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An Examination of Pathways from Childhood Maltreatment to Adolescent Binge Drinking

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Abstract

Considerable clinical and empirical evidence has accumulated over the past decades indicating that there is a strong association between childhood maltreatment and heavy episodic drinking in adolescence, but there is a paucity of empirically based knowledge about the processes linking the association. The aim of this paper is to examine mechanisms that might account for the association between childhood maltreatment and heavy episodic drinking in adolescence. Using a nationally representative sample of adolescents (ages ranging 12–21; N = 6,337), this study examined the role of individual self-regulatory processes in the associations, controlling for age, gender, race/ethnicity, peer substance use, parental alcoholism, and parent–child conflict. Factor analyses were used to test the measurement structure of self-regulatory processes. Findings confirmed the association between childhood maltreatment and heavy episodic drinking in adolescence. Structural modeling analyses indicated indirect effects for childhood maltreatment primarily through poor self-regulatory processes and peer substance use. Implications for future research are discussed.

INTRODUCTION

The consumption of five or more alcoholic drinks on a single occasion at least once every 2 weeks, typically called heavy episodic drinking (HED), remains a major public health problem among US adolescents.¹ According to the 2009 National Survey on Drug Use and Health, rates of current HED were 7% for 14–15-year-olds, 17% for 16–17-year-olds, and 34.7% for 18–20-year-olds.² Developmental characteristics of individuals in adolescence, such as identity exploration and reduced parental control, have the potential to increase HED in adolescence.^{3,4} Maltreated children represent a subpopulation of US children particularly

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Declaration of Interest

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vulnerable to HED in adolescence. For example, using a nationally representative sample of adolescents ($N = 5,513$) in grades 7 through 12, Diaz et al. found that exposure to physical or sexual abuse was associated with a 1.8-fold increase in the relative risks for boys (95% CI: 1.3–2.6) and a 2.2-fold increase in the relative risks for girls (95% CI: 1.3–3.7) of HED in adolescence.⁵ Shin et al. also found that childhood maltreatment is a robust risk factor for adolescent HED among 12,748 adolescents (ages ranging 12–21) in the National Longitudinal Study of Adolescent Health sample, controlling for peer alcohol use and parental alcoholism.⁶

Although there is considerable evidence that childhood maltreatment increases the likelihood of adolescent HED, potential mediators of the association between childhood maltreatment and HED have received scant attention. Common theoretical models proposed to explain why victims of childhood maltreatment are at increased risk for adolescent HED come from developmental psychopathology, which assumes that inappropriate development at one stage has a ripple effect on subsequent development.^{7–9} For example, poor self-regulatory processes as developmental sequelae of childhood maltreatment may be the main component of the maltreated child's vulnerability to adolescent HED. Childhood maltreatment is related to deviations in several developmental processes underlying emotional and behavioral self-regulation and its evolution, including poor emotion comprehension,^{10–12} increased expression of negative emotion,^{13,14} heightened arousal to negative emotions,^{11,15,16} poor emotional reactivity,^{17,18} poor emotion management skills,¹⁹ and behavioral dysregulation.^{17,20–22} Furthermore, a number of studies have found that maltreated children exhibit developmental deficits in cognitive functioning, which is closely related to behavioral self-regulation.²³ Such developmental deficits may leave maltreated children ill-equipped to protect themselves from the future allure of alcohol use during adolescence.

Although many studies have helped to build a body of evidence on the harmful effects of childhood maltreatment on the development of self-regulatory processes,^{11,15,18,19} numerous investigators have found that deficits in self-regulatory processes (eg, inattentiveness) are risk factors for adolescent HED.^{24–27} For example, deficits in self-regulatory capacities such as poor problem solving and inattentiveness have been linked to alcohol problems in adolescence. Low attentiveness increases an individual's vulnerability to alcohol use during adolescence^{28–30} whereas good problem-solving processes are relevant to resisting temptations for alcohol use among young people.^{31–33}

Despite these findings about the connections between childhood maltreatment, self-regulatory processes, and adolescent HED, few studies have explored the role of self-regulatory processes in explaining why childhood maltreatment leads to the increased likelihood of HED in adolescence. This study hypothesized that individual differences in self-regulatory processes are critical in modulating the impact of exposure to childhood maltreatment on risk for HED in adolescence. Thus, we examined whether developmental deficits in self-regulation are responsible for HED among adolescents who are victims of childhood maltreatment.

