Applying the Social-Ecological Framework to Understand the Associations of Bullying Perpetration Among High School Students: A Multilevel Analysis

Gabriel J. Merrin
University of Illinois at Urbana-Champaign

Dorothy L. Espelage
University of Florida

Jun Sung Hong
Wayne State University and Sungkyunkwan University

Objective: Drawing from the social-ecological framework, this multilevel study examines individual, family, and school correlates of bullying perpetration among a sample of high school-age students. Cross-level interactions address contextual influences across individuals and schools. *Method:* The analytic dataset contains anonymous responses (collected in 2012) of the Dane County Youth Survey (DCYS) from 12,185 high school students in Grades 9 through 12 (49.8% females). The survey assessed demographic characteristics, family relations, peer relations, substance use, bullying, victimization, and school connectedness. *Results:* Multilevel modeling was used to examine between-person and between-school differences in individual rates of bullying perpetration. Females reported less engagement in bullying perpetration than did males. Furthermore, alcohol and marijuana use was related to higher rates of bullying perpetration. In addition, between-person family dysfunction and school risk were both associated with higher rates of bullying perpetration. Similarly, between-person rates of school connectedness were associated with less bullying perpetration. At the school level, average between-school differences in family dysfunction was related to greater bullying perpetration. A cross-level interaction was also significant. Compared with individuals attending schools with higher average rates of family dysfunction, schools with lower rates of family dysfunction displayed lower levels of bullying perpetration. *Conclusion:* Prevention programs that consider various dimensions of the social-ecological perspective and, more specifically, family and school factors have potential to reduce bullying.

Keywords: aggression, bullying, peer abuse, school violence, youth violence

Bullying, defined as repeated, aggressive behavior intended to cause physical and/or mental harm (World Health Organization, 2012), has received a significant amount of research attention over the years. During the 2009–2010 academic year, 23% of public school districts nationwide reported that bullying among students occurred daily or weekly (Robers, Zhang, Morgan, & Musu-Gillette, 2015). Although a certain amount of peer conflict and harassment is typical in high schools, bullying behaviors present a serious detriment to adolescent health and development. Adolescents who are identified as bullies are at an increased risk for adverse outcomes including alcohol, tobacco, and drug use; mental health problems; juvenile and criminal justice involvement; and suicidal thoughts and behaviors (Copeland, Wolke, Angold, & Costello, 2013; Lösel & Bender, 2011; Ttofi, Farrington, Lösel, & Loeber, 2011).

From a developmental perspective, bullying typically peaks in middle school and decreases in high school (see Espelage, 2015; Pellegrini & Long, 2002); as a result, a great deal of research has focused on the correlates and predictors of bullying during middle school (Espelage, Bosworth, & Simon, 2000, 2001; Espelage, Hong, Rao, & Thornberg, 2015; Lee, 2011; Rose, Espelage, Monda-Amaya, Shogren, & Aragon, 2015). More specifically, the social-ecological framework has been applied to explore factors that foster or inhibit bullying behaviors (e.g., Barboza et al., 2009; Bowes et al., 2009; Espelage et al., 2015; Lee, 2011; Rose et al., 2015). This framework posits that attitudes and behaviors of an individual are influenced by a complex interplay between individuals and the social environment they are embedded in (Bronfenbrenner, 1979). It is clear from both theory and research that bullying is a behavior that is influenced by individual-, family-, peer group-, school-, and community-level factors (Espelage, 2014; Espelage et al., 2015). In addition, there is growing consensus among scholars that there is a need for empirical research that documents how these contexts can inhibit bullying behavior among youth (Astor, Guerra, & Van Acker, 2010). To address this call for additional research, the present study examines the social-ecological correlates of bullying perpetration among a large sample of high school students.

Correlates of bullying and victimization within the individual, family, school, and community contexts have been widely exam-

ined, primarily among early adolescent samples (e.g., Barboza et al., 2009; Espelage et al., 2015; Lee, 2011; Rose et al., 2015). To our knowledge, few studies have specifically investigated social-ecological correlates of bullying with a high school sample that considers both person- and school-level differences. This approach allows for an examination of person-level differences (i.e., average differences between people), school-level differences (i.e., average differences between schools), and contextual effects (i.e., influence of the school on the individual). Some studies have examined how important correlates such as parental involvement and school environment may shape adolescent bullying behavior (e.g., Holt, Kantor, & Finkelhor, 2008; Spriggs, Iannotti, Nansel, & Haynie, 2007). However, few studies have considered interactions between and among social contexts—for example, interactions between family and school—and how they may contribute to adolescent behavior problems and conflicts among peers. The social-ecological framework emphasizes the importance of exploring the dynamic interactions within and among individual and contextual factors; thus, understanding these interactions are important. Additionally, various family and school factors may be important moderators that may exacerbate or buffer an adolescent's engagement in bullying perpetration.

To address the existing research gaps, the present study applies the social-ecological framework to explore individual, family, and school correlates of bullying perpetration among a large sample of high school-age students. In line with Bronfenbrenner's (1979) ecological perspective, we also consider contextual influences across individual, family, and school levels. As Bronfenbrenner (1977) purported, it is essential to explore the interrelations and interactions among major settings that surround individual adolescents. Thus, we also examine the interactions among family and school.

Individual Context

Individual-level factors, including age, sex, and race/ethnicity are frequently examined correlates of bullying. Regarding age, bullying appears to increase from elementary to middle school (Pellegrini & Long, 2002) and decrease in high school (Ortega, Elipe, Mora-Merchan, Calmaestra, & Vega, 2009). In terms of sex, studies have found that bullying appears to be higher among males (Griffiths, Wolke, Page, Horwood, & the ALSPAC Study Team, 2006; Wang, Iannotti, & Nansel, 2009). However, in terms of race/ethnicity and bullying, research has produced inconsistent findings. To illustrate, several studies (e.g., Goldweber, Waasdorp, & Bradshaw, 2013; Wang et al., 2009) report that Black youth were most likely to engage in bullying behavior, whereas other studies report that youth of other races/ethnicities were more prone to bullying (e.g., Nansel et al., 2001; Seals & Young, 2003).

In addition, studies have also explored individual level determinants, such as the use of illicit substances and the extent to which they may place adolescents at an elevated risk for bullying behavior. As studies have documented, experiences in bullying may heighten risk behaviors such as alcohol and drug use (e.g., Radliff, Wheaton, Robinson, & Morris, 2012). It is also possible that adolescents who drink or use drugs may engage in antisocial and delinquent activities, including bullying. According to Swahn et al.'s (2011) study, which comprised a sample of 175,311 students in Grades 8, 10, and 12, preteen alcohol use initiation was significantly associated with bullying perpetration. Furthermore, from a large, diverse sample of 6th–12th graders in 16 school districts ($n = 79,492$), Carlyle and Steinman (2007) found that substance use was strongly related to bullying perpetration. Alcohol and drug use typically starts during adolescence and increases with age (Volk, Craig, Boyce, & King, 2006). The use of alcohol and drugs can impair adolescents' thoughts and behaviors and increase their risk of engaging in misbehaviors, including bullying perpetration (Carlyle & Steinman, 2007; Radliff et al., 2012; Swahn et al., 2011; Volk et al., 2006).

Family Context

Though adolescence is a period where youth spend less time with their family and more time with their peers, the family context continues to play an important role throughout adolescent development (Rubin, Bukowski, & Parker, 1998). As such, research has focused on the role of the family environment and parenting behaviors and how they can influence adolescent bullying behaviors. The influence of family environment on adolescent bullying involvement can be explained by several theories, including attachment theory, social learning theory, and family systems theory (Holt et al., 2008). Studies that have considered these theories consistently find significant differences in the family characteristics of adolescents who engage in bullying and those who do not. Bullies come from homes that are characterized as abusive, conflictual, and dysfunctional (Baldry, 2003; Baldry & Farrington, 2005; Espelage, Low, Rao, Hong, & Little, 2014; Holt et al., 2008; Low & Espelage, 2013). In contrast, adolescents who report receiving parental support and a high level of parental involvement are less likely to engage in bullying behaviors (Flouri & Buchanan, 2003; Holt & Espelage, 2007; Marini, Dane, Bosacki, & Cura, 2006; Wang et al., 2009). Because parenting can shape children's behavior and possibly influence bullying behavior, it is not surprising that parents of bullies are described as being emotionally distant and hostile and lacking quality parenting skills (Smokowski & Kopasz, 2005).

School Context

Adolescents spend a great deal of time in school; as such, the school context is one of the most salient influential environments for adolescent behavior. Schools are complex human organizations that bring together students, teachers, practitioners, school officials, parents, and other relevant stakeholders (Astor et al., 2010). School contextual factors, such as school connectedness and perceptions of safety have been consistently linked to bullying behavior and involvement, as implicated in several studies (Espelage, Polanin, & Low, 2014; Wilson, 2004; Young, 2004). School connectedness, conceptualized as a belief held by students that adult caregivers in the school (e.g., teachers) care about their learning and about them as individuals, is an important protective factor. Moreover, adolescents who feel connected to their school are less likely to be involved in bullying behavior. Using a nationwide sample of 6,397 students from 125 schools, Brookmeyer, Fanti, and Henrich (2006) reported that students who felt more connected to their schools demonstrated a reduction in aggressive behavior over time, and school climate served as a protective factor against student violent behavior.

