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Associations Between Physical and Relational Forms of Peer Aggression and Victimization and Risk for Substance Use Among Elementary School-Age Youths

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ABSTRACT
This study examined associations between physical and relational forms of aggression and victimization and risk for willingness to engage in substance use and actual use in a sample of 231 (50% male) second- through fourth-grade students (mean age = 8.3 years). Physical aggression was more strongly associated with risk for substance use outcomes than physical victimization. Neither relational aggression nor victimization were linked to risk for substance use. Specifically targeting physical aggression for the prevention of early substance use among elementary school-age youths appears to be warranted.

KEYWORDS
aggression; substance use willingness; victimization

Introduction
Peer aggression and victimization occur frequently in childhood and adolescence (Crick, Casas, & Ku, 1999; Crick & Grotpeter, 1996), and previous research indicates that both peer aggression and victimization are associated with a host of negative outcomes (e.g., Vernberg & Biggs, 2010), including adolescent substance use (e.g., Adelmann, 2005). However, the links between peer aggression and victimization and substance use outcomes among elementary school-age youths have not been evaluated. From a prevention perspective, targeting those identified as at risk for a behavior prior to the initiation of the behavior is essential. Understanding the associations between peer aggression and victimization and risk for willingness to engage in substance use in addition to risk for actual use in elementary school-age youths is necessary so that appropriate prevention programs can be implemented prior to the initiation of substance use. Accordingly, the current study is the first study (to our knowledge) to evaluate associations between physical and relational forms of aggression and victimization and risk for substance use outcomes (i.e., willingness to engage in substance use and actual use) in a sample of second- through fourth-grade students.

Peer aggression and victimization are widespread problems in today’s schools, with data suggesting that approximately 19% of children engage in aggressive acts toward their peers (Nansel et al., 2001). Furthermore, as many as 10% to 20% of children and adolescents experience chronic victimization by their peers (Graham & Juvonen, 1998; Kochenderfer-Ladd & Wardrop, 2001; Stadler, Feifel, Rohrmann, Vermeiren, & Poustka, 2010), with 60% of youths reporting exposure to peer victimization during the elementary school years alone (Kochenderfer-Ladd & Wardrop, 2001).

Peer aggression and victimization can take many forms, and research increasingly distinguishes between physical and relational forms of peer aggression and victimization. While physical aggression and victimization refers to physical attacks (e.g., hitting, pushing, or kicking) or verbal threats (Crick et al., 1999), relational aggression and victimization involves harm through the manipulation of (or damage to) peer relationships and social status through the spreading of rumors and social ostracism (Crick & Grotpeter, 1996). All forms of aggression and victimization are detrimental to both the aggressor and the victim (e.g., Vernberg & Biggs, 2010). Numerous findings indicate that peer aggression and victimization are both associated with increased risk of depression, anxiety, low self-esteem, peer rejection, and externalizing problems, including antisocial behavior and delinquency (for reviews, see Card, Stucky, Sawalani, & Little, 2008; Reijntjes et al., 2011; Reijntjes, Kamphuis, Prinzie, & Telch, 2010). Most relevant to the current study, growing evidence suggests that both peer aggression and victimization are associated with early substance use (e.g., Adelmann, 2005).
Problem behavior theory asserts that if an individual is willing/able to engage in one type of problem behavior, then they are at increased risk for engaging in other problem behaviors (Jessor, 1992; Jessor & Jessor, 1977). That is, participating in multiple problem behaviors (such as aggression, delinquency, and substance use) is the manifestation of a single underlying behavioral concern. Thus, engaging in aggressive behavior puts an individual at risk for early substance use, along with other problem behaviors. Indeed, Nansel and colleagues (2001; Nansel, Craig, Overpeck, Saluja, & Ruan, 2004) demonstrated that peer aggression was associated with alcohol use in a sample of sixth through tenth graders. Research by Radliff, Wheaton, Robinson, and Morris (2012) also found that middle and high school students who engage in aggression towards peer used more substances (i.e., alcohol, tobacco, and marijuana use) than those who did not report engaging in aggressive behavior. Other research has provided further support for these findings across studies of middle and high school-aged students (Adelmann, 2005; Carlyle & Steinman, 2007; Houbre, Tarquinio, Thuillier, & Hergott, 2006; Niemelä et al., 2011; Peleg-Oren, Cardenas, Comerford, & Galea, 2012). However, this literature does not provide a clear picture regarding what forms of aggressive behavior (i.e., physical or relational) are most strongly linked to early substance use, with the majority of this literature broadly assessing physically aggressive behavior and not differentiating between physical and relational forms of aggression. This focus on physical aggression is likely due to relational aggression only being recognized as a concern since the 1990s, with research focusing predominantly on peer relationship (peer rejection and isolation) and internalizing (depression and anxiety) outcomes rather than externalizing outcomes (delinquency and substance use) of relational aggression (Crick et al., 1999; Crick & Grotter, 1996). Differentiating between the forms of aggression would allow a more refined intervention approach, depending on the form of aggression exhibited. For example, whereas an intervention for physical aggression would focus on behavioral control and prosocial ways of problem-solving conflicts, interventions for relational aggression would target social relationships and non-manipulative ways of interacting with peers. Thus, further research evaluating associations between physical and relational forms of aggression and substance use would be useful in determining what types of aggression to target for the prevention of substance use.

