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Longitudinal pathways of victimization, substance use, and delinquency: Findings from the National Survey of Adolescents☆

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Abstract

Using a nationally representative sample of 3614 adolescents, age 12 to 17 years, this study examines longitudinal associations among interpersonal victimization (i.e., sexual abuse, physical abuse and/or assault, and witnessed community and domestic violence) and high risk behavior (i.e., alcohol use, drug use, and delinquent behavior). A bidirectional relationship was hypothesized between high risk behavior and victimization for the full sample. Descriptive results indicated that a high correlation between types of high risk behavior, with over 50% of adolescents having engaged in at least one type of high risk behavior by Wave 2 in the study. Results suggested strong links between victimization and high risk behaviors, whereas sequential order of the constructs across time was dependent on gender and type of victimization. Specifically, hypotheses concerning victimization and high risk behavior were fully supported with boys, but different patterns emerged in the data for girls.

Keywords

Interpersonal violence; Victimization; Substance use; Delinquency; Adolescents; Cross-lag panel

1. Introduction

Data from a variety of sources indicate a high prevalence of interpersonal violence victimization among adolescents, including sexual assault, physical assault/abuse, and witnessing domestic or community violence (Finkelhor, Ormrod, Turner, & Hamby, 2005; Finkelhor, Turner, Ormrod, Hamby, & Kracke, 2009; Kilpatrick, Saunders, & Smith, 2003;

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Conflict of Interest
There are no conflicts of interest in this manuscript.

Saunders, 2003), with gender differences in violence exposure consistently noted across studies. Male adolescents are more likely to experience physical assault and witnessed community violence, whereas females report higher rates of sexual abuse or assault (Finkelhor et al., 2005; Finkelhor et al., 2009; Kilpatrick et al., 2003; Kilpatrick, Saunders, & Smith, 2003; Stevens, Ruggiero, Kilpatrick, Resnick, & Saunders, 2005). A wealth of data suggests that victimization, in both sexes, is related to substance use and delinquent acts (hereto referred to as high risk behavior; e.g., Kilpatrick et al., 2000); however, the temporal relation is yet to be determined. Further, although gender differences are reported in the rates of various forms of interpersonal violence, as well as in engagement of high risk behaviors (e.g., Danielson et al., 2009), potential gender differences in the relations between victimization and high risk behaviors has not been studied, and therefore is the aim of the present study.

1.1. Victimization, substance use, and delinquent behavior

Victimization has been linked to high risk behavior, such as increased substance use (Finkelhor et al., 2009; Kilpatrick et al., 2000; Widom, Marmorstein, & White, 2006) and delinquency (Kingree, Phan, & Thompson, 2003; Stewart, Dennison, & Waterson, 2001). For example, studies indicate higher rates of alcohol use among adolescents with a victimization history (Hamburger, Leeb, & Swahn, 2008; Simpson & Miller, 2002), as well as strong associations between victimization and delinquency (Widom & Maxfield, 2001; Dembo, Schmeidler, & Childs, 2007). Importantly, evidence suggests that high risk behaviors, such as alcohol and drug use problems and delinquency, tend to occur simultaneously (Dembo & Schmeidler, 2002). Researchers have found that 25% of adolescents detained for delinquent acts also reported alcohol use, 70% reported drug use, and 75% reported either alcohol or drug use (National Center on Addiction and Abuse Substance, 2002). Despite the reported high rates of co-occurrence of substance use and delinquency in youth with a victimization history, previous studies have examined these high risk behaviors in isolation. Studies have provided valuable information regarding the link between victimization and substance use – or victimization and delinquency – the frequent co-occurrence of multiple high risk behaviors in adolescents suggests the need for a combined investigation of these constructs. And further, less information is available on the temporal order of these constructs; whether paths between these constructs may be acting simultaneously or whether associations vary across different types of victimization. In other words: does victimization predict high risk behavior; does high risk behavior predict victimization; or are these relationships bidirectional?

Two theoretical frameworks generate hypotheses to explain the temporal ordering of these relationships. First, coping theory proposes that adolescents engage in high risk behaviors to cope with increased negative affect resulting from exposure to victimization (Lazarus, 1993), similar to the self-medication hypothesis (Khantzian & Albanese, 2008) and negative reinforcement theory (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). In support of these theoretical frameworks, some researchers have found that adolescents who have experienced victimization were more likely to engage in high risk behavior than their non-victimized counterparts (Kilpatrick et al., 2000; Widom et al., 2006). For example, in a longitudinal investigation of individuals from childhood into young adulthood, Widom et al. (2006) found that adolescents with histories of child abuse and neglect reported significantly more substance use in middle adulthood than their non-victimized counterparts. Similarly, other researchers have used the coping theory framework to describe behaviors in the context of victimization and high risk behavior (Macy, 2007).