On the contrary, students' sense of school connectedness can be undermined, particularly in a school environment that is charac-

terized as disorganized or unsafe. Risky school environments and activities may influence a student's ability to achieve the intended academic, cognitive, and developmental outcomes schools seek to achieve (Morrison, Furlong, & Morrison, 1994). However, students who are in classrooms or schools that they perceive as unsafe can be exposed to an array of risk behaviors, which can subsequently reinforce negative behaviors, including bullying. For example, in a sample of 5,391 students in Grades 7, 9, and 11, Glew, Fan, Katon, and Rivara (2008) found that adolescents identified as bullies, bully victims, and victims were significantly more likely to report feeling unsafe at school than their peers who were uninvolved in bullying. In contrast, students who perceived their school as safe and reported more teacher support were less involved in bullying (Beran & Tutty, 2002).

Summary

To date, many studies have found significant relations between family and school factors and engagement in bullying perpetration. In addition, studies have found strong support for the moderating effects of parenting practices or school-level factors on individual behavior and bullying involvement (Flouri & Buchanan, 2002; Wienke Totura et al., 2009). For instance, Baldry and Farrington's (2005) study, derived from a sample of 679 male adolescents in Italian high schools, revealed a moderating effect of parental support on punitive parenting, and on emotionally oriented coping strategies in predicting victimization. Similarly, in a sample of 2,506 middle school youth, Wienke Totura et al. (2009) found that increased adult monitoring in school moderated the association between externalizing problems and bullying perpetration, particularly among females.

To our knowledge, however, studies have not examined the moderating relation (interaction) that families and schools may have on individual rates of bullying behavior, nor have they assessed school-level differences. Explicitly testing various interactions between family and school-level factors can provide information about the combined relations among families and schools on rates of bullying. Perhaps the combination of being in a dysfunctional family coupled with a risky school environment may be associated with particularly higher individual rates of bullying. Adolescents in dysfunctional families are less likely to have had a secure attachment with their caregivers during early childhood, which can seriously undermine their socialization outside the home (Kennedy & Kennedy, 2004), resulting in negative peer interactions including bullying. Additionally, home and school environments where aggressive behaviors occur frequently may, in turn, influence adolescent's behavior through observation and role modeling (Monks et al., 2009), increasing their risk of engagement in bullying behaviors.

Moreover, by considering school-level differences, we can also examine average differences between schools (between-school) as well as the effect of the school on the individual (contextual effect). The extent to which average differences between schools are associated with bullying perpetration and the effect of schools on individual rates of bullying perpetration both have important implications for school-wide bullying prevention and intervention efforts. Differences and the extent to which school-level factors can influence the magnitude of individual rates of bullying perpetration, which have important implications for school-wide bullying prevention and intervention efforts. The current study addresses the aforementioned shortcomings by: (a) using multilevel

modeling to test both between-person and between-school differences in bullying perpetration, (b) explicitly testing interactions between family and school factors to examine the extent to which they differentially impact individual rates of bullying perpetration, and (c) testing the contextual effects (effect of the school on the individual) of family and school factors on bullying perpetration.

Research Hypotheses

In line with previous study findings, our hypotheses are as follows: (a) younger age adolescents, males, individuals from lower socioeconomic statuses (SESs), and those who use alcohol or marijuana are more likely to engage in bullying; (b) adolescents with both family dysfunction and school risks are at higher risk of bullying; (c) adolescents who are connected to their school are less likely to engage in bullying; (d) adolescents that attend schools with students with more family dysfunction and school risk are at higher risk of bullying; (e) adolescents who attend schools with students with more school connectedness are less likely to engage in bullying; and (f) adolescents with a dysfunctional family or those who attend schools with other individuals with more dysfunctional families are more likely to bully, specifically in the context of school risk. Conversely, individuals with a dysfunctional family or those who attend schools with other individuals with more dysfunctional families but are connected to their school are less likely to be involved in bullying.

Method

Participants

The analytic dataset contains anonymous responses (collected via Survey Monkey in 2012) to the DCYS from 12,185 high school students in Grades 9 through 12 (49.8% females), ages 14 through 18 years ($M = 14.85$, $SD = 1.76$). A majority of the sample identified as White (75.2%), followed by other (9.6%), Black (6.6%), Hispanic (4.3%), and Asian (4.3%). Dane County is the second most populous county in Wisconsin and is geographically diverse, ranging from small working farms to a large city. Students receiving free or reduced-cost lunch included 17.5% of the sample. Of the participants, 87.9% were identified as heterosexual, and the remaining identified as lesbian, gay, bisexual, transgender or sexually questioning (12.1%). Thirty schools from Dane County participated in the study. These final numbers do not include students who were screened out. More specifically, student responses were subjected to a screener to identify youth who were not being truthful (e.g., mischievous responders); in such cases, data from the youth were removed from the dataset (Robinson & Espelage, 2011; Robinson-Cimpian, 2014).[1]

Procedures

Students completed anonymous surveys independently while in school during proctored sessions. The researchers administered

---

[1] The sensitivity analysis procedure for identifying mischievous responders is a four-step process that includes: (a) identifying items to be used as the screener, (b) calculating the index values by aggregating individual's responses from the screener, (c) examining groups of respondents at various levels of the screener, and (d) comparing disparities and removing individuals that report extreme values that would potentially bias the results (Robinson-Cimpian, 2014).

and monitored all surveys. A waiver of active consent and students' written assent were used. Parent information letters were sent home at the beginning of the school year and parents or guardians had the option of returning the form or calling the school to withdraw their child from the study. Surveys were given to all 9th–12th grade students in school and the response rate was 93% across the 30 schools. Versions of the survey have been administered since 1980 and had been developed in collaborations with students and school officials in the school districts, which contributes to the high response rate. Students were not provided with an incentive for their participation.

Measures

The DCYS (Koenig, Espelage, & Biendseil, 2005) was developed to collect information on students' opinions, behaviors, attitudes, and needs. The survey included demographics and over 100 items on a range of topics, including family relations, peer relations, drug usage, bullying, victimization, and school belonging. The Dane County Youth Assessment is a county-wide survey administered across school districts in the county, in collaborations with several community organizations (e.g., United Way, Department of Human Services). Versions of this survey have been implemented in 2000, 2005, 2008, 2009, 2012, and 2015 with measures being explored and validated across three of the survey years (2000, 2005, and 2008), which included a similar composition of students.

First, exploratory factor analyses (EFA) of the items in the 2000 DCYS were conducted. The purpose of the EFA was to identify the most applicable model with meaningful factors, as such, two criteria were used in retaining a preliminary factor structure: (a) factor loadings that exceeded .40 were retained (Floyd & Widaman, 1995), and (b) cross loadings less than .40 were retained. The purpose was to maintain both theoretical and conceptual plausibility to aid in establishing strong validity among the measures (i.e., concurrent and construct validity). Results from the EFA informed the measurement models using confirmatory factor analysis (CFA) from data collected in 2005 and further evaluated in the 2008 survey (Koenig & Bettin, 2009). CFAs with robust maximum likelihood estimations were conducted using LISREL 8.2 (Jöreskog & Sörbom, 1998). CFAs of the 2008 data confirmed the factor structure developed based on the previous results from the 2005 data (Koenig & Bettin, 2009; Koenig et al., 2005). Indicator variables were selected on the basis of prior theory and the EFA/CFAs of the 2005 data set. Further information and the results of the EFA and CFA from the three survey waves are available (see Koenig & Bettin, 2009; Koenig et al., 2005).

Dependent Variable

The nine-item University of Illinois Bully Scale (Espelage & Holt, 2001) assesses the frequency of bullying perpetration at school. Students are asked how often in the past 30 days they did things to other students at school. Example items include, teased other students, upset other students for the fun of it, excluded others from their group of friends, helped harass other students, and threatened to hit or hurt another student. Response options include: "Never," "1 or 2 times," "3 or 4 times," "5 or 6 times," and "7 or more times." Construct validity of the measure has been examined using EFA and CFA (Espelage & Holt, 2001). Higher scores indicated more self-reported bullying behaviors. The scale correlated moderately with the Youth Self-Report Aggression Scale ($r = .65$; Achenbach, 1991), suggesting that bullying behavior was somewhat distinct from aggressive behavior. Concurrent validity was assessed using correlations with peer nominations of bullying (Espelage, Holt, & Henkel, 2003). More specifically, students who reported the highest level of bullying on the scale received significantly more bullying nominations ($M = 3.50$, $SD = 6.50$) from their peers than those who did not self-report high levels of bullying ($M = .98$; $SD = 1.10$; Espelage et al., 2003). Additionally, this scale was not significantly correlated with the University of Illinois Victimization Scale ($r = .12$), providing evidence of discriminant validity (Espelage et al., 2003). Cronbach's alpha coefficient was .91 in this study.

Control Variables

Self-reports of age, sex (male/female), race/ethnicity, and SES were controlled for in the analyses. SES was assessed using free/reduced-cost lunch as a proxy for an individual's SES.

Individual-Level Factors

Individual rates of alcohol and marijuana use were included in the model to account for the rates of substance use. Two items for alcohol and marijuana use were summed and included in the model. Participants were asked how often in the last 30 days they engaged in the following activities: (a) drinking alcohol, and (b) smoking marijuana. Response options were "None," "1 to 2 days," "3 to 6 days," and "more than 6 days."

Family-Level Factors

A dysfunctional family environment scale emerged through factor analysis and included five items ($\alpha = .80$). Participants were asked how much they agreed or disagreed with the following: (a) My parents and I physically fight, (b) My parents physically fight with each other, (c) My parent uses illegal drugs at least once a week, (d) My parents get drunk at least once a week, and (e) Sometimes things feel so bad at home I want to run away. Response options were "No" or "Yes."

