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Patterns of Adolescent Bullying Behaviors: Physical, Verbal, Exclusion, Rumor, and Cyber

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Abstract

Patterns of engagement in cyber bullying and four types of traditional bullying were examined using latent class analysis (LCA). Demographic differences and externalizing problems were evaluated across latent class membership. Data were obtained from the 2005–2006 Health Behavior in School-aged Survey and the analytic sample included 7,508 U.S. adolescents in grades 6 through 10. LCA models were tested on physical bullying, verbal bullying, social exclusion, spreading rumors, and cyber bullying behaviors. Three latent classes were identified for each gender: All-Types Bullies (10.5% for boys and 4.0% for girls), Verbal/Social Bullies (29.3% for boys and 29.4% for girls), and a Non-Involved class (60.2% for boys and 66.6% for girls). Boys were more likely to be All-Types Bullies than girls. The prevalence rates of All-Types and Verbal/Social Bullies peaked during grades 6 to 8 and grades 7 & 8, respectively. Pairwise comparisons across the three latent classes on externalizing problems were conducted. Overall, the All-Types Bullies were at highest risk of using substances and carrying weapons, the Non-Involved were at lowest risk, and the Verbal/Social Bullies were in the middle. Results also suggest that most cyber bullies belong to a group of highly aggressive adolescents who conduct all types of bullying. This finding does not only improve our understanding of the relation between cyber bullying and traditional bullying, but it also suggests that prevention and intervention efforts could target cyber bullies as a high-risk group for elevated externalizing problems.

Keywords

bullying; cyber bullying; demographic differences; externalizing problems; latent class analysis

Introduction

Bullying can be defined as a type of aggressive behavior which is intentional, repeated, and usually involves imbalance of power between the bully and the victim (Olweus, 1993). It is

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a widespread school problem that is linked to various psychological adjustment and academic problems among school-aged children and adolescents (Gini, 2008; Nansel, Craig, Overpeck, Saluja, & Ruan, 2004; Schwartz, Gorman, Nakamoto, & Toblin, 2005). In school, bullying behaviors may take various forms (Crick & Grotpeter, 1995; Olweus, 1993), including physical bullying (e.g., hitting, pushing, and kicking), verbal bullying (e.g., calling mean names in a hurtful way), social exclusion (e.g., ignoring or leaving out others on purpose), and spreading rumors (e.g., telling lies about others). Recently, cyber bullying has emerged as a new type of bullying which involves bullying others using electronic devices such as cell phones and computers (Li, 2007; Raskauskas & Stoltz, 2007; Slonje & Smith, 2008; Williams & Guerra, 2007). A recent national study showed that each of the above bullying subtypes is common among U.S. youth, ranging from 13.6% for cyber bullying to 53.6% for verbal bullying (Wang, Iannotti, & Nansel, 2009).

Traditional and Cyber Forms of Bullying

As cyber bullying emerges as a new form of bullying, researchers have sought to understand the association between traditional bullying and cyber bullying. According to Juvonen and Gross (2008), cyber bullying is an extension of traditional bullying, with the location of bullying extended from school to the cyber space. Similarly, Raskauskas and Stoltz (2007) reported that students' roles in traditional bullying predicted the same role in cyber bullying. However, whereas the majority of studies generally suggest a positive correlation between traditional and cyber bullying (Gradinger, Strohmeier, & Spiel, 2009; Smith et al., 2008; Ybarra, Diener-West, & Leaf, 2007), most prior studies did not differentiate between various subtypes of traditional bullying and have combined physical bullying, verbal bullying, social exclusion, and spreading rumors into a single traditional bullying construct (e.g., Li, 2007; Raskauskas & Stoltz, 2007). As such, it remains unclear whether the relation between traditional bullying and cyber bullying is common to all subtypes of traditional bullying or is driven by certain subtypes of traditional bullying. For example, given that both cell phones and computers are often used as means of communication, it may be that the relation between traditional and cyber bullying is largely accounted for by verbal bullying, social exclusion, and spreading rumors but not physical bullying. Few previous studies, if any, have examined this question. This gap in the literature is an important one to address because understanding which subtypes of traditional bullying are linked to or co-occur with cyber bullying can help teachers, school counselors, psychologists, and parents evaluate the degree of seriousness of adolescents' bullying behaviors (e.g., how likely are they to also engage in physical bullying) when they observe the presence of cyber bullying. Accordingly, this information can inform prevention and intervention efforts targeting adolescent bullying.

