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The impact of low self-control and delinquent peer associations on bullying perpetration and victimization among South Korean adolescents: Time-concurrent, time-lagged, and latent growth curve modeling

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ABSTRACT
This study examines the impact of low self-control and deviant peer affiliations on bullying perpetration and victimization in South Korea. Our sample is drawn from a five-wave, longitudinal study of 2,844 Korean adolescents (ages 11–15), compiled by the Korean Youth Panel Study. Theoretically driven models are tested using time-concurrent and time-lagged models to assess the time-ordered relationship between deviant peer affiliations and bullying perpetration and victimization, and latent growth curve models to assess developmental trajectories of bullying outcomes. Low self-control is incorporated as a time-invariant construct, and deviant peer affiliations is incorporated as a time-varying construct. The impact of covariates drawn from the mixed model is slightly different for bullying perpetrators and victims. The time-concurrent effect of deviant peer associations is stronger than the time-lagged effect on both bullying perpetration and victimization. Deviant peer affiliations fully mediate the link between low self-control and only bullying victimization in a full model.

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Bullying; victimization; low self-control; delinquent peer associations

Bullying perpetration and victimization are serious problems affecting adolescents across the globe. Whether perpetrator or victim, bullying can negatively affect school performance, social skills, and psychosocial health (Fox & Boulton, 2005; Jenkins, Demaray, Fredrick, & Summers, 2016; Juvonen, Wang, & Espinosa, 2011). Intrapersonal characteristics (e.g., low vs. high self-control) and interpersonal relationships (e.g., prosocial vs. delinquent peer associations) influence adolescent bullying involvement, as well as social and emotional development (Hemphill, Tollit, & Herrenkohl, 2014). Low self-control in adolescents, for example, is more likely to predict physical health, substance dependence, and criminal offending outcomes (Moffitt et al., 2011). Similarly, adolescents who are identified as bullying perpetrators and/or victims are more likely to associate with delinquent peers and engage in deviant behaviors, such as delinquency, criminal activities, and alcohol/drug misuse (Bender & Losel, 2011; Cullen, Unnever, Hartman, Turner, & Agnew, 2008; DeCamp & Newby, 2015; Farrington, Loeber, Stallings, & Ttofi, 2011; Losel & Bender, 2014; Ttofi, Farrington, Losel, Crago, & Theodorakis, 2015; Ttofi, Farrington, Losel, & Loeber, 2011).

The homophily principle helps explain the interconnections among bullying involvement, rejection by prosocial peers, and increased involvement with delinquent peers (McPherson, Smith-Lovin, & Cook, 2001). According to the homophily principle, adolescents bond with peers who are similar in terms of socio-demographic (e.g., age, gender, race/ethnicity, and socio-economic status), intrapersonal (e.g., low self-control), and behavioral characteristics (e.g., delinquency, academic achievement; Broidy, Daday, Crandall, Sklar, & Jost, 2006; Espelage, Holt, & Henkel, 2003; Lauritsen &
Laub, 2007; Low, Polanin, & Espelage, 2013; McPherson et al., 2001; Mustaine & Tewksbury, 2000; Schreck, Wright, & Miller, 2002). Farrell and Danish’s (1993) peer selection model highlights how adolescents self-select themselves into peer groups with members who share similar levels of self-control, while also emphasizing the socialization function of peer groups to introduce, reinforce, and maintain delinquent behaviors among its members (Farrell & Danish, 1993). In addition, bullying perpetrators and victims are more likely to associate with delinquent peers because they are often excluded from prosocial peer groups due to problems with reactive aggression (Dodge & Coie, 1987) and emotional dysregulation (Shields & Cicchetti, 2001), which makes it more difficult to maintain friendships with their prosocial counterparts (Estell et al., 2009).

The extant literature, however, also suggests another potential explanation: affiliation with deviant peers makes adolescents more likely to engage in bullying to elicit approval and acceptance from deviant peers (Haynie et al., 2001; Mouttapa, Valente, Gallaher, Rohrbach, & Unger, 2004; Poulin, Dishion, & Burrraston, 2001; Weiss et al., 2005). Further, it is plausible that risky lifestyles (e.g., affiliation with deviant peers) increase the likelihood of victimization due to exposure to high-risk situations that create criminogenic opportunities. However, the effect of risky lifestyles on bullying victimization has been rarely examined in Western cultures due to the differential power between bullies and victims of bullying that makes victims vulnerable. In Asian culture, however, bullying is defined as a collective act valued for the benefit of “interpersonal harmony” and “group peer rejection” (Chan & Wong, 2015; Cho, Wooldredge, & Sun Park, 2015; Chui & Chan, 2013). Given the differential definition of bullying in both cultures, it is reasonable to examine the potential pathways between risky lifestyles and bullying victimization in the Asian cultures. At present, little longitudinal research exists that can untangle the temporal order and causal inference of low self-control and deviant peer associations on bullying perpetration and victimization, respectively, among Korean youth.

The current study intends to make four noteworthy contributions to the research on the correlates of bullying perpetration and victimization among Korean youth. First, this study tests Gottfredson and Hirschi’s (1990) general theory of crime in a unique Korean context in which the concept of low self-control is important for understanding both offender’s criminality and victim precipitation. Next, this study examines the mediating effect of risky lifestyles, such as affiliation with deviant peers, on the link between low self-control and bullying outcomes (i.e., bullying perpetration and victimization) among Korean youth. Examining these effects, thus allows us to assess the external validity of lifestyle-routine activities theory. In doing so, it uses five-year data from the Korean Youth Panel Survey in a longitudinal research design to examine either the bidirectional/reciprocal or time-ordered relationship between affiliation with deviant peers and both bullying outcomes. Finally, the study examines the growth effect—how the change in both bullying outcomes is related to the change in risky lifestyles (e.g., affiliation with deviant peers) across time. This research is vital as self-control and peer associations have important implications for reducing bullying involvement and subsequent mental health, behavioral health, and academic consequences (Murphy & Eisenberg, 2002).