School-Level Factors

School connectedness was measured with a six-item school climate/belonging scale ($\alpha = .86$). Participants were asked how much they agreed or disagreed with the following items: (a) The rules and expectations are clearly explained at my school, (b) I usually enjoy going to school, (c) It is important to me that I graduate from school, (d) Teachers and other adults at my school treat me fairly, (e) There are adults I can talk to at school when I have a problem; and (f) I feel like I belong at this school. Response options included "Never," "Sometimes," "Often," and "Always."

Risky school was assessed with four items. Students were asked how many times in the school year they saw certain risk behaviors and activities at their school: (a) students using alcohol or drugs, (b) presence of weapons, (c) presence of gang activity, and (d) students selling drugs. Response options included "Never," "1 to 2 times," "3 to 4 times," and "5 or more times" ($\alpha = .79$).

Analytic Plan

Multilevel modeling was used in the current study because of the nested nature of individuals within schools. This approach is different from ordinary least squares regression because it does not assume that individuals are independent (Snijders & Bosker, 2012). Multilevel modeling accounts for the shared group variance or correlated residuals by estimating random intercepts and slopes that partition variance at various levels allowing us to control for and test between-person and between-school dependencies.

We fit six multilevel models to the data using SAS 9.4. We began with the estimation of a null or unconditional model (Model 1) to calculate the intraclass correlation coefficient. The intraclass correlation indicated that 1.5% of variance in bullying perpetration was between-schools. Although the intraclass correlation was rather modest, it was still necessary to account for between-school dependencies because it was larger than zero, which indicated that there was school-level dependency that needed to be adjusted for. Additionally, a statistically significant random school intercept variance was found which indicated that there was significant variation between schools (Model 1). Furthermore, we compared a null model without random between-school intercepts with a null model with random between-school intercepts and found that the random between-school model had significantly better fit as indicated by significant reductions in -2 log likelihood (-2LL; ΔLR $= 29.7$, $\Delta df = 1$, $p < .001$). This indicated that the model with random between-school intercepts was a better fit to the data, suggesting that the between school variance, though modest, was a significant source of group level dependency and should be accounted for. Thus, standard errors and estimates obtained by using a single level general linear model might be biased; hence, we opted for a multilevel framework to adjust for this source of group level dependency. As such, and given the nested nature of the school data, multilevel modeling was deemed appropriate for the present study (Snijders & Bosker, 2012). Models 2 and 3 added demographic and individual variables to the model; between-person variables were added to Model 4, between-school variables in Model 5, and finally our interactions in Model 6. Our final model consisted of the variables from previous models including demographic variables, individual level variables, between-person, and between-school variables of dysfunctional family, school risk, and school connectedness, as well as our three hypothesized interactions. One of our hypotheses, an interaction between-school level family dysfunction and person-level school connectedness was not statistically significant and was removed for parsimony.

Choosing a meaningful centering strategy is very important when using multilevel models. We centered the between-person and between-school variables so they were orthogonal to each other, and thus share no variance. Between-person variables (Level 1) were group-mean centered and referred to average differences between people that attend the same school. To group-mean center the between-person variable, we subtracted each individual's raw score from their respective school mean score for each variable. Between-school variables (Level 2) were grand-mean centered and refer to average differences between schools. To grand-mean center the between-school variables, we subtracted each school mean from the grand mean, this rescaled the grand mean to 0. Model fit was assessed using reductions in -2 Log Likelihood (-2LL), Akaike information criterion (AIC), and Bayesian information

criterion (BIC; Burnham & Anderson, 2004; Singer & Willett, 2003). More specifically, using likelihood ratio tests we examined the extent to which subsequent nested models significantly improved model fit. The final model is as follows.

Linear mixed model equation:

$$
\begin{aligned}
\text{Bullying}_{ij} = {} & \beta_{0j} + \beta_{1j}(\text{Age})_{ij} + \beta_{2i}(\text{Black})_{ij} + \beta_{3j}(\text{Latino/a})_{ij} \\
& + \beta_{4j}(\text{Asian})_{ij} + \beta_{5j}(\text{Other})_{ij} + \beta_{6j}(\text{Sex})_{ij} \\
& + \beta_{7j}(\text{Socio-EconomicStatus})_{ij} + \beta_{8j}(\text{AlcoholUse})_{ij} \\
& + \beta_{9j}(\text{MarijunaUse})_{ij} + \beta_{10j}(\text{BPDysFamily})_{ij} \\
& + \beta_{11j}(\text{BPSchoolRisk})_{ij} + \beta_{12j}(\text{BPSchoolConnect})_{ij} \\
& + \beta_{13j}(\text{BPDysFamily} \times \text{BPSchoolRisk})_{ij} \\
& + \beta_{14j}(\text{BPDysFamily} \times \text{BPSchoolConnect})_{ij} \\
& + \beta_{01}(\text{BSDysFamily})_{j} + \beta_{02}(\text{BSSchoolRisk})_{j} \\
& + \beta_{03}(\text{BSSchoolConnect})_{j} \\
& + \beta_{04}(\text{BSDysFamily} \times \text{BPSchoolRisk})_{j} + (e_{ij} + i_{0j})
\end{aligned}
$$

$$(1)$$

where the label "BP" represents between-person and "BS" represents between-school variables. The sex variable was coded such that male served as the reference category, the SES variable was coded such that full-priced lunch was the reference category, and the racial category was dummy coded such that White was the reference category. Our three variables of interest (family dysfunction, school risk, and school connectedness) were all included at both Level 1 (between-person) and Level 2 (between-school).

There was a very small percentage of missing data (1% – 4%); however, rather than using listwise deletion for individuals who had missing data, we used a multiple imputation strategy ($k = 50$) using the EM algorithm via SAS 9.4. This technique ensured that every individual would be included in our model. To examine missing data mechanisms, we used Little's missing completely at random (MCAR) test to determine whether the data was MCAR. However, the test was significant ($\chi^2 = 82.5$, $df = 9$, $p < .001$), which indicated that the data were not MCAR (Enders, 2010; Little, 1988). Although there is no explicit method to formally test the missing at random (MAR) assumption without knowing the values of the missing dependent variable (i.e., bullying scores), we took various steps to examine the missing data patterns (Enders, 2010). First, there was a very small percentage of missing data across all of the variables, with much of the missing data coming from males and individuals with higher family SES. Compared with their female counterparts, males had significantly more missing data on bullying perpetration ($\chi^2 = 9.34$, $df = 1$, $p = .002$), dysfunctional family ($\chi^2 = 16.06$, $df = 1$, $p < .001$), and school connectedness ($\chi^2 = 15.78$, $df = 1$, $p < .001$). Additionally, individuals with higher SES had a larger proportion of missing data on bullying perpetration ($\chi^2 = 9.35$, $df = 1$, $p = .002$), dysfunctional family ($\chi^2 = 13.55$, $df = 1$, $p < .001$), and alcohol use ($\chi^2 = 49.84$, $df = 1$, $p < .001$). Second, we attempted to adjust for any bias by including various demographic variables (i.e., race, sex, SES, age, grades) and individual centered variables (i.e., alcohol and marijuana use) in our imputation model that we believed were the primary source of missingness in our data. For example, because males and individuals with higher family SES

had more missing data, we included sex and family SES in our imputation model to adjust for the potential bias due to these variables. Similarly, race, age, academic grades, and substance use were also used to adjust for bias due to missing data. As such, due to the small amount of missing data, coupled with the large sample size, and adjusting for potential bias due to missingness on various demographic and individual variables, we believe the data are MAR. Under the MAR assumption the imputation model using the expectation maximization algorithm provides unbiased estimates (Allison, 2002; McLachlan, Krishnan, & Ng, 2004). As such, all 12,185 participants were included in the final results.

Results

Table 1 presents means and standard deviations and percentages for the study variables. The average age of the participants was 14.85 years old and approximately 49.8% of the sample was female. A majority of the sample was White (75.2%), followed by Other (9.6%), Black (6.6%), Hispanic (4.3%), and Asian (4.3%). Moreover, 17.5% of the students reported that they received free/reduced-cost lunch. Furthermore, there was modest average alcohol ($\bar{x}$ = .45) and marijuana ($\bar{x}$ = .39) use; however, there was variability around both alcohol (SD = .80) and marijuana use (SD = .90) respectively. Table 2 presents the correlations for bullying perpetration and all the independent variables of interest.

Model Fit

We evaluated the contribution of each set of predictors in our nested models using log likelihood ratio tests. Significant reductions in −2LL were evaluated for each of the subsequent models and were all found to significantly improve model fit. Reductions in AIC and BIC, which are versions of log likelihood, were also considered (Table 3). Starting with a random intercept model as a baseline, we added demographic variables to the model and assessed the difference in −2LL from both models (Model 1 to

Table 1
Descriptive Statistics

Variables	M	SD	n	%	Range
Demographics					
Age (in years)	14.85	1.76			12–18
Female			6,068	49.8	
White			9,163	75.2	
Hispanic			524	4.3	
Black			804	6.6	
Asian			524	4.3	
Other			1,170	9.6	
Free lunch			2,132	17.5	
Alcohol use	.445	.80			0–3
Marijuana use	.393	.90			0–3
Between-person					
Dysfunctional family	.075	.18			0–1
School risk	.515	.63			0–3
School connectedness	2.17	.52			0–3
Between-school					
Dysfunctional family	.075	.02			0–1
School risk	.515	.15			0–3
School connectedness	2.17	.06			0–3
Dependent variable					
Bullying perpetration	.23	.45			0–3

Table 2
Correlations Among the Variables

Variables	1	2	3	4	5	6	7
1. Bully							
2. BPRS	.42**						
3. BPDF	.36**	.34**					
4. BPSC	−.29**	−.30**	−.25**				
5. BSRS	.01	.0	.0	.0			
6. BSDF	.05**	.0	.0	.0	.46**		
7. BSSC	−.02*	.0	.0	.0	−.04**	−.61**	

Note. Between-person and Between-school variables are orthogonal and thus share no variance. BPRS = between-person risky school; BPDF = between-person dysfunctional family; BPSC = between-person school connectedness; BSRS = between-school risky school; BPDF = between-school dysfunctional family; BSSC = between-school school connectedness.
* $p < .05$. ** $p < .001$.