To address this gap, the current study applies a latent class analysis (LCA) to examine how five subtypes of bullying, including cyber bullying, co-occur in the same person. LCA is a person-based latent variable approach in which latent classes or groups can be identified based on participants' observed response to multiple categorical variables (Andersen & McCutcheon, 2003; Magidson & Vermunt, 2004; Nylund, Asparouhov, & Muthén, 2007). As such, LCA is an appropriate method to examine patterns of involvement in multiple subtypes of bullying and identify groups of individuals who are likely to endorse a particular pattern of bullying involvement. Using a LCA model, Wang, Iannotti, Luk, and Nansel (2010) examined how different subtypes of victimization occurred in the same person and extracted three latent classes, including (a) a latent class of "all-types victims" who were victims of all types of bullying, (b) a latent class of "verbal/social victims" who were marked by victimization by verbal bullying, social exclusion, and spreading rumors, and (c) a latent class of "non-victims" who had minimal probabilities of being victimized by any bullying behavior. The all-types victims consisted of 9.7% of boys and 6.2% of girls,

whereas the verbal/social victims consisted of 28.1% of boys and 35.1% of girls. Moreover, a graded relation was found between the three latent classes of victimization on their level of depression and frequency of medically attended injuries and medicine use. However, the prior study focused on the co-occurrence of subtypes of victimization (i.e., being targets of bullying behaviors) and did not consider the co-occurrence of subtypes of bullying (i.e., conducting bullying behaviors). As such, it remains unclear how various subtypes of bullying co-occur in the same student or whether such co-occurrence is linked to correlates of bullying. If a similar pattern can be found for bullying perpetration in which there is a group of bullies who engage in all traditional and cyber forms of bullying, the identification of such a highly aggressive group, as well as the demographic characteristics associated with it, could guide more targeted prevention and intervention efforts. Thus, the first goal of the current study was to examine how cyber bullying and four subtypes of traditional bullying, including physical bullying, verbal bullying, social exclusion, and spreading rumors, co-occurs in the same person.

Demographic Characteristics: Gender, Grade, and Race/Ethnicity

Numerous studies have examined demographic differences in adolescent bullying behaviors in the United States. When traditional bullying is conceptualized as a single construct, researchers have found that boys are more likely to be bullies, and bullying seems to peak in middle school (Goldbaum, Craig, Pepler, & Connolly, 2007). When specific subtypes of bullying were taken into consideration, studies have shown that boys are more likely to be involved in physical or verbal bullying than girls, whereas girls may be more likely to be bullying others socially or relationally than boys (Bjorkqvist, 1994; Owens, Shute, & Slee, 2000). With regard to cyber bullying, some studies found that boys were more likely to be cyber bullies (Aricak et al., 2008; Li, 2006), whereas other studies did not find any gender difference (Slonje et al., 2008; Williams et al., 2007). Among the few studies that have examined grade differences in specific subtypes of bullying, a recent study showed that physical bullying and cyber bullying peaked in middle school and declined in high school, whereas verbal bullying peaked in middle school and remained relatively elevated during high school (Williams et al., 2007).

In contrast to studies on gender and grade differences, relatively few and inconsistent findings have been reported with respect to racial/ethnic differences in overall bullying or specific subtypes of bullying. For instance, a higher prevalence of bullying was found among African American adolescents than Hispanic adolescents in metropolitan Los Angeles (Juvonen, Graham, & Schuster, 2003). In a national survey, Nansel and colleagues (Nansel et al., 2001) reported that Hispanic adolescents were more likely to engage in bullying than Caucasian adolescents. However, more recent national data suggest that African American adolescents were more likely than Caucasian adolescents to be physical, verbal, and cyber bullies (Wang et al., 2009). Moreover, there are other studies which showed no racial/ethnic differences in bullying behaviors (Seals & Young, 2003; Spriggs, Iannotti, Nansel, & Haynie, 2007).

