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Relational peer victimization interacts with depression severity to predict the timing of alcohol use initiation in adolescent girls

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Abstract

Background: Peer victimization is consistently linked to adolescents' alcohol use. However, the relative influence of relational and physical peer victimization on alcohol use, and timing of drinking initiation, is not well understood. In this study, we evaluate the impact of both relational and physical peer victimization on adolescent girls' alcohol use initiation, and the extent to which depression severity moderates these associations.

Methods: Participants were 2125 girls in the Pittsburgh Girls Study, a longitudinal community-based study. Participants reported experiences of relational and physical peer victimization, depression severity, and alcohol use each year from ages 10–17. Cox proportional hazards regression analyses predicting timing of first drink were conducted in two stages, testing for main effects of peer victimization in Model 1 and moderation by depression severity in Model 2.

Results: Analyses were split at age 14 to adjust for proportional hazards violations. Model 1 results supported a main effect for relational (Hazards ratio [HR]=1.83, CI: 1.46–2.28 age 13; HR=1.23, CI: 1.05–1.45 age 14) but not physical victimization on timing of alcohol use onset (HR=1.10, CI: 0.88–1.39). Model 2 results show that depression severity moderates the association between relational victimization and alcohol use initiation: the association between relational victimization and early alcohol use onset was stronger for lower depression severity (–1 SD HR=2.38, CI: 1.68–3.39 age 13; –1 SD HR=1.48, CI: 1.10–1.52 age 14).

Conclusions: Results demonstrate that relational (and not physical) victimization predicts earlier drinking among adolescent girls. Relational peer victimization conferred greater risk for alcohol use initiation when depression severity was lower, whereas girls with high depression severity engaged in early alcohol use regardless of peer victimization. Results suggest that interventions focused on relational peer victimization may have spillover effects for delaying girls' alcohol use initiation, particularly in early adolescence, when this association is most robust.

Keywords

peer victimization; depression; adolescent alcohol use; alcohol use initiation

Introduction

Adolescent alcohol use has been well-established as a significant and pervasive public health concern (Johnston et al., 2013). Early alcohol use initiation in particular has been shown to predict binge drinking in late adolescence and early adulthood, initiation of other substance use, low academic performance, and delinquency (Cheney et al., 2018, Moss et al., 2014, Dawson et al., 2008, Guttmanova et al., 2011, Sartor et al., 2016, LaBrie et al., 2008). In addition, it is estimated that 40% of individuals who begin drinking at age 14 or younger develop lifetime alcohol dependence (Grant and Dawson, 1997), and that drinking before this time is associated with a fourfold increase in the risk of developing alcohol dependence in adulthood compared to individuals who do not begin drinking until age 21 (Hingson et al., 2006). Although historically boys initiate alcohol use at an earlier age than girls, this gender gap has been steadily decreasing (Johnston et al., 2019). Specific to alcohol use initiation, research has also shown that girls who begin drinking by 12 years of age drink more than any other group throughout adolescence (Bolland et al., 2016), suggesting a need to better understand pathways that increase risk for early alcohol use onset among girls. In the current study, we examine experiences of peer victimization – a known predictor broadly of risky health behaviors (Wormington et al., 2013, Sullivan et al., 2006) – and the impact it may have on alcohol use onset in girls. Further, we investigate the extent to which depression severity may exacerbate the association between peer victimization and alcohol use onset in girls.

Peer victimization

Peer victimization occurs at high rates; research estimates that 40–80% of youth have experienced peer victimization at some point, and 10–15% experience chronic peer victimization (Juvonen and Graham, 2001, Hawker and Boulton, 2000). Extensive research has shown that peer victimization is associated with adolescents' poor psychosocial adjustment (Hanish and Guerra, 2002, Hawker and Boulton, 2000), as well as increased use of alcohol (e.g., Radliff et al., 2012, Sullivan et al., 2006, Wormington et al., 2013). Most studies have shown significant associations between mild forms of victimization and general characteristics of alcohol use (e.g., any use, drinking frequency) rather than problem drinking (for reviews and meta-analyses, see Maniglio, 2017, Moore et al., 2017). Further, this association has been demonstrated across various developmental periods, from middle school (Peleg-Oren et al., 2012) to high school (Radliff et al., 2012), and college (Rospenda et al., 2013). However, it is unknown how peer victimization relates to the timing of alcohol use onset (Maniglio, 2017), which is important to understand in order to introduce effective interventions and prevention efforts at developmentally appropriate time points. Additionally, existing research speaks to the need to evaluate different forms of peer victimization, rather than assessing victimization status in broad terms (Kim et al., 2019, Fite et al., 2016).

