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Addict Behav. 2018 September ; 84: 160–166. doi:10.1016/j.addbeh.2018.04.010.**Peer victimization and substance use: Understanding the indirect effect of depressive symptomatology across gender****Tamika C. B. Zapolski, Ph.D.^{1,*}, Alia T. Rowe, B.A.², Sycarah Fisher, Ph.D.³, Devon Hensel, Ph.D.⁴, and Jessica Barnes-Najor, Ph.D.⁵**¹Indiana University Purdue University at Indianapolis²Indiana University Purdue University at Indianapolis³University of Kentucky⁴Indiana University School of Medicine⁵Michigan State University**Abstract**

Objective—Peer victimization in school is common, with emerging literature suggesting that it may also increase risk for substance abuse. Yet, little is known about the underlying mechanisms within this risk pathway. The objective of this study is to use a prospective 3-wave design to examine the mediating role of depressive symptomatology on the relationship between peer victimization and substance use, as well as examine if the pathway varies based on gender.

Method—801 youth between 6th and 12th grade completed surveys across three years, which included measures on school peer victimization, depression symptomatology and substance use. Models tested the mediational pathway between victimization, depressive symptoms, and substance use. Models were stratified by gender.

Results—Controlling for grade and the effect of each variable across waves, a significant indirect effect of peer victimization on substance use through depressive symptoms was found for females, with a non-significant indirect effect for males.

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Compliance with Ethical Standards

Conflict of interest: There are no conflicts of interests involved in the conduct of this research.

Ethical Approval: Our study protocol has been reviewed and approved by the Institutional Review Board at Michigan State University and the research has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Informed Consent: All participants in the study provided informed assent, with informed consent provided by their legal guardian.

Contributors. TZ designed the study, collaborated with DH on the statistical analysis, and co-wrote the first draft of the manuscript. AR conducted literature searches and assisted in writing the introduction. DB and JB-N contributed to edits of the manuscript. DH conducted the statistical analysis and provided edits to the manuscript. All authors approved the final manuscript.

Conflict of Interest. All authors declare that they have no conflicts of interest.

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Conclusion—Results suggest that female youth who are victimized by peers engage in substance use behaviors, at least in part, due to increases in depressive symptoms. Given its effect on depression, female victims may therefore benefit from coping skills training that targets emotion regulation and distress tolerance skills in order to combat increased risk for substance use behaviors as a coping response to their victimization. Further research is warranted to better understand the risk pathway for male youth who also experience peer victimization.

Keywords

Peer Victimization; Adolescents; Gender; Depression; Substance Use

Introduction

Peer victimization has been conceptualized as aggressive nonsexual behavior, whether physical (e.g., physical aggression, attacks on personal property), verbal (e.g., verbal aggression), or relational (e.g., group exclusion), experienced by a youth by their peers (Beale & Scott, 2001; Hawker & Boulton, 2000; Mynard & Joseph, 2000). This form of peer aggression is distinguished from peer bullying, which is characterized by repeated aggressive behavior in which there is a distinct power imbalance between the perpetrator and victim (Gladden, Vivolo-Kantor, Hamburger, & Lumpkin, 2014). Although not as severe as bullying (Gladden et al., 2014), peer victimization is not an uncommon experience among school-aged youth in the United States (Beale & Scott, 2001; Schneider, O'Donnell, Stueve, & Coulter, 2012). Furthermore, peer victimization has been found to be associated with increased risk for negative mental and behavioral health outcomes, such as depression, low self-esteem (Hawker & Boulton, 2000; Ivarsson, Broberg, Arvidsson, & Gillberg, 2005), aggression, delinquency (Khatri, Kupersmidt, & Patterson, 2000; Topper, Castellanos-Ryan, Mackie, & Conrod, 2011), reduced academic performance (Nakamoto & Schwartz, 2010), and elevated risk for suicide (Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2008). Moreover, although peer victimization can occur in a number of contexts, it is often experienced within school settings (Hong & Espelage, 2012; Kochenderfer & Ladd, 1996). The National Center for Educational Statistics (2015) documented that approximately 3 million youth between the ages of 12–18 report being victimized by peers at school during the past year. Additionally, as noted by the National School Safety Center (NSSC), peer victimization is the most enduring and underrated problem in U.S. schools (Beale & Scott, 2001). Thus, understanding both the impact of peer victimization on health behaviors, as well as, factors involved in the risk process are critical in order to inform intervention programming.