Model 2: ΔLR = 2034.3, Δdf = 7, $p < .001$). Model 3 added individual level variables of alcohol and marijuana use to the model and was found to significantly improve model fit (Model 2 to Model 3: ΔLR = 2418.9, Δdf = 2, $p < .001$). Furthermore, Model 4 added the between-person effects (Model 3 to Model 4: ΔLR = 1946.1, Δdf = 3, $p < .001$) and Model 5 added the between-school effects (Model 4 to Model 5: ΔLR = 14.1, Δdf = 3, $p < .003$). Our final model added the interactions and was also found to significantly reduce −2LL (Model 5 to Model 6: ΔLR = 688.4, Δdf = 3, $p < .001$).

Preliminary Findings

Preliminary models found support for some of the demographic variables in predicting bullying perpetration (see Table 3). Model 2 examined our first hypothesis that age, sex, lower SES, and substance use (alcohol and marijuana use) would be associated with higher rates of bullying perpetration. In line with our first hypothesis, our results indicated that age was a significant predictor (β = −.02, SE = 0.00, $p < .001$) such that older youth in the sample reported less bullying perpetration compared with their younger counterparts. In standardized units, this indicated that a 1-year increase in age was associated with a −.04 standard deviation decrease in bullying perpetration. Similarly, sex (β = −.11, SE = 0.01, $p < .001$) was also a significant predictor, such that females reported significantly less bullying perpetration, on average. This corresponded to a standardized effect of −.24 and indicated that females reported on average about a quarter of a standard deviation less on rates of bullying perpetration compared with their male counterparts. Furthermore, individuals who reported receiving free/reduced-cost lunch in school reported significantly more bullying perpetration than those not receiving free/reduced-cost lunch (β = .09, SE = 0.01, $p < .001$). This corresponded to a standardized effect of .20 and indicated that individuals who received free/reduced-cost lunch reported .20 standard deviations higher on rates of bullying perpetration than individuals not receiving free/reduced-cost lunch. Additionally, as indicated in Model 3, average rates of alcohol (β = .16, SE = 0.01, $p < .001$) and marijuana use (β = .07, SE = 0.01, $p < .001$) were found to be significantly associated with higher rates of bullying perpetration. However, the association was slightly larger for alcohol use compared to marijuana use. Standardized effects indicated that a one standard deviation

Table 3

Estimates of Fixed and Random Effects From a Series of Individual Multilevel Models

Parameters	Parameter estimates (SE)					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Fixed effects						
Intercept	.23*** (.01)	.52*** (.06)	.82*** (.06)	.72*** (.06)	.72*** (.06)	.57*** (.05)
Age		−.02*** (.00)	−.04*** (.00)	−.02*** (.00)	−.02*** (.00)	−.02*** (.00)
Black		.00 (.02)	.00 (.02)	.02 (.02)	.02 (.02)	.02 (.02)
Hispanic		−.01 (.02)	.02 (.02)	.02 (.02)	.01 (.02)	.01 (.02)
Asian		−.01 (.02)	−.02 (.02)	.00 (.02)	.00 (.02)	.00 (.02)
Other		.03 (.01)	.02 (.01)	.03* (.01)	.03* (.01)	.02* (.01)
Female		−.11*** (.01)	−.10*** (.01)	−.08*** (.01)	−.09*** (.01)	−.08*** (.01)
Free lunch		.09*** (.01)	.05*** (.01)	−.03** (.01)	−.03** (.01)	−.02* (.01)
Alcohol use			.16*** (.01)	.09*** (.01)	.09*** (.01)	.08*** (.01)
Marijuana use			.07*** (.01)	.01 (.01)	.01 (.01)	.01 (.01)
BP dysfunctional family				.47*** (.03)	.47*** (.03)	.40*** (.07)
BP school risk				.18*** (.01)	.18*** (.01)	.11*** (.01)
BP school connectedness				−.11*** (.01)	−.11*** (.01)	−.06*** (.01)
BS dysfunctional family					2.00** (.46)	1.3* (.49)
BS school risk					−.06 (.05)	−.08 (.05)
BS school connectedness					.18 (.13)	.12 (.12)
BP Dysfunctional Family × BP Risky School						.41*** (.02)
BP Dysfunctional Family × BP School Connectedness						−.23*** (.03)
BS Dysfunctional Family × BP Risky School						.78* (.34)
Contextual effects						
Dysfunctional family						−.22 (.13)
School risk						.19** (.05)
School connectedness						−.71 (.47)
Random effects						
Intercept BP	.20*** (.002)	.19*** (.002)	.17*** (.002)	.14*** (.002)	.14*** (.002)	.13*** (.002)
Intercept between-school	.0009* (.0004)	.0008* (.0004)	.0010* (.0004)	.0011** (.0005)	.0002 (.0002)	.0002 (.0002)
Fit indices						
−2LL	14,919.7	12,885.4	10,466.5	8,520.4	8,506.3	7,817.9
AIC	14,925.7	12,905.4	10,490.5	8,550.4	8,542.3	7,859.9
BIC	14,928.2	12,913.8	10,500.5	8,562.9	8,557.3	7,877.4
No. parameters	3	10	12	15	18	21

Note. BP = between-person; BS = between-school; AIC = Akaike information criterion; BIC = Bayesian information criterion. Model 1 to Model 2: $\Delta LR = 2,034.3$, $\Delta df = 7$, $p < .001$; Model 2 to Model 3: $\Delta LR = 2,418.9$, $\Delta df = 2$, $p < .001$; Model 3 to Model 4: $\Delta LR = 1,946.1$, $\Delta df = 3$, $p < .001$; Model 4 to Model 5: $\Delta LR = 14.1$, $\Delta df = 3$, $p < .003$; Model 5 to Model 6: $\Delta LR = 688.4$, $\Delta df = 3$, $p < .001$.
* $p < .05$. ** $p < 01$. *** $p < .001$.

increase in alcohol use was associated with a .28 standard deviation increase in bullying perpetration. Similarly, a one standard deviation increase in marijuana use was associated with a .14 standard deviation increase in bullying perpetration. None of the race/ethnicity variables were significantly associated with bullying perpetration.

Between-Person Associations

As shown in Model 4, all of the between-person family and school variables were significantly associated with bullying perpetration (see Table 3). In line with our second hypothesis, between-person school risk had a significant positive association with bullying perpetration ($\beta = .18$, $SE = 0.01$, $p < .001$). That is, on average, compared to other individuals at the same school, individuals who reported higher average levels of school risk also reported higher average rates of bullying perpetration. This corresponded to a standardized effect of .25 and indicated that a one standard deviation increase in school risk was associated with a .25 standard deviation increase in bullying

perpetration. Furthermore, average between-person dysfunctional family was a significant predictor of bullying perpetration ($\beta = .47$, $SE = 0.03$, $p < .001$). This corresponded to a standardized effect of .19. Individuals who reported higher average levels of dysfunctional family also reported higher rates of bullying perpetration compared to other individuals at the same school. Additionally, in line with our third hypothesis, we found that between-person school connectedness had a negative association with bullying perpetration ($\beta = -.11$, $SE = 0.01$, $p = .001$). On average, individuals who reported higher school connectedness reported significantly less bullying perpetration compared to other individuals at the same school. In standardized units, this indicated that, on average, a 1 standard deviation increase in school connectedness was associated with a −.13 standard deviation decrease in bullying perpetration.

Between-School Associations

Between-school variables were added in Model 5 (see Table 3). Contrary to our hypotheses, H_4 and H_5, only one of the three

between-school variables were a significant predictor of bullying perpetration. Both the between-school school risk ($\beta = -.06$, $SE = 0.05$, $p = .22$) and school connectedness ($\beta = .18$, $SE = 0.13$, $p = .19$) variables were not found to be significant predictors of bullying perpetration. However, between-school dysfunctional family was found to be a particularly strong predictor of bullying perpetration ($\beta = 2.0$, $SE = 0.46$, $p = .001$). That is, compared with other schools, schools with higher average levels of students with dysfunctional families had a significant positive association with individual rates of bullying perpetration. This effect was associated with a rather modest standardized effect of .09. This finding partially supported our fourth hypothesis.