Many studies have focused on the impact of physical peer victimization on various forms of adolescent maladjustment (for a meta-analysis, see Hawker and Boulton, 2000). By comparison, relational victimization, which is characterized by behaviors that damage or manipulate relationships with peers, such as excluding or spreading rumors about an individual (Crick and Bigbee, 1998), is also imperative to consider. Specifically, relational peer victimization is particularly relevant during early adolescence, given that this marks the time period in which individuals transition from parent to peer-focused relationships (Nansel et al., 2003, Sullivan et al., 2006), and may be useful for understanding risk for girls in particular (Paquette and Underwood, 1999, Rose and Rudolph, 2006).

Relational victimization occurs for both boys and girls; however, some studies suggest it may be more prevalent among girls (Crick and Nelson, 2002), is more common than physical peer victimization among girls (Sullivan et al., 2006), as well as more impactful on girls' well-being (Sullivan et al., 2006). Research suggests that girls are more distressed and hurt by relational victimization compared to boys, that they tend to ruminate more about such experiences, and that social aggression is more strongly tied to their self-concepts (Paquette and Underwood, 1999). Further, the effects of relational peer victimization on alcohol use (Sullivan et al., 2006) and other risky health behaviors and indicators of well-being (Rose and Rudolph, 2006) remain even after controlling for the effects of physical peer victimization (Rose and Rudolph, 2006, Sullivan et al., 2006). Therefore, in the current study, we focus on understanding the impact of relational peer victimization on girls' alcohol use initiation, above and beyond the effects of physical peer victimization. Relational and physical victimization have rarely been distinguished in studies focused on adolescents' alcohol use, and we are unaware of any studies assessing timing of alcohol use initiation that do so. Given that there is considerable variability in the associations between peer victimization and alcohol use, there is also a need to evaluate potential moderating factors (Hong et al., 2014) that may exacerbate the effect of peer victimization and provide insight into who may be most vulnerable to peer victimization. One relevant factor to consider in the context of relational peer victimization and alcohol use initiation is adolescents' depression severity.

Depression severity

There is a well-established association between depression severity and adolescent alcohol use (Marmorstein, 2009, Hussong et al., 2011); however, the extent to which depression symptom severity increases vulnerability to early alcohol use in the context of peer victimization remains unclear. Research suggests that there may be complex interrelationships between these factors (Davis et al., 2018). First, studies demonstrate that peer victimization is positively associated with depressive cognitions among adolescents and that this effect is stronger for relational peer victimization (Sinclair et al., 2012). In addition, longitudinal studies have shown that depression severity are positively associated with subsequent alcohol use among adolescents, including in the current sample (Schleider et al., 2019) – and this link is stronger among girls (Jun et al., 2015, Needham, 2007).

Given the nuanced nature of the interrelationships between these constructs, it is also important to consider how depression severity may exacerbate the association between peer

victimization and risk for adolescent alcohol use initiation. Peer victimization may cause distress, and individuals may therefore be motivated to drink as a strategy to cope or self-medicate (Topper et al., 2011, Sullivan et al., 2006). However, as not all adolescents who experience peer victimization engage in early alcohol use, it is critical to identify moderating factors that increase victimized adolescents' vulnerability (Hong et al., 2014). Depression is a primary factor that can impact one's perception of stress (Galaif et al., 2003) and strategies for coping with stressors (Garnefski et al., 2003) such as peer victimization. Specifically, depressed adolescents may perceive events to be more stressful compared to non-depressed adolescents, be more reactive to stress, and may ruminate on and blame themselves for stressful events (Garnefski et al., 2003). This is particularly the case for interpersonal stressors (Shih et al., 2006), which suggests that depressed adolescents may be more sensitive to experiences of peer victimization. Based on research which suggests that relational peer victimization contributes to high levels of distress and rumination for girls (e.g., McLaughlin et al., 2009; Paquette and Underwood, 1999), coupled with research that suggests depression severity may make individuals more sensitive to interpersonal stressors such as relational peer victimization, we hypothesize that depression severity will exacerbate the association between relational peer victimization and risk for alcohol use initiation. We will explore the interaction between physical peer victimization and depression severity. Although depression severity is likely to operate in the same way for both relational and physical peer victimization, it is possible that girls might experience physical peer victimization less frequently and perceive it as less distressing (relative to relational peer victimization) (Sullivan et al., 2006, Paquette and Underwood, 1999). Accordingly, it is possible that depression severity may not exacerbate risk from physical peer victimization to drinking onset to the same degree as it does for relational peer victimization.