One health outcome in which the literature is mixed on its association with peer victimization is substance use. Quinn, Fitzpatrick, Bussey, Hides, and Chan (2016) examined the differential impact classification as either a victim, a perpetrator, both a victim and perpetrator, or neither a victim nor perpetrator, had on alcohol and tobacco onset, intensity, and alcohol-related harms among adolescents. The authors found no significant differences in risk for substance use between victims and those youth who had not experienced victimization. Conversely, there are others who have observed a positive relationship between peer victimization and substance use, such that the experience of

victimization is associated with increase risk (Carlyle & Steinman, 2007; Pinchevsky, Fagan, & Wright, 2013; Radliff, Wheaton, Robinson, & Morris, 2012; Ringwalt & Shamblen, 2012). For example, Tharp-Taylor, Haviland, and D'Amico (2009) reported that among youth aged 11–14, those who experienced any type of peer victimization, defined as mental or physical victimization while on school property, were more likely to report substance use as they transitioned through adolescence. Topper and colleagues (2011) also found among a slightly older group of youth aged 13–15, that baseline peer victimization (i.e., physical or verbal aggression) was correlated with quantity and frequency of alcohol use at 12 months and predicted alcohol-related problems at 12 months above and beyond baseline alcohol problems. Additional evidence for a positive effect of peer victimization and increased alcohol use was provided by Valdebenito, Ttofi, and Eisner (2015), who conducted a meta-analysis based on 61 cross-sectional studies among adolescent samples, finding an overall modest association between school peer victimization and drug use (i.e., illicit drug use, excluding alcohol or tobacco).

With some accumulating evidence for a positive association between peer victimization and substance use, few have examined potential mediators within the risk pathway to help explain why victimization would increase risk for substance use. As suggested by Maniglio (2015) and in line with the self-medication theory (Khantzian, 1997), it is posited that individuals that have experienced peer victimization may be at increased risk to engage in substance use behaviors as a coping strategy to manage distress. Though only a limited number of studies have been conducted, there is evidence to suggest that factors associated with emotion regulation mediate this relationship. For example, Topper and colleagues (2011) found that the prospective relationship between peer victimization and alcohol problems was mediated through coping motives. Moreover, Luk, Wang, and Simons-Morton (2010) found an indirect path between victimization, depression, and frequency of substance use. Although Luk et al.'s (2010) findings are based on cross-sectional data, based on evidence that peer victimization predicts later depressive symptoms (McDougall & Vaillancourt, 2015; Schwartz, Gorman, Nakamoto, & Toblin, 2005; Ttofi, Bowes, Farrington, & Losel, 2014) and depressive symptoms predict later substance use among adolescents (Edwards et al., 2014; Maslowsky, Schulenberg, & Zucker, 2014; McKowen, Tompson, Brown, & Asarnow, 2013), it is speculated that a mediational relationship between peer victimization, depressive symptoms, and substance use is probable. These findings suggest that youth who are victimized become distressed and engage in substance use as a means of coping with their distress due to peer victimization. However, more empirical evidence is needed based on longitudinal study designs to confirm this mediational relationship.