**Theoretical background**

*Impact of low self-control within the individual trait approach*

Gottfredson and Hirschi (1990) formulated the “general theory of crime,” addressing the root causes of criminality, which they consider to be low self-control in conjunction with opportunities. Individuals with low self-control, for example, are more likely to be impulsive, self-centered, short-sighted, thrill-seeking, physically inclined, risk-taking, and belligerent, without anticipating the long-term consequences of their behaviors (Gottfredson & Hirschi, 1990). Moreover, individuals with low self-control are less likely to fear potential negative consequences of violent acts, and they are less likely to make changes to their risky lifestyles, which makes them more likely to engage in
behaviors (e.g., substance use, property damage) that coincide with delinquent activities (Fong, Vogel, & Vogel, 2008; Higgins, Tewksbury, & Mustaine, 2007; Reisig & Pratt, 2011; Schreck, Stewart, & Fisher, 2006; Turanovic & Pratt, 2014). Gottfredson and Hirschi (1990) were also concerned with opportunities as a key predictor. Potential offenders have a propensity to take advantage of criminal opportunities when opportunities are presented. In other words, individuals with low self-control have to be presented with opportunities for acts of force and fraud to be manifested. However, they did not fully explain opportunities. Thus, low self-control is considered the primary factor for anti-social behavior. Any other factors correlated with antisocial behavior should be rendered ineffective once low self-control is controlled. The exclusion of low self-control from empirical analyses might mislead the impact that criminals cause.

Since the overlap between victims and offenders suggests that they possess similarities in demographic and trait characteristics (Cho & Wooldredge, 2016), low self-control should explain not only what motivates people to offend but also why they are victimized. The notion that low self-control may be related to victimization was first solidified with Schreck’s (1999) reformulation of Gottfredson and Hirschi (1990) theory. Schreck’s self-control theory is also based on the concept of low self-control and is essential for understanding the origins of the victims’ role—why certain individuals are more vulnerable to victimization and how victims contribute, as a causative factor, to their own victimization. Schreck (1999) argued that, like offenders, individuals with low self-control are more likely to put themselves into risky circumstances creating opportunities for crime and less likely to have foresight of their actions and consequences to avoid being a victim. His findings revealed that that criminality was attributable to low self-control, which in turn, had a significant direct effect on both personal and property victimization. Consistent with the generality of Gottfredson and Hirschi (1990) theory, a considerable amount of research has provided strong empirical evidence supporting for Schreck’s self-control theory for all types of victimization (Franklin, Franklin, Nobles, & Kercher, 2012; Schreck, Stewart, & Fisher, 2006; Schreck et al., 2002; Stewart, Elifson, & Sterk, 2004; Tillyer, Fisher, & Wilcox, 2011). Theories, however, have historically overlooked how low self-control contributes to the risk of bullying perpetration and victimization.

**Impact of deviant peer affiliations in the opportunity approach**

Research on victimization has highlighted the role of opportunities in explaining victimization and similar theoretical assumptions of how the contextual or situational factors create criminal opportunities, which, in turn, affect one’s vulnerability to crime (Cohen & Felson, 1979; Cornish & Clarke, 1986; Fisher, Sloan, Cullen, & Lu, 1998; Hindelang, Gottfredson, & Garofalo, 1978; Miethe & Meier, 1994). An enormous body of research on criminal opportunities has used Cohen, Kluegel, and Land’s (1981) lifestyle-routine activities theory to explain differences in victimization risk with the mediating effects of four risk predictors: (a) exposure to crime, (b) proximity to potential offenders, (c) target attractiveness, and (d) guardianship (Cohen et al., 1981; Miethe & Meier, 1994). Situational risky predictors, such as the campus party culture (Lasky, Fisher, Henriksen, & Swan, 2017), classroom-related activities, and intramural sports extracurricular activities (Peguero, 2008) that create or facilitate criminal opportunities, are the proximate effects on crime and victimization as opposed to individual traits such as low self-control.

Affiliation with deviant peers is considered as a significant cause for the likelihood of victimization, indicative of exposure to crime that increases the likelihood of victimization. Individuals who associate with deviant peers are more likely to be exposed to high-risk people, and they would be more vulnerable to motivated offenders, making them more likely to be victimized. Vézina and his colleagues (2011) found that girls who were highly affiliated with deviant peers were more likely to engage in risky lifestyles and were at high risk of dating violence victimization. Relationships that youths have with peers are potentially related to victimization risk such that youth with closer ties to more deviant peers are more likely to be vulnerable to victimization (Posick, 2013), exposed to
motivated offenders (Schreck & Fisher, 2004), and to have weaker guardianship (Gottfredson & Hirschi, 1990). Empirical research within criminology has consistently demonstrated that criminal behavior is influenced by deviant peers (Pratt & Cullen, 2000; Warr, 2002; Warr & Stafford, 1991). As such, the literature on peer socialization recognizes that adolescents have certain characteristics that enable them to select others like themselves into their peer networks. Adolescents who share peer networks typically have similar lifestyles, relatively similar offending histories, and engage in mutual processes that influence future behaviors (Glueck & Glueck, 1950; Hindelang et al., 1978). When adolescents begin to be involved in a deviant peer circle, they encounter more criminal opportunities. Thus, adolescents who join deviant peer groups are generally at higher risk of physical aggression, violence, and substance use. Deviant peer norms are mutually reinforced between adolescents and their peers through the desire to maintain status and demonstrate loyalty (Sutherland, 1947).

Gottfredson and Hirschi (1990) also argued that individuals with low self-control self-select to be associated with others who have low levels of self-control that also exhibit anti-social behaviors. This is not the learning mechanism for understanding the relationship between crime and affiliation with deviant peers but rather the self-selection by individuals who are impulsive, self-centered, shortsighted, and risk-taking. The extant research has reported that delinquent peer associations were positively related to delinquency (Lonardo, Giordano, Longmore, & Manning, 2009; Weerman & Smeenek, 2005), and subsequent alcohol use (Fergusson, Swain-Campbell, & Horwood, 2002; Nash, McQueen, & Bray, 2005; Van Ryzin, Fosco, & Dishion, 2012). However, De Kemp and his colleagues (2006) found that adolescents’ delinquency increased their peers’ delinquent behavior but not vice versa.