The current study

In this study, we investigate the interactive effects of peer victimization and depression severity on alcohol use initiation among adolescent girls. To date, no PGS study has examined peer victimization experiences in relation to substance use. Further, in examining the interaction of peer victimization with depression symptoms in predicting alcohol use, this study extends work by Schleider et al., 2019, which considered the reciprocal associations between depressive symptoms and alcohol use. First, we test the predictive effects of relational and physical peer victimization, hypothesizing that relational peer victimization will be a significant predictor of girls' alcohol use initiation, even after accounting for the potential influence of physical peer victimization. Second, we test the extent to which the severity of depression symptoms moderates the association between peer victimization and alcohol use initiation. Given the existing literature on peer victimization among girls, we hypothesize that depression severity will exacerbate the influence of relational peer victimization on risk for alcohol use onset. We also explore the possibility of this moderation effect for physical peer victimization.

We evaluate these hypotheses using longitudinal data from adolescent girls recruited from the community in the context of overlap with several demographic and psychosocial influences that we examine as covariates: socioeconomic status (SES), conduct problems, early puberty, and race. Adolescents from socioeconomically disadvantaged families are less

likely to use alcohol but more likely to experience bullying than adolescents from more advantaged backgrounds (Green et al., 2013, Tippet and Wolke, 2014). Conduct problems are considered both an established risk factor for early alcohol use (Kuperman et al., 2013), as well as a correlate of peer victimization (Singham et al., 2017). Similarly, early pubertal development is correlated with increased risk for early initiation of alcohol use (Costello et al., 2007) and bullying by peers (Su et al., 2018). Finally, there are well-documented race differences in adolescent alcohol use, in which White adolescents tend to drink more than Black adolescents, that must be taken into account (Johnston et al., 2019; Malone et al., 2012). Considering such psychosocial factors that may confound the association between victimization and alcohol use has been highlighted in a recent systematic review of the literature linking peer victimization and alcohol use (Maniglio, 2017).

Materials and Methods

Participants

The Pittsburgh Girls Study (PGS; $N = 2,450$) is a longitudinal community-based study of four female age cohorts (ages 5–8 at wave 1) that oversampled low-income neighborhoods in Pittsburgh. Recruitment was conducted from 1999–2000; 85.2% of eligible families completed the first wave of data collection. The sample retention was high: 88.5% or higher across the annual waves of data collection used in the current study (when girls were 10 to 17 years of age). Analyses were conducted with girls starting at age 10, as the peer victimization measure was not introduced until age 11. Complete details of sample ascertainment and procedures can be accessed in previous publications (Hipwell et al., 2002; Keenan et al., 2010). Analyses were conducted exclusively with girls identified by their primary caregiver as Black or White ($n = 2306$) in order to increase interpretability of potential distinctions by race. We excluded an additional 181 participants due to missingness on key variables, resulting in a final analytic sample of 2125 girls (57.5% Black, 42.5% White). Participants excluded based on missingness on key variables did not differ significantly from those included in analyses with respect to reports of peer physical victimization or relational victimization at any age. Excluded participants were less likely than those included in analyses to endorse consuming at least a full drink (13.8% vs. 43.7%; $\chi^2_{(1)} = 20.61, p < .001$), reflecting their younger age at last assessment (14.67 vs. 16.78 years; $F(2170) = 293.45, p < .001$).