In contrast, findings from other studies have supported the opposite temporal sequencing relating to this link: that adolescents who have engaged in high risk behavior are more likely to experience victimization (Pedersen & Skrondal, 1996). According to life style and routine

activities theories (Riley, 1987), lifestyle differences between teenagers may place some of them at increased risk for victimization. That is, adolescents who engage in high risk behavior may be more vulnerable to experiencing victimization due to the criminal and deviant lifestyles and greater exposure to potentially dangerous situations (Danielson, de Arellano, Ehrenreich et al., 2006). Although research has indicated that lifestyles involving violence or delinquent behavior increase risk of victimization (Riley, 1987; Windle, 1994), violence is not a necessary factor; high risk behaviors including substance use may also heighten the risk for victimization (Rani & Thomas, 2000).

In sum, according to coping theory, victimization is posited to precede high risk behavior; whereas the life style and routine activities theory propose that high risk behavior precedes victimization. While these theories contribute to understanding the relationship among constructs, researchers have not yet examined how they may be acting simultaneously in the expression of victimization and high risk behavior, or examined their contribution to different types of victimization. These are necessary components to further our understanding of the relationship between victimization and high risk behavior.

Studies have indicated that there may be gender differences in the association between victimization and high risk behavior, with significant relationships more commonly found among girls than boys (Krischer & Sevecke, 2008; Widom et al., 2006). A meta-analysis investigating the association between victimization and substance use found a significant link for girls, but not for boys among studies included in the review (Simpson & Miller, 2002). Similarly, several studies have reported significant relationships between victimization and delinquent behavior in girls, but not boys (Dixon, Howie, & Starling, 2004; Krischer & Sevecke, 2008). For example, when comparing delinquent boys and girls between 14 and 19 years of age, Krischer and Sevecke (2008) found that girls reported significantly higher rates of sexual and physical abuse than boys. However, researchers have yet to examine gender differences with regard to the temporal order between victimization and high risk behavior, or to specifically evaluate reasons for the higher associations among girls. In addition, no studies have utilized nationally representative samples, with data collected at multiple time points, to investigate these constructs simultaneously or to distinguish between different types of victimization.

1.2. Aims of the current study

As indicated by this review of the extant literature, research is needed to inform understanding of the direction of the association between victimization and high risk behavior and the role of gender. The current study utilizes a nationally representative sample of adolescents (i.e., the 2005 National Survey of Adolescents [NSA-Replication]) to investigate the relationship between victimization and high risk behaviors over time. Based upon literature indicating that boys report higher rates of physical abuse and witnessing violence and girls report higher rates of sexual abuse (Finkelhor et al., 2005; Kilpatrick, Ruggiero, et al., 2003; Kilpatrick, Saunders, & Smith, 2003), these victimization variables were investigated separately within this study. Two hypotheses were proposed: (1) A bidirectional relationship would emerge between victimization and high risk behaviors, and (2) Gender differences would be found in the association between types of victimization and high risk behavior, such that physical abuse and witnessing violence would be related to high risk behavior in boys but not in girls, and sexual abuse would be related to high risk behavior in girls.

2. Methods

The NSA-Replication study is an epidemiological study of 3614 youths, ages 12 to 17 years. Among other goals, the NSA-Replication aimed to identify the population prevalence of

potentially traumatic events, including physical assault, sexual assault, and witnessed violence in the home, school, and community, and to examine risk factors associated with exposure.

2.1. Participants

The NSA-Replication study included a national household probability sample and an oversample of urban-dwelling adolescents. Recruitment of participants began following approval by the Institutional Review Board of the Medical University of South Carolina. Sample selection and interviewing were conducted by Schulman, Ronca, and Bucuvalas, Inc. (SRBI), a New York-based survey research firm. To conduct the initial probability sample, SRBI used a multistage, stratified, area probability, random-digit-dialing six-stage sampling procedure. (Readers are referred to Kilpatrick et al., 2000 for detailed information on these procedures).

A total of 6694 households were contacted during recruitment, in which parents completed a brief structured interview and were asked to identify at least one eligible adolescent. Of these, 1268 (18.9%) parents refused adolescent participation; 188 (2.8%) adolescents refused to be interviewed following parental consent; 119 (1.8%) adolescent interviews were initiated but not completed; and 1505 (22.5%) identified eligible adolescents were unreachable or not available for interview. Thus, 3614 cases resulted in complete adolescent interviews at Wave 1, including 2459 in the national cross-section and 1155 urban-dwelling adolescents. Of these adolescents, 2511 (69%) completed the follow-up assessment at Wave 2 (mean length of time between Wave 1 and 2 = 15.29 months, SD = 4.58 months). The 1103 uncompleted Wave 2 assessments were due to telephone problems such as technical problems or nonworking number (29%); inability to reach the participant (i.e., always busy, no answer, parent or adolescent never available) (24%); adolescent refusal during Wave 2 recontact (17%); wrong telephone number (12%); ineligibility (9%); or only partial completion of the interview (9%). To examine attrition of the sample over time, effect sizes were calculated to compare participants who completed vs. those who did not complete the Wave 2 assessment. Effect sizes were small (Cohen, 1988) for all victimization and high risk behavior variables (range of $d = 0.04$ to 0.13); thus indicating minimal differences between completers and non-completers on all study variables.

