotional neglect on substance use was also found ($\beta = -0.173$, $p < 0.01$) **(Figure 3)**.

Figure 2

Graph of the Interaction Between General Neglect, Academic Performance, and Substance Use

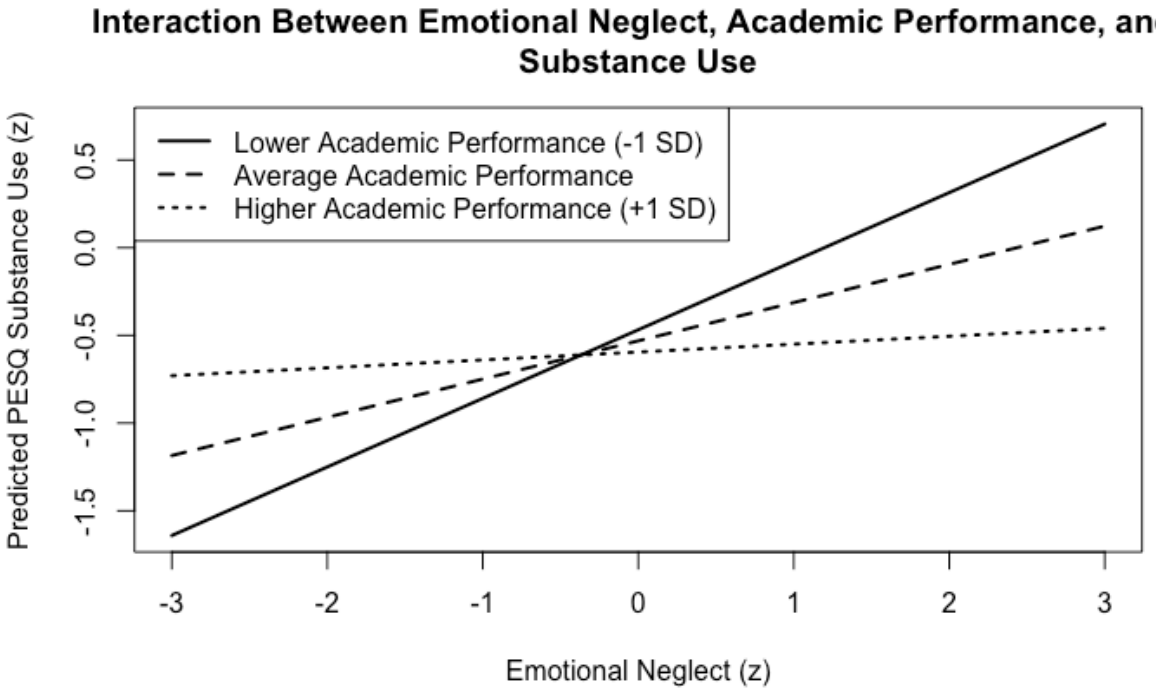


Figure 3

Graph of the Interaction Between Emotional Neglect, Academic Performance, and Substance Use