Procedures

Written informed consent was provided by girls' primary caregivers (94% mothers), and verbal assent was provided by girls prior to data collection. All interviews were conducted annually in-person by trained research staff in participants' homes, separately for the girl and her primary caregiver. The protocol for maintaining confidentiality was explained to all participants, and girls were informed that their interview responses would not be shared with their caregivers. The University of Pittsburgh's Human Research Protection Office approved the protocol. Respondents received compensation for study participation.

Measures

Age at alcohol use initiation.—Past year alcohol use was assessed at each wave of data collection with the Nicotine, Alcohol, and Drug Use measure (Pandina et al., 1984). This measure assesses the frequency and usual quantity of past year alcohol consumption. Participants report their alcohol use frequency using 8 response options including: “I didn’t within the past year,” “less than 5 times in the past year,” and “more than 5 times in the past year but less than once a month”. Quantity of use was assessed using 7 response options including: “a sip or a taste,” “less than one bottle/glass/shot,” and “1–2 bottles/glasses/ shots.” Given our interest in capturing alcohol use beyond a few sips, we created a proxy for age at first full drink: the age at which respondents first reported consuming alcohol in any quantity 5 or more times in the past year or consuming 1–2 drinks per occasion at any frequency in the past year (Sartor et al., 2018).

Peer victimization.—Relational and physical peer victimization were assessed annually using an adapted version of the Peer Experiences Questionnaire – Victim Version (Prinstein et al., 2001, Vernberg et al., 1999). Participants reported the frequency of 9 items over the past year on a 5-point scale with response options ranging from 0 (*never*) to 4 (*a few times a week*). Consistent with the original scale specification (Prinstein et al., 2001, Vernberg et al., 1999) and supported by a factor analysis of the current data at each age, five items assessed relational peer victimization (e.g., “A kid ignored me on purpose to hurt my feelings”; “A kid told lies about me so other kids wouldn’t like me”), and four items assessed overt physical peer victimization (e.g., “A kid hit, kicked, or pushed me in a mean way”; “A kid chased me like he or she was really trying to hurt me”). Items were averaged to create scores for relational and physical peer victimization, respectively. The reliability coefficients ranged from .74 to .81 for relational, and from .55 to .78 for physical peer victimization across the eight waves.

Depression severity.—Severity of symptoms associated with *DSM-IV* depressive disorders were assessed each year with the *DSM-IV* based Child Symptom Inventory (CSI-4, Gadow & Sprafkin, 1994), transitioning to the Adolescent Symptom Inventory (ASI-4, Gadow & Sprafkin, 1998) measure at age 12. Adolescents reported on the presence of nine *DSM-IV* symptoms of major depressive disorder plus two additional symptoms: low self-esteem and hopelessness. Seven of the symptoms are rated on four-point scales (0=never to 3=very often), and four symptoms (significant change in normal appetite or weight, sleep, activity and concentration) are scored as 0.5=absent or 2.5 = present. Items were scored on Likert scales ranging from 0 (never) to 3 (very often). and summed to yield an index of depression severity (scores could range from 0–33). In this sample, the reliability coefficients for the depression severity scores ranged from .72 to .85 across the eight waves.

Covariates.—*Socioeconomic status (SES)* was assessed with three items: primary caregivers’ report of: single-parent household status (0 = no, 1 = yes); household receipt of public assistance (0 = no, 1 = yes); and primary caregiver’s highest level of education (0 = 12 years, 1 = <12 years). *Race* was assessed with a single item and responses were reduced to a binary variable (0 = Black, 1 = White).

Conduct problems over the past year were assessed with the ASI-4 (Gadow et al., 2001). Girls self-reported the frequency of conduct disorder symptoms on 4-point scales with response options ranging from (0 = never to 3 = very often). Example items include: running away overnight, deliberately starting fires, and being physically cruel to animals or people. Scores were summed to create a severity score (range 0–45). Across assessment points, internal consistency was adequate ($\alpha = .65$ to $.72$).

Pubertal timing was assessed via a single item on the Pubertal Development Scale (Petersen et al., 1988), in which girls self-reported menarche status. Early puberty was defined as menarche before age 12 (0 = no, 1 = yes).