Contextual Effects

We were also able to capture the contextual effects. Contextual effects for school risk, school connectedness, and dysfunctional family are displayed in Model 6 (see Table 3). School connectedness ($\beta = -.71$, $SE = 0.47$, $p = .102$) and dysfunctional family ($\beta = -.22$, $SE = 0.13$, $p = .152$) contextual effects were not found to be significantly associated with bullying perpetration. However, school risk ($\beta = .19$, $SE = 0.05$, $p = .003$) was significantly associated with bullying perpetration. This corresponded to a rather modest standardized effect of .06. The significant school risk contextual effect refers to the influence of the school on the individual. Contextual effects are substantively different from both between-person differences (average differences between-people within the same school) and aggregated between-school differences (average differences between schools), such that contextual effects refer to the effect of the school on the individual. More specifically, these results suggest that individual values of school risk on rates of bullying perpetration are enhanced as the rates of school-level school risk increase. Said differently, the magnitude of the association between individual rates of school risk on individual rates of bullying perpetration is stronger for individuals that attend schools with higher rates of school risk.

Interactions

To test the extent to which family dysfunction amplified the relation between various school factors and individual rates of bullying perpetration, we tested a series of hypothesized interactions. We hypothesized that family dysfunction at both the between-person and between-school levels would exacerbate the rates of bullying perpetration, within the context of school risk and school connectedness. Our significant hypothesized interactions are presented in Model 6 (see Table 3) and plotted in Figures 1 to 3. There were three significant interactions that are presented in Model 6: two between-person interactions and one cross-level interaction. The between-person interactions include an interaction between dysfunctional family and school risk ($\beta = .41$, $SE = 0.02$, $p = .001$), and dysfunctional family and school connectedness ($\beta = -.23$, $SE = 0.03$, $p = .001$). Figure 1 displays the plotted between-person interaction for dysfunctional family and school risk at high, low, and the average levels of each of the respective variables. Each of the plotted lines represents a different level of family dysfunction plotted against varying levels of school risk. As indicated in Figure 1, family dysfunction exacerbated the association between school risk and bullying perpetration. Higher levels of family dysfunction were associated with higher levels of bullying perpetration. More specifically, for individuals with high levels of family dysfunction, the magnitude of the positive association between school risk and bullying perpetration was amplified. Furthermore, for individuals with average or low levels of family dysfunction, school risk was significantly associated with bullying perpetration, but the association was attenuated relative to individuals with high levels of family dysfunction. Tests of simple slopes revealed that each of the family dysfunction slopes, that included high ($\beta = .18$, $SE = 0.01$, $p = .001$), average ($\beta = .11$, $SE = 0.01$, $p = .001$), and low ($\beta = .03$, $SE = 0.01$, $p = .001$), were all statistically significant.

Figure 2 displays the interaction for between-person school connectedness and dysfunctional family. The interaction indicated
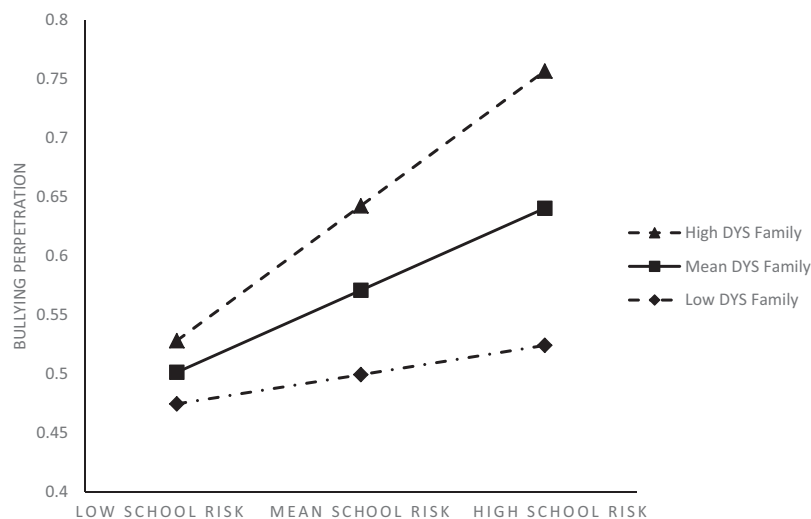

Figure 1. Interaction among between-person dysfunctional family and between-person risky school. High = +1 *SD*, *M* = average, low = −1 *SD*. Simple slopes: High: $\beta = .18$, $SE = .01$, $p < .001$; *M*: $\beta = .11$, $SE = .01$, $p < .001$; and low: $\beta = .03$, $SE = .01$, $p < .003$.
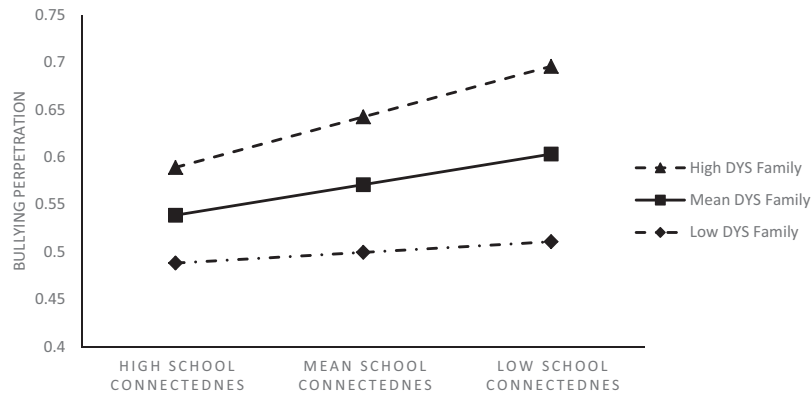
Figure 2. Interaction among between-person dysfunctional family and between-person school connectedness. High = +1 *SD*, *M* = average, low = −1 *SD*. Simple slopes: High: β = −.10, *SE* = .01, *p* < .001; *M*: β = −.07, *SE* = .01, *p* < .001; and low: β = −.03, *SE* = .01, *p* < .003.

that family dysfunction moderated the negative association school connectedness had on bullying perpetration. That is, for individuals with high levels of family dysfunction, the magnitude of the negative association between school connectedness and bullying perpetration was weakened. For individuals with average or low levels of family dysfunction, school connectedness was significantly associated with bullying perpetration such that the magnitude of the negative association was stronger, relative to individuals with high levels of family dysfunction. An examination of simple slopes uncovered that each of the family dysfunction slopes that included high (β = −.10, *SE* = 0.01, *p* = .001), average (β = −.07, *SE* = 0.01, *p* = .001), and low (β = −.03, *SE* = 0.01, *p* = .001), were all statistically significant.

Figure 3 presents the cross-level interaction among between-school dysfunctional family and between-person school risk (β = .78, *SE* = 0.34, *p* = .021). The interaction indicated that school-level family dysfunction exacerbated the relationship among between-person school risk and individual rates of bullying perpetration. More specifically, for schools with high average levels of family dysfunction, the positive association between school risk and bullying perpetration was magnified. For schools with average or low levels of family dysfunction, school risk was significantly associated with bullying perpetration. However, the association was attenuated, relative to schools with high levels of family dysfunction. Tests of simple slopes indicated that each level of the between-school family dysfunction that included high (β = .11, *SE* = 0.01, *p* = .001), average (β = .11, *SE* = 0.01, *p* = .001), and low (β = .10, *SE* = 0.01, *p* = .001), were statistically significant. This cross-level interaction suggested that schools that had a large number of students that come from dysfunctional families may create a context within a school with which bullying behavior can occur at a higher rate. The school context has been found to be a strongly associated with a variety of student related outcomes. These findings support the idea that the school context may be an important mechanism that maybe influencing the rates of bullying and aggressive behaviors among students.

Discussion

The aim of the current study was to examine family and school correlates of bullying perpetration in a sample of high school students. Consistent with past study findings and our hypotheses, we found that females in our sample reported less bullying perpetration than did males (Griffiths et al., 2006; Wang et al., 2009). Because males are typically regarded as the more "aggressive sex," it is likely that they would engage in aggressive interactions with their peers more frequently than females. Our results also suggest that younger students reported engaging in bullying perpetration at higher rates than did older students, which is in line with our hypothesis and previous studies that suggest that bullying peaks in middle school and decreases as students enter high school (e.g., Espelage, 2015; Pellegrini & Long, 2002).

Also in line with our hypothesis, we found that youth who used alcohol and marijuana were involved in bullying perpetration at a higher rate (Carlyle & Steinman, 2007; Swahn et al., 2011). It is possible that the effects of intoxication, which may cause disinhibition, cognitive-perceptual distortion, attention deficits, bad judgment, and so forth can result in aggressive and antisocial behavior (Pernanen, 1993; Pihl & Peterson, 1993), such as bullying. It is also important to note however that there is little research evidence that suggests that alcohol or drug use is a precursor to aggressive and violent behavior (Osgood, 1994). It might be that substance use and violent behavior are both predicted by the same or similar sets of risk factors or that both are clustered together as a result of experiences with wide range of deviant behaviors (Jessor, Donovan, & Costa, 1991).

Students receiving free/reduced-cost lunch were more likely to perpetuate bullying than those who do not, which is also congruent with our hypothesis and other study findings (e.g., Unnever & Cornell, 2003). Adolescents of low family SES are likely to reside in a neighborhood where they may be consistently exposed to violence and might hold attitudes favorable toward peer aggression (Unnever & Cornell, 2003).