METHODS

Design and Sample

This study used the National Longitudinal Study of Adolescent Health (Add Health) data, a longitudinal cohort study of a nationally representative sample of adolescents in grades 7–12. The Wave 1 in-home interviews ($N = 20,745$) were conducted in 1995, and 80% of the first respondents were followed up 1 year later (Wave 2). Finally, in 2002, Wave 3 interviews were completed by 15,197 respondents. This study uses the 6,337 respondents who participated in both Wave 1 and 3 interviews, and have childhood maltreatment data.

Measures

HED—The Add Health asked, “During the past 12 months, on how many days did you drink five or more drinks in a row?” Adolescent HED was defined as having five or more drinks in a row at least two to three times per month in the past 12 months at Wave 1. The reference group was those who drank less frequently or had never drunk alcohol in their lives.

Childhood Maltreatment—In an attempt to ensure that childhood maltreatment preceded self-regulatory processes and HED in adolescence, exposure to childhood maltreatment is defined as child abuse and neglect incidents that occurred before 6th grade in this study. The Add Health measured three types of childhood maltreatment (ie, neglect, physical abuse, and sexual abuse) at Wave 3. Neglect was operationalized as when a caregiver or responsible adult left the respondent home alone unsupervised or had not taken care of the respondent’s basic needs (eg, food, clothing). Physical abuse was defined as when a parent or responsible adult slapped, hit, or kicked the respondent, whereas sexual abuse was coded as when a parent or responsible adult touched the respondent in a sexual way, forced the respondent to touch him or her in a sexual way, or forced the respondent to have sexual relations. Three types of childhood maltreatment were initially dummy coded using a nonmaltreatment group as the reference group. Next, considering the multiplicity of childhood maltreatment reported in the literature,³⁴ three childhood maltreatment types were combined into a five-category variable: neglect only, physical abuse only, neglect and physical abuse, sexual abuse (sexual abuse only, neglect and sexual abuse, and physical and sexual abuse were collapsed into one category because of the small sample size), and all three types.

Self-Regulation—The respondents were presented with a set of 11 questions that measured self-regulation at Wave 1. The 11-item scale developed by the Add Health included items such as “You had trouble keeping your mind on what you were doing” and “When making decisions, you usually go with your ‘gut feeling’ without thinking too much about the consequences of each alternative.” Response categories ranged from 1 (strongly agree) to 5 (strongly disagree). Further information on the measurement structure of self-regulation, which identified two distinct constructs of self-regulatory processes (ie, good problem solving and inattentiveness) is provided in the results section. Internal consistency of the self-regulation measure for the current sample was .73.

Demographic and Risk Measures—Respondents were asked directly about age, gender, and race/ethnicity whereas family income and parent education data were collected from respondents' caregivers. Parent–child conflict was assessed by a 4-item scale that measured satisfaction with the parent–child relationship. Peer substance use was measured by three items measuring alcohol, cigarettes, and marijuana use of respondents' three best friends. Finally, respondents were asked about their biological mother's or father's alcohol problems. Parental alcohol problems were dichotomized.

Data Analysis

All analyses corrected for design effects and the unequal probability of selection in the Add Health survey design. To test the underlying measurement structure of self-regulation, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed using maximum likelihood estimator. In addition, structural equation modeling (SEM) analyses were performed to examine pathways among study variables using weighted least squares mean and variance adjusted estimator (WLSMV). In addition, we tested the indirect effects of exogenous variables on HED. The indirect effects equal the product of the direct effects involved (eg, multiplying the X to Z and Z to Y paths equals the X to Z to Y indirect effect). Model fits were assessed by inspecting the statistical significance of the comparative fit index (CFI), the Tucker–Lewis Index (TLI), and the root mean square error of approximation (RMSEA). Higher CFI and TLI values (close to .95 or higher) and lower RMSEA (close to .06 or below) values indicated the better fitting model.³⁵