Data analysis

Descriptive statistics were generated using SPSS version 24. Primary analyses were conducted in SAS (SAS Institute, 2013). All predictors and covariates other than early pubertal status, race, and socioeconomic status were time-variant. A survival analysis approach was taken with the data, given our aim of predicting timing of first drink and the utility of this approach for handling right censored data, i.e., that not all participants had passed through the age of risk for initiation of alcohol use. Cox proportional hazards (PH) regression analyses were conducted to predict alcohol use initiation as a function of peer relational victimization and peer physical victimization. SES indicators, conduct problems, early pubertal status, and race were included as covariates in all models. Potential moderation by depression severity on the association between peer victimization and alcohol use initiation was tested by entering interactions between depression severity and each of the peer victimization scales into models. The PH assumption that risk remains constant over time was tested and violations were resolved by splitting the risk period and estimating hazards ratios for each period.

Results

Sample characteristics, including socioeconomic status indicators, early pubertal status, and conduct problems are shown in Table 1. Less than half of participants (43.7%) reported ever consuming at least one full drink. Mean age at first full drink was 15.15 years ($SD = 1.68$). Mean scores for relational peer victimization, physical peer victimization, and depression severity are reported in Table 2, with an overall decrease from ages 10 to 17 evident for both relational and physical peer victimization scores. As shown in Table 3, both types of peer victimization were significantly positively correlated with each other within each year ($r = .52-.71$) and were both positively associated with depression severity ($r = .29-.38$ relational; $r = .13-.31$ physical). Approximately half (51.0%; $n = 1059$) of participants reported relational peer victimization in at least one year, with the highest proportion reporting at age 10 (48.6%) and the lowest proportion reporting at age 17 (7.1%). Further, 24.9% ($n = 527$) reported physical peer victimization in at least one year, with the highest proportion reporting at age 10 (17.6%) and the lowest proportion reporting at age 17 (1.9%). Endorsement of relational peer victimization was associated with elevated risk for consuming a full drink (49.1% of girls with a history of relational peer victimization, 37.6% of girls with no history; $\chi^2(1) = 28.15$, $p < .001$). Endorsement of physical peer

victimization was not associated with consuming a full drink (47.1% of girls with a history of physical peer victimization, 42.6% of girls without a history; $\chi^2(1) = 3.39, p = .066$).

Timing of first drink as a function of peer victimization

Results of Cox PH regression analyses predicting timing of first drink as a function of relational peer victimization, physical peer victimization, and depression severity, adjusted for covariates, are shown in Table 4. Analyses were conducted in two model-building stages. In the first step, to test for main effects, we included only relational and physical peer victimization. In the second step, to test our moderation hypothesis, we also included depression severity and its interactions with relational and physical peer victimization. Violations of the PH assumption were observed for relational peer victimization in the first step, and for relational peer victimization, depression severity, race, and early pubertal status in the second model-building step. The violations were resolved by splitting the period of risk into age 13 and age 14, with separate hazard ratios (HRs) derived for the risk periods age 13 and age 14.

In the first model-building step (Model 1), relational peer victimization was associated with elevated risk for alcohol use initiation both at age 13 or younger (HR = 1.83, 95% confidence intervals (CI): 1.46–2.28) and at age 14 or older (HR = 1.23; CI: 1.05–1.45). Notably, the HR estimate for age 14 was below the lower bound of the CI of the HR for age 13, indicating that risk was significantly greater for initiation at age 13 or younger. Peer physical victimization was not significantly associated with initiation of alcohol use (HR = 1.10, CI: 0.88–1.39).

In the second model-building step, results showed that depression severity moderated the association between relational peer victimization and alcohol use, but not for the association between physical peer victimization and alcohol use. Given the absence of a hypothesis regarding moderating effects of depression severity on the association of physical peer victimization with alcohol use initiation, and our interest in deriving the most parsimonious model and aiding interpretation of the significant interaction between relational peer victimization and depression severity, we present the model with only the relational peer victimization by depression severity interaction in Table 4. Because the physical peer victimization main effect was also not significant in Model 1, the model presented in Table 4 only includes relational peer victimization, depression severity, and their interaction. Findings from the full model including both interactions are reported in Supplemental Table 1.