Link between experiencing peer victimization and early substance use

In contrast to peer aggression, experiencing peer victimization may be associated with substance use through a failure to bond to conventional social institutions and/or self-medicating purposes (Bierman, 2004; Coie, 1990; Hawkins, Lishner, Catalano, & Howard, 1986). Specifically, the Social Development Model posits that if an individual does not become invested and attached to the social entities in their environment (i.e., peers, school, family), then they may reject the norms of the group and engage in behavior that is contrary to the norms (e.g., Catalano, 1982; Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; Catalano & Hawkins, 1996). Thus, victimized youths may become disenfranchised from social rules due to the negative interactions with peers, and this lack of engagement is thought to provide little motivation to engage in socially valued behavior, resulting in inappropriate behavior that may come to include substance use (Bierman, 2004; Coie, 1990; Hawkins et al., 1986). In addition, youths who are victimized may use substances to cope with the negative emotions experienced as a result of these aversive peer interactions.

While there is some evidence to suggest that victimization is associated with substance use (e.g., Peleg-Oren et al., 2012), findings have been mixed. For example, in a study of 11- to 14-year-olds, Sullivan, Farrell, and Kliewer (2006) noted an association between youth drinking behavior and status as a victim of both emotional and physical aggression. Luk, Wang, and Simons-Morton (2010) also found a positive association between victimization (physical, relational, and cyber victimization) and substance use in tenth-graders. In addition, Tharp-Taylor, Haviland, and D’Amico (2009) identified an association between peer victimization and alcohol and cigarette usage in middle school youths. However, other studies did not find a significant relation between victimization and substance use (e.g., Houbre et al., 2006; Rivers, Poteat, Noret, & Ashurst, 2009). These inconsistencies may be explained by differing operational definitions of peer victimization across studies, with some measures of peer victimization being broad and others assessing and including various forms of victimization (i.e., physical versus relational). Further, some studies classified or grouped youths based on victimization status (e.g., Houbre et al., 2006; Rivers et al., 2009) while other studies examined victimization on a continuum (e.g., Luk et al., 2010; Sullivan et al., 2006).
Interestingly, both Houbre and colleagues’ (2006) and Rivers and colleagues’ (2009) studies that did not find a relation between victimization and substance use grouped youths based on their victimization status (victim or not) using a global measure of victimization that did not differentiate between the various forms of victimization (i.e., physical versus relational). Thus, more research distinguishing between physical and relational victimization and using continuous measures (rather than dichotomizing) of victimization may be necessary to better understand these associations.

Furthermore, to our knowledge, no research has examined these associations in elementary school-age samples, with all research conducted with middle and high school-age students. This is an important limitation for research on the development of substance use behavior, as early initiation of substance use behavior is a risk factor for future use-related problems (e.g., Grant, Stinson, & Harford, 2001; Maggs & Schulenberg, 2005) and other adverse psychosocial adjustment factors (e.g., poor academic achievement, depression, and anxiety; Fergusson, Horwood, & Beautrais, 2003; Patton et al., 2002). Research suggests that peer aggression and victimization are evident in elementary school (Kochenderfer-Ladd & Wardrop, 2001). Furthermore, rates of substance use initiation begin to peak in middle school (Barnam, Pulkinnen, & Rose, 2004; Johnston, O’Malley, Bachman, & Schulenberg, 2011), with rates increasing linearly from fourth to ninth grade (Fite, Colder, Lochman, & Wells, 2008). Thus, evaluating associations in a sample of elementary school-age youths is ideal for prevention research.