RESULTS

Measurement Modeling Analysis for Self-Regulation

The sample characteristics and prevalence of childhood maltreatment is presented in Table 1. The measurement structure of self-regulation was tested. Eleven indicators of self-regulation were initially submitted to an EFA. Four indicators were removed from the model because of low (<.40) standardized factor loadings, including “you usually go out of your way to avoid having to deal with problems,” “I have trouble paying attention in school,” “when you get what you want, it's usually because you worked hard for it,” and “you feel like you are doing everything just about right.” The remaining seven indicators in the self-regulation measures were then entered into a CFA, and two- and one-factor models were specified. The two-factor model of self-regulation was compared with a one-factor model in which the indicators were all specified as measures of one self-regulation construct. The two-factor model had better fit (CFI = .988, TLI = .981, RMSEA = .035), compared to a one-factor model (CFI = .676, TLI = .514, RMSEA = .177). A chi-square difference test also indicated superiority for the two-factor model (difference $\chi^2(1, N = 6,377) = 5,101$). A three-factor solution did not converge. Items and standardized factor loadings for two self-regulation constructs in the two-factor model are presented in Table 2. On the basis of content analysis, we labeled the two factors good problem solving and inattentiveness, which were used in subsequent analyses.

SEM Analysis for Childhood Maltreatment, Self-Regulation, and HED in Adolescence

Figure 1 shows fit indices and path coefficients for our SEM analyses, which were performed to examine pathways from childhood maltreatment to adolescent HED by good problem solving and inattentiveness, and to investigate these pathways in a multivariate context. Five predictor variables including parental education, family income, Hispanic and Asian American ethnicities, and sexual abuse were excluded from the final model because they had no significant correlations with the outcome variables. A final structural model was specified in which four childhood maltreatment variables, age, gender, African American, “other ethnicity,” parental alcoholism, and parent-child conflict were exogenous variables whereas good problem solving and inattentiveness were specified as endogenous variables. Peer substance use was specified as a proximal variable. Pathways were specified from childhood maltreatment to good problem solving and inattentiveness, respectively and from the two self-regulation constructs to HED. A covariance of the two self-regulation constructs’ error terms was also specified in the final model, which had 61 freely estimated parameters.

The final model fit the data well with the following indices: $\chi^2(73) = 156.23$, CFI = .98, TLI = .96, RMSEA = .013, and accounted for 39% of the variance in adolescent HED. The factor correlation for good problem solving and inattentiveness was low (0.11), indicating that these constructs are distinct from each other. Childhood maltreatment variables had asymmetric relationships with self-regulation. All childhood maltreatment variables had paths to inattentiveness whereas no childhood maltreatment variables had paths to good problem solving. Results for demographic variables indicated that females had more inattentiveness, being African American was positively related to good problem solving and inversely to inattentiveness, and belonging to “other ethnicity” was related to having inattentiveness. Finally, parent-child conflict had inverse paths to good problem solving and positive paths to inattentiveness whereas parental alcoholism had positive paths to inattentiveness.

Results for the self-regulation and HED association indicated that inattentiveness had a predictive path to higher levels of HED and good problem solving was not related to HED. Consistent with previous studies, both peer substance use and parental alcoholism had a substantial direct path to HED. Finally, being female was inversely, and being older was positively related to HED, respectively.

Four childhood maltreatment variables: neglected only, physical abuse only, neglect and physical abuse, and all types of maltreatment had indirect effects on HED ($\beta = .09, .07, .10$, and $.25$, respectively), and these indirect effects were mediated by inattentiveness and peer substance use. Results for indirect effects also showed that gender ($\beta = .05$) had significant indirect effects on HED through inattentiveness.

DISCUSSION

This study examined whether deficits in self-regulatory processes mediate the association between childhood maltreatment and HED among a nationally representative sample of adolescents. There is a paucity of empirically based knowledge about the developmental

processes linking childhood maltreatment and HED in adolescence. The primary factor postulated in this study to link childhood maltreatment with HED was individual self-regulatory processes. Factor analyses found that individual self-regulatory processes have multiple dimensions including good problem solving and inattentiveness. Results of SEM analyses showed that childhood maltreatment was related to adolescent HED primarily through inattentiveness. However, childhood maltreatment was not related to good problem solving, which were not associated with adolescent HED. This study also found that peer substance use and parental alcoholism were positively associated with HED during adolescence.

