The influence of school-based natural mentoring relationships on school attachment and subsequent adolescent risk behaviors

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Abstract
A relatively new area of research suggests that naturally occurring mentoring relationships may influence the development of adolescents by protecting against risk behaviors. Few studies have explored how these relationships function to reduce risk behavior among youth, especially in the school context. Based on previous research and theory, we proposed and tested a mediation model, which hypothesized that school attachment mediated the longitudinal association between school-based natural mentoring relationships and risk behaviors, including eight indicators of substance use and violence. Students (N = 3320) from 65 high schools across eight states completed a self-report questionnaire at baseline and 1-year follow-up. The sample was comprised of youth with an average age of 14.8 years and an almost equal percentage of females (53%) and males from various ethnic backgrounds. Tests for mediation were conducted in Mplus using path analysis with full information maximum likelihood procedures and models adjusted for demographic covariates and baseline level of the dependent variable. Results suggested that natural mentoring relationships had a protective indirect influence on all eight risk behaviors through its positive association on the school attachment mediator. Implications are discussed for strengthening the association between school-based natural mentoring and school attachment to prevent risk behaviors among youth.

Introduction
Schools are prosocial institutions that influence the daily lives of adolescents. Adult personnel who serve a variety of roles in schools, including teachers, coaches, counselors, nurses and other staff have constant contact with the student body. These contacts and resulting relationships are influential considering youth typically spend >8000 hours during their adolescent years in school [1]. As non-parental adults, these personnel have the opportunity to serve as school-based mentors and may play an important role in shaping adolescent behavior, helping youth overcome adversity and promoting school engagement and achievement [2–4]. For example, school-based mentoring relationships can engage youth in school activities by promoting student learning, competence, self-efficacy and academic adjustment [5, 6]. This engagement in conventional pursuits is protective against adolescent risk behavior including substance use, sexual risk behavior and delinquency [7–9]. Conversely, those students not engaged in prosocial pursuits and those having poor relationships with school personnel have a greater proclivity to engage in risk behaviors.
such as substance use and violence and fail to complete school [10–12]. Thus, mentoring relationships between school-based personnel and students are an important area of investigation considering the positive influence of mentoring on youths’ prosocial engagement and development.

Several explanations have been offered to describe how mentoring relationships may protect against youth risk behavior. The social development model (SDM [13]), which integrates control, social learning and attachment theories, suggests that prosocial bonds are of central importance in preventing adolescent risk behavior and delinquency and postulates that when youth are committed to prosocial pursuits and conventional organizations such as schools, they are less likely to have associations with delinquent peers and activities, thus protecting youth from socially learned risk behavior. Moreover, the qualities of the mentoring relationship such as empathy and trust lead to a mentee’s attachment to a mentor and subsequent modeling of prosocial behaviors performed by their mentor, which are guided by conventional social norms. Research indicating that weak school bonds predict adolescent risk behavior and delinquency provides support for this model [7]. The more recent model of youth mentoring (MYM [14]) proposes that specific domains of youth development are positively influenced by mentoring relationships, which subsequently prevent risk behavior. These domains include socioemotional development (e.g. helping youth understand, express and regulate emotions), cognitive development (e.g. increasing abstract thinking and information processing) and identity development (e.g. modeling prosocial behavior and assisting in values clarification). Based on these theories, it is fair to postulate that school-based mentoring relationships may enhance youths’ prosocial attachment to conventional activities (i.e. school) and reduce their engagement in risky behavior.