Consistent with our hypothesis, a significant interaction between relational peer victimization and depression severity was observed for both age 13 (HR = 0.96, CI: 0.93–1.00 [rounded up from 0.997]) and for age 14 (HR = 0.97, CI: 0.95–0.99). As shown in Table 4, to reveal the nature of the significant interactions between relational peer victimization and depression severity, they were broken out by mean-centered depression severity scores. Separate HRs were estimated for relational peer victimization at low (–1 SD), average (mean), and high (+1 SD) levels of depression severity. For the risk period age 13, relational peer victimization was associated with elevated likelihood of initiating alcohol use at all levels of depression severity scores. Notably, risk conferred by relational

peer victimization was significantly greater at low (HR = 2.38, CI: 1.68–3.39) vs. high depression severity scores (HR = 1.67, CI: 1.35–2.06). For the risk period age 14, relational peer victimization was associated with elevated likelihood of initiating alcohol use at low (HR = 1.48, CI: 1.17–1.88) and average depression severity scores (HR = 1.29, CI: 1.10–1.52), but was not associated with alcohol use initiation at high depression severity scores (HR = 1.12, CI: 0.97–1.30).

Discussion

Results of this study provide critical insight into the role of peer victimization and depression severity in understanding risk for adolescent girls' early alcohol initiation. We found support for the hypothesis that relational peer victimization would predict earlier alcohol use initiation, above and beyond the effects of physical peer victimization. These findings are consistent with past research demonstrating that girls are highly distressed by relational peer victimization (Paquette and Underwood, 1999, Rose and Rudolph, 2006), which is shown to be associated with alcohol use (Sullivan et al., 2006, Vieno et al., 2011). We found that, although relational victimization poses a broad risk for adolescent alcohol use initiation, this risk is greater for initiation by age 13. One potential reason for this is that adolescents' friendship stability increases over time (for a review, see Poulin and Chan, 2010) such that older adolescents are more likely to have established a secure friendship group or network. Contrarily, the relative instability of these peer relationships in early adolescents may result in greater distress following peer victimization, although no research to our knowledge has explicitly assessed this possibility. It is also important to note that any alcohol use by age 17 may be considered normative, but early use is a more informative marker for the development of later alcohol problems, and thus, early adolescence may be the period in which risk is expected to manifest. The results speak to the importance of introducing peer victimization interventions in middle school years, where this association appears to be the most robust and could potentially have spillover effects into alcohol use prevention.

Despite the fact that relational peer victimization may be relatively more impactful on girls' distress, well-being, and alcohol use (Sullivan et al., 2006, Rose and Rudolph, 2006), we were somewhat surprised at the absence of evidence for physical peer victimization conferring risk for alcohol use onset, given that this association has been found in the few known studies to examine relational and physical victimization separately (Sullivan et al., 2006, Vieno et al., 2011). This might partly reflect the low prevalence of physical peer victimization in our sample, which was only ever reported by a quarter (24.9%) of participants (vs. 51.0% reporting relational peer victimization) – and was most often reported as only occurring “once or twice” in the past year. Past research also indicates that relational peer victimization is more common among adolescents than physical peer victimization (Sullivan et al., 2006, Vieno et al., 2011). It could also indicate that alcohol use is not perceived as an instrumental means for coping with physical peer victimization. To speculate, it could be that some adolescents drink to conform to perceived peer norms after being excluded and isolated, i.e., experiencing relational peer victimization, but not physical peer victimization, which may be less likely to threaten interpersonal belonging needs that can influence drinking behavior (Twenge et al., 2002). Since few studies have examined the

relative impact of relational and physical peer victimization on adolescent alcohol use, additional research is necessary to delineate the specific motivations and expectancies that each type of peer victimization elicits.

Depression severity also moderated the effect of relational (but not physical) peer victimization on alcohol use initiation. We found that relational peer victimization conferred greater risk for alcohol use initiation when depression severity was lower. Specifically, risk for alcohol use initiation conferred by relational victimization was significantly higher for girls with below average vs. above average depression severity scores. In fact, risk for initiation at age 14 or older was not significantly associated with peer relational victimization among girls with above average depression severity scores. Findings suggest a potential ceiling effect in which, among girls experiencing depression severity, early alcohol use was highly likely regardless of their relational peer victimization status. Although this pattern was not consistent with the hypothesized direction of the interaction (i.e., depression severity would exacerbate the effect of peer victimization), it nevertheless supports the notion that peer victimization and depression severity need to be considered in tandem with respect to risk for adolescent alcohol use. Notably, we did not find support for moderation by depression severity of the association between physical peer victimization and alcohol use initiation (see Supplemental Table 1). Consistent with our speculation that physical peer victimization may be less prevalent and distressing than relational victimization for girls (thus resulting in the nonsignificant main effect described above), it may not predict alcohol use initiation regardless of the presence or severity of depression severity.