**Integrated approach between low self-control and opportunity**

A promising development of this study is the integration of opportunity theory with the general theory of crime to better understand both the situational contexts and individual traits related to crime and victimization. Many studies have used the integration of both theories as a theoretical framework, examining the effect of low self-control on crime and victimization when opportunity measures (e.g., risky lifestyles) were presented. Schreck et al. (2002) examined factors that test both theories on the risk for victimization. Their findings revealed that low self-control is directly related to risk of victimization, while delinquent peer associations significantly predicted victimization, both directly and indirectly, through adoption of risky lifestyles. Schreck and Fisher (2004) also investigated how the link between low self-control and risky lifestyles increases risk for victimization and found that engaging in delinquent activities and associating with delinquent peers significantly contributed to victimization. Furthermore, individuals with low self-control have a higher risk of becoming victims and are more likely to engage in delinquent activities and have delinquent peer associations after becoming victims of violence (Schreck et al., 2006). In addition, Franklin et al. (2012) found that self-control deficits had a direct effect on female victims, even after controlling for routine risky activities. Sullivan, Ousey, and Wilcox (2016) investigated the relationships between impulsiveness and delinquent peer associations on violence perpetration and victimization among an adolescent sample. Supporting the individual trait approach, they found higher levels of impulsivity predicted more involvement in perpetration and victimization. Moreover, consistent with the opportunity approach, they found associating with delinquent peers also increased involvement in perpetration and victimization. Some studies revealed that risky lifestyles fully or partially mediated the link between low self-control and victimization, while low self-control exerted both direct and indirect/mediated effect (Turanovic, Reisig, & Pratt, 2015) even in cyberdeviance (Holt, Bossler, & May, 2012). As aforementioned, a handful of studies related to the mediating role of risky lifestyles on the link between low self-control and victimization are exclusively conducted in Western culture, but a limited number of studies were conducted to understand the relationship between low self-control, opportunity measures, and bullying within the context of the integrated approach of low
self-control and opportunity theories. Moon and Alarid (2015) found that youth with less self-control were more likely to physically and psychologically bully others, and the significant effect of low self-control weakened when opportunity factors were presented. In particular, associations with bullies were a stronger predictor of bullying than low self-control.

Many efforts have been made to assess the integrated approach between low self-control and opportunity measures on crime and victimization in Korean literature. Cho and Wooldredge (2016) found that Korean youth with low self-control were generally at high risk of bullying victimization and showed that the rate of bullying victimization gradually decreased. Low self-control was rendered insignificant on the rate of change in bullying victimization after controlling for risky lifestyles. Also, Woo and Cho (2013) and Cho (2016) reported that low self-control increased victimization risk even after controlling for risky lifestyles among Korean youth. Reyns and his colleagues (2016), however, found that low self-control did not have a positive direct effect on violent victimization but increased violent victimization risk through risky lifestyles among Korean prison inmates. Despite such efforts, little is known about the impact of delinquent peer associations as risky lifestyles on victimization within the context of the integrated approach. However, Cho and Wooldredge (2016) found that delinquent behaviors among Korean youth were significantly and positively related to the initial level and rate of change in bullying victimization over time in the presence of low self-control.

**Present study**

Our study uses a longitudinal design and examines whether adolescents with low self-control and deviant peer affiliations are more likely to be involved in bullying perpetration and victimization with the same theoretical background—the integration between individual trait and opportunity perspectives. Our research is unique in that it attempts to identify the bidirection (i.e., reciprocal) and/or time-ordering relationship between deviant peer affiliations and both bullying perpetration and victimization via the time-current and time-lagged models as well as developmental trajectories via latent growth curve modeling (LGCM). First, we examine differences in bullying perpetration and victimization over time, focusing on the intrapersonal characteristics of gender and self-control. We also investigate the effect of deviant peer affiliations on perpetration and victimization within each time point. For instance, we compared the effects of deviant peer affiliations at Time 1 on bullying perpetration and victimization at Time 1 (time-concurrent effects) as well as the effect of deviant peer affiliations at Time 1 on bullying perpetration and victimization at Time 2 (time-lagged effects). Further, we examine how the rate of change in deviant peer affiliations over time is related to the rate of change of bullying perpetration and victimization over time. Finally, we examined both the direct and indirect effects of low self-control on bullying perpetration and victimization through deviant peer affiliations.

**Research questions**

Using longitudinal data from a nationally representative sample of adolescents in South Korea, our study aims to investigate the following research questions utilizing LGM: (a) How is low self-control related to the initial points and rates of change in bullying perpetration and victimization? (b) Are there time-concurrent and/or time-lagged effects of deviant peer affiliations on bullying perpetration and victimization within each time point, after controlling for gender and low self-control? (c) How are the initial average starting points and the rates of change in deviant peer affiliations predictive of the initial average starting points and rates of change in bullying perpetration and victimization over time? and (d) Is there a mediating effect of deviant peer affiliations on the link between low self-control and bullying perpetration and victimization?
Methods

Data and sample

Data for the current study is derived from the Korean Youth Panel Study (KYPS), which is based on the prospective panel survey design, compiled by the National Youth Policy Institute in South Korea. Participants surveyed were in fourth grade in 2004 and eighth grade in 2008. Data were obtained through personal interviews with the sampled students and through phone interviews with their caregivers. Data were collected using a stratified, multistage cluster design to obtain a representative sample of adolescents in South Korea. Elementary schools were stratified by the sampled regions in Seoul and 14 other metropolitan areas and provinces, and were sampled proportionate to size, based on the average number of students in each fourth grade class. Any schools refusing to participate or having less than three classes of 50 or more students were replaced with the next school listed in the sampling frame. Lists of all fourth-year students, excluding those in accelerated or special needs classes, were compiled from the selected schools. A focus group survey of youth was conducted by visiting the schools. For the youth’s parents and guardians, telephone interview surveys were conducted. Data were collected following prespecified procedures: (a) survey preparation, (b) school contact, (c) first school visit (for explaining the goal of the survey, requesting cooperation, and providing an official letter for youth and their parents), (d) second school visit (for conducting the survey and collecting contact information for the youth’s parents or guardians), (e) telephone interviews of the parents or guardians, and (f) feedback call (thanking the youth for their participation and requesting continued cooperation). Surveys during Wave 1 were administered from November through December of 2004 and produced information for a sample of 2,844 adolescents at age 11. Wave 2 surveys in 2005 were administered to the same subjects of Wave 1 and each year through 2008. Table 1 shows the attrition rates for the five waves of data. The attrition rate from the initial wave to the fifth wave was approximately 14%.