Furthermore, between-person family dysfunction and school risk were both found to be related to higher rates of bullying perpetration, whereas, between-person rates of school connectedness were related to less bullying perpetration. In other words, youth who are consistently exposed to family dysfunction and school risks may engage in bullying, whereas those who are connected to the school might have less propensity to bully others. Also, we found that youth attending schools with higher propor-
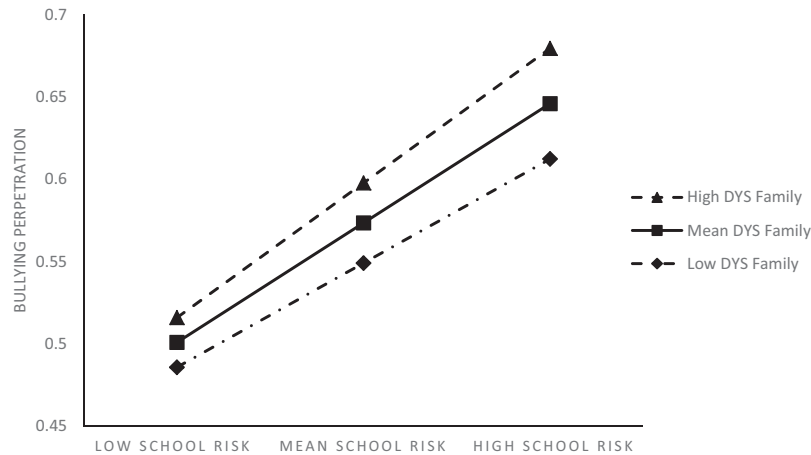
Figure 3. Cross level interaction among between-school dysfunctional family and between-person risky school. High = +1 *SD*, *M* = average, low = −1 *SD*. Simple slopes: High: β = .114, *SE* = .01, *p* < .001; *M*: β = .11, *SE* = .01, *p* < .001; and low: β = .10, *SE* = .01, *p* < .001.

tions of students coming from a dysfunctional home were at significant risk of bullying behavior. These findings support our hypotheses and other research findings (e.g., Baldry, 2003; Baldry & Farrington, 2005; Espelage, Low, et al., 2014; Glew et al., 2008; Holt et al., 2008; Low & Espelage, 2013). Youth who live in a home where they are exposed to family dysfunction and attend schools where they are consistently exposed to risk behaviors might acquire such behaviors, which can increase their risk of bullying behavior. These youth, might also be socialized to engage in bullying and perceive such behavior as an appropriate means of interacting with their peers. This study adds to the existing literature by using a multilevel framework that allowed us to test both individual- and school-level differences together in the same model. Additionally, this study also tested the extent to which family and school factors interacted to predict individual levels of bullying perpetration. Examining both individual- and school-level associations together are important because they hold different substantive meaning and thus have different implications for practice and theory.

In addition, individual differences in family dysfunction and school risk were both found to be positively associated with bullying perpetration. These findings are also consistent with our hypotheses and previous literature that has linked problems within the home and risky school environments with increased rates of bullying perpetration (Espelage, Polanin, et al., 2014; Low & Espelage, 2013). Similarly, individual perceptions of school connectedness were negatively associated with bullying perpetration, which supports our hypotheses and the idea that feelings of school support and belonging can act as a protective factor for reducing bullying behaviors (Baldry & Farrington, 2005).

At the school-level and contrary to our hypotheses, differences in school risk and school connectedness were not found to be significantly associated with bullying perpetration. This may partially be due to the relatively low amount of between-school variance in this sample. Contrary to school risk and school connectedness, schools with higher rates of dysfunctional families also had higher rates of bullying perpetration, which partially supported our hypotheses. That is, the concentration of students within a

school environment with family problems is related to higher rates of bullying perpetration. Additionally, the contextual effect of school risk was found to be significantly associated with individual rates of bullying perpetration. Specifically, the magnitude of the relationship between individual rates (between-person) of dysfunctional families on bullying perpetration was stronger for schools with high rates of dysfunctional families (between-school). These findings, although not surprising, are noteworthy and underscores the importance of addressing school culture and climate in efforts to reduce bullying behaviors.

Our three significant interactions tested the moderating relations of family and school factors, and revealed differences between family dysfunction and school context on individual rates of bullying perpetration. Specifically, the between-person (Level 1) interactions demonstrated that individuals with both high rates of dysfunctional family environments and perceptions of school risk, and high rates of dysfunctional family and low perceptions of school connectedness, had much higher rates of bullying perpetration. Interestingly, between-person family dysfunction exacerbated the relationship between both high school risk and low school connectedness, respectively. Individuals with low rates of family dysfunction had relatively low levels of bullying perpetration even within the contexts of high school risk and low school connectedness. These findings support the protective nature that families can have on bullying behaviors, even for students in risky schools or with low levels of school belonging. The cross-level interaction provided evidence that individuals with higher rates of school risk and schools with higher rates of family dysfunction, were associated with higher rates of bullying perpetration. Interestingly, schools with higher average rates of individuals reporting dysfunctional family environments exacerbated the association between individual rates of school risk and bullying perpetration. Bullying behaviors were higher in schools with higher levels of family dysfunction and lower in schools with low rates of family dysfunction, across all levels of school risk. This finding suggests that the school context is an important mechanism that may be influencing the rates of bullying perpetration, specifically within

schools that have a large number of students that come from dysfunctional homes.

The present study has several strengths that contribute to scholarship on bullying. First, we examined factors associated with bullying perpetration by considering both family and school related variables together, and focused specifically on how family dysfunction moderated the association between school context and bullying perpetration. Second, to account for the nested nature of schools, we used multilevel modeling to control for school-level variables, which also enabled us to test for school level differences by adding Level 2 variables to our model. Although between-school variability was modest, we found significant between-school differences in family dysfunction. Finally, by partitioning variance for both between-persons and between schools, we were also able to test the contextual effects of dysfunctional family, school risk, and school connectedness. Although only the school risk contextual effect was significant, this provided another level of understanding and indicated that as the number of students reporting school risk within a school increased, the magnitude of the association between individual rates of school risk and bullying perpetration became stronger.

Limitations

Despite these strengths, there are also some limitations that need to be acknowledged. First, the current study was a cross-sectional design, which did not allow us to make any causal inferences. Longitudinal data would allow for an examination of how bullying perpetration would change over time. Second, the data were collected in one particular county with a majority White sample, and as a result, the findings are geographically and racially/ethnically limited. Third, data were derived solely from youth self-report. Future studies might consider multiple reports (e.g., parent report, teacher report), which would yield greater reliability of the findings. Furthermore, our study focused exclusively on physical forms of bullying perpetration and did not consider relational and more covert forms of bullying perpetration. Future studies should examine both overt and covert forms of bullying together to identify differences among the various forms. These limitations aside, the present study provides strong support for exploring the association and interactions between and among family- and school-level variables and how they are related to rates of bullying perpetration.

Research Implications

Future research should consider the limitations in the present study by using a longitudinal research design to investigate predictors of bullying perpetration in high school within a multilevel context. The current study revealed that person- and school-level differences in dysfunctional families were significantly associated with individual rates of bullying perpetration, which has implications for research and theory. However, the continuity or discontinuity of these relations over time remains unclear. A longitudinal approach that considers various levels of analysis has the ability to examine both within- and between-person differences as well as a within- and between-school differences over time, would provide more in depth information about school level associations while also considering person level correlates. Another possible consid-

eration is to explore patterns of bullying behavior among adolescents who are transitioning from middle school to high school. This transition is marked with changes and uncertainty, where adolescents begin to spend more time away from home and more time with their peers. Furthermore, adolescents are learning to navigate a new environment and situate themselves within a new social hierarchy. The combination of these changes has the potential to be an important time period with which bullying behaviors may be more salient in the lives of adolescents. Given that bullying peaks in middle school, particularly during elementary to middle school transitions, several studies have examined such transition (Espelage, Hong, et al., 2015; Pellegrini, 2002; Pellegrini & Long, 2002). Although bullying appears to decline in high school (Robers et al., 2015), our study findings indicate that bullying remains a serious problem in high schools. Also considering that the present study sample were predominantly White student sample in a rural/suburban area, future research might expand on this finding by exploring schools located in other areas, such as inner cities where bullying appears to be higher among diverse adolescent sample (see Robers et al., 2015). Future studies using racially and ethnically diverse high school student samples in various regions can enhance the validity of the study findings. Also as acknowledged in our limitations, given the possibility of social desirability bias, future studies might consider gathering data from multiple sources, including parent and teacher reports and peer nominations in addition to youth self-reports. Gathering data from multiple informants located in various environments (e.g., home, school) can more accurately capture the interrelations among individual-, family-, peer-, and school-level factors associated with adolescent bullying, which is reflective of the social-ecological perspective.

Clinical and Policy Implications

These findings also have implications for school-based violence prevention. As reflected in the study findings, a social-ecological perspective is a useful guiding framework for the development of prevention and intervention strategies for reducing bullying in schools. Although many bullying interventions and prevention programs have been expanded over the years, a meta-analysis by Merrell, Gueldner, Ross, and Isava (2008) had documented that the majority of programs have produced modest positive outcomes. Despite the increased recognition of the importance of the social-ecological perspective in understanding bullying behavior, few programs have adequately reduced bullying behaviors. Though some bullying prevention programs attempt to address the broader school environment these programs may fall short due to poor program-to-school fit, lack of commitment by school personnel, school culture and climate that does not support the effort, or lack of fidelity in implementation. Although we agree that school-based interventions are challenging, the current findings suggest that addressing family and school factors at both the individual and school levels have the potential to reduce bullying behaviors. Assessing the climate and culture of the school is imperative to finding an appropriate prevention program that will fit the needs of the school. Our findings suggest that the school context plays an important role in the development of bullying behaviors. However, it remains unclear the extent to which school-level factors impact individual rates of bullying behaviors over time, as such, further investigations are needed. Given our findings, it is important for

school practitioners to consider the interrelations between family and school factors and how they may contribute to adolescent bullying behavior. School practitioners could achieve this by first assessing climate and culture of the school, which may reinforce bullying and peer conflicts among students.