Because adolescents were oversampled in urban areas, cases were weighted to maximize representativeness of the sample to the 2005 U.S. adolescent population. A weight was created to restore the urban cases to their true proportion of the urban/suburban/rural variable, based on 2005 U.S. Census estimates. Next, weights were created to adjust the weight of each case based on age and sex. We generated sample frequencies by age cohort and sex and compared this distribution to the U.S. Census estimates, and weightings were assigned to each sex × age group cell within the sample. This procedure resulted in weighted sample distributions that closely approximated 2005 U.S. Census estimates.

The weighted sample of 3614 participants included 1806 boys and 1808 girls between ages 12 and 171 ($M = 14.50$, $SD = 1.71$). Mean age for boys was 14.51 ($SD = 1.70$) and for girls was 14.50 ($SD = 1.72$), with approximately 50% of both boys and girls age 15 to 17. Sixty-five percent ($N = 2346$) self-identified their race as Caucasian, 16% ($N = 557$) as African-American, 11% ($N = 409$) as Hispanic, 3% ($N = 99$) as Asian/Pacific Islander, and 2% ($N = 86$) as Native American. Three percent ($N = 117$) did not report race information.

[1]Ten participants were outside of this age range (6 were 11 years old; 4 were 18 years old).

2.2. Measures

A highly structured telephone interview with specially trained interviewers was used to collect information regarding a variety of topics, including demographic characteristics, victimization (i.e., physical abuse and/or assault, sexual abuse, and witnessed community and domestic violence), and high risk behaviors (i.e., alcohol use, drug use, and delinquency). To increase accuracy of responses, the interview included behaviorally specific terminology and introductory statements to orient adolescents to questions (Kilpatrick, Ruggiero, et al., 2003; Kilpatrick, Saunders, & Smith, 2003). Wave 1 responses were based upon lifetime prevalence of victimization, while Wave 2 responses included victimization incidences that occurred since the last interview (approximately one year). The interview procedure is described in greater detail in the Methods section, and specific survey questions are available from the first author.

2.2.1. Demographic characteristics—Demographic variables, including adolescent age, gender, and ethnicity, were assessed with standard questions used by the U.S. Bureau of the Census (1988). Specifically, adolescents reported on their current age at the time of the interview, gender, and race, which were coded into five dummy-coded variables (Caucasian, African American, Hispanic, Asian/Pacific Islander, or Native American).

2.2.2. Victimization—Victimization variables were assessed using a modified version of the violence assessment module from the original National Survey of Adolescents, which can be obtained by contacting the authors (Kilpatrick et al., 2000; Kilpatrick, Ruggiero, et al., 2003; Kilpatrick, Saunders, & Smith, 2003). *Sexual abuse* (SA) was defined as (a) episodes that involved unwanted vaginal or anal penetration by an object, finger, or penis; (b) episodes of unwanted oral sex; (c) episodes in which another person touched the adolescent's genitalia against their will; or (d) episodes in which the adolescent unwillingly touched another's genitalia. *Physical abuse or assault* (PAA) included being (a) locked in a closet or tied up by an adult in charge; (b) thrown across the room or against a wall, car, floor, or other hard surface by an adult in charge, so that he/she was hurt pretty badly; (c) beaten up, hit with a fist, or kicked hard by an adult in charge; (d) grabbed around the neck or chocked by an adult in charge; (e) attacked or threatened with a gun, knife, other weapon, or other object; (f) physically attacked without a weapon, including fists, but thought the person was trying to kill or seriously injure him/her; or (g) beat up, attacked, or hit with fists or an object so hard he/she was hurt pretty badly. *Witnessed domestic violence* (WDV) included episodes in which the adolescent observed that parents (a) punched, hit, or beat up one another; (b) choked one another; (c) hit one another with an object; or (d) threatened one another with a gun, knife, or other weapon. *Witnessed community violence* (WCV) included direct observation of (a) seeing someone shoot, cut, or stab someone; (b) seeing someone being molested, sexually assaulted, or raped; (c) being robbed or mugged; (d) seeing someone threatened with a gun, knife, or other weapon; (e) seeing someone beaten up, hit, punched, or kicked. Cronbach's alphas for the victimization variables were 0.99, 0.72, 0.64, and 0.89, respectively, indicative of good internal consistency.