Dependent variables

Bullying perpetration and victimization were assessed at each time point utilizing a single item measure on a continuous scale, “Bullied others with a group of individuals during the last year” and “was bullied by a group of individuals during the last year.” Both items were positively skewed, recoded into a binary variable (1 for “yes” and 0 for “no”) at each of the five time points, and transformed by taking a logarithm. The logarithmic mean scores for bullying perpetration were stable at Waves 1 and 2 (.10), and declined across Waves 3, 4, and 5 (.09, 08, and 04). Similarly, the logarithmic mean scores for bullying victimization declined across all five time points (.07 to .01). All variables examined for the analyses are described in Table 2.

Independent variables

Deviant peer affiliations

Deviant peer affiliations were assessed utilizing a 16-item measure that asked participants, “How many of their close friends engaged in the following acts during the last year” (e.g., jaywalking, riding a bus or a subway without paying, defying a teacher by shouting, cheating on an exam, having unexcused absences, having misappropriate expense, picking on others as a group, teasing others,

Table 1. Attrition of repeated observed data.

<table>
<thead>
<tr>
<th></th>
<th>Wave 1</th>
<th>Wave 2</th>
<th>Wave 3</th>
<th>Wave 4</th>
<th>Wave 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total N</td>
<td>2,844</td>
<td>2,707</td>
<td>2,671</td>
<td>2,511</td>
<td>2,448</td>
</tr>
<tr>
<td>Missing N</td>
<td>0</td>
<td>137</td>
<td>173</td>
<td>333</td>
<td>396</td>
</tr>
<tr>
<td>Attrition rate (%)</td>
<td>0</td>
<td>4.82</td>
<td>6.10</td>
<td>11.7</td>
<td>13.9</td>
</tr>
</tbody>
</table>
watching porn/adult contents, drinking alcohol, smoking tobacco, beating up others, robbing others, stealing, and running away). These items were recoded as 1 for yes and 0 for no, creating a summated scale that ranged from 0 to 16. The delinquent peer associations measure demonstrated satisfactory internal reliability across all five waves ($\alpha = .78, .82, .83, .86, \text{ and } .86$).

**Low self-control**
Grasmick, Tittle, Bursik, and Arneklev (1993) measured self-control with a 24-item scale for six domains of self-control described by Gottfredson and Hirschi (1990): temper, simple tasks, risk seeking, physical activities, self-centeredness, and impulsivity. In this study, low self-control was measured with six items on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Example items include “I may hit other people when I feel annoyed,” “I will hit back at a person who hits me,” “I fight more frequently than others,” “I throw objects,” “I am impulsive to hit,” and “I display explosive anger,” tapping impulsivity. Several studies indicated a significant effect of low self-control that was measured through the presence of impulsivity (Endresen & Olweus, 2001; Jolliffe & Farrington, 2011). The low self-control measure demonstrated satisfactory internal reliability across all five waves ($\alpha = .76, .80, .80, .80, \text{ and } .81$). We conducted factor analyses to create a single construct with higher values reflecting less self-control.

**Control variables**
Both low self-control and gender were considered as covariates for all of the analyses. Gender was coded as 0 for females and 1 for males. The sample was comprised of 54% males and 46% females.

| Table 2. Descriptive statistics of the study sample ($N = 2,844$). |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| **Variable**      | Wave 1 M (SD)     | Wave 2 M (SD)     | Wave 3 M (SD)     | Wave 4 M (SD)     | Wave 5 M (SD)     |
| Bullying perpetration | .07 (.26)        | .04 (.21)        | .03 (.18)        | .02 (.13)        | .01 (.12)        |
| Bullying victimization | .10 (.30)        | .10 (.30)        | .09 (.29)        | .08 (.27)        | .04 (.20)        |
| Gender            | SEX              | .54 (.50)        | .54 (.50)        | .53 (.50)        | .53 (.50)        |
| Hit others        | LSC1             | 2.86 (1.20)      | 2.98 (1.17)      | 3.12 (1.12)      | 3.24 (1.11)      |
| Hit back           | LSC2             | 3.36 (1.09)      | 3.36 (1.10)      | 3.44 (1.05)      | 3.57 (1.03)      |
| Fight frequently   | LSC3             | 1.83 (0.91)      | 1.84 (0.90)      | 1.89 (0.90)      | 1.89 (0.89)      |
| Throw objects      | LSC4             | 2.06 (1.26)      | 2.24 (1.27)      | 2.45 (1.28)      | 2.66 (1.30)      |
| Impulse to hit     | LSC5             | 2.09 (1.16)      | 2.12 (1.13)      | 2.15 (1.10)      | 2.18 (1.11)      |
| Display explosive anger | LSC6          | 1.91 (1.10)      | 1.99 (1.08)      | 2.02 (1.07)      | 2.00 (1.04)      |
| Jaywalk           | DPA1             | .53 (.50)        | .64 (.48)        | .66 (.47)        | .69 (.46)        |
| Ride bus/subway without pay | DPA2        | .01 (.90)        | .05 (.29)        | .06 (.25)        | .15 (.35)        |
| Defy a teacher    | DPA3             | .16 (.37)        | .24 (.43)        | .22 (.41)        | .23 (.42)        |
| Cheat on an exam  | DPA4             | .17 (.38)        | .19 (.39)        | .19 (.40)        | .13 (.33)        |
| Have unexcused absences | DPA5       | .22 (.42)        | .23 (.42)        | .16 (.37)        | .14 (.35)        |
| Misappropriate expense | DPA6          | .19 (.40)        | .20 (.40)        | .16 (.37)        | .18 (.38)        |
| Pick on others as a group | DPA7    | .23 (.42)        | .25 (.43)        | .22 (.41)        | .18 (.38)        |
| Tease others      | DPA8             | .25 (.44)        | .25 (.43)        | .20 (.40)        | .18 (.39)        |
| Threaten others   | DPA9             | .12 (.32)        | .12 (.33)        | .09 (.29)        | .09 (.29)        |
| Watch porn/adult contents | DPA10   | .06 (.24)        | .09 (.29)        | .12 (.33)        | .25 (.43)        |
| Drink alcohol     | DPA11            | .02 (.15)        | .03 (.18)        | .05 (.22)        | .10 (.30)        |
| Smoke tobacco     | DPA12            | .08 (.28)        | .04 (.19)        | .07 (.26)        | .13 (.39)        |
| Beat up others    | DPA13            | .05 (.22)        | .08 (.28)        | .05 (.22)        | .06 (.23)        |
| Rob others        | DPA14            | .06 (.24)        | .07 (.25)        | .06 (.24)        | .10 (.30)        |
| Steal             | DPA15            | .07 (.26)        | .04 (.21)        | .03 (.18)        | .02 (.13)        |
| Runaway           | DPA16            | .10 (.30)        | .10 (.30)        | .09 (.29)        | .08 (.27)        |
**Analysis**

Time-concurrent and time-lagged models and latent growth curve models were executed utilizing *Mplus* 6.12 (Muthen & Muthen, 2011). Given the theories being tested, these models allowed for estimating both the time-concurrent and time-lagged effects of deviant peer affiliations on bullying perpetration and victimization at each time point, as well as the latent intercept and slope factors of the deviant peer affiliations variable on the developmental growth trajectories over time.