It is also plausible that the indirect effect of negative affect within the peer victimization-substance use pathway may vary by gender, given evidence of gender differences within prevalence of peer victimization, depressive symptoms, and substance use outcomes. Specifically, adolescent males have been found to report peer victimization more often than females (Carlyle & Steinman, 2007; Nylund, Bellmore, Nishina, & Graham, 2007). Males also generally tend to report higher rates of substance use than their female peers (Chen and Jacobson, 2012; Vieno, Gini, & Santinello, 2011). Wormington, Anderson, Tomlinson, and Brown (2013) examined the moderating impact gender had on the relationship between peer

victimization and lifetime substance use, finding a stronger effect for male victims than females. However, the prevalence of depressive symptomatology tends to be reported at higher rates among females compared to males (Cummings, Caporino, & Kendall, 2014), with the impact of peer victimization on depressive symptomatology also found to be stronger for females (Klomek et al., 2008). For example, Hamilton et al. (2016) examined the interplay of peer victimization and negative affect among pre-adolescents aged 12–13 based on gender and found girls who reported greater instances of peer victimization experienced greater deficits in emotional clarity. The researchers also found that peer victimization predicted levels of depression and anxiety symptoms among these girls. Null findings were observed for the adolescent males in the study. As for gender differences within the impact of negative affect on substance use outcomes, findings are mixed. Utilizing the National Longitudinal Study of Adolescent to Adult Health (Add Health), the association between depressive symptoms and substance use outcomes (i.e., daily smoking, marijuana use, and regular heavy episodic drinking) was significantly stronger for females than males (Schuler, Vasilenko, & Lanza, 2015). However, the effect for each substance disappeared after accounting for concurrent use of other substances. The absence of a gender effect has also been observed in other studies with both community and nationally-representative samples (Brook, Cohen, & Brook, 1998; Schwinn, Schinke, & Trent, 2010).

To date, only one published study has examined gender differences in the indirect effect of negative affect on peer victimization and substance use. Luk et al. (2010) found among their sample of 10th grade adolescents that depressive symptoms mediated the relationship between peer victimization and frequency of past month substance use, but the effect was only found for females, with no significant mediating effect found in males. Limitations of the study include the cross-sectional design of the study and the restricted age range of the sample.

The current study will add to the growing body of literature on the indirect effect of depression on the relationship between peer victimization and substance use outcomes by utilizing a prospective three-wave study design among a large sample of middle and high school youth. We hypothesize, consistent with previous literature, that peer victimization will be positively related to depressive symptoms and past month substance use. In line with the self-medication theory, we hypothesize that an indirect effect for depressive symptoms will be significant, such that greater past year victimization will be associated with past month substance use indirectly through higher depressive symptomatology. It is hypothesized, based on Luk et al. (2010) that the indirect path for substance use will be observed only among females.

Method

Procedure and Participants

Our study involves participants drawn from a 5-year study (2005–2009) examining school and health behavior outcomes among students between fourth and twelfth grade. Participants were sampled from 159 schools (21 school districts) in a large Midwestern county. Informed consent forms were sent home to parents of potential participants and were asked to return signed forms back to the school if they wished to provide consent. This consent procedure

occurred each year, as the parent study was not designed to be longitudinal, but rather an annual assessment of health behaviors among school-aged youth. For the current study, the final three years of data collection were used to test the study hypotheses. A total of 801 participants between 6th and 12th grade were included in the study. A majority of the participants were female (n = 469, 58.6%), self-identified as White (n=578, 72.2%), and were in 6th grade (n=349, 43.6%) at time 1 of the study. See Table 1 for demographic information.

Measures

Demographic and background measure—Participants were asked to indicate their gender, grade, and ethnic/racial background (i.e., African American, American Indian, Asian, Hispanic, Multiracial, White, and Other).

Peer victimization—Being a target of peer victimization at school was assessed using a 12- item measure that was constructed for the study, as the measure was developed in conjunction with community partners. However, items included on the measure are similar to those within other published studies on peer victimization among adolescents (e.g., Hawker & Boulton, 2000; Mynard & Joseph, 2000; Radliff et al., 2012; Tharp-Taylor et al., 2009; Topper et al., 2011). Items were rated on a Likert scale from 1 (*never*), 2 (*not much*), 3 (*sometimes*), and 4 (*a lot*) describing the frequency of victimization experiences in the past year. Items include statements such as “A kid at my school said he or she was going to hurt me,” “A kid at my school hit or pushed me when they were not playing around,” and “I have been left out or ignored by kids at school.” For the current study, the peer victimization scale showed good internal consistency at each time point ($\alpha = .84-.87$).