2.2.3. High risk behavior—Alcohol use was assessed using a modified version of the substance use and delinquency assessment modules from the original National Survey of Adolescents, which can be obtained by contacting the authors (Kilpatrick et al., 2000, Kilpatrick, Ruggiero, et al., 2003; Kilpatrick, Saunders, & Smith, 2003). Alcohol use was assessed with two variables: *nonexperimental alcohol use* included whether adolescents had ingested five or more drinks in a given day over the past year, and *alcohol use – gotten drunk* included whether adolescents had ever gotten drunk or very high from alcohol. A drink was defined as a 12-oz (340-g) can of beer, 4-oz (113-g) of wine, or a shot (approximately 1-oz [28-g]) of liquor. Drug use was assessed with two variables: *drug use* –

ever included whether adolescents had ever used drugs, and *nonexperimental drug use* included whether adolescents had used drugs on four or more occasions in the past year. Drug use was characterized by marijuana, inhalants, or hard drugs, including cocaine, heroin, LSD, or non-medical use of prescription drugs (NMUPD), which included sedatives, stimulants, painkillers, and steroids. NMUPD was included due to its growing prevalence among adolescent populations (McCauley et al., 2010), subjective effects, addictive potential, and lethality similar to that of other hard drugs. *Delinquent behavior* was assessed with a modified version of the scale developed by Elliot, Huizinga, and Ageton (1985) for the National Youth Survey, which included whether the adolescent had (a) purposely damaged or destroyed property; (b) stolen something, including a vehicle; (c) beaten up or physically attacked someone; (d) broken into a vehicle, office building, store, or house to steal something; (e) sold drugs; (f) been involved in a gang fight; (g) used force to get money or things from others; (h) attacked someone with or without a weapon; (i) forced someone to do something sexual; or (j) been arrested or in jail.

2.3. Procedure

Interviews were conducted in English using computer-assisted telephone interviewing technology. (For a review of this technology, please refer to Kilpatrick et al., 2000). During the brief interview, interviewers provided parents with a brief description of the study and interview topics, informed them that the adolescent could refuse to answer any questions or terminate the interview at any time, and obtained parental permission to contact the adolescent. Adolescent assent to participate was obtained before the interview began.

Two steps were taken to ensure that adolescents could answer the interview questions freely and privately: (1) interviewers asked whether the adolescent was in a situation where privacy could be assured and he/she could answer in an open and honest manner. If the adolescent indicated that he/she could not, the interviewer offered to reschedule the interview; (2) the interview was primarily designed with closed-ended questions (i.e., yes or no) to reduce the likelihood of negative consequences if others were listening. Following completion, adolescents received an NSA certificate of participation and monetary compensation of $5.

Several steps were taken to recontact participants for the Wave 2 assessment, including (1) contacting participants at the telephone number on file, (2) obtaining three additional telephone numbers from past residences using ChoicePoint Credit Information Bureau, (3) sending letters to the last known address, and (4) recontacted ChoicePoint after 3 months to obtain updated telephone numbers.

2.4. Participant protection

Based upon federal guidelines for studies funded by the U.S. Department of Justice, investigators are precluded from disclosing any information obtained in the study without participant consent. To further protect the NSA participants, additional measures were developed to identify adolescents in potentially dangerous situations. Specifically, adolescents indicated if he/she (a) had been sexually abused in the past year, (b) had been hit or physically assaulted by a family member living in the household in the past year, or (c) had not disclosed the sexual or physical assault to anyone. If an adolescent answered yes to any of these questions, a clinician on the project team interviewed the adolescent; adolescents deemed to be in current danger were encouraged to make a voluntary report to child protective services. In addition, adolescents were asked if they would like to be contacted by a counselor to discuss his/her feelings; only two adolescents requested to be contacted by a counselor, which is unlikely to have affected results. Clinicians were prepared to make the report if the adolescent was unwilling; no clinicians had to make a

report throughout the duration of the study. Finally, all adolescents were offered the toll-free number of Child Help, a national telephone counseling program for at-risk youth.

2.5. Data analysis plan

Latent variable framework, or structural equation modeling, was implemented using LISREL (Jöreskog & Sörbom, 1993). First, each latent construct (i.e., high risk behavior and victimization) was fit individually at each time point, followed by fitting measurement models for both latent constructs over time to establish that the constructs were measured similarly at Wave 1 and 2 (French & Mantzicopoulos, 2007). A cross-lagged structural model was then fit to the latent variables (see Figs. 1–3), to examine the relation between high risk behavior and victimization over time.