**Current study**

Although there is growing evidence to suggest that both peer aggression and victimization may be associated with early substance use (e.g., Adelmann, 2005), additional research is needed to further clarify associations. From a prevention intervention perspective, it is important to understand the links between peer aggression and victimization and substance use outcomes in elementary-age children, as early use is associated with lifelong substance abuse and use-related problems (e.g., Grant et al., 2001; Maggs & Schulenberg, 2005). In addition, differences in associations between physical and relational forms of peer aggression and victimization and substance use are not yet clear. Thus, we need to know what types of behavior to target in elementary school in order to implement effective interventions so that subsequent substance use and use-related problems can be prevented. If victimization effects are evident, then negative emotions and disenfranchisement may be targeted for the prevention of substance use. Alternatively, if aggression effects are evident then overall behavioral difficulties may be a target of intervention and strategies would likely include behavioral control and/or more prosocial and less manipulative ways of interacting with peers.

Willingness to engage in substance use is a strong predictor of future use (Andrews et al., 2008). Thus, it would also be useful to evaluate associations between peer aggression and victimization and risk for willingness to use substances in order to inform the development of early targeted prevention programs. Accordingly, using a sample of 231 second- through fourth-grade students, the current study cross-sectionally evaluates associations between teacher reports of physical and relational forms of aggression and victimization and student reports of willingness to use substances in addition to actual substance use by estimating path models within a structural equation modeling framework. Both peer aggression and victimization were expected to be associated with substance use outcomes; however, due to the more consistent findings in the literature, the associations between aggressive behavior and substance use outcomes were expected to be stronger than the links between victimization and substance use outcomes.

**Methods**

**Participants**

Participants included 231 children (50% male; mean age = 8.3 years, SD = .95) and their homeroom teachers in Grades 2 (31.6%), 3 (32.5%), and 4 (35.9%) from an elementary school in a small, Midwestern town. According to school records, the racial composition of the school was predominantly Caucasian, with less than 20% of the student body identifying with a racial/ethnic minority group. Socioeconomic data were not available for the participants; however, the average income for the town was approximately $25,369 per capita, with 5.1% of individuals residing in the town living below the federal poverty line. School records indicated that approximately 35% of the student population was eligible for free and reduced lunch. The researchers’ Institutional Review Board as well as school administration provided approval for the study. Caregiver consent and child assent were obtained prior to data collection. In the summer, an informational booth was set up during school enrollment. Caregivers who approached the table were given information regarding study participation, and parents interested in signing up their children provided written informed consent. At the beginning of the school year, consent forms were sent home to the caregivers of the
remaining students. Of the 380 second- through fourth-grade students enrolled in the school, 252 (66%) received parental consent to participate in the study. A total of 233 students completed the survey. Reasons for the loss of consented participants included absence from school, moving out of the district, and the need for special education accommodations. Note that two participants were missing data relevant to the current study aims, resulting in 231 participants included in the current analyses.

**Measures**

**Demographics**

Teachers reported on students’ gender and grade.

**Aggression and victimization**

A teacher-reported 18-item measure was used to assess levels of aggression and victimization. Teachers responded on a 5-point Likert scale (never to almost always). This measure was adapted from a peer-nominated scale (Crick & Bigbee, 1998), and teachers were asked to complete this measure for each student. The measure included six items pertaining to aggression, with two subgroups containing three items each: physical aggression (e.g., “pushes and shoves others”) and relational aggression (e.g., “tries to make other kids not like a certain person by spreading rumor about them”). Similarly, there were six items pertaining to victimization, with two subgroups containing three items for each subgroup: physical victimization (e.g., “gets hit, kicked, punched by others”) and relational victimization (e.g., “other kids tell rumors about them behind their back”). The remaining six questions were related to bystander behaviors, which were not included in the current analysis. Sum scores for each category were calculated, with higher scores indicating more peer aggression or victimization experiences. In this sample, the subscales demonstrated good internal consistency (α = .86 for physical aggression, α = .82 for relational aggression, α = .89 for physical victimization, α = .83 for relational victimization).