Although mentoring relationships have been defined in various ways, they are generally described as relationships that (i) occur over time between a mentor (i.e. a person who is older and who has greater experience than the mentee) and mentee, (ii) consist of an emotional bond founded on mutual trust and respect and (iii) function as a resource for support and guidance that is intended to facilitate the mentee’s healthy development [15]. Two types of mentoring relationships have been specified in the literature. The first type, ‘formal’ mentoring relationships, has gained relatively more research attention than other types of mentoring relationships and is defined as a relationship set in place by a school or outside agency (e.g. Big Brothers Big Sisters). The second type, ‘natural’ mentoring relationships, is defined as those relationships existing authentically without the help of a school or outside agency [16]. Although both types of mentoring approaches may be beneficial to youth, it has been suggested that natural mentoring relationships may be especially important because bonds formed within these relationships appear to last longer and occur more frequently than formal mentorship [16, 17]. Although it is not known for sure, this may be because natural mentors appear to share many of the same characteristics with their mentee (i.e. same gender, ethnicity and socioeconomic background [18]) and typically initiate the mentoring relationship on their own [19], which may suggest a more authentic interest in the youth.

Empirical research on school-based natural mentoring relationships is limited; however, some studies have begun to explore natural mentoring relationships in more general contexts (e.g. [19–22]). For example, data from one representative sample of high school students in the United States [17] showed that adolescents who reported a natural mentoring relationship were more likely to report less risk behavior (i.e. gang affiliation and violence), score higher on psychological well-being, report more positive health behaviors (i.e. physical activity and contraception use) and be involved in conventional pursuits (i.e. complete high school, attend college and work at least 10 hours per week) than youth who reported no natural mentoring relationships. The majority (40%) of adolescents in this study reported family members as mentors and ~32% reported a teacher, guidance counselor or coach as a mentor. Klaw et al. [23] analyzed longitudinal data obtained from 198 adolescent mothers attending alternative schools. Results indicated that, as
compared with those not reporting a natural mentoring relationship, those reporting these relationships were 3.5 times more likely to have graduated from or remained in high school. Only family members were reported as mentors in this study. Findings from cross-sectional data obtained via face-to-face interviews with 770 high school students [24] showed that youth with natural mentors reported less substance use and delinquency compared with those without these mentors. In addition, mentoring relationships had an indirect effect on these risk behaviors through positive associations with school attitudes and youth avoidance of negative peer influences. In this study, ~36% of respondents reported family members as their mentor, and 10% of respondents reported teachers, coaches, counselors or ministers as their mentor. Finally, Beier et al. [25] analyzed cross-sectional data from a sample of 294 adolescents attending a community-based clinic for routine health care and found those respondents who self-reported a natural mentor, as compared with those without a natural mentor, were less likely to report current smoking and illicit drug use, weapon carrying and multiple sex partners; however, no evidence was found for an association between a mentoring relationship and current alcohol use. Only 2% of this sample reported teachers or related school personnel as mentors, and the majority (75%) reported family members as mentors. Although the small pool of research has suggested a positive influence of mentorship on youth behavior, the dearth of empirical work on school-based natural mentoring relationships to date limits our understanding of the mechanism whereby natural mentoring influences adolescent risk behavior.

The current study

Given the small but growing area of literature that suggests natural mentoring relationships are positively associated with conventional pursuits and negatively associated with risk behavior among adolescents, we hypothesized and tested a mediation model whereby school attachment mediated the relationship between natural mentoring relationships and several adolescent risk behavior outcomes. In this model, we predict that natural mentoring relationships will be positively associated with school attachment and inversely predict risk behavior outcomes, and school attachment will inversely predict risk behavior outcomes. Our study builds upon previous research in the area of natural mentoring relationships in several ways. First, we analyze a large data set from a diverse sample of adolescents from several regions in the United States, which increases the generalizability of our results and statistical power. Second, our study tests a mediation model using longitudinal data and controls for baseline values of the outcome variables, which helps elucidate temporal relationships. Third, we test a mediation model using path analysis, which provides empirical information about one possible mechanism whereby natural mentoring relationships may reduce adolescent risk behavior. Finally, we examine natural mentoring relationships that occur exclusively in the school context, which to our knowledge, has not been examined to date.