The time-concurrent and time-lagged models examine whether deviant peer affiliations (t-1) at an earlier time point was predictive of bullying perpetration and victimization at a later time point (t), while controlling for gender and low self-control at the onset and escalation of perpetration and victimization. The latent growth curve model examined (a) cross-sectional relationships between each predictor and outcome (i.e., “intercepts-on-intercepts”) (b) longitudinal relationships between rates of change in the means of the predictor and rates of change in the outcome means (i.e., “slopes-on-slopes”) and (c) mixed relationships between the initial average starting point of the predictor and the rates of change in the outcome means (i.e., “intercepts-on-slopes”; Cho et al., 2015).

The LGCM is characterized by intercept and slope, expressed as \( Y_{ti} = \eta_{0i} + \eta_{1i} T_t + e_{ti} \), where \( Y_{ti} \) represents the outcome measure for an individual \( i \) at time point \( t \), \( \eta_{0i} \) represents the latent intercept factor for an individual \( i \), \( \eta_{1i} \) represents the latent slope factor for an individual, \( i \) is referred to as the within person model (i.e., Level 1 model). Each intercept and slope factor can be expressed as \( \eta_{0i} = \alpha_0 + \gamma_{0i} \) and \( \eta_{1i} = \alpha_1 + \gamma_{1i} \), where \( \alpha_0 \) and \( \alpha_1 \) represent the means of \( \eta_{0i} \) and \( \eta_{1i} \) respectively, and \( \gamma_{0i} \) and \( \gamma_{1i} \) represent the variance of \( \eta_{0i} \) and \( \eta_{1i} \). Combining the two equations is referred to as a between-person model (i.e., the Level 2 model), and is expressed as \( Y_{it} = (\alpha_0 + \alpha_1 T_t) + (\gamma_{0i} + \gamma_{1i} T_t + e_{it}) \), which is called an unconditional growth model, consisting of two elements—a fixed (i.e., \( \alpha_0 + \alpha_1 T_t \)) and a random component (i.e., \( \gamma_{0i} + \gamma_{1i} T_t + e_{it} \)). The equations \( \eta_{0i} = \alpha_0 + \beta_{0i}(\text{gender}) + \beta_{3i}(LSC) + \beta_{3i}(DPA) + \epsilon_{0i} \) and \( \eta_{1i} = \alpha_1 + \beta_{3i}(\text{gender}) + \beta_{4i}(LSC) + \beta_{5i}(DPA) + \gamma_{1i} \) are referred to as a conditional growth model, comprising two predictors \( x_{1i} \) and \( x_{2i} \), where \( x_{1i}, x_{2i}, \) and \( x_{3i} \) are three predictors, and \( \beta_{0i}, \beta_{1i}, \beta_{2i}, \beta_{3i}, \beta_{4i}, \) and \( \beta_{5i} \) are the fixed effects of the three predictors explaining the latent intercept and slope factors.

**Missing data**

One of the common methodological issues in longitudinal studies is attrition of subjects over time, so not all of the data can be collected for all sampled subjects. If one of the repeated measures has missing data in a particular wave, all data for the same measure from other waves were excluded from the analysis. The attrition rate from the initial wave to the fifth time point was approximately 14%.

However, a continuous outcome with missing completely at random, missing at random, and missing not at random is addressed in *M-plus* by specifying full information maximum likelihood (FIML), indicating all data contributions. I used the estimator option called maximum likelihood estimation with robust standard errors (MLR). Although MLR techniques were used, for some models, cases with missing values on predictors and all variables except for the predictors were excluded. 1

**Results**

**Unconditional latent growth curve model**

The unconditional LGCM was used to examine if there are intra-individual differences in the developmental growth trajectories of both bullying perpetration and victimization over five time points (i.e., a within-person model). The latent intercept and slope factors were created with five observed repeated measures of perpetration and victimization, respectively, as shown in Figure 1.
Table 3 displays the results from the unconditional LGCM for the “means of the intercepts” of bullying perpetration and victimization. Each average starting point was positively significant, indicating a significant average rate of perpetration and victimization in the first wave examined. Also, the “means of the slopes,” reflecting the rate of change were negatively significant, showing a significantly decreased rate of bullying perpetration and victimization risk over time. Further, the latent intercept factors of bullying perpetration and victimization were negatively correlated with the latent slope factors of bullying perpetration and victimization. Adolescents who started out with higher levels of perpetration and victimization showed a gradually decreasing rate of change in
### Table 3. Univariate latent growth curve model of bullying perpetration and victimization.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intercept (Initial level)</th>
<th>Linear slope</th>
<th>Model fit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>Variance</td>
<td>M</td>
</tr>
<tr>
<td>Bullying perpetration</td>
<td>0.665*** (0.008)</td>
<td>0.076*** (0.009)</td>
<td>-0.025*** (0.003)</td>
</tr>
<tr>
<td>Bullying victimization</td>
<td>0.645*** (0.007)</td>
<td>0.061*** (0.007)</td>
<td>-0.030*** (0.002)</td>
</tr>
</tbody>
</table>

***p ≤ .001; **p ≤ .01; *p ≤ .05.
bullying perpetration and victimization over time. More importantly, the variances for the intercepts and slopes for both bullying perpetration and victimization were statistically significant, indicating that there was significant individual variability around each latent factor.