**Willingness to use substances**

Self-reported willingness to use substances was assessed using the Willingness to Use questionnaire (Wills, Gibbons, Garrard, & Bordy, 2000). The measure consisted of six items regarding the child’s willingness to engage in tobacco, alcohol, and marijuana use. For each substance, children were provided a description of a situation that involved use with friends (e.g., “Suppose you were with a group of friends and some of them were smoking. There were some extra cigarettes there that you could have if you wanted.”). Children responded to items (e.g., “How willing would you be to smoke a cigarette?”) using a 3-point Likert scale (not at all willing, kind of willing, and very willing). Due to the low base rates of willingness to use, “kind of willing” and “very willing” responses were both treated as a positive response and a dichotomous (yes/no) variable was created to indicate whether the student endorsed willingness to engage in the use of any substance.

**Substance use**

Self-reported substance use was assessed using three items from the Center for Substance Abuse Prevention Student Survey (Pentz et al., 1989). Three yes/no questions assessed the lifetime use of tobacco, alcohol, and marijuana use (i.e., “Have you ever had a drink of alcohol?,” “Have you ever smoked a cigarette, even just a few puffs, or used chewing tobacco, snuff, or dip?,” and “Have you ever tried marijuana?”). Due to low base rates of use, a dichotomous (yes/no) variable was created to indicate whether the student had endorsed the use of any substance.

**Procedures**

Data collection began 10 weeks after the start of the fall semester and was conducted over the course of one month. Child self-report measures were administered in the classrooms during a 30-minute period. Only children whose caregivers provided written consent remained in the classroom. Children provided verbal assent before their participation (98% agreed to participate; N = 4 refusals). Data from each classroom were collected by two or three trained research team members; one team member in each room read standardized instructions and the questionnaire items aloud, while the other team members circulated the room to answer questions and ensure students were able to keep pace with the reading of each question. No school personnel were permitted in the room during the data collection to ensure confidentiality of responses and to increase accuracy in reporting. All classrooms received a $75 gift card upon completion of the study to compensate the school for their time and effort. Homeroom teachers provided consent (N = 24; 100% participation) and completed online surveys over the course of a month using Qualtrics interview software. Specifically, teachers were asked to complete a 10-minute survey about each of the students in their homeroom class and were compensated $7 per survey completed.

**Results**

**Statistical analysis**

In order to evaluate study variables and understand basic associations, descriptive statistics (i.e., frequencies,
means, standard deviations, and correlations) were first computed. Unique associations between physical and relational aggression and victimization on substance use outcomes were then evaluated within a structural equation model framework by estimating path models using Mplus statistical software (Muthén & Muthén, 1998–2011). Estimating path models allows for multiple outcomes to be examined simultaneously and allows for direct comparisons across outcomes to be made (Kline, 2010).

Because the substance use outcomes were dichotomous in nature, weighted least squares (WLSMV) estimation with a mean and variance adjusted chi-square test statistic was used to evaluate associations. WLSMV provides unbiased estimates, standard errors, and model fit test statistics for dichotomous data (Muthén, 1984). The weighted root-mean-square residual (WRMR) statistic was used to evaluate model fit, whereby a WRMR value of <.90 indicates a good fit to the data (Yu & Muthén, 2001).

**Descriptive statistics**

Teachers reported that 16.5% of students experienced relational victimization and 6.5% of students experienced physical victimization. Teachers also indicated that 10% of students reportedly engaged in at least one physical act of aggression and 21% of students engaged in at least one act of relational aggression. With regard to substance use, 12.6% (N = 29) of the students reported willingness to use substances and 7.4% (N = 17) reporting having used substances. Consistent with prior research (Johnston et al., 2011), boys were more likely to have used a substance (N = 13 versus 4; X^2 = 5.23, p = .02) and were more likely to endorse willingness to use substances than were girls (N = 22 versus 7; X^2 = 9.01, p = .00).