In terms of developing or selecting appropriate intervention in schools, it is particularly important for educators and school administrators to first investigate whether or not the intervention is evidence-based, if it promotes prosocial behaviors, and if there are documented data on the outcomes (Swearer, Espelage, Vaillancourt, & Hymel, 2010). Moreover, systems affecting adolescents include families and schools, as well as peer groups and teacher–student relations as the present study findings have shown. Changes at this level need to be systematic in nature and require support and engagement from parents, students, teachers, and school officials. Therefore, interventionists, in consultation with educators should consider developing a treatment plan that considers parental involvement and the climate of the school. Interestingly, a meta-analysis of school bullying programs by Ttofi and Farrington (2011) found that effective programs associated with a decrease in bullying include components, such as parent meetings and improved supervisions in school. However, we also acknowledge the challenges of parental involvement, which may be unlikely in homes that are characterized as dysfunctional. In such situations, school practitioners might consider including programs for parents, such as parent training, which has shown to decrease bullying behavior in adolescents (Ttofi & Farrington, 2011).

In summary, it is important for all relevant stakeholders to work together to create a supportive and safe school environment, which would help reduce the occurrences of bullying behaviors. The first necessary step is to address the limitations presented in this study by conducting further research at the school level, which can provide a viable resource for the development of effective programs.

References

Achenbach, T. M. (1991). *Integrative guide for the 1991 CBCL/4–18, YSR, and TRF profiles*. Burlington, VT: Department of Psychiatry, University of Vermont.

Allison, P. D. (2002). Missing data: Quantitative applications in the social sciences. *British Journal of Mathematical & Statistical Psychology, 55,* 193–196.

Astor, R. A., Guerra, N., & Van Acker, R. (2010). How can we improve school safety research? *Educational Researcher, 39,* 69–78. http://dx.doi.org/10.3102/0013189X09357619

Baldry, A. C. (2003). Bullying in schools and exposure to domestic violence. *Child Abuse & Neglect, 27,* 713–732. http://dx.doi.org/10.1016/S0145-2134(03)00114-5

Baldry, A. C., & Farrington, D. P. (2005). Protective factors as moderators of risk factors in adolescence bullying. *Social Psychology of Education, 8,* 263–284. http://dx.doi.org/10.1007/s11218-005-5866-5

Barboza, G. E., Schiamberg, L. B., Oehmke, J., Korzeniewski, S. J., Post, L. A., & Heraux, C. G. (2009). Individual characteristics and the multiple contexts of adolescent bullying: An ecological perspective. *Journal of Youth and Adolescence, 38,* 101–121. http://dx.doi.org/10.1007/s10964-008-9271-1

Beran, T. N., & Tutty, L. (2002). Children's reports of bullying and safety at school. *Canadian Journal of School Psychology, 17,* 1–14. http://dx.doi.org/10.1177/082957350201700201

Bowes, L., Arseneault, L., Maughan, B., Taylor, A., Caspi, A., & Moffitt, T. E. (2009). School, neighborhood, and family factors are associated with children's bullying involvement: A nationally representative longitudinal study. *Journal of the American Academy of Child & Adolescent Psychiatry, 48,* 545–553. http://dx.doi.org/10.1097/CHI.0b013e31819cb017

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist, 32,* 513–531. http://dx.doi.org/10.1037/0003-066X.32.7.513

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by Design and Nature*. Cambridge, MA: Harvard University Press.

Brookmeyer, K. A., Fanti, K. A., & Henrich, C. C. (2006). Schools, parents, and youth violence: A multilevel, ecological analysis. *Journal of Clinical Child and Adolescent Psychology, 35,* 504–514. http://dx.doi.org/10.1207/s15374424jccp3504_2

Burnham, K. P., & Anderson, D. R. (2004). Multimodel inference understanding AIC and BIC in model selection. *Sociological Methods & Research, 33,* 261–304. http://dx.doi.org/10.1177/0049124104268644

Carlyle, K. E., & Steinman, K. J. (2007). Demographic differences in the prevalence, co-occurrence, and correlates of adolescent bullying at school. *The Journal of School Health, 77,* 623–629. http://dx.doi.org/10.1111/j.1746-1561.2007.00242.x

Copeland, W. E., Wolke, D., Angold, A., & Costello, E. J. (2013). Adult psychiatric outcomes of bullying and being bullied by peers in childhood and adolescence. *JAMA Psychiatry, 70,* 419–426. http://dx.doi.org/10.1001/jamapsychiatry.2013.504

Enders, C. K. (2010). *Applied missing data analysis*. New York, NY: Guilford Press.

Espelage, D. L. (2014). Ecological theory: Preventing youth bullying, aggression, & victimization. *Theory into Practice, 53,* 257–264. http://dx.doi.org/10.1080/00405841.2014.947216

Espelage, D. L. (2015). Emerging issues in school bullying research & prevention science. In E. T. Emmer & E. Sabornie (Eds.), *Handbook of classroom management: Research, practice, and contemporary issues* (pp. 76–93). New York, NY: Taylor & Francis.

Espelage, D. L., Bosworth, K., & Simon, T. R. (2000). Examining the social context of bullying behaviors in early adolescence. *Journal of Counseling & Development, 78,* 326–333. http://dx.doi.org/10.1002/j.1556-6676.2000.tb01914.x

Espelage, D. L., Bosworth, K., & Simon, T. R. (2001). Short-term stability and prospective correlates of bullying in middle-school students: An examination of potential demographic, psychosocial, and environmental influences. *Violence and Victims, 16,* 411–426.

Espelage, D. L., & Holt, M. K. (2001). Bullying and victimization during early adolescence: Peer influences and psychosocial correlates. *Journal of Emotional Abuse, 2*(2–3), 123–142. http://dx.doi.org/10.1300/J135v02n02_08

Espelage, D. L., Holt, M. K., & Henkel, R. R. (2003). Examination of peer-group contextual effects on aggression during early adolescence. *Child Development, 74,* 205–220. http://dx.doi.org/10.1111/1467-8624.00531

Espelage, D. L., Hong, J. S., Rao, M. A., & Thornberg, R. (2015). Understanding ecological factors associated with bullying across the elementary to middle school transition in the United States. *Violence and Victims, 30,* 470–487. http://dx.doi.org/10.1891/0886-6708.VV-D-14-00046

Espelage, D. L., Low, S., Rao, M. A., Hong, J. S., & Little, T. D. (2014). Family violence, bullying, fighting, and substance use among adolescents: A longitudinal mediational model. *Journal of Research on Adolescence, 24,* 337–349. http://dx.doi.org/10.1111/jora.12060

Espelage, D. L., Polanin, J. R., & Low, S. K. (2014). Teacher and staff perceptions of school environment as predictors of student aggression, victimization, and willingness to intervene in bullying situations. *School*

Psychology Quarterly, 29, 287–305. http://dx.doi.org/10.1037/spq0000072

Flouri, E., & Buchanan, A. (2002). Life satisfaction in teenage boys: The moderating role of father involvement and bullying. *Aggressive Behavior, 28,* 126–133. http://dx.doi.org/10.1002/ab.90014

Flouri, E., & Buchanan, A. (2003). The role of mother involvement and father involvement in adolescent bullying behavior. *Journal of Interpersonal Violence, 18,* 634–644. http://dx.doi.org/10.1177/0886260503251129

Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment, 7,* 286–299. http://dx.doi.org/10.1037/1040-3590.7.3.286

Glew, G. M., Fan, M. Y., Katon, W., & Rivara, F. P. (2008). Bullying and school safety. *The Journal of Pediatrics, 152,* 123–128. e1. http://dx.doi.org/10.1016/j.jpeds.2007.05.045

Goldweber, A., Waasdorp, T. E., & Bradshaw, C. P. (2013). Examining associations between race, urbanicity, and patterns of bullying involvement. *Journal of Youth and Adolescence, 42,* 206–219. http://dx.doi.org/10.1007/s10964-012-9843-y

Griffiths, L. J., Wolke, D., Page, A. S., & Horwood, J. P., & the ALSPAC Study Team. (2006). Obesity and bullying: Different effects for boys and girls. *Archives of Disease in Childhood, 91,* 121–125. http://dx.doi.org/10.1136/adc.2005.072314

Holt, M. K., & Espelage, D. L. (2007). Perceived social support among bullies, victims, and bully-victims. *Journal of Youth and Adolescence, 36,* 984–994. http://dx.doi.org/10.1007/s10964-006-9153-3

Holt, M. K., Kantor, G. K., & Finkelhor, D. (2008). Parent/child concordance about bullying involvement and family characteristics related to bullying and peer victimization. *Journal of School Violence, 8,* 42–63. http://dx.doi.org/10.1080/15388220802067813

Jessor, R., Donovan, J. E., & Costa, F. M. (1991). *Beyond adolescence: Problem behavior and young adult development.* New York, NY: Cambridge University Press.

Jöreskog, K. G., & Sörbom, D. (1998). *LISREL 8.2 user's reference guide.* Lincolnwood, IL: Scientific Software International.