**Conditional basic model with low self-control**

Model 1 in Table 4 presents the findings of the LGCM with time-invariant factors only (sex and low self-control, See Figure 2) as predictors of both intercepts and slopes of bullying perpetration and victimization. Gender was significantly and negatively related to the initial starting point of victimization, but not perpetration. Females were more likely than males to be victimized in fourth grade ($\beta = -0.033$, $p < .001$). In addition, adolescents with low self-control displayed higher levels of bullying perpetration ($\beta = 0.081$, $p < .001$) and bullying victimization in fourth grade ($\beta = 0.024$, $p < .001$). However, low self-control was significantly and inversely related to the rate of change in only bullying perpetration over time ($\beta = -0.017$, $p < .001$), but not bullying victimization. Adolescents with high levels of low self-control showed a gradually decreased rate of change in bullying perpetration over time. This demonstrated a good fit of the statistical model, driven by the theoretical model with the sampled data, with TLI and CFI exceeding 0.90, as well as RMSEA less than 0.05.

**Time-concurrent and time-lagged model with deviant peer affiliations**

Model 2 in Table 4 is the time-concurrent and time-lagged model, examining whether the deviant peer affiliations variable has time-concurrent effects within each single time point and/or time-lagged effects of an earlier time point ($t-1$) on later bullying perpetration and victimization ($t$). Deviant peer affiliations were added as a time-varying variable in the first model, which represented the opportunity approach as an indicator of risky lifestyles of LRAT.

| Table 4. Maximum likelihood estimates for time-concurrent and time-lagged effects on bullying perpetration and victimization. |
|---|---|---|---|---|
| Variable | Bullying perpetration | | Bullying victimization | |
| | Model 1$^a$ | Model 2$^b$ | Model 1$^a$ | Model 2$^b$ |
| Time-invariant effect of SEX$w_1$ $\rightarrow$ Intercept BUL | $-0.001$ ($0.009$) | $-0.023$ ($0.010$) | $-0.033^{***}$ ($0.007$) | $-0.025^{***}$ ($0.007$) |
| SEX$w_1$ $\rightarrow$ Slope BUL | $-0.004$ ($0.003$) | $-0.001$ ($0.004$) | $0.005$ ($0.002$) | $0.004$ ($0.003$) |
| LSC$w_1$ $\rightarrow$ Intercept BUL | $0.081^{***}$ ($0.008$) | $0.034^{***}$ ($0.008$) | $0.024^{***}$ ($0.006$) | $0.008$ ($0.006$) |
| LSC$w_1$ $\rightarrow$ Slope BUL | $-0.017^{***}$ ($0.003$) | $-0.007^{*}$ ($0.004$) | $-0.006$ ($0.002$) | $-0.002$ ($0.002$) |
| Time-current effect of DPA$w_1$ $\rightarrow$ BUL$w_1$ | $0.024^{***}$ ($0.011$) | $0.030^{***}$ ($0.006$) | |
| DPA$w_2$ $\rightarrow$ BUL$w_2$ | $0.025^{***}$ ($0.002$) | $0.005^{***}$ ($0.001$) | |
| DPA$w_3$ $\rightarrow$ BUL$w_3$ | $0.022^{***}$ ($0.002$) | $0.005^{***}$ ($0.001$) | |
| DPA$w_4$ $\rightarrow$ BUL$w_4$ | $0.026^{***}$ ($0.002$) | $0.002^{**}$ ($0.001$) | |
| DPA$w_5$ $\rightarrow$ BUL$w_5$ | $0.016^{***}$ ($0.001$) | $0.000$ ($0.001$) | |
| Time-lagged effect of DPA$w_1$ $\rightarrow$ BUL$w_2$ | $0.006^{*}$ ($0.002$) | $0.001$ ($0.002$) | |
| DPA$w_2$ $\rightarrow$ BUL$w_3$ | $0.005^{*}$ ($0.002$) | $0.004^{**}$ ($0.001$) | |
| DPA$w_3$ $\rightarrow$ BUL$w_4$ | $0.001$ ($0.002$) | $0.001$ ($0.001$) | |
| DPA$w_4$ $\rightarrow$ BUL$w_5$ | $0.002$ ($0.001$) | $0.001$ ($0.001$) | |
| Model fit | | | |
| RMSEA | $0.026$ | $0.046$ | $0.024$ | $0.044$ |
| TLI | $0.963$ | $0.868$ | $0.971$ | $0.865$ |
| CFI | $0.979$ | $0.918$ | $0.984$ | $0.916$ |

*Note. BUL = bullying outcomes (perpetration and victimization); LSC = low self-control; DPA = deviant peer affiliations.

$^a$Linear growth curve model – Gender and low self-control as time-invariant covariates. $^b$Linear growth curve model—gender and low self-control as time-invariant covariates; deviant peer affiliations as time variant covariate.

*** $p < .001$; ** $p < .01$; * $p < .05$. 
Bullying perpetration

After controlling for the time-varying effect, gender was statistically significant with regards to the latent bullying perpetration intercept \( (\beta = -0.023, p < .05, \text{see Figure 3}) \), indicating that females were more likely than males to bully others. Note that gender was not significant on bullying perpetration in the first model but became significant in the presence of risky lifestyles. Low self-control positively predicted the latent bullying perpetration intercept \( (\beta = 0.034, p < .001) \), while predicting a negative effect on the latent bullying perpetration slope \( (\beta = -0.007, p < .05) \). Higher levels of low self-control were predictive of a gradually decreased rate of change in bullying perpetration over time. Deviant peer associations had the time-concurrent effect on bullying perpetration at each single time point \( (\beta = 0.024, p < .001 \text{ at Wave 1}; \beta = 0.025, p < .001 \text{ at Wave 2}; \beta = 0.022, p < .001 \text{ at Wave 3}; \beta = 0.026, p < .001 \text{ at Wave 4}; \text{and} \beta = 0.022, p < .001 \text{ at Wave 5}) \). However, there was the time-lagged effect on bullying perpetration at only Waves 1 and 2 \( (\beta = 0.006, p < .05) \) and at Waves 2 and 3 \( (\beta = 0.005, p < .05) \) during the study period. This indicated that deviant peer affiliations from the earlier year were significantly predictive of later bullying perpetration when respondents were in elementary school, but not in middle school. This finding demonstrates a good fit for the statistical model, with statistical values of CFI = .918 and RMSEA = .046, despite the values of TLI = .868.