Maximum likelihood estimation was used to analyze the covariance matrices of the observed variables, to examine the fit of the hypothesized model and the relations among latent constructs. *A priori* significance levels of $\alpha = 0.05$ were used for all statistical tests. Data were analyzed to detect non-normal distributions, skewness, and kurtosis of each observed variable. Model fit was estimated using the chi-square statistic (χ^2), where a significant χ^2 indicates a lack of fit between the theoretical model and the sample data and suggests that the model may not be empirically supported (Hoyle, 1995); Comparative Fit Index (CFI) and Bentler–Bonett normed fit index (NFI; Bentler & Bonett, 1980), where values greater than 0.90 indicate good model fit; and the Standardized Root Mean Squared Residual (SRMR), in which values less than 0.08 indicate adequate model fit (Jöreskog & Sörbom, 1990).

3. Results

Descriptive statistics on high risk behaviors and types of victimization exposure (overall and by gender) are reported in Table 1. Study variables were highly related, with 31% of variables resulting in small effect sizes, 57% in medium effect sizes, and 12% in large effect sizes (Cohen, 1988). Further, effect sizes among high risk variables (range = 0.39 to 2.34) were medium (46%) to large (54%); effect sizes among victimization variables (range = 0.02 to 0.67) were small (39%) to medium (61%); and effect sizes between high risk and victimization variables (range = 0.02 to 0.69) were small (39%) to medium (61%). Substance use behaviors and delinquent behaviors were highly inter-related, so were considered in the same latent construct for further analyses.

3.1. Structural equation model in the full sample

3.1.1. Measurement model—The baseline model for victimization provided a good fit to the sample data, χ^2 (15, $N = 3614$) = 812.39, $p < 0.001$, NFI = 0.94, CFI = 0.94, SRMR = 0.05. Victimization at Wave 1 significantly predicted victimization at Wave 2 ($\beta = 0.68$, $B = 22.76$, $p < 0.05$) suggesting invariance of the construct over time. Similarly, the baseline model for high risk behavior provided an adequate fit, χ^2 (29, $N = 3614$) = 4253.85, $p < 0.001$, NFI = 0.92, CFI = 0.92, SRMR = 0.08. High risk behavior at Wave 1 significantly predicted behavior at Wave 2 ($\beta = 0.73$, $B = 43.88$, $p < 0.05$). Finally, separate models were sequentially fit to test the invariance of factor loadings and stability coefficients across time in each construct. Results indicated a significant decline in fit for victimization, $\Delta\chi^2$ (8, $N = 3614$), $p < 0.001$, and high risk behavior, $\Delta\chi^2$ (10, $N = 3614$), $p < 0.001$; suggesting that factor loadings lacked invariance across time.

3.1.2. Cross-lag analyses—The cross-lag model was fit to the sample data to examine the relation between victimization and high risk behavior (see Fig. 1). Results indicated that the model combining these constructs provided adequate fit to the hypothesized model,χ^2

(122, $N = 3614$) = 8198.33, $p < 0.001$, NFI = 0.90, CFI = 0.91, SRMR = 0.10. Investigation of individual paths revealed that victimization at Wave 1 significantly predicted high risk behavior incidence at Wave 2 ($\beta = 0.42$, $B = 16.47$, $p < 0.05$), and risky behavior at Wave 1 significantly predicted victimization incidence at Wave 2 ($\beta = 0.23$, $B = 9.30$, $p < 0.05$). Additionally, paths from the victimization and high risk behavior latent constructs were investigated separately by time point. Results indicated that victimization and high risk behavior were significantly related at Wave 1 ($\beta = 0.41$, $B = 19.32$, $p < 0.05$), and also at Wave 2 ($\beta = 0.57$, $B = 21.55$, $p < 0.05$) assessment.

3.2. Gender differences

Structural equation models were analyzed separately for boys ($N = 1806$) and girls ($N = 1808$) to investigate gender differences in the relation between victimization and high risk behavior. Sexual abuse was limited to investigation among girls, due to the low incidence ($N = 6$) of boys reporting new sexual victimization at Wave 2. Therefore, only physical abuse/assault, witnessed community violence, and witnessed domestic violence variables were included in the victimization latent construct. All procedures for analyzing the measurement model and cross-lag analyses followed that of the model in the full sample as described above.