Materials and methods

Participants and procedures

A convenience sample of 65 high schools from 14 school districts in 8 states (CA, AZ, KS, LA, SC, WA, MD and MA, USA) was recruited for this study. The data were collected as part of a larger trial of Project Toward No Drug Abuse (TND), an evidence-based substance abuse prevention program [26]. Participating high schools were randomly assigned to one of three conditions: (i) regular teacher training ($n = 1085$), (ii) implementation support training ($n = 1358$) or (iii) standard care control ($n = 877$). In the first two conditions, classroom teachers delivered the TND program, which is based on a motivation, skills and decision making framework [27]. The study protocol was Institutional Review Board approved, and parental informed consent (if <18 years old) and student assent were required for participation. Project staff administered all assessments. Of the 3751 consented students, 3320 (89%) students provided baseline data. All students completed a paper-and-pencil questionnaire during
regular classroom periods at baseline, and both paper-and-pencil (59.6%) and telephone interview (40.4%) methods were used to collect data at 1-year follow-up depending on student availability.

**Measures**

**Covariates**

Age (in years), gender and ethnicity were self-reported at baseline. A treatment condition variable was created and adjusted for in our models to account for the effect of being in a certain treatment condition. We also adjusted for respondents’ living situation, which indicated the respondent lived with both parents (0), mother only (1) or neither (2). Living situation is an important covariate as youth who live with their parents may receive parental mentorship, monitoring and guidance that may also influence their risk behavior.

**Natural mentoring relationship**

Five items were used to obtain student reports of a school-based natural mentoring relationship. An introductory statement: ‘At my school, there is a teacher or other adult …’ was followed by five indicators: ‘who really cares about me’; ‘who tells me when I do a good job’; ‘who listens to me when I have something to say’; ‘who believes I will be a success’ and ‘who I can talk to about things that are bothering me’. Responses were obtained from four Likert scale responses ranging from (1) ‘not at all true’ to (4) ‘very much true’. A mean score for the five items was created with higher scores indicating a greater respondent perception of a school-based natural mentoring relationship (Cronbach’s \( \alpha = 0.87 \)).

**School attachment**

Four items, adapted from a widely recognized youth survey [28], assessed respondents’ attachment to their school at baseline. Items included are as follows: ‘How well do you feel you are doing in school right now?’; ‘How interested are you in school now?’; ‘How often do you feel that the schoolwork you are assigned is meaningful and important?’; ‘At your school, do students help each other, even if they are not friends?’ Responses were measured using a 4-point Likert scale. A mean score of the four items was calculated with higher scores indicating more school attachment (Cronbach’s \( \alpha = 0.62 \)). Due to the measures relatively low Cronbach’s alpha, we conducted a factor analysis and found that all four items loaded on to one factor with eigenvalues >0.49. These items also showed discriminant validity against the natural mentoring relationship indicators. Similar items used to measure school attachment have shown to be inversely correlated with past 30-day and lifetime substance use among youth [29].

**Substance use**

The survey assessed past 30-day use of cigarettes, alcohol, marijuana and hard drugs (i.e. cocaine, hallucinogens, stimulants, inhalants, ecstasy and other illicit drugs). Participants were asked how many times they had used each of these drugs the last 30 days. Seven response option categories were given including the following: 0 times, 1–10 times, 11–30 times, 31–50 times, 51–70 times, 71–90 times and 91–100 times. The reliability of these items has been previously established [30]. Each drug use category was recoded as a binary variable (0 = no use and 1 = current use) to account for positively skewed distributions. We measured two indicators of heavy drinking, drunkenness and binge drinking, which were adapted from the Monitoring the Future Survey [31]. Binge drinking was measured with the item, ‘During the past 2 weeks, how many times have you had five or more alcohol drinks in a row?’ Drunkenness was measured with the item, ‘Think about the past 30 days. On how many of those days were you drunk on alcohol?’ Due to distribution skewness, both binge drinking and drunkenness variables were coded (1) ‘ever’ or (0) ‘never’.