Strengths and limitations

One of the primary strengths of the current study is the longitudinal design, which allows us to consider variations in peer victimization and depression severity over time from early to late adolescence. The inclusion of both peer relational and physical victimization as well as a broad range of risk factors that co-occur with peer victimization and alcohol use further allows us to identify independent contributions of these two forms of peer victimization. In addition, our analytic approach allows us to identify fluctuations across developmental periods in the relative impact of peer victimization. Specifically, we were able to evaluate how the predictive strength of peer victimization and depression severity on alcohol use initiation differs at early vs. later adolescence, as well as account for the potential cumulative impact of peer victimization. In other words, recognizing that alcohol use may not immediately follow peer victimization, this approach allowed us to understand whether early victimization still conferred risk for drinking in later adolescence, a period during which alcohol is likely to be more readily available. Another strength includes the large proportion of Black girls and girls from low-income families in the sample, which allows us to investigate these pathways among historically underrepresented populations.

Study findings should be interpreted with certain limitations in mind. First, as our aim was to identify links between peer victimization and onset of alcohol use, inferences cannot be made about the associations of peer victimization with the development of heavy or problem drinking. Second, the reliability coefficients for physical victimization varied across ages and was somewhat low at certain ages (ranging from 0.55 to 0.78). Third, the peer

victimization assessments did not query cyberbullying behaviors, an important area for future investigation, as associations with alcohol use may differ for peer victimization experiences via social media or other online contexts. Fourth, as participants were recruited from an urban area, with low-income neighborhoods oversampled by design, findings may not generalize to girls from non-urban or higher income populations. Finally, we recognize possible bias due to attrition, as excluded participants were less likely to endorse consuming at least a full drink (which reflected their younger age at the last assessment).

Future directions

Findings from the current study suggest several directions for future research that may provide a more nuanced understanding of the link between peer victimization and adolescent alcohol use initiation, or substance use more broadly. First, assessing the generalizability of findings to other substance use, such as marijuana or opioid use is important. Although various substance use tends to co-occur, these pathways are not identical, such that each substance may serve a different purpose, may be used in different social contexts, therefore warrants its own discussion. Past research guided the current study in which relational peer victimization was the focus among adolescent girls, but it is also necessary to gain insight into how the interrelationships between relational and physical peer victimization and depression severity predict early alcohol use among adolescent boys. It may also be worth considering different dimensions of depression (e.g., isolation/anhedonia vs. fatigue/insomnia) and how they may differentially impact links between peer victimization and alcohol use. In addition to investigating risk factors such as depression that increase vulnerability to interpersonal stressors, it is also important to simultaneously evaluate protective factors that may promote resilience to experiences of peer victimization and offset risk for adolescent alcohol use.

A critical goal for future research is to develop a more nuanced understanding of the specific mechanisms by which peer victimization and depression severity impact adolescent alcohol use. In particular, there is a need to better understand the underlying social processes, given the interpersonal nature of peer victimization. In addition to drinking to cope with stress, peer victimization may elicit motivations to restore peer connections by conforming to perceived norms, which may include drinking (Perkins, 2002, Teunissen et al., 2012). This may be particularly important for individuals who are concerned with fulfilling social connection goals potentially at the expense of other important goals (e.g., health, safety; Goldstein et al., 2005, Jackson et al., 2014). This pathway may exist in parallel with a pathway in which peer victimization leads to social withdrawal, and subsequent alcohol use as an avoidant coping strategy. Investigating these potential different motivations and parallel pathways within a longitudinal framework is particularly needed.