Bullying and Externalizing Problem Behaviors

Multiple cross-sectional and longitudinal studies have shown that bullies are more likely to engage in externalizing behaviors, such as substance use and violent behaviors (Barker, Arseneault, Brendgen, Fontaine, & Maughan, 2008; Gini & Pozzoli, 2009; Niemelä et al., 2011; Sourander et al., 2007; Stein, Dukes, & Warren, 2007), yet few studies have distinguished between different subtypes of bullying behaviors. Among the few studies that examined bullying subtypes, a recent study has shown that physical, verbal, and cyber bullies are more likely to use alcohol (Peleg-Oren, Cardenas, Comerford, & Galea, 2010). In a cross national study, Nansel et al. (2004) found that involvement in bullying is positively

associated with carrying weapon in all six different countries included in their study. However, none of the above studies have examined the extent to which co-occurrence of multiple types of bullying is related to substance use and carrying weapon. Thus, the third purpose of the current study was to examine the association between the latent class membership extracted in the LCA with substance use and weapon carrying.

Gaps in the Literature and the Current Study

This study is designed to address several limitations of prior research. First, most previous studies either examined overall bullying or only some subtypes of bullying without considering co-occurrence of multiple subtypes of bullying. Specifically, it is unclear whether the traditional-cyber bullying relation is driven by some or all subtypes of traditional bullying. Second, many existing studies were conducted in local or regional samples, thereby limiting their ability to generalize the results on demographic differences across various subtypes of bullying to the general population. Third, although a positive association between bullying and externalizing behaviors has been documented in prior research, some of these studies only included boys (Niemelä et al., 2011; Stein et al., 2007) and most did not differentiate between subtypes of bullying (e.g., Barker et al., 2008; Sourander et al., 2007). Thus, it is of interest to test whether co-occurrence of subtypes of bullying is related to externalizing problems. Adolescent substance use and weapon carrying are two externalizing problems that might further interfere with the learning environment in schools, and as such were included in the present study.

Using a nationally representative sample, three research questions were examined in the current study. First, we tested patterns of co-occurrence in students' involvement in physical bullying, verbal bullying, social exclusion, rumor spreading, and cyber bullying using LCA models. Second, we examined whether there were notable demographic differences across the extracted latent classes. Third, we investigated whether a graded relation in substance use and weapon carrying was observable across the extracted latent classes. Based on a similar study on patterns of co-occurrence of peer victimization (Wang et al., 2010), we hypothesized that a three-class solution would best fit the data, including one class of highly aggressive students who engaged in all subtypes of bullying. Moreover, we expected to find gender, grade, and race/ethnicity differences across the extracted latent classes. Finally, we predicted that involvement in more subtypes of bullying would be associated with higher levels of substance use and weapon carrying.

Method

Sampling and Participants

Data were obtained from a nationally representative sample in the 2005–2006 Health Behavior in School-aged Children (HBSC) study conducted in the United States. The target population for the HBSC is all students in public, private, and Catholic schools in all states and the District of Columbia. The sample was collected through a multistage stratified design. To cover all census regions and grades 6 through 10, sample selection was stratified by census region and grade (grade 6, grades 7 and 8, and grades 9 and 10). Within each census region and grade stratum, school districts were randomly selected as the primary sampling units (PSU). Then, schools were randomly selected within each selected school district, and classes were randomly selected within each selected school. To ensure that the PSU had at least 10 schools, rural school districts within a county were grouped as a PSU. School districts with very large enrollments were considered as separate primary sampling units. The probability of a PSU being selected was proportional to the total enrollment in grades 6 through 10. To obtain more precise population estimates for African American and

Hispanic students, these two minority groups were oversampled and student sampling weights were calculated to correct for the sampling scheme.