**Violence**

Past 12-month violence perpetration and violence victimization were measured using previously validated items [29]. Items included the following: ‘Have you slapped, punched, kicked, or beaten-up someone?’; ‘Have you used a weapon (like a knife, gun or club)
to threaten a person?'; ‘Have you used a weapon (like a knife, gun or club) to injure someone?'; ‘Have you damaged or stolen someone else’s property on purpose?’. Response categories ranged from (0) never to (6) ‘5 or more times’ (Cronbach’s α = 0.72). The same set of four items was used with the wording reversed to assess whether the respondent had been a victim of violence in the past year [e.g. Has someone injured you with a weapon (like a knife, gun or club)?; Cronbach’s alpha = 0.70]. Both violence perpetration and victimization variables were binary coded as (1) ever or (0) never to maintain consistency with our substance use outcomes.

Analysis

Descriptive statistics, attrition analyses and regressions (using Procedure Mixed to determine clustering effects) were conducted in SAS 9.1 software [32]. The unconditional mean models for each dependent variable indicated the presence of behavioral clustering within schools [Intraclass Correlation Coefficients (ICC’s) > 0.03], but not within geographic region (ICC’s < 0.01; i.e. East Coast, Midwest, Northeast, South and West); thus, our mediation modeling accounted for students nested within schools in order to obtain more accurate standard error estimates [33]. Path analysis procedures for our mediation models were conducted in Mplus statistical software [34]; this program allows all regression equations in the mediation model to be estimated simultaneously.

In short, mediation is the scenario where an independent variable (X) causes an intervening variable (M), which in turn causes the dependent variable (Y). In our study, we tested the following hypothesized pathway: school-based natural mentoring relationships (X) would be positively associated with school attachment (M), which in turn would inversely predict adolescent risk behavior (Y) 1-year later. Both school-based natural mentoring relationships and school attachment were measured at baseline and risk behavior outcomes were measured both at baseline and 1-year follow-up. Our mediation models adjusted for demographic covariates, the effects of treatment condition during the course of the study and baseline dependent variable scores. Tests for mediation were conducted using procedures outlined for the product of coefficient tests by MacKinnon et al. [35]. According to this procedure, a variable can be tested as a mediator by dividing the estimate of the product of paths \( a \times b \) by its corresponding standard error and comparing this value to a standard normal distribution to determine significance (see paths illustrated in Fig. 1). The product of these two parameters \( a \times b \) is the mediated or indirect effect, and the coefficient \( c \) relating the X variable to the Y variable adjusted for the mediator is the non-mediated or direct effect. Relative to other tests of mediation, the product of coefficient tests appears to be the best test among several methods for testing mediation in terms of having the most power and accurate Type I error rates [35].

Attrition analyses were conducted using independent t-tests and chi-square tests to determine differences between the full baseline sample (3320) and the analysis sample (2097; 63% retention rate), which consisted of fewer observations due to participants skipping items or due to attrition. At baseline, non-completers were older, scored lower on natural mentoring relationships and reported less school attachment at baseline. To determine possible influences of attrition, we tested whether the correlations between these variables and the dependent variables differed between completers (Cs) and non-completers (NCs; i.e. those who had data at baseline but not at follow-up). Cs showed a significantly stronger negative correlation between natural mentoring relationship scores and past 30-day cigarette use than NCs (Cs \( r = -0.11 \); NCs \( r = -0.03 \); \( P < 0.05 \)). Cs showed a significantly stronger negative correlation between school attachment scores and past 30-day alcohol use (Cs \( r = -0.24 \), NCs \( r = -0.17 \), \( P < 0.05 \)). Finally, NCs showed a significantly stronger positive correlation between age and all substance use categories compared with Cs. Thus, considering that ad hoc procedures for handling missing data such as listwise deletion or mean substitution often result in biased parameter and/or standard error estimates, our mediation
modeling procedures used full information maximum likelihood estimation (FIML [37]) as implemented in Mplus to yield more accurate estimates while adjusting for the uncertainty associated with the missing data [37]. The FIML estimation does not impute, or fill in, missing values but directly estimates model parameters and standard errors using all available raw data. The FIML estimator allowed our models to possibly use data from all 3320 respondents. Due to respondent missing data patterns, the FIML estimator used data from an average of 3103 respondents (range = 3082–3128; see Table II) across our eight path models.