3.2.1. Boys—For boys, the baseline measurement model for victimization provided good fit to the sample data, χ^2 (5, $N = 1806$) = 165.69, $p < 0.001$, NFI = 0.98, CFI = 0.98, SRMR = 0.09. As with the overall model, victimization at Wave 1 significantly predicted victimization incidence at Wave 2 ($\beta = 0.65$, $B = 19.17$, $p < 0.05$) for the boys, suggesting invariance of the construct over time. The baseline model for high risk behavior provided adequate fit for the sample of boys, χ^2 (29, $N = 1806$) = 2350.70, $p < 0.001$, NFI = 0.92, CFI = 0.92, SRMR = 0.21. Further, high risk behavior at Wave 1 significantly predicted high risk behavior incidence at Wave 2 ($\beta = 0.77$, $B = 33.06$, $p < 0.05$).

Results of the cross-lag model analyses provided adequate fit to the sample of boys, χ^2 (92, $N = 1806$) = 4773.74, $p < 0.001$, NFI = 0.89, CFI = 0.89, SRMR = 0.23. As Fig. 2 shows, examination of individual paths revealed that victimization at Wave 1 significantly predicted high risk behavior at Wave 2 ($\beta = 0.03$, $B = 1.55$, $p < 0.05$), and high risk behavior at Wave 1 significantly predicted victimization at Wave 2 ($\beta = 0.07$, $B = 2.96$, $p < 0.05$). Finally, the paths between high risk behavior and victimization were significant at Wave 1 ($\beta = 0.71$, $B = 23.06$, $p < 0.05$), and at Wave 2 ($\beta = 0.28$, $B = 9.66$, $p < 0.05$).

3.2.2. Girls—The baseline measurement model for victimization (i.e., physical abuse/assault, witnessed community violence, and witnessed domestic violence) provided adequate fit to the sample of girls, χ^2 (5, $N = 1808$) = 505.58, $p < 0.001$, NFI = 0.94, CFI = 0.94, SRMR = 0.06. Further, victimization at Wave 1 significantly predicted victimization incidence at Wave 2 ($\beta = 0.68$, $B = 12.42$, $p < 0.05$), suggesting invariance of the construct over time. For girls, the baseline model for high risk behavior provided good fit to the data, χ^2 (29, $N = 1808$) = 2343.91, $p < 0.001$, NFI = 0.90, CFI = 0.90, SRMR = 0.08. High risk behavior at Wave 1 significantly predicted high risk behavior at Wave 2 ($\beta = 0.67$, $B = 19.72$, $p < 0.05$).

Results of the cross-lag model did not provide an adequate fit to the sample of girls, χ^2 (92, $N = 1808$) = 2385.98, $p < 0.001$, NFI = 0.85, CFI = 0.86, SRMR = 0.12. The individual paths of this model could not be interpreted, as the overall cross-lag model did not provide adequate fit to the data.

3.3. Sexual abuse in girls

Additional analyses were conducted to examine paths of sexual abuse in girls. Procedures followed those of the overall abuse model, although the victimization latent construct consisted of sexual abuse only. A baseline measurement model for sexual abuse could not be conducted, due to lack of degrees of freedom. Sexual abuse at Wave 1 significantly predicted sexual abuse at Wave 2 ($\beta = 0.50$, $B = 33.47$, $p < 0.05$). The baseline model for high risk behavior provided a good fit to the sample data, χ^2 (29, $N = 1808$) = 2343.91, $p < 0.001$, NFI = 0.90, CFI = 0.90, SRMR = 0.08, although high risk behavior at Wave 1 did not significantly predict high risk behavior incidence at Wave 2 ($\beta = 0.80$, $B = 11.29$, *n.s.*).

Results of the cross-lag model investigating sexual abuse provided a good fit to the sample of girls, χ^2 (46, $N = 1808$) = 5753.42, $p < 0.001$, NFI = 0.99, CFI = 0.99, SRMR = 0.08. As shown in Fig. 3, the individual path from sexual abuse at Wave 1 to high risk behavior at Wave 2 was significant ($\beta = 0.47$, $B = 16.68$, $p < 0.05$), although high risk behavior at Wave 1 did not significantly predict sexual abuse at Wave 2 ($\beta = 0.22$, $B = 3.09$, *n.s.*). Finally, high risk behavior and sexual abuse were not significantly related to one another at Wave 1 ($\beta = 0.46$, $B = 7.65$, *n.s.*), but were significantly related at Wave 2 ($\beta = 0.42$, $B = 11.24$, $p < 0.05$).