Our findings confirm that childhood maltreatment poses serious hazards to adolescent self-regulatory capacities such as inattentiveness. Adolescents with a history of childhood maltreatment demonstrated higher levels of inattentiveness than adolescents without a childhood maltreatment history. The often volatile, hostile, and threatening family environments experienced by maltreated children may pose serious hazards to children's self-regulation capacities and make it difficult to learn appropriate attention skills.^{36,37} This study also found that inattentiveness is related to adolescent HED and mediates the association between childhood maltreatment and HED in adolescence. It is possible that childhood maltreatment may manifest in deficiencies in attentiveness, which in turn may lead to vulnerabilities related to alcohol problems in adolescence. Although a causal inference cannot be made in the present cross-sectional study, the pathways found among childhood maltreatment, inattentiveness, and adolescent HED might support predictions from developmental psychopathology that posits that adolescent HED can be construed as a result of failure in self-regulation for maltreated adolescents whose self-regulatory abilities are limited because of childhood maltreatment.

Future prospective longitudinal research is warranted to examine the pathways among childhood maltreatment, development of self-regulatory processes, and trajectories of adolescent HED. If these mechanisms are confirmed in future studies, self-regulatory processes should be considered as potentially useful targets to prevent HED among this high-risk subpopulation of adolescents, childhood maltreatment victims. Using self-regulation concepts in drug prevention has a theoretical rationale^{38,39} and intervention paradigms using self-regulation promotion have been tested in various areas.^{40–44}

Deficits in self-regulation processes are known determinants of alcohol problems in adolescence.^{28,45} We found that adolescents displaying inattentiveness engaged in high levels of HED, and this is consistent with prior research.^{46,47} Adolescents who experience attention deficits may be more likely to consume large quantities of alcohol in a row because they fail to pay attention to undesirable effects of HED. Individuals' expectations about how alcohol will affect them and consideration of undesirable effects of HED is closely related to frequency of alcohol use and alcohol-related problems.^{48,49} This study tested a latent construct for self-regulation processes, and found good problem solving and inattentiveness to be distinct constructs with different alcohol use consequences. This finding confirms previous studies that have distinguished between good self-regulation (eg, planfulness) and poor self-regulation (eg, impulsivity), and that have reported different effects of good and poor self-regulation on adolescent substance use behaviors.^{50–52} Given that self-regulation is

a multidimensional construct,⁵³ it is recommended that future research uses both dimensions of self-regulation (ie, good and poor self-regulation) in examining the role of each type of self-regulatory process in hazardous drinking during adolescence. Findings of such research may help to explain which types of self-regulation are more related to childhood maltreatment and predictive of adolescent HED.

Limitation

This study benefits from a number of strengths, including a large nationally representative sample of adolescents, and one of the few studies examining the developmental mechanism by which exposure to childhood maltreatment increases adolescent HED. However, the limitations of several aspects of our study must be acknowledged. Although EFA and CFA of the Add Health developed self-regulation measures were conducted, lack of psychometric information about reliability and validity of the measures should be noted. We also note that the findings of this study need to be replicated using different samples. Future studies may benefit from incorporating other facets of self-regulation processes including impulsivity, planning, and anger control. In addition, because the Add Health used a self-report measure of adolescent HED and parental alcohol problems, there may be underreporting of adolescent alcohol use and parental alcoholism. Furthermore, although the literature suggests that individuals' retrospective self-reports of childhood maltreatment are relatively valid^{54–58} and their self-reports are highly concordant with official records such as court,^{59,60} child protective services (CPS),^{56,60–62} and medical records,⁶³ the retrospective aspect of reports of childhood maltreatment may bias the current findings in the direction of underreporting or potentially misreporting. Finally, the Add Health only measured one aspect of childhood maltreatment (ie, maltreatment types) without addressing other aspects of childhood maltreatment including severity, frequency, timing, duration, and the length of time between childhood maltreatment and current age. For example, although few studies have examined the effect of childhood maltreatment severity on adolescent self-regulation and HED, it is possible that severity of childhood maltreatment may increase risk of developing both deficiencies in self-regulation processes and adolescent HED.^{64,65} Future research investigating the association between childhood maltreatment and adolescent HED needs to include multidimensional aspects of maltreatment experiences in model testing.