Conclusion

The current study provides important insight into the effect of peer victimization on risk for alcohol use initiation in girls, by showing that relational peer victimization predicts earlier drinking and the importance of considering this association in the context of adolescent girls' depression severity. Results indicated that, for girls with above average levels of depression severity, earlier alcohol use initiation is likely regardless of their experiences of

peer victimization. However, we found a stronger association of peer victimization with risk for initiating alcohol use when depression severity was low or average, underscoring the fact that peer victimization may still elevate risk for early alcohol use even if peer victimization is not associated with depression severity. That is, the absence of signs of depression severity does not mean that adolescents are unaffected by peer victimization – an important message for parents, teachers, and other adults involved in adolescents’ lives. Our findings also have implications for the timing of substance use prevention and their relation to anti-bullying efforts. Specifically, early adolescence (age 13) is a critical period with respect to peer victimization impacting alcohol use initiation among girls, suggesting that the implementation of anti-bullying campaigns, especially in the middle school years, may reduce girls’ risk for alcohol use onset.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Sample characteristics: socioeconomic status indicators, race, early pubertal status, and conduct problems at age 10

Household receipt of public assistance	38.2%
Single parent headed household	43.0%
Primary caregiver education <12 years	47.2%
Race: Black (vs. White)	57.5%
Early puberty (menses before age 12)	28.0%
Conduct problems: $M(SD)$	0.89 (1.59)

Note. Socioeconomic status indicators and neighborhood factors are primary caregiver report; race, conduct problems, and early puberty are child reports.

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Table 2.
Year by year mean (SD) relational peer victimization, physical peer victimization, and depression scores

Age	Relational peer victimization	Physical peer victimization	Depression
10	0.66 (0.77)	0.32 (0.62)	7.97 (4.45)
11	0.54 (0.68)	0.22 (0.46)	7.35 (4.39)
12	0.47 (0.59)	0.19 (0.42)	7.00 (4.42)
13	0.42 (0.54)	0.17 (0.36)	7.20 (4.64)
14	0.37 (0.49)	0.13 (0.29)	7.63 (4.91)
15	0.35 (0.47)	0.11 (0.27)	7.27 (4.85)
16	0.27 (0.43)	0.09 (0.25)	6.91 (4.84)
17	0.19 (0.37)	0.06 (0.22)	6.47 (4.89)

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Table 3.

Year by year correlations among relational peer victimization, physical peer victimization, and depression

Age	Relational peer victimization – Physical peer victimization	Relational peer victimization – Depression	Physical peer victimization – Depression
10	.71 [*]	.36 [*]	.31 [*]
11	.66 [*]	.38 [*]	.29 [*]
12	.59 [*]	.36 [*]	.28 [*]
13	.60 [*]	.32 [*]	.27 [*]
14	.52 [*]	.30 [*]	.21 [*]
15	.53 [*]	.29 [*]	.21 [*]
16	.54 [*]	.26 [*]	.15 [*]
17	.52 [*]	.29 [*]	.13 [*]

^{*} $p < .001$

Table 4.

Results of Cox PH regression analyses predicting initiation of alcohol use as a function of peer victimization, moderated by depression

		HR (95% CI)	
		Model 1	Model 2
Relational peer victimization			
Alcohol use onset	13	1.83 (1.46 – 2.28)	1.99 (1.57 – 2.53)
Alcohol use onset	14	1.23 (1.05 – 1.45)	1.29 (1.10 – 1.52)
Physical peer victimization		1.10 (0.88 – 1.39)	–
Depression			
Alcohol use onset	13	–	1.07 (1.04 – 1.11)
Alcohol use onset	14	–	1.04 (1.03 – 1.06)
Relational peer victimization × depression			
Alcohol use onset	13	–	0.96 (0.93 – 1.00[*])
Depression: 1 SD below mean		–	2.38 (1.68 – 3.39)
Depression = Mean		–	1.99 (1.57 – 2.53)
Depression: 1 SD above mean		–	1.67 (1.35 – 2.06)
Relational peer victimization × depression			
Alcohol use onset	14	–	0.97 (0.95 – 0.99)
Depression: 1 SD below mean		–	1.48 (1.17 – 1.88)
Depression = Mean		–	1.29 (1.10 – 1.52)
Depression: 1 SD above mean		–	1.12 (0.97 – 1.30)

Note. PH = proportional hazards; HR = hazards ratio; CI = confidence interval. Bold indicates statistically significant at $p < 0.05$.

* Rounded up from .997

Covariates included: Household receipt of public assistance, single parent headed household, primary caregiver education <12 years, race, early puberty, conduct problems