Correlations, means, and standard deviations of study variables can be found in Table 1. Physical aggression was associated with increased likelihood of both willingness to use substances and actual substance use. Physical victimization was also associated with increased risk for willingness to use substances, but not actual use. However, neither relational aggression nor relational victimization were linked to either substance use outcome. Boys demonstrated higher levels of both physical aggression and physical victimization than did girls; however, no gender differences in relational forms of aggression or victimization were evident. As reported earlier, correlation analyses also suggest that boys were more likely to indicate both willingness to use and actual use than were girls. Finally, the only grade level effect found was that younger children were more likely to report willingness to use substances than were older children.

### Table 1. Correlations, Means, and Standard Deviations.

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<td>3. Physical Aggression</td>
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<td>6. Relational Victimization</td>
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<td>7. Willingness</td>
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<td>8. Use</td>
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<td>Mean</td>
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<td>Std. Deviation</td>
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<td>1.34</td>
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*p < .05, **p < .01.

**Path model**

A path model in which willingness to engage in substance use and actual use were regressed on physical aggression, relational aggression, physical victimization, relational victimization, grade, and gender was estimated in order to evaluate unique effects. As seen in Figure 1 (WRMR = .00), physical aggression was uniquely positively associated with increased risk for willingness to engage in substance use and marginally statistically positively associated with increased risk for actual use; however, no other aggression or victimization variable was uniquely associated with either substance use outcome. Boys were more likely to endorse willingness to engage in substance use and marginally statistically more likely to report actual use than were girls. Finally, younger children were more likely to report willingness to use substances than were older children.

**Discussion**

The goal of the current study was to evaluate the associations between two forms of peer aggression and victimization (physical and relational) and risk for both willingness to engage in substance use and actual use in a sample of second- through fourth-grade students. The present study advances the literature by examining differences in physical and relational forms of both aggression and victimization, and by examining these associations in a sample of elementary school-age students, which has implications for early prevention and intervention. Findings suggest that physical aggression, but not physical victimization, is uniquely associated with substance use outcomes, and neither relational...
aggression nor relational victimization are linked to either substance use outcome.

Consistent with previous research (Adelmann, 2005; Carlyle & Steinman, 2007; Houbre et al., 2006; Niemelä et al., 2011; Peleg-Oren et al., 2012), physically aggressive behavior was associated with increased risk for both substance use outcomes. The current study extends this line of research by demonstrating that these links are evident in elementary school-age youths. Findings are consistent with problem behavior theory, which suggests that if an individual exhibits one type of problem behavior, then he or she is at risk for other problem behaviors (Jessor, 1992; Jessor & Jessor, 1977).

Physical victimization was also associated with increased risk for willingness to engage in substance use, but not actual use, at the bivariate level. However, when accounting for the variance associated with physical aggression and other factors, the link between physical victimization and willingness to engage in substance use was no longer evident. The link between victimization and substance use has been mixed in the literature, with some studies finding an association (e.g., Luk et al., 2010; Peleg-Oren et al., 2012) and other studies finding no association (e.g., Houbre et al., 2006; Rivers et al., 2009). The current results suggest that the link with substance use is specific to physical victimization in elementary school-age youths, but that this link is not as strong as physical aggression.

Interestingly, relational forms of aggression and victimization were not associated with willingness to engage in substance use or actual use. It may be that the link between involvement in peer victimization and substance use is specific to physical forms of aggression and victimization in elementary school-age youths. However, relational aggression and victimization may be more strongly associated with substance use outcomes as youths transition into adolescence and both relational

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**Figure 1.** Path model evaluating associations between involvement in peer victimization and substance use outcomes. Notes. * and bolded line = $p < .05$; † and solid line = $p < .10$; dotted line = $p > .10$. 
forms of aggression (e.g., Galen & Underwood, 1997) and negative emotions (Hankin et al., 1998; Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993; Lakdawalla, Hankin, & Mermelstein, 2007) increase and substances are more accessible. The impact of relational forms of aggression and victimization may also become more salient in adolescence, when peer relationships take on increasing importance (Larson & Richards, 1991).

From a prevention intervention perspective, targeting physical aggression may be useful for preventing early substance use. Indeed, there is evidence to suggest that the Coping Power Program, which targets disruptive and reactivity aggressive behavior in the classroom context, is effective in preventing early substance use (Lochman, Wells, & Murray, 2007; Lochman & Wells, 2002, 2004). However, the impact of this intervention in reducing aggressive behavior and preventing substance use in the context of peer aggression and victimization has yet to be evaluated. It will be important for future research to evaluate whether this intervention is effective in preventing early substance use with those involved in physically aggressive behavior.