Results

More than half of the sample (53%) was female, and the average age of respondents at baseline was 14.8 years [standard deviation = 1.0 (range = 13–20)]. The sample was comprised of several ethnic groups (i.e. 41% White, 29% Latino, 16% Black, 3% Asian and 11% other including mixed ethnicity). Both baseline and 1-year follow-up descriptive statistics and bivariate correlations for the main analysis variables are presented in Table I. Alcohol use was the most frequently reported substance use category at baseline (33%) and 1-year follow-up (28%), and hard drug use was the least frequently reported category at baseline (6%) and 1-year follow-up (5%). At baseline, more than half of the sample reported at least one episode of violence perpetration (65%) and violence victimization (52%) in the previous 12 months and these percentages remained high at 1-year follow-up (41 and 38%, respectively). Only two adjustment variables were significantly correlated with the main analysis variables; age ($r = -0.03$) and gender ($r = -0.05$) were weakly correlated with school attachment. No model adjustment variables (i.e. age, gender, ethnicity, living situation and treatment condition) correlated with natural mentoring relationship scores. Baseline data indicated that natural mentoring relationship and school attachment scores were positively correlated ($r = 0.37$, $P < 0.001$). Natural mentoring relationship scores were significantly and inversely correlated with all risk behaviors at both baseline ($r$ range = $-0.12$ to $-0.21$; $P$ values < 0.05) and 1-year follow-up ($r$ range = $-0.07$ to $-0.15$; $P$ values < 0.05). Similarly, school attachment scores were significantly and inversely correlated with all risk behaviors at both baseline ($r$ range = $-0.15$ to $-0.21$; $P$ values < 0.05) and 1-year follow-up ($r$ range = $-0.11$ to $-0.15$, $P$ values < 0.05).

Fig. 1 illustrates the conceptual pathway of the hypothesized meditation model with coefficient paths indicated. Both standardized and unstandardized estimates for these paths (i.e. $a$, $b$ and $c$) and the indirect effect (product of the coefficients $a$ and $b$) for each corresponding dependent variable are presented in Table II. Each individual model is adjusted for gender, age, ethnicity, living situation, treatment condition and baseline dependent variable score and predicts the dependent variable at 1-year follow-up. All path models demonstrated a good fit to the data (all path models: $CFI = 1.0$, $RMSEA < 0.001$,
Table I. Bivariate correlations and descriptive statistics for main variables by time point

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation at baseline</th>
<th>Correlation at 1-year follow-up</th>
<th>Mean (standard deviation) or % at baseline</th>
<th>Percentage at 1-year follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NMR SA</td>
<td>NMR SA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NMR</td>
<td></td>
<td>1</td>
<td>0.37</td>
<td>2.8 (0.8)</td>
</tr>
<tr>
<td>SA</td>
<td></td>
<td>0.37</td>
<td>1</td>
<td>2.9 (0.6)</td>
</tr>
<tr>
<td>Cigarettes</td>
<td></td>
<td>0.20</td>
<td>0.20</td>
<td>0.15</td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td>0.21</td>
<td>0.21</td>
<td>0.33</td>
</tr>
<tr>
<td>Marijuana</td>
<td></td>
<td>0.21</td>
<td>0.21</td>
<td>0.15</td>
</tr>
<tr>
<td>Hard drug</td>
<td></td>
<td>0.15</td>
<td>0.15</td>
<td>0.06</td>
</tr>
<tr>
<td>Drunk</td>
<td></td>
<td>0.13</td>
<td>0.19</td>
<td>0.23</td>
</tr>
<tr>
<td>Binge drink</td>
<td></td>
<td>0.12</td>
<td>0.19</td>
<td>0.15</td>
</tr>
<tr>
<td>Violence perpetration</td>
<td></td>
<td>0.19</td>
<td>0.19</td>
<td>0.65</td>
</tr>
<tr>
<td>Violence victimization</td>
<td></td>
<td>0.15</td>
<td>0.15</td>
<td>0.52</td>
</tr>
</tbody>
</table>

NMR, natural mentoring relationship score; SA, school attachment score. All bivariate correlations shown above are significant at $P < 0.05$.