Depression—The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is a 13-item self-report measure frequently used to assess depressive symptomatology with children, adolescents, and adults (Radloff, 1991; Roberts, Lewinsohn, & Seeley, 1991). CES-D assesses depressive behaviors and feelings experienced in the past week. For this study, the time frame was extended to the last year. Responses were rated on a 4-point scale ranging from 1 (*Not at all*) to 4 (*A lot*). The CES-D has been shown to have high internal consistency among youth within non-clinical settings (coefficient alpha of .86-.90, Dierker et al., 2001; Garber et al., 2009). For the current study, the scale also showed high internal consistency at each time point ($\alpha = .90-.91$).

Substance use—The substance use measure was adapted from items included in various national studies conducted among youth (e.g., Monitoring the Future, YRBSS). Participants were asked to indicate how many days in the past 30 days had they engaged in the following 6 behaviors: “smoke cigarettes,” “use smokeless tobacco,” “had at least one drink of alcohol,” “used marijuana,” “used inhalants,” and “used other drugs.” Response choices were provided on a 7-point Likert scale, with 1 (*0-days*), 2 (*1 or 2 days*), 3 (*3-5 days*), 4 (*6-9 days*), 5 (*10-19 days*), 6 (*20-29 days*) and 7 (*everyday*). For the current study, the frequency measure was based on the composite score of the six substance use items. There was high internal consistency across each time point ($\alpha = .90-.91$).

Data Analyses—Preliminary analyses were performed using SPSS 24.0. Structural equation modeling was conducted in Stata 13.0, using a maximum likelihood estimation for missing values, to examine the indirect effect on depression on the relationship between peer victimization and substance use (Figure 1). These indirect effects were evaluated using three total crosslagged paths: between peer victimization at time 1 and depression at time 2, depression at time 2 and substance use at time 3, and peer victimization at time 1 and substance use at time 3. Autoregressive paths were also included in the model; however, no other crosslagged were evaluated. Each model was also stratified by gender, such that the hypothesized pathways were examined separately based on self-identification as either male or female. Within each gender stratified model, goodness of model fit was evaluated using chi-square and its *p*-value (Bollen & Long, 1992). We also measured local goodness of fit with the comparative fit index (CFI), for which ideal values range between 0.90 and 1.0, as well as the root mean square error of approximation (RMSEA; Brown & Cudeck, 1993), for which values of .08 or below indicate reasonable fit of the model to the data.

Results

Preliminary Analyses

Among our sample of youth, based on average scores on the peer victimization measure at time 1, 14.7% reported experiencing some form of victimization at least occasionally in the past year. The most common forms of peer victimization reported by youth occurring “sometimes” or “a lot of the time” were the following: kids telling lies or rumors about me (reported by 42.2% of participants), being teased about my body (reported by 25.1% of participants), being told by a kid at school that they were going to hurt me (reported by 25% of participants), being teased about the way I look (reported by 24.5% of participants), and been left out or ignored by kids at my school (reported by 24.2% of participants), and being hit or pushed by a kid at school (reported by 19.8% of participants). The average score on the depression items at time 1 was a 2.04 indicating experiencing symptoms of depression “a little.” However, 9.5% of the sample had average scores of 3 or greater, which was indicative of experiencing symptoms “some” or “a lot” of the time. Lastly, 13.0 % of youth reported past month substance use at time 1, 21.3% at time 2, and 30.2% at time 3.