Although physical victimization was not uniquely associated with increased risk for willingness to use substances, physical victimization was associated with increased risk at the bivariate level. If further evidence suggests an association between physical victimization and substance use outcomes then prevention programs may also need to target physical victimization among elementary school-age youths. From a prevention intervention perspective, it may be useful to target the negative emotions associated with victimization (Card et al., 2008; Reijntjes et al., 2011; Reijntjes, Kamphuis, Prinzie, & Telch, 2010), as negative emotions may result in substance use for coping and self-medicating purposes and/or a failure to bond to conventional social institutions (Bierman, 2004; Coie, 1990; Hawkins et al., 1986). Cognitive-behavioral interventions have been found to be effective in reducing internalizing symptoms among children and adolescents (Ferdon & Kaslow, 2008), and therefore may be effective in reducing negative emotions associated with victimization, ultimately reducing risk for substance use. However, more research is needed to evaluate the effectiveness of such interventions for victimized youths before specific recommendations can be made.

Further note that consistent with previous research (Fite, Evans, Cooley, & Rubens, 2014; Radliff et al., 2012), aggression and victimization were correlated, suggesting that many youths who are victimized are also aggressors. Thus, although it appears that physical aggression is the key component to target for early substance use, interventions will likely include youths identified as both aggressors and victims.

Finally, findings also suggested that younger children were more likely to report a willingness to use substances than older children. Younger children may not have had the opportunity to be exposed to anti-substance use messages as much as older children, as many anti-substance use programs are targeted for fourth grade and up. Findings may suggest that it is worthwhile to develop and implement anti-substance use programs for younger children.

**Limitations and conclusions**

There are several noteworthy methodological limitations that need to be reviewed. In particular, this study focuses on predominantly Caucasian second through fourth graders in a small Midwestern town, and findings may not generalize to other racial or age groups in other geographical locations. Also, this research was cross-sectional, which limits our ability to examine possible change in associations over time. Given the strong correlations between physical and relational aggression as well as physical and relational victimization, it may be that, at this age, physical aggression accounts for majority of the variance in substance use and youths’ willingness to use. Yet, this relation may shift over time, suggesting that future research should continue to examine these associations at various developmental stages.

Furthermore, there were low rates of actual use, as expected with this age group. Although the estimator used for modeling associations is set up to accommodate the limited endorsement of the substance use outcomes, it is important to replicate findings in larger samples of youths who endorse willingness to use and actual use. We point out, however, that findings are consistent with expectations and prior research conducted with older youths that have increased rates of use (Adelmann, 2005; Carlyle & Steinman, 2007; Houbre et al., 2006; Niemelä et al., 2011; Peleg-Oren et al., 2012). The items used to assess lifetime use were vague and did not separate out use in the context of family versus use with friends or in isolation. While this is a common approach to assess substance use behavior, future research examining the role of peer aggression and victimization in substance use in these various contexts would be useful.

Some may also question our use of child self-reports of substance use outcomes. In particular, relationally aggressive youths may demonstrate stronger social skills, which could lead them to be more sensitive to issues such as social desirability bias in their report on
substance use. However, we note that self-report is the most common method used to assess child/adolescent substance use, and child reports of substance use have been found to be valid and reliable (Dolcini, Adler, & Ginsberg, 1996; Rosenbaum, 2009). In addition, the current study relied on teacher reports of both aggression and victimization. Child perceptions of victimization have been argued to be important in understanding the impact of victimization (Grills-Taquechel, Polifroni, & Pane, 2010; Vernberg, Nelson, Fonagy, & Twemlow, 2011). Thus, future research utilizing child self-reports of victimization will be helpful before firm conclusions regarding victimization findings should be drawn.

Despite these limitations, the current study contributes to our understanding of associations between peer aggression and victimization and risk for early substance use. Findings suggest that physical rather than relational forms of aggression need to be the focus of substance use prevention among elementary school-age youths. Future directions in this line of research include evaluating potential moderators (e.g., peer delinquency) and mediators (e.g., negative emotions) of these associations as well as examining how these relations may change over time.

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