The total sample in the HBSC 2005–2006 survey included 9,011 students in grades 6 through 10, of which 7,508 completed a survey that included bullying items. Data from 7,508 students were analyzed in this study, which represents results from all participants in grades 7 through 10 and approximately half of students in grade 6.¹ The sample was composed of 15.0% 6th graders, 23.3% 7th graders, 22.9% 8th graders, 18.8% 9th graders, and 20.1% 10th graders. The analytic sample consisted of 48.5% boys and 51.5 girls, as well as 42.2% Caucasian, 18.7% African American, and 26.4% Hispanic adolescents. The mean age of the sample was 14.2 years ($SD = 1.4$ years).

Measures

Demographic variables—Demographic variables included gender, grade, and race/ethnicity. Because previous studies have suggested a nonlinear association between grade and bullying which may peak during middle school, grade was included in the analyses as a categorical variable with three levels: 6 ($n = 1,125$), 7 and 8 ($n = 3,466$), and 9 and 10 ($n = 2,917$). To obtain adequate sample sizes for analyses, race/ethnicity was classified into four categories: Caucasian, African American, Hispanic, and Other.

Bullying Behaviors—Involvement in traditional bullying behaviors was measured using the Revised Olweus Bully/Victim Questionnaire (OBVQ; Olweus, 1996; Solberg & Olweus, 2003). The development of OBVQ was based on the definition of bullying, proposed by Olweus (1993). Prior studies suggested that the OBVQ has satisfactory construct validity and reliability (Kyriakides, Kaloyirou, & Lindsay, 2006) and modest concurrent validity (Lee & Cornell, 2010). A definition of bullying was first provided. Students were then asked how frequently they had engaged in different bullying behaviors: *never*, *once or twice*, *two or three times a month*, *about once a week*, or *several times a week* in the past two months. Measures on physical bullying, verbal bullying, social exclusion, and spreading rumors subtypes of bullying were included in the current study. Physical bullying was measured by the item “hitting, kicking, pushing, shoving around, and locking indoors.” Verbal bullying was measured by three items: “teasing in a hurtful way,” “calling mean names about race,” and “calling mean names about religion.” Social exclusion was measured by the item “leaving others out of things on purpose, excluding others from their “group of friends, and completely ignoring others.” Spreading rumors was measured by the item “telling lies and spreading false rumors about others.”

Satisfactory internal consistency and test–retest reliability of the questionnaire have been found in prior research and in the current study. For example, a recent study on psychometric properties of OBVQ reported that the Cronbach’s alpha was .79 (Hartung, Little, Allen, & Page, 2011). In the current study, the Cronbach’s alpha estimate of internal consistency was .86 for scores on the six items measuring overall traditional bullying, and was .75 for scores on the three items measuring verbal bullying. With the same response options and time frame, two items measuring cyber bullying followed the items assessing the other types of bullying: “bullying others using computers, e-mail messages, pictures” and “bullying others using cell phones” (Cronbach’s alpha = .83).

Because we were interested in the involvement in the five types of bullying, we used the cut-off point associated with the scale anchor *once or twice in the past couple of months* to

¹All students completed a single survey, but two versions of the survey were administered to 6th grade students, one with items on bullying and one without.

differentiate involvement from non-involvement.² A dichotomous variable was first created for each item. If a respondent endorsed one or more items measuring a particular type of bullying, he or she was coded as “yes” for conducting the type of bullying. Thus, five dichotomous variables (representing physical bullying, verbal bullying, social exclusion, spreading rumor, and cyber bullying) were created for further analyses. All five subtypes of bullying were included as indicators in the LCA models.

Substance Use—Four items were used to measure frequency of substance use in the past 30 days: smoking cigarettes, drinking alcohol, being drunk, and using marijuana. Responses were coded 1 to 7: *never, once or twice, 3–5 times, 6–9 times, 10–19 times, 20–39 times and 40 times or more*. The items were adapted from the European School Survey Project on Alcohol and Other Drugs 1995, 1999, and 2003 (Hibell et al., 2004) and were also used in other surveys such as Monitoring the Future Study (Johnston, O’Malley, Bachman, & Schulenberg, 2009). Based on a series of three-wave panel analyses, test–test reliabilities for self-reported cigarette, alcohol, and marijuana use were all above .80 (Bachman, Johnston, & Omalley, 1981). Construct validity was also supported in studies using predicting variables such as attitudes and belief about drugs (Johnston & O’Malley, 1985). Using the current data for all participants, a confirmatory factor analysis was conducted on the four items, and a one-factor structure model showed satisfactory model fit (CFI = .998, TLI = .993, and RMSEA = .056). Based on this evidence, a dichotomous variable was created in that substance use for at least one item was coded as “use;” otherwise, substance use was coded as “no use.”