Bullying victimization

Gender was negatively associated with the latent bullying victimization intercept in the full model \( (\beta = -0.025, p < .001, \text{see Figure 4}) \). This indicated that females were more likely than males to be victimized by others. Unlike bullying perpetration in the current study, low self-control had no impact on both the latent intercept and the rate of change in bullying victimization over time. The significant link between low self-control and victimization was mediated by deviant peer affiliations in fourth grade. This finding demonstrated the time-concurrent effect of deviant peer affiliations on victimization within each single time point, \( (\beta = 0.004, p < .001 \text{ at Wave 1}; \beta = 0.005, p < .001 \text{ at Wave 2}; \beta = 0.005, p < .001 \text{ at Wave 3}, \text{and} \beta = 0.002, p < .01 \text{ at Wave 4}) \) except for Wave 5. However, there were no time-lagged effects, with the exception of victimization at Wave 3 on deviant peer affiliations at Wave 2 \( (\beta = 0.004, p < .01) \). Adolescents associating with deviant peers were more likely to be bullied within the same, single time point. Generally, deviant peer affiliations at an early time point

Figure 3. The time-concurrent and time-lagged model of deviant peer affiliation on bullying perpetration.
did not affect the rate of victimization at a later time point. The statistical model fit the data well with the model fit values of CFI = .916 and RMSEA = .044, despite the values of TLI = .865.

**Latent growth curve model with low self-control and deviant peer affiliations**

The final step in the LGCM was to examine how the initial starting point of one construct was related to both the starting point and developmental growth trajectories, respectively, as well as how the rate of change in one construct is predictive of the rate of change in the other. This model was theoretically driven, based on the mixed model. Results of LGCM are described in Table 5.

**Bullying perpetration**

Low self-control was significant for both the latent intercept and the slope factors of bullying perpetration ($\beta = .081$ and $\beta = -.017$ at $p < .001$, see Figure 5). After controlling for deviant peer affiliations, low self-control remained significant, but the effect was slightly reduced, indicating that deviant peer affiliations partially mediated the link between low self-control and bullying perpetration ($\beta = .015$ and $\beta = -.004$ at $p < .05$). Also, gender became significant for both the latent intercept and the slope factors of bullying perpetration ($\beta = -.063$ at $p < .001$ and $\beta = .012$ at $p < .01$) in the full model. Also, gender was positively related to the latent deviant peer affiliations intercept ($\beta = .623$, $p < .001$), indicating that males were more likely than females to associate with deviant peers. Overall, females were at high risk of bullying perpetration, while males were more likely to associate with delinquent peers. Low self-control was significantly related to both the latent intercept and the slope factors of delinquent peer associations. Fourth-graders with low self-control were more likely to associate with deviant peers ($\beta = -.109$, $p < .001$).

The starting point of deviant peer affiliations was positively related to the starting point of bullying perpetration ($\beta = .101$, $p < .001$). Adolescents who associated with deviant peers were more likely to bully others. Also, the starting point of delinquent peer associations was negatively predictive of the rate of change in bullying perpetration over time ($\beta = -.023$, $p < .001$). That is,
fourth graders associating with deviant peers were more likely to show a gradually decreased rate of change in bullying perpetration over time. Finally, the developmental growth trajectory in deviant peer affiliations was predictive of the developmental growth in bullying perpetration ($\beta = .055$, $p < .001$). This indicates that adolescents with few delinquent peer associations over time also showed a gradually decreased rate of change in perpetration. The model fit for perpetration was slightly higher than the fit for the time-concurrent and time-lagged model, with the values of RMSEA = .04, CFI = .931 and TLI = .893.
Bullying victimization

Gender was negatively associated with victimization ($\beta = -0.033$, $p < .001$, see Figure 6), indicating that females were more likely to be bullied at the initial level. Fourth-graders with low self-control were more likely to be victims ($\beta = 0.024$, $p < .001$), but low self-control was not significant in the rate of change in bullying victimization. After controlling for deviant peer affiliations, gender remained significant for both the latent intercept and the slope factors of bullying victimization ($\beta = -0.051$, $p < .001$; $\beta = 0.009$, $p < .001$), while low self-control was not. It indicated that deviant peer affiliations fully mediated the link between low self-control and victimization among the fourth graders. There appears to be a direct effect and an indirect effect of low self-control on bullying victimization via deviant peer affiliations. Gender positively predicted the starting point of deviant peer affiliations ($\beta = 0.625$, $p < .001$), meaning that males were more likely to associate with delinquent peers. Low self-control had a positive effect on the latent starting point of deviant peer affiliations. Adolescents with low self-control were more likely to associate with delinquent peers ($\beta = 0.640$, $p < .001$). Also, low self-control was negatively related to the rate of change in deviant peer affiliations ($\beta = -0.103$, $p < .001$). Adolescents with low self-control showed the gradually decreased rate of deviant peer affiliations over time.

The initial time point for deviant peer affiliations was positively related to the starting point of bullying victimization ($\beta = 0.30$, $p < .001$). Fourth graders with deviant peer affiliations were more likely to be bullied. The latent intercept of delinquent peer associations was negatively related to the rate of change in bullying victimization over time ($\beta = -0.006$, $p < .001$). Fourth-graders with deviant peer affiliations showed a less decreased rate of change in bullying victimization over time. Finally, the developmental growth trajectory of delinquent peer associations, unlike perpetration, was not significantly predictive of the developmental change in bullying victimization. The statistical model fit the data well with values of RMSEA = .023, TLI = .962 and CFI = .975.

In sum, females were more likely to engage in bullying and also be bullied, whereas males were more likely to associate with deviant peers. Adolescents with low self-control tended to show a high starting point and a gradually decreased rate of change in bullying perpetration, even after controlling for deviant peer affiliations. Importantly, although adolescents with low self-control were more likely to be victims, low self-control was not significant in the presence of a risky lifestyle factor.
Adolescents who associated with deviant peers were more likely to engage in bullying others and be victimized at the same time point (i.e., the time-concurrent effect). Also, there were the time-lagged effects of deviant peer associations on perpetration and victimization of younger adolescents. Further, the starting point of associating with deviant peers among fourth graders coincided with less decreased rates of bullying perpetration and victimization. The rate of change in associating with deviant peers was predictive of the rate of change in bullying perpetration. Finally, adolescents with low self-control were more likely to be victimized, and those with low self-control associate with deviant peers, thereby increasing bullying victimization risk.