CONCLUSION

In summary, the association between childhood maltreatment and adolescent HED was mediated by inattentiveness. These associations remain after controlling for peer and parental alcohol consumption. Future studies need to examine the causal relationships and temporal directionality among childhood maltreatment, self-regulatory processes, and HED in adolescence.

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FIGURE 1.

Structural model for childhood maltreatment, self-regulation, and heavy episodic drinking in adolescence. Exogenous variables specified as freely correlated. Covariances of exogenous variables and of residual terms for endogenous constructs were included in the model but are not all in the figure. Straight, single-headed arrows represent path effects, and curved, double-headed arrows indicate covariances. Coefficients are significant at $p < .05$.

TABLE 1

Childhood maltreatment and sample characteristics

	Total weighted %	Any maltreatment <i>n</i> = 3,905	No maltreatment <i>n</i> = 3,659
Gender *			
Male (<i>n</i> = 3,398)	49.7	52.4	32.9
Female (<i>n</i> = 4,168)	50.3	47.6	67.1
Age *			
12–14 (<i>n</i> = 2,524)	35.5	37.2	33.7
15–17 (<i>n</i> = 3,938)	48.9	47.8	50.0
18–21 (<i>n</i> = 1,102)	15.6	15.0	16.3
Race/ethnicity *			
Non-Hispanic White (<i>n</i> = 4,787)	67.6	66.4	69.1
Black (<i>n</i> = 1,396)	14.9	14.4	15.3
Hispanic (<i>n</i> = 836)	11.4	12.1	10.7
Asian (<i>n</i> = 312)	3.1	3.6	2.5
Other (<i>n</i> = 231)	3.1	3.5	2.5
Family income [†] *			
0–21,999 (<i>n</i> = 1,382)	24.0	25.4	22.5
22,000–39,999 (<i>n</i> = 1,438)	24.8	24.8	24.8
40,000–59,999 (<i>n</i> = 1,439)	24.8	25.2	24.4
60,000 (<i>n</i> = 1,600)	26.4	24.6	28.3
Parental education *			
Not a high school graduate (<i>n</i> = 1,201)	16.4	16.1	16.8
High school graduate/GED (<i>n</i> = 2,046)	32.3	32.1	32.6
Technical school or some college (<i>n</i> = 1,902)	28.4	29.6	27.2
At least a college graduate (<i>n</i> = 1,646)	22.9	22.2	23.4
Poverty index *			
0 (<i>n</i> = 5,052)	78.2	75.8	81.0
1 (<i>n</i> = 1,180)	18.3	20.6	15.9
2 (<i>n</i> = 224)	3.5	3.7	3.1
Parent–child conflict *			
No (<i>n</i> = 6,254)	84.4	80.8	88.4
Yes (<i>n</i> = 1,159)	15.6	19.2	11.6
Heavy episodic drinking *			
No (<i>n</i> = 6,695)	88.8	87.6	90.1
Yes (<i>n</i> = 799)	11.2	12.4	9.9
Parental alcoholism *			
No (<i>n</i> = 5,166)	82.8	80.5	85.2
Yes (<i>n</i> = 997)	17.2	19.5	14.8
Peer substance use (<i>n</i> = 7,357) *	0.84	0.90	0.78

	Total weighted %	Any maltreatment <i>n</i> = 3,905	No maltreatment <i>n</i> = 3,659
Depressive symptoms (<i>n</i> = 7,563) *	0.82	0.84	0.80

[†] *n* = 5,859 (does not include refused or missing).

* *p* < .001. *P*-Values based on within subgroup analyses.

TABLE 2

Standardized loadings for constructs in two-factor confirmatory factor analysis model

Latent construct and indicator	Standardized factor loading
Good problem solving	
When making decisions, you generally use a systematic method for judging and comparing alternatives.	.64
When you are attempting to find a solution to a problem, you usually try to think of as many different ways to approach the problem as possible.	.70
After carrying out a solution to a problem, you usually try to analyze what went right and what went wrong.	.58
When you have a problem to solve, one of the first things you do is get as many facts about the problem as possible.	.68
Inattentiveness	
You have trouble keeping your mind on what you were doing.	.81
When making decisions, you usually go with your “gut feeling” without thinking too much about the consequences of each alternative.	.43
I have trouble getting my homework done on time.	.67