4. Discussion

Utilizing a nationally representative sample of adolescents, this study builds upon previous literature by further supporting the link between high risk behavior (i.e., alcohol use, substance use, delinquent behavior) and victimization, while providing additional information regarding direction of the link based upon gender. Further, these results demonstrate the acute nature of the findings, as significant effects were found over time ($M = 15.29$ months, $SD = 4.58$ months). Not surprisingly, there was a high correlation between engagement in substance use behaviors and engagement in delinquent behaviors, underscoring the importance of examination of both forms of high risk behaviors. Specifically, while 8–21% of adolescents had engaged in alcohol use, drug use, or delinquent behavior by the Wave 2 interview, over 50% of adolescents had engaged in at least one of these behaviors; suggesting a strong link between engagement in these behaviors. When examining the overall sample, results were consistent with past research, confirming a link between victimization and high risk behavior (CDC, 2005; Danielson et al., 2006; Danielson et al., 2009; Widom et al., 2006). At first glance, findings seem supportive with both theoretical frameworks (i.e., the coping theory of behavior and the lifestyles and routine activities theory). However, when examined separately by gender, different patterns emerged based upon the sequential order of variables and type of victimization.

Specifically, results indicated that boys who engaged in high risk behavior (i.e., alcohol use, drug use, and delinquent behavior) were at increased risk for exposure to physical abuse/assault and/or witnessed violence later in adolescence. Simultaneously, boys who were exposed to physical abuse/assault and/or witnessed violence were more likely to engage in later high risk behavior than their non-victimized counterparts. These results were inconsistent with previous literature, which had demonstrated a significant relationship between victimization and high risk behavior for girls, but not for boys (Krischer & Sevecke, 2008; Widom et al., 2006). However, previous literature was limited, as researchers have typically used cross-sectional data and combined several types of victimization in their investigations (Simpson & Miller, 2002). This made it difficult to form conclusions regarding gender differences in specific types of victimization, especially given support for greater rates of sexual abuse among girls, and physical abuse and witnessed violence among boys (Finkelhor et al., 2009; Hanson, Borntrager, Self-Brown et al., 2008). These results make sense given the nature of the behaviors, as boys who engage in gang

activity (an example of high risk behavior) may be more likely to be exposed to opportunities for physical assault and witnessed community violence. In turn, this cycle may be perpetuated by further delinquent behavior and engagement in other high risk behaviors (e.g., substance use).

When examining victimization in girls, different results emerged based upon the type of victimization under investigation. Results on physical abuse/assault and/or witnessed violence among girls could not be interpreted due to inadequate fit of the cross-lag model. However, results were consistent with the coping theory when investigating sexual abuse. Girls who were exposed to sexual abuse were more likely to engage in later high risk behavior than their counterparts, but girls who engaged in early high risk behavior were not at increased risk for later sexual abuse. Further investigation of sexual abuse did not indicate significant differences in age groups (e.g., younger vs. older girls) – showing the relevance of these findings across 12 to 17 year olds. Overall, these results indicate that girls who are exposed to sexual abuse may be a distinct group of girls who differ from girls exposed to other types of violence. For example, post hoc analyses indicated that girls exposed to sexual abuse are six times more likely to refrain from delinquent behaviors than to engage in them.

These results were consistent with previous literature in confirming the association between victimization and high risk behavior for girls (Krischer & Sevecke, 2008; Simpson &Miller, 2002;Widomet al., 2006), while building upon these previous findings by: identifying the direction of the link between victimization and high risk behavior, utilizing of a nationally representative sample of adolescents, and using careful measurement of different victimization types among girls.

4.1. Limitations

Limitations within this study may reduce the generalizability of the findings. First, assessment data were self-report and retrospective in nature, which increased the likelihood of common method variance and precludes comprehensive assessment of adolescent behaviors. In addition, some of the measures utilized within the study were modified from previous nationally-representative studies, but lacked validation. Thus, further studies should attempt to validate these scales, as it is imperative to have adequate measures of the latent constructs. Second, only adolescents with household telephones were sampled, which decreases generalizability of study findings. However, it is likely this sample is representative of the great majority of adolescents across the United States, because data indicate that most households are equipped with telephone coverage (Keeter, Kohut, & Presser, 2000). Third, only a limited number of high risk variables were assessed within the study, while other high risk variables may be associated with adolescent victimization. For example, inclusion of other variables such as risky sexual behavior and bullying may have enhanced our ability to draw more precise interpretations. Fourth, gender comparisons in adolescent sexual abuse could not be performed, due to the low prevalence of adolescent boys that reported new incidences of sexual abuse between the Wave 1 and time 2 assessments ($n = 6$). This is not surprising given the low prevalence of reported sexual abuse in adolescent boys (Hanson et al., 2008; Stevens et al., 2005), although these comparisons may have strengthened the findings. In addition, interpretation of physical abuse/assault and/or witnessed violence could not be conducted due to inadequate fit of the model. Further, findings specific to sexual abuse in girls should be interpreted with caution, given the low prevalence of sexual abuse reported at Wave 2 (3.9%) and limited power for the paths within this model ($\pi = 0.20$ to 0.54; Hancock, 2006). In addition, attrition could have influenced findings in the current study, as 69% of Wave 1 participants completed the Wave 2 assessments. However, data indicated few differences between completers and non-completers on important variables. Finally, results were based on data from two waves,

which does not provide much data regarding the trend of these variables; a three wave study would have provided many advantages for handling change over time and missing data.