**Discussion**

The current study enhances the identification of different covariates between bullying perpetration and victimization among Korean adolescents by integrating the individual trait (e.g., low self-control) and opportunity approaches (e.g., deviant peer affiliations). Despite a handful of studies on the integration of both approaches on victimization in the western culture (Daigle, Fisher, & Cullen, 2008; Piquero, MacDonald, Dobrin, Daigle, & Cullen, 2005; Schreck, 1999; Schreck et al., 2006), there has been little literature available on assessing the generality of this integrated approach in bullying. Also, few studies have used longitudinal data; in particular, of Korean adolescents. This study further used the longitudinal design—the time-concurrent and time-lagged models for understanding the time-specific and/or the bi-directional relationship between deviant peer affiliations and bullying outcomes as well as the latent growth curve model for identifying how the rate of change in bullying outcomes corresponded to the rate of change in deviant peer affiliations.

Related to low self-control, the first important finding supports the first hypothesis regarding the generality of low self-control in predicting both bullying perpetration and victimization. Adolescents with both dimensions of low self-control—being impulsive—had positive effects on bullying perpetration and victimization. Also, adolescents with low self-control tended to show a high starting point and a gradually decreased rate of change in bullying perpetration. This is consistent with Gottfredson and Hirschi (1990) general theory of crime and the extant literature within the western and Korean cultures that individuals with low self-control are more likely to be impulsive and thus are more likely to be involved in offending behaviors (Higgins et al., 2007; Reisig & Pratt, 2011; Schreck et al., 2006; Turanovic & Pratt, 2014) and victimization (Cho, 2016, 2017; Cho & Wooldredge, 2016; Franklin et al., 2012; Schreck et al., 2006, 2002; Stewart et al., 2004; Tillyer et al., 2011; Woo & Cho, 2013). Based on this, it is concluded that low self-control appears to be the most robust predictor of a spectrum of bullying outcomes.

Regarding opportunity measures, the findings of the study fully support the second and third hypotheses: that adolescents who associated with delinquent peers were more likely to bully others and be bullied, compared to those who did not. There were time-concurrent effects of deviant peer affiliations on bullying perpetration and victimization at each time point. However, the time-lagged effects did not appear during every time point of the study period. It shows the correlation between deviant peer affiliations and both bullying perpetration and victimization outcomes rather than the time-ordered causal inference. Further, the starting point of associating with deviant peers among fourth graders coincided with less decreased rates of bullying perpetration and victimization. Importantly, a higher rate of change in delinquent peer associations was predictive of the developmental growth trajectories in perpetration. However, a greater rate of change in delinquent peer associations was not predictive of a greater rate of change in victimization over time. This finding affirms opportunity perspectives, which supported the assumption that individuals that associate with deviant peers are more likely to be exposed to high-risk circumstances and be vulnerable to potential offenders that, in turn, are at high risk of being victimized. The study findings provide further empirical evidence in support of the significant positive link between deviant peer affiliations and offending behaviors (Fergusson et al., 2002; Lonardo et al., 2009; Nash et al., 2005; Van Ryzin et al., 2012; Weerman & Smeenk, 2005) and victimization (Schreck & Fisher, 2004; Schreck et al., 2006, 2002; Vézina et al., 2011).
Deviant peer affiliations also appear to be the significant predictor of a spectrum of behavioral outcomes in the Korean culture (Cho, 2016, 2017; Cho & Wooldredge, 2016).

However, the findings partially support the fourth hypothesis. The link between low self-control and bullying perpetration was partially mediated by deviant peer affiliations while the relationship of low self-control on bullying victimization was fully mediated. This finding is quite consistent with the findings of the previous studies that risky lifestyles partially mediated the link between low self-control and victimization (Cho & Wooldredge, 2016; Holt et al., 2012; Ren, He, Zhao, & Zhang, 2017; Reynolds et al., 2016; Schreck et al., 2002; Turanovic & Pratt, 2014; Turanovic et al., 2015). It is worthwhile to know that low self-control plays a significant role in understanding offending behaviors even after controlling for risky lifestyles, while the role of low self-control is rather weak on victimization.

Our study does have limitations. First, only one item measuring bullying perpetration and victimization was considered. This means it lacks a more in depth understanding of the factors that might differentially affect adolescents’ experiences with bullying and victimization. Also, relying only on adolescents’ self-reports may have introduced unmeasured biases. Moreover, this study did not examine how the social context influences the link between individual level predictors and victimization (Browning & Erickson, 2009; Lauritsen & Laub, 2007). We must acknowledge the importance of investigating both individual characteristics and those of schools, communities, and social controls, such as community social organization and social ties. In addition, this study considered relatively few individual-level characteristics, which minimizes the impacts that other interpersonal relationships, such as with family members and teachers, and contexts, such as schools and communities, have on the development of delinquent peer associations. Therefore, future studies might build on this by examining each predictor at different levels, such as family, schools, and neighborhoods (Outlaw, Ruback, & Britt, 2002; Rice & Smith, 2002; Schreck, Miller, & Gibson, 2003; Wilcox, Gialopsos, & Land, 2013; Wilcox, Land, & Hunt, 2003; Wilcox, Madensen, & Tillyer, 2007). Further, in this study gender was used as a control variable, finding that females were more likely than males to be involved in both perpetration and victimization, even after controlling for other individual traits (e.g., low self-control) and risky lifestyles (e.g., delinquent peer associations). This is inconsistent with past studies that found that males were more likely than females to be involved in bullying (Griffiths, Woke, Page, & Horwood, 2006; Wang, Iannotti, & Nansel, 2009). However, this finding is also consistent with other studies which found that females were more likely than males to be victimized by their peers (e.g., Berger & Rodkin, 2009). LRAT suggests that behavioral patterns are shaped by demographic characteristics, such as gender but the theory does not explain how gender shapes the behavioral patterns leading to victimization (Cohen et al., 1981; Hindelang et al., 1978). Given this proposition, it is implied that the significance of gender should be reduced or rendered insignificant after the lifestyles are incorporated in the model. However, many studies including this study found that the role of gender remains significant even after controlling for risky lifestyles (Faris & Felmlee, 2011). For this reason, future studies might identify distinct risk factors that contribute to the gender-specific correlation with victimization.

**Note**

1. In these cases, we use a numerical iteration algorithm option called INTEGRATION = MONTECARLO, and thus, all cases with missing values are included in the analysis.

**References**