One-way ANOVA analyses were conducted to examine variation on study variables based on demographic variables. Results indicated comparable scores across race/ethnicity for all variables. Regarding gender, differences were observed for depression and substance use, with females reporting higher rates of depressive symptomatology at each time point (T1: $F(1, 799) = 16.56, p < .001$; T2: $F(1, 799) = 42.25, p < .001$; T3: $F(1, 799) = 54.86, p < .001$) and males reporting greater substance use at time 3 ($F(1, 799) = 4.50, p = .034$). Significant age effects were also observed, with youth in higher grades reporting greater depressive symptomatology at time 2 ($F(4, 796) = 2.97, p = .019$) and substance use across all time points (T1: $F(4, 796) = 4.05, p = .003$; T2: $F(4, 796) = 7.28, p < .001$; T3: $F(4, 796) = 4.96, p = .001$). Among the study variables of interest (i.e., peer victimization, depressive symptomatology, and substance use) correlation analysis indicated a significant association between each variable across almost all time points. See table 2 for bivariate correlations.

Path Model: Relationship between Peer Victimization, Depression, and Substance Use

Among the overall sample, a direct effect of time 1 peer victimization on time 2 depression symptoms was found ($b = .14, p < .001$). However, no effect was observed for the other two paths within the mediation model: Neither time 1 peer victimization ($b = .01, p = .70$) nor time 2 depression symptoms ($b = .01, p = .47$) were found to predict time 3 substance use. Moreover, the indirect effect of peer victimization through depression and later substance use was also non-significant ($b = .002, p = .48$). Effects varied based on gender: Time 1 peer victimization predicted time 2 depression among both males ($b = .16, p = .01$) and females ($b = .21, p = .001$). In addition, depression at time 2 significantly predicted time 3 substance use among females ($b = .06, p = .004$), but not among males ($b = -.05, p = .19$). The indirect effect of peer victimization on substance use through depressive symptoms was also found for females ($b = .01, p = .03$), but not for males ($b = -.01, p = .25$). Fit indices suggest that the data fit the model well ($\chi^2[25] = 380.439, p < .001$; CFI=0.951; RMSEA[90% CI]= .061 [.055-.067], $p < .001$).

Discussion

Using the self-medication theory (Khantzian, 1997), researchers have speculated that peer victimization increases substance use risk, which is employed as a coping response to manage distress. However, empirical evidence for this risk pathway has been mixed, and has been limited by cross-sectional designs and lack of consideration to potential gender effects. The current study aimed to fill this gap by using a prospective three-wave study design among a large sample of youth (grades 6–10 at time 1). Consistent with our hypothesis we found a significant indirect effect of peer victimization on substance use via depressive symptoms. However, the indirect pathway was only observed for females, with a non-significant effect observed for males.

These findings provide further support for the impact of peer victimization on negative psychological and behavioral outcomes among adolescents (Hawker & Boulton, 2000). Unpacking these relationships are important as prevention programming can be tailored to directly address those factors that are most critical in decreasing substance use risk among victimized youth, such as addressing youth's emotional responses (Blaustein & Kinniburgh, 2010). Moreover, consistent with Luk et al. (2010), the effect of peer victimization on substance use through increases in depressive symptoms was only observed for females, with a non-significant effect found for males. These findings suggest that the impact of peer victimization on health outcomes may operate differently across gender. Thus, although addressing depressive symptomatology as a consequence of peer victimization may be appropriate for females in reducing risk for substance use, this strategy may not be as effective for reducing substance use for males. It is plausible that other psychological outcomes, such as anxiety or anger, may prove to be a stronger mediator for substance use risk for male victims of peer aggression (Espelage, Mebane, & Swearer, 2004). More research is warranted examining gender differences on the impact of peer victimization on health outcomes among adolescents.

Our findings have other important implications for future studies on the impact of peer victimization on health outcomes among adolescents. Specifically, although we examined

the impact of peer victimization in isolation, it is true that youth may be a victim of peer aggression in one context and become the perpetrator in another (e.g., Krug, Mercy, Dahlberg, & Zwi, 2002; Ryoo, Wang, & Swearer, 2015). Furthermore, youth who are both victims and perpetrators have been shown to have more internalizing problems (e.g., depression, anxiety), externalizing problems (e.g., aggression, substance use), fewer prosocial behaviors, and greater academic difficulties than youth who are only victims or have never been victimized (Arseneault et al., 2006). What is undeniable is that both roles – being victim or victim-perpetrator – impacts youth’s trajectories toward maladaptive behavior subsequent to feelings of being victimized (Haltigan & Vaillancourt, 2014; Barker, Arseneault, Brendgen, Fontaine, & Maughan, 2008) and warrants further investigation.