Table II. Path analysis model coefficients by path and products for indirect effects

<table>
<thead>
<tr>
<th>Path</th>
<th>Dependent variable</th>
<th>$a$ (SE)</th>
<th>$b$ (SE)</th>
<th>$c$ Direct effect</th>
<th>$a \times b$ Indirect effect</th>
<th>$N$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$\beta$</td>
<td>$\beta$</td>
<td>$\beta$</td>
<td>$\beta$</td>
<td></td>
</tr>
<tr>
<td>Past 30 day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarettes</td>
<td>Past 30 day</td>
<td>0.25 (0.01)**</td>
<td>-0.17 (0.07)*</td>
<td>-0.06 (0.04)</td>
<td>-0.04 (0.02)*</td>
<td>3099</td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td>0.37</td>
<td>-0.08</td>
<td>-0.04</td>
<td>-0.03</td>
<td>3107</td>
</tr>
<tr>
<td>Marijuana</td>
<td></td>
<td>0.24 (0.01)**</td>
<td>-0.12 (0.05)**</td>
<td>-0.08 (0.04)*</td>
<td>-0.03 (0.01)**</td>
<td>3095</td>
</tr>
<tr>
<td>Hard drugs</td>
<td></td>
<td>0.36</td>
<td>-0.06</td>
<td>-0.06</td>
<td>-0.02</td>
<td>3091</td>
</tr>
<tr>
<td>Drunk</td>
<td></td>
<td>0.25 (0.01)**</td>
<td>-0.20 (0.09)*</td>
<td>-0.20 (0.06)**</td>
<td>-0.05 (0.02)*</td>
<td>3093</td>
</tr>
<tr>
<td>Past 2 weeks</td>
<td></td>
<td>0.38</td>
<td>-0.11</td>
<td>-0.15</td>
<td>-0.04</td>
<td>3082</td>
</tr>
<tr>
<td>Binge drink</td>
<td></td>
<td>0.24 (0.01)**</td>
<td>-0.21 (0.06)**</td>
<td>-0.02 (0.06)</td>
<td>-0.05 (0.02)**</td>
<td>3127</td>
</tr>
<tr>
<td>Past 12 months</td>
<td></td>
<td>0.36</td>
<td>-0.11</td>
<td>-0.01</td>
<td>-0.04</td>
<td>3128</td>
</tr>
<tr>
<td>Violence perpetration</td>
<td></td>
<td>0.24 (0.01)**</td>
<td>-0.24 (0.06)**</td>
<td>-0.04 (0.04)</td>
<td>-0.06 (0.02)**</td>
<td>3082</td>
</tr>
<tr>
<td>Violence victimization</td>
<td></td>
<td>0.37</td>
<td>-0.13</td>
<td>-0.03</td>
<td>-0.05</td>
<td>3128</td>
</tr>
</tbody>
</table>

$\beta$, path between natural mentoring relationship and school attachment; $b$, path between school attachment and dependent variable; $c$, path between natural mentoring relationship and dependent variable; $a \times b$, product of the coefficients of $a$ and $b$; $B$, unstandardized beta coefficient estimate; SE, standard error of the unstandardized beta estimate; $\beta$, standardized beta coefficient estimate; $N$, sample size based on FIML estimator. All path models demonstrated good fit (CFI = 1.0, RMSEA < 0.001, WRMR < 0.01). Models were adjusted for age, gender, ethnicity, living situation and treatment condition.