4.2. Implications for future research, policy, and practice

These findings have implications for the treatment of victimization and high risk behavior in adolescents – especially given that effects were found in the short time frame. First, results supporting a strong relationship between victimization at Wave 1 and 2 highlight the importance of targeting future victimization among adolescents with a victimization history, in attempt to prevent incidences of revictimization. Second, findings demonstrated a significant link between victimization and high risk behavior, which suggests that risky behavior is a potential factor to address when treating adolescent victimization (or conversely, to assess for victimization history in youth who are in treatment for substance use problems). To address this relationship, the field is moving toward the development and evaluation of integrated interventions that involve treatment for victimization along with prevention or treatment of high risk behaviors in adolescents, such as Seeking Safety (Najavits, Gallop, & Weiss, 2006), Trauma Systems Therapy (Saxe, Ellis, & Kaplow, 2007) and Risk Reduction through Family Therapy (RRFT; Danielson, 2006). For example, RRFT is an intervention designed for adolescents who have been exposed to sexual assault, which aims to reduce risk of high risk behaviors following victimization. Although interventions that integrate symptoms of victimization with prevention of high risk behavior are recommended, empirical data supporting the efficacy and effectiveness of recently developed approaches is limited (Danielson et al., 2006). Therefore, empirical investigations of these promising interventions are imperative to treating the correlates of adolescent victimization.

Results suggest that it also may be important to consider the likelihood of future victimization when treating adolescents who are engaging in high risk behaviors. This is especially important for boys who are engaging in high risk behavior, as findings indicate that this population may be at increased risk for physical abuse/assault and/or witnessed violence. Family-based, ecological approaches are frequently utilized in the treatment of high risk behaviors (i.e., Henggeler, Pickrel, & Brondino, 1999; Waldron, Slesnick, Brody et al., 2001); however, these results suggest that addressing risk reduction for victimization may be another relevant topic for inclusion in these integrated approaches.

Overall, findings provide further support for the link between victimization and high risk behavior – demonstrating gender differences between types of victimization, including a bi-directional relation among boys and uni-directional relation among girls. Further research is necessary to increase generalization and knowledge regarding this important link. Specifically, studies involving multi-measure and multi-informant approaches would provide additional support for these findings. Further, assessment of other types of high risk behaviors may explain additional variance in the relationships and could identify gender differences that did not exist within the high risk variables utilized here. Therefore, more studies are necessary to examine further the direction of the link between victimization and high risk behavior across gender, as well as to replicate the findings from the current study.

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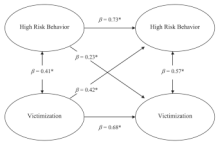

Fig. 1.
Overall model.

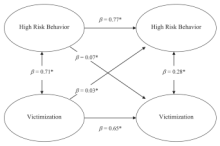

Fig. 2.
Boys – physical abuse/assault, witnessed community violence, and witnessed domestic violence.

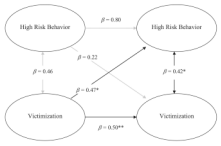

Fig. 3.
Girls – sexual abuse.

Table 1

Descriptive statistics.

	Overall (*N* = 3614)		**Girls (*N* = 1808)**		**Boys (*N* = 1806)**	
	Wave 1	**Wave 2**	**Wave 1**	**Wave 2**	**Wave 1**	**Wave 2**
	% Yes		**% Yes**		**% Yes**	
High risk behavior						
Alcohol use – 5 or more drinks	13.6	20.4	13.6	18.4	13.6	22.4
Alcohol use – gotten drunk	16.0	21.4	16.9	20.5	15.1	22.3
Drug use – Ever	18.6	16.6	19.4	15.8	17.9	17.4
Drug use – 4 or more occasions	11.7	10.4	11.1	8.9	12.2	11.8
Delinquency	20.1	8.6	13.4	5.9	26.9	11.2
Any one of the above	25.1	50.8	25.9	49.9	24.3	51.7
Victimization						
Sexual abuse	8.0	2.2	12.2	3.9	3.8	0.5
Physical abuse and assault	19.7	6.4	17.1	5.8	22.4	7.0
Witnessed community violence	39.2	19.4	37.7	18.5	40.6	20.4
Witnessed domestic violence	7.9	1.3	9.0	1.6	6.9	1.0

Note: Wave 1 includes prevalence of high risk behavior or victimization, while Wave 2 includes incidence of high risk behavior or victimization since the last interview (*M* = 15.29 months, *SD* = 4.58 months).