The impact of peer victimization on depression and substance use may also vary in important ways based on the type of victimization experienced. Sullivan, Farrell, and Kliewer (2006) made the distinction between physical victimization (e.g., being hit) and relational victimization (e.g., exclusion from peers, spreading rumors), finding that physical victimization was significantly related to alcohol and cigarette use but not heavy use. However, relational victimization was significantly related to all substance use outcomes, even after controlling for the effect of physical victimization. Moreover, a gender effect was observed, such that physical victimization was more strongly related to both categories of alcohol use among boys than among girls. In contrast, relational victimization was more strongly related to marijuana use among girls than among boys. Our study did not include subscales based on type of victimization and only included one item assessing physical victimization, thus these differences could not be assessed. Future studies are warranted in this area, as gender differences in the pathway between peer victimization and substance use may be found based on the type of victimization experienced.

With the rising use of technology by youth (Lenhart, 2015; Madden et al., 2013), there is also an increase in the experience of cyber victimization (Chan & La Greca, 2016). Fisher, Gardella, and Teurbe-Tolon (2016) conducted a systematic review and meta-analysis of existing research on the relationship between peer cyber victimization and internalizing and externalizing problem among adolescents, finding a positive and significant relationship between cyber victimization and almost all internalizing and externalizing problems assessed. Specifically, cyber victimization was associated with suicidal ideation, depression, anxiety, self-esteem, and physical symptoms, as well as self-harm, substance use, and social problems. The only problems that were not found to be associated with cyber victimization were aggression and sexual behaviors. Based on the pathways noted in the current study, future studies are warranted examining this pathway for cyber victimization.

Similarly, variation in risk from victimization can depend on the chronicity of the victimization and whether there is a power imbalance present between the perpetrator and the victim. Bullying, which is a more severe type of peer victimization occurs when there is the presence of aggressive behaviors that are both repeated and involve a power imbalance favoring the perpetrator (Gladden et al., 2014). The experience of bullying compared to other forms of aggression between peers that do not necessary involve repeated exposure and a power imbalance has been shown to result in more severe consequences (Hunter, Boyle, & Warden, 2007). Moreover, as noted in the Center for Disease Control report on

bullying (Gladden et al., 2014), given evidence that prevention efforts targeting non-bullying aggression have been found to be ineffective at decreasing bullying behavior (Taub, 2001; Van Schoiack-Edstrom, Frey, & Beland, 2002) as well as the converse, that bully prevention programs are ineffective at preventing other forms of aggression (Ferguson, San Miguel, Kilburn, & Sanchez, 2007), understanding the specific risk process for each form of aggressive behavior is critical.

Lastly, future studies can also expand on the current work by examining protective factors within adolescent's social networks that can influence the impact peer victimization has on depression and substance use outcomes, such as school belonging and peer/parental involvement (Wormington, Anderson, Schneider, Tomlinson, & Brown, 2016). For example, adequate parental knowledge has been shown to weaken the relationship between peer victimization and alcohol use among female adolescents (Jiang, Yu, Zhang, Bao, & Zhu, 2016). Higher levels of social support have also been shown to lessen adolescent's likelihood of initiating alcohol (Wormington et al., 2013), even above and beyond the negative influence of peer behavior (Mason, Mennis, Linker, Bares, & Zaharakis, 2014). Moreover, Wormington et al. (2013) found for adolescent boys that victimization predicted higher alcohol use among youth who lacked supportive social networks. Thus, social support may be an important protective factor to consider when examining substance use risk due to the experience of peer victimization. Conversely, there are also factors that may exasperate the impact of peer victimization on substance use, such as affiliation with deviant peers (Jiang et al., 2016). Examining these factors will also provide a more comprehensive framework for understanding the multiple variables involved in understanding risk and resilience to substance use as a consequence of peer victimization.