***$P < 0.001$, **$P < 0.01$, *$P < 0.05$.  

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Discussion

Relatively little research has explored the mediating variables that function between natural mentoring relationships and adolescent risk behaviors; this is especially true for mentoring relationships that occur in schools (i.e., only between 0 and 32% of respondents in previous studies indicated school-based mentors [17, 23–25]). In an attempt to advance the literature in this area, we tested the hypothesis that school attachment mediated the longitudinal relationship between school-based natural mentoring and several adolescent risk behaviors. Our findings showed significant indirect effects for the proposed mediation pathway across all eight dependent variables in the hypothesized direction after adjusting for demographic covariates and baseline dependent variable score. This consistency of results across the dependent variables and across the different recall periods for these variables (i.e., past 2 weeks, 30 days and 12 months) increases confidence in our findings. However, it is important to note that the mediation effect sizes were small. Indirect standardized effect sizes ranged from −0.02 to −0.04 for substance use outcomes and −0.04 to −0.05 for violence outcomes. These effect sizes are similar to those found in a previous cross-sectional study, whereby natural mentoring relationships had an indirect effect on adolescent risk behavior through school attitudes and youth avoidance of negative peer influences (effect size range = 0.03–0.04 [22]).

Our findings are also consistent with previous research that suggests natural mentoring relationships are protective against adolescent risk behaviors, specifically those studies investigating substance use [24, 25] and violence outcomes [17]. We found an inverse relationship between natural mentoring relationship scores and substance use and violence through an indirect effect of school attachment for all dependent outcomes. Natural mentoring relationships also showed a direct effect on three risk behavior outcomes (i.e., alcohol, marijuana, and hard drugs) after accounting for the mediation path. Our findings support studies that have found significant positive associations between natural mentoring relationships and adolescent conventional engagement in educational pursuits [17, 23]. We found a significant bivariate correlation between natural mentoring relationships and school attachment at baseline ($r = 0.37$), and a significant association remained between these variables after adjusting for covariates in our path models (standardized beta estimates ranged from 0.35 to 0.37, all $P$ values < 0.001). However, some of our findings were inconsistent with previous literature. Our results differed from those studies that did not find a significant association between natural mentoring relationships and binge drinking [17] or alcohol use [25]. These inconsistencies may be due to the different time frames used to measure binge drinking, differences in the natural mentorship measures used and/or small sample sizes that limited previous studies’ power to detect a small effect.

Our findings corroborate with the frameworks of SDM [13] and the MYM [14], which postulate that mentoring relationships reduce adolescent risk behavior by engaging youth in prosocial activities such as school pursuits and conventional relationships, which then steer youth away from risk behavior. Based on our findings, it appears that ‘school-based’ natural mentoring relationships may also influence youth in this manner. Consequently, to reduce adolescent risk behavior, it may be important to consider ways in which school-based natural mentoring relationships can strengthen youths’ school attachment in an attempt to reduce risk behavior.

The MYM gives a practical framework to inform us how natural mentoring relationships may
be useful to strengthen youths’ school attachment. The MYM proposes that a mentor can influence three specific domains of youth development during the course of a mentoring relationship. These domains include social–emotional, cognitive and identity development and are central attributes of the school context. Youth encounter school-based relationships and activities on a daily basis, which may contribute to healthy or unhealthy development in areas of emotions, cognitions and self-identity. For example, based on school experiences and relationships, students may develop perceptions of school that are positive (i.e. a place of learning, opportunity and social support) or negative (i.e. a place of fear, embarrassment and social exclusion). Natural mentoring relationships may play an important role to enhance positive experiences and reduce negative experiences among youth in the school context.

Natural mentors can work with youth to address negative emotions such as stress, fear, anger and embarrassment that arise from engaging in school-related activities (i.e. homework, tests, peer and teacher relationships and social events). Further, mentors can assist youth in developing positive emotions toward school-related activities such as excitement, enjoyment and confidence by engaging them in conventional pursuits that fit the youths’ interests (i.e. art, music, dance and sports). When mentors help youth decrease negative emotions about school and increase positive ones, youth may become more engaged in and attached to school pursuits. Second, these mentors can assist youth to develop cognitive skills in areas of self-regulation, abstract thinking, information processing and problem solving. These cognitive skills may work directly to enhance school attachment by increasing students’ academic performance and competence. Finally, mentors can help youth internalize the value of school by modeling and expressing prosocial attitudes and behaviors. When mentors observe youth modeling these prosocial attitudes and behaviors, they can provide positive reinforcement through verbal feedback and rewards, which may motivate youth to engage further in school. These proposals give initial consideration on how to strengthen school attachment through school-based natural mentoring relationships; however, research is needed to examine these proposals empirically (for a manual of additional recommendations for engaging youth in school, see [38]).