Kennedy, J. H., & Kennedy, C. E. (2004). Attachment theory: Implication for school psychology. *Psychology in the Schools, 41,* 247–259. http://dx.doi.org/10.1002/pits.10153

Koenig, B., & Bettin, C. (2009). *Dane County Youth Assessment 2009.* Retrieved from Dane County Department of Human Services website: http://www.danecountyhumanservices.org

Koenig, B., Espelage, D. L., & Biendseil, R. (2005). *Dane County youth assessment: The Dane County Youth Commission* (Unpublished report).

Lee, C. H. (2011). An ecological systems approach to bullying behaviors among middle school students in the United States. *Journal of Interpersonal Violence, 26,* 1664–1693. http://dx.doi.org/10.1177/0886260510370591

Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association, 83,* 1198–1202. http://dx.doi.org/10.1080/01621459.1988.10478722

Losel, F., & Bender, D. (2011). Emotional and antisocial outcomes of bullying and victimization at school: A follow-up from childhood to adolescence. *Journal of Aggression, Conflict and Peace Research, 3,* 89–96. http://dx.doi.org/10.1108/17596591111132909

Low, S., & Espelage, D. (2013). Differentiating cyber bullying perpetration from non-physical bullying: Commonalities across race, individual, and family predictors. *Psychology of Violence, 3,* 39–52. http://dx.doi.org/10.1037/a0030308

Marini, Z. A., Dane, A. V., Bosacki, S. L., & Cura, Y. (2006). Direct and indirect bully victims: Differential psychosocial risk factors associated with adolescents involved in bullying and victimization. *Aggressive Behavior, 32,* 551–569. http://dx.doi.org/10.1002/ab.20155

McLachlan, G. J., Krishnan, T., & Ng, S. K. (2004). *The EM algorithm (Paper No. 24).* Berlin, Germany: Humboldt-Universität Berlin, Center for Applied Statistics and Economics (CASE).

Merrell, K. W., Gueldner, B. A., Ross, S. W., & Isava, D. M. (2008). How effective are school bullying intervention programs? A meta-analysis of intervention research. *School Psychology Quarterly, 23,* 26–42. http://dx.doi.org/10.1037/1045-3830.23.1.26

Monks, C. P., Smith, P. K., Naylor, P., Barter, C., Ireland, J. L., & Coyne, I. (2009). Bullying in different contexts: Commonalities, differences and the role of theory. *Aggression and Violent Behavior, 14,* 146–156. http://dx.doi.org/10.1016/j.avb.2009.01.004

Morrison, G. M., Furlong, M. J., & Morrison, R. L. (1994). School violence to school safety: Reframing the issue for school psychologists. *School Psychology Review, 23,* 236–256.

Nansel, T. R., Overpeck, M., Pilla, R. S., Ruan, W. J., Simons-Morton, B., & Scheidt, P. (2001). Bullying behaviors among US youth: Prevalence and association with psychosocial adjustment. *Journal of the American Medical Association, 285,* 2094–2100. http://dx.doi.org/10.1001/jama.285.16.2094

Ortega, R., Elipe, P., Mora-Merchan, J. A., Calmaestra, J., & Vega, E. (2009). The emotional impact on victims of traditional bullying and cyberbullying: A study of Spanish adolescents. *Zeitschrift für Psychologie/Journal of Psychology, 217,* 197–204.

Osgood, D. W. (1994, November). *Drugs, alcohol, and adolescent violence.* Paper presented at the Annual Meeting of the American Society of Criminology, Miami, FL.

Pellegrini, A. D. (2002). Bullying, victimization, and sexual harassment during the transition to middle school. *Educational Psychologist, 37,* 151–163. http://dx.doi.org/10.1207/S15326985EP3703_2

Pellegrini, A. D., & Long, J. D. (2002). A longitudinal study of bullying, dominance, and victimization during the transition from primary school through secondary school. *British Journal of Developmental Psychology, 20,* 259–280. http://dx.doi.org/10.1348/026151002166442

Pernanen, K. (1993). Research approaches in the study of alcohol-related violence. *Alcohol Health & Research World, 17,* 101–107.

Pihl, R. O., & Peterson, J. (1993). Alcohol and aggression: Three potential mechanisms of the drug effect. In S. E. Martin (Ed.), *Alcohol and interpersonal violence: Fostering multidisciplinary perspectives (NIAAA Research Monograph No. 24,* pp. 149–159). Rockville, MD: National Institute of Health.

Radliff, K. M., Wheaton, J. E., Robinson, K., & Morris, J. (2012). Illuminating the relationship between bullying and substance use among middle and high school youth. *Addictive Behaviors, 37,* 569–572. http://dx.doi.org/10.1016/j.addbeh.2012.01.001

Robers, S., Zhang, A., Morgan, R. E., & Musu-Gillette, L. (2015). *Indicators of school crime and safety: 2014* (Report No. NCES 2015–072/NCJ 248036). Washington, DC: National Center for Education Statistics, U.S. Department of Education and Bureau of Justice Statistics, Office of Justice Programs, U.S. Department of Justice.

Robinson, J. P., & Espelage, D. L. (2011). Inequities in educational and psychological outcomes between LGBTQ and straight students in middle and high school. *Educational Researcher, 40,* 315–330. http://dx.doi.org/10.3102/0013189X11422112

Robinson-Cimpian, J. P. (2014). Inaccurate estimation of disparities due to mischievous responders several suggestions to assess conclusions. *Educational Researcher, 43,* 171–185. http://dx.doi.org/10.3102/0013189X14534297

Rose, C. A., Espelage, D. L., Monda-Amaya, L. E., Shogren, K. A., & Aragon, S. R. (2015). Bullying and middle school students with and without specific learning disabilities: An examination of social-ecological predictors. *Journal of Learning Disabilities, 48,* 239–254. http://dx.doi.org/10.1177/0022219413496279

Rubin, K. H., Bukowski, W., & Parker, J. G. (1998). Peer interactions, relationships, and groups. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 779–862). New York, NY: Wiley.

Seals, D., & Young, J. (2003). Bullying and victimization: Prevalence and relationship to gender, grade level, ethnicity, self-esteem, and depression. *Adolescence, 38,* 735–747.

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence.* New York, NY: Oxford University Press. http://dx.doi.org/10.1093/acprof:oso/9780195152968.001 .0001

Smokowski, P. R., & Kopasz, K. H. (2005). Bullying in school: An overview of types, effects, family characteristics, and intervention strategies. *Children & Schools, 27,* 101–110. http://dx.doi.org/10.1093/cs/27 .2.101

Snijders, T. A., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). London, UK: Sage.

Spriggs, A. L., Iannotti, R. J., Nansel, T. R., & Haynie, D. L. (2007). Adolescent bullying involvement and perceived family, peer and school relations: Commonalities and differences across race/ethnicity. *Journal of Adolescent Health, 41,* 283–293. http://dx.doi.org/10.1016/j .jadohealth.2007.04.009

Swahn, M. H., Topalli, V., Ali, B., Strasser, S. M., Ashby, J. S., & Meyers, J. (2011). Pre-teen alcohol use as a risk factor for victimization and perpetration of bullying among middle and high school students in Georgia. *The Western Journal of Emergency Medicine, 12,* 305–309.

Swearer, S. M., Espelage, D. L., Vaillancourt, T., & Hymel, S. (2010). What can be done about school bullying? Linking research to educational practice. *Educational Researcher, 39,* 38–47. http://dx.doi.org/10 .3102/0013189X09357622

Ttofi, M. M., & Farrington, D. P. (2011). Effectiveness of school-based programs to reduce bullying: A systematic and meta-analytic review. *Journal of Experimental Criminology, 7,* 27–56. doi:10.1007/s11292-010-9109-1

Ttofi, M. M., Farrington, D. P., Lösel, F., & Loeber, R. (2011). The predictive efficiency of school bullying versus later offending: A systematic/meta-analytic review of longitudinal studies. *Criminal Be-haviour and Mental Health, 21,* 80–89. http://dx.doi.org/10.1002/cbm .808

Unnever, J. D., & Cornell, D. G. (2003). The culture of bullying in middle school. *Journal of School Violence, 2,* 5–27. http://dx.doi.org/10.1300/ J202v02n02_02

Volk, A., Craig, W., Boyce, W., & King, M. (2006). Adolescent risk correlates of bullying and different types of victimization. *International Journal of Adolescent Medicine and Health, 18,* 575–586. http://dx.doi .org/10.1515/IJAMH.2006.18.4.575

Wang, J., Iannotti, R. J., & Nansel, T. R. (2009). School bullying among adolescents in the United States: Physical, verbal, relational, and cyber. *Journal of Adolescent Health, 45,* 368–375. http://dx.doi.org/10.1016/j .jadohealth.2009.03.021

Wienke Totura, C. M., MacKinnon-Lewis, C., Gesten, E. L., Gadd, R., Divine, K. P., Dunham, S., & Kamboukos, D. (2009). Bullying and victimization among boys and girls in middle school: The influence of perceived family and school contexts. *The Journal of Early Adolescence, 29,* 571–609. http://dx.doi.org/10.1177/0272431608324190

Wilson, D. (2004). The interface of school climate and school connectedness and relationships with aggression and victimization. *The Journal of School Health, 74,* 293–299. http://dx.doi.org/10.1111/j.1746-1561.2004 .tb08286.x

World Health Organization. (2012). *World report on violence and health.* Retrieved from http://www.who.int/violence_injury_prevention/violence/ world_report/en/full_en.pdf

Young, D. H. (2004). Does school connectedness predict bullying? An analysis of perceptions among public middle school students. *Dissertation Abstracts International Selection A: Humanities and Social Sciences, 64,* 3959.