Limitations

The current study is the first to examine the indirect effect of peer victimization on substance use via depressive symptoms using a prospective design among middle and high school youth, and examining the moderating effect of gender. However, findings should be interpreted in light of the study's limitations. First, a composite variable was computed for substance use outcomes. Although a composite substance use variable has been used in previous studies examining its relationship with peer victimization (e.g., Luk et al., 2010), given findings of gender differences within the relationship between depression and substance use based on the specific substance analyzed (Wilkinson, Halpern, & Herring, 2016), important differences in risk may have been overlooked by using a composite variable and should be examined in future studies. Second, the findings provided support for the impact peer victimization has on substance use via depressive symptoms for female youth. Although a significant indirect effect of depression was observed, there are other variables associated with psychological distress and coping that should also be considered to provide a more comprehensive assessment for substance use risk. Third, our measure of peer victimization primarily assessed verbal and relational peer victimization, with minimal assessment of physical forms of peer victimization. Although previous literature has documented that a majority of peer victimization incidents that occur are non-violent or non-physical in nature (Wang, Iannotti, & Luk, 2012; Wang, Iannotti, & Nancel, 2009), suggesting that the assessment of primarily verbal and relational aggression is relevant, it

does limit the potential effect observed as the measure excludes physical forms of aggression. Moreover, a lack of an effect for male youth may be in part due to the exclusion of physical peer victimization, which has been shown to be more prevalent among adolescent males than females (e.g., Sullivan et al., 2006; Wang et al., 2009). Future studies are warranted that examine the proposed pathways based on both a comprehensive measure that includes multiple forms of victimization, as well as pathways based on specific types of victimization experienced.

Conclusion

Peer victimization is a growing concern within school settings as it has been associated with numerous health and behavioral outcomes among adolescent populations, including low self-esteem, aggression and delinquency (Hawker & Boulton, 2000; Ivarsson et al., 2005; Khatri et al., 2000; Topper et al., 2011). The current study, was the first to our knowledge, to utilize a prospective design to examine the effect of school-based peer victimization on subsequent depressive symptomatology and later substance use. Moreover, we examined whether this risk pathway varied by gender. Our findings indicated that peer victimization increased risk for depressive symptoms over the course of 1 year for both male and female youth, but the indirect effect of depressive symptoms on later substance use as a consequence of peer victimization was only observed for female youth. These findings highlight both the lasting negative impact of peer victimization on health outcomes among adolescents and the need to both identify and provide intervention programming for this at-risk population of youth, particularly adolescent females, to reduce risk for substance use as a consequence of peer victimization and elevations in depression.

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Highlights

- Peer victimization predicted later depressive symptoms.
- Peer victimization predicted later substance use through depression for females.
- No indirect effect was found for male youth.

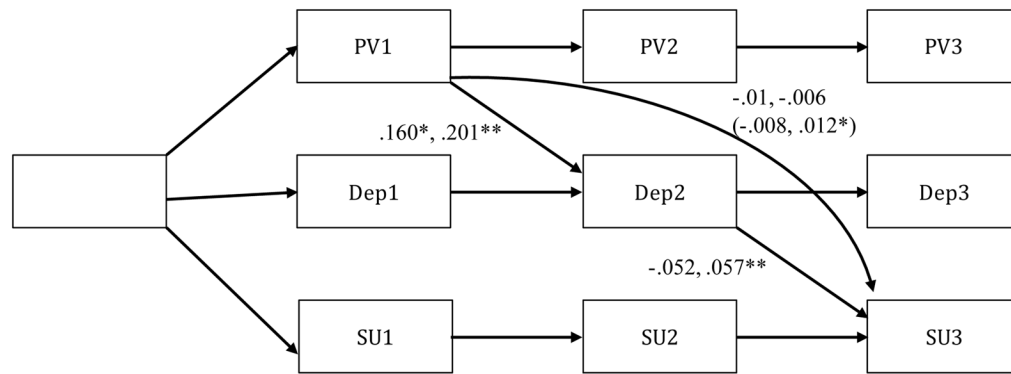


Figure 1.