Although our findings suggest one possible mechanism whereby natural mentoring relationships influence adolescents’ risk behavior through its association with school attachment, limitations are noted. First, attrition analyses indicated that respondents with missing data differed from the analysis sample; non-completers were older, reported lower natural mentoring relationship scores and less school attachment at baseline. However, we examined the baseline correlations between these three variables and dependent variable scores at baseline across completers and non-completers. Differences in correlations were prominent only for the age variable, suggesting that our findings may be generalized only to younger adolescents. The use of FIML procedures also increased the generalizability of our results relative to using other procedures such as pairwise and list-wise deletion or mean imputation. Second, because baseline data were obtained from paper-and-pencil survey only and follow-up data were obtained from a combination of paper-and-pencil survey and staff-administered telephone interviews, social desirability bias, caused by lack of privacy over the telephone, may be the reason that substance use prevalence was lower at follow-up as compared with baseline. This is an important limitation considering that substance use often increases on average across the teen years. Moreover, because student self-report was our only method of assessment, our findings are vulnerable to systematic error and recall bias. Although previous research has shown that student self-report of substance use does not contain strong self-report bias when confidentiality is guaranteed [39], as was the case in our study, researchers should consider employing multiple measures including biological measures for substance use and collateral reports by mentors in future studies. Third, the ‘natural mentoring relationship’ scale was somewhat indirect as it measured the degree to which students had a caring relationship with school-based personnel. Previous
studies have assessed mentorship more directly, obtaining a binary response to the question, ‘Other than your parents or step-parents, has an adult made an important positive difference in your life at any time since you were 14 years old?’ [17]. Measurement scales similar to ours may be of interest to future researchers because students may not formally identify school personnel as a mentor even though these adults appear to function as a mentor in the school context and because our measure captures more information about a mentoring relationship relative to a binary measure. Our measure of school attachment showed relatively low internal consistency reliability; however, follow-up factor analyses indicated that the items showed convergent and discriminant validity. Future studies should replicate our proposed model based on a more reliable set of school attachment items and use both direct and indirect measures of school-based natural mentoring relationships.

Finally, there are limitations to our mediation model. First, although our mediation model fit the data well, it is only one of many models that can theoretically fit the data well. For example, it is possible that students with greater school attachment are more likely to seek out or be sought out by natural mentors. Second, our mediation model included an independent and mediating variable that were both measured at baseline. Thus, future studies are needed to test our model against alternate hypothesized mediation models and to use three different measurement periods to verify our findings. Our results also indicated that effect sizes were small. However, small effect sizes do not necessarily infer a lack of importance. Small effects are not unusual when the dependent variable is difficult to influence, as is the case with adolescent risk behaviors [40]. Considering this, our study still found small effects over a 1-year time interval even after adjusting for demographic covariates and baseline level of the dependent variable.

**Conclusions**

Natural mentoring relationships have been shown to occur frequently among youth; however, little is known about these relationships and how they function to protect against adolescent risk behavior. Although the majority of adolescents do not formally report school-based personnel as a main mentor in previous studies, in our study, it appears that youth report school-based personnel to provide many of the functions of a mentor. Specifically, our findings suggested that school-based natural mentoring relationships may facilitate small protective effects on a variety of adolescent risk behaviors, and these effects function at least partially through youths’ school attachment. Implications for our findings are based on the model of youth development and suggest that school-based natural mentors can possibly enhance youths’ school attachment by addressing school-related issues in the domains of socioemotional, cognitive and identity development.

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**References**