Depression as a mediator between peer victimization and substance use by gender
 Depiction of structural model representing the mediation pathway between peer victimization, depressive symptoms, and substance use for male and female adolescents. Coefficients are only represented for hypothesized pathways. The indirect pathway coefficient is represented within parentheses. The first coefficient is for males and the second is for females. Not included in the figure, for ease of presentation, are disturbance terms and error terms. * $p < .05$, ** $p < .01$.

Table 1

Demographic and Descriptive Statistics

Variable	N or Mean	% or SD
Grade at Time 1		
6th	349	43.6
7th	198	24.7
8th	133	16.6
9th	88	11.0
10th	33	4.1
Gender		
Male	332	41.4
Female	469	58.6
Race/Ethnicity		
African-American/Black	145	18.1
Native American/Alaskan Native	6	0.7
Asian	8	1.0
Hispanic	10	1.2
Multiracial	53	6.6
Caucasian/White	578	72.2
Did not provide response	1	0.1
Peer Victimization		
Time 1	1.61	0.52
Time 2	1.61	0.54
Time 3	1.55	0.53
Depressive Symptomatology		
Time 1	2.00	0.65
Time 2	2.02	0.67
Time 3	2.05	0.67
Substance Use		
Time 1	104	13.0
Time 2	171	21.3
Time 3	242	30.2

Table 2

Correlation Coefficient Matrix

	PV1	PV2	PV3	Dep1	Dep2	Dep3	SU1	SU2	SU3
PV1	—	0.60 ^{**}	0.51 ^{**}	0.51 ^{**}	0.36 ^{**}	0.29 ^{**}	0.24 ^{**}	0.10 ^{**}	0.11 [*]
PV2		—	0.62 ^{**}	0.41 ^{**}	0.49 ^{**}	0.37 ^{**}	0.22 ^{**}	0.28 ^{**}	0.16 ^{**}
PV3			—	0.36 ^{**}	0.39 ^{**}	0.43 ^{**}	0.23 ^{**}	0.19 ^{**}	0.40 ^{**}
Dep1				—	0.60 ^{**}	0.54 ^{**}	0.17 ^{**}	0.11 ^{**}	0.04
Dep2					—	0.64 ^{**}	0.13 ^{**}	0.26 ^{**}	0.14 ^{**}
Dep3						—	0.17 ^{**}	0.18 ^{**}	0.17 ^{**}
SU1							—	0.29 ^{**}	0.33 ^{**}
SU2								—	0.20 ^{**}
SU3									—

Notes: PV=peer victimization; Dep=depression; SU=substance use; 1=time 1; 2=time 2; 3=time 3

* $p < .05$;

** $p < .01$

Table 3
Results of Path Model Analyses Predicting Substance Use Outcomes from Peer Victimization and Depression, Stratified by Gender

	b	SE	LL	UL	p-value
DIRECT EFFECTS OF T1 PEER VICTIMIZATION					
T2 Depression	.149	.046	.060	.239	.001
Male	.160	.062	.039	.281	.010
Female	.206	.063	.082	.330	.001
T3 Substance Use	.011	.030	.697	-.045	.067
Male	-.010	.053	-.114	.095	.857
Female	-.006	.030	-.064	.052	.851
DIRECT EFFECTS OF T2 DEPRESSION					
T3 Substance Use	.01	.020	.470	-.024	.052
Male	-.052	.040	.193	-.131	.026
Female	.057	.020	.019	.096	.004
INDIRECT EFFECTS OF DEPRESSION					
PV→DEP→SU	.002	.003	-.004	.008	.481
Male	-.008	.007	-.022	.006	.245
Female	.012	.005	.001	.022	.030

Note. Confidence intervals are stated at 95%. Grade was included as a covariate in all analyses. Bolded values are significant at $p < .05$ or greater