Carrying a weapon—A single item was used for carrying a weapon: “The last time you carried a weapon during the past 30 days, what type of weapon was it?” Responses were “I did not carry a weapon during the past 30 days,” “knife or pocketknife,” “stick or club,” “knuckle-brace/brass knuckles,” “tear gas/pepper spray/mace,” “handgun or other firearm,” and “other type.” This item was adapted from the Youth Risk Behavior Survey Questionnaire (Eaton et al., 2010). A dummy variable was created with two categories: “had carried a weapon” or “had not carried a weapon.” The weapon carrying items were asked for participants in grades 7 or higher; therefore comparison of carrying weapons across latent classes was conducted with adolescents in grades 7 through 10 only.

Procedure

Data were collected through anonymous self-report questionnaires distributed in the classroom, with a student response rate of 87%. Youth assent and parental consent were obtained as required by the participating school districts. The study protocol was reviewed and approved by the Institutional Review Board of the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

Research staff, trained at a central location and sent to the schools, supervised the completion of the anonymous self-report questionnaires by the students in their regular classrooms. Teachers and school personnel were asked to assure student privacy by not walking around the classroom or looking at the surveys while they were being completed. Quality control visits by senior staff were conducted to assure that these procedures were followed in the field. All items, including those assessing age, gender, family affluence, and race/ethnicity, were read and completed by respondents alone. The survey had a Flesch–Kincaid grade level readability of 3.3 (Flesch, 1948).

²A review on prevalence of cyber bullying showed that it was not uncommon to consider occasional events as involvement in cyber bullying (e.g., Raskauskas & Stoltz, 2007).

Data Analysis

The statistical software package Mplus 6.1 (L. K. Muthén & B.O. Muthén, 1998) was used for model-fitting. To accommodate the complex sampling structure of the HBSC data, latent class analysis (LCA) models were examined with stratification, cluster, and sampling weights, a complex survey feature that exists within Mplus. Furthermore, Mplus enabled us to make use of all available data, including cases with some missing responses on bullying items, through estimation by full information maximum likelihood (Schafer & Graham, 2002).

A series of LCA were conducted in three steps. The first step was to choose the optimal number of classes by specifying separate LCA models with various numbers of classes. Model selection was based on conceptual considerations and a variety of statistical criteria, which included Akaike information criterion (AIC, Akaike, 1987), Bayesian information criterion (BIC, Raftery, 1995), sample-size adjusted Bayesian information criterion (ABIC), entropy (Akaike, 1977), Lo-Mendell-Rubin likelihood ratio test (LMR LRT, Lo, Mendell, & Rubin, 2001). AIC, BIC, and ABIC are information criteria with a lower value indicating better fit, whereas entropy close to 1 indicate less discrepancy between the specified model and data. LMR LRT compares an estimated model with a model with one less class, with a significant p -value ($< .05$) indicating improved model fit. Moreover, class interpretability and theoretical implication were considered in selecting the optimal model. In a LCA, each participant is assigned to a latent class based on the highest posterior probability. Item probabilities (i.e., the probabilities of endorsing the items in each latent class) are used to define the latent classes. In the current study, latent classes are defined by probabilities that the individuals in each class reported conducting physical bullying, verbal bullying, social exclusion, spreading rumor, and cyber subtypes of bullying.

The second step was to examine the latent class demographic differences by gender, grade, and race/ethnicity through a LCA model with covariates. The demographic variables were added to the LCA model chosen in the first step. This model is analogous to a multinomial logistic regression, with the latent class membership serving as the outcome variable and the demographic characteristics serving as predictor variables.

The final step was to compare the two externalizing problem behaviors across the extracted latent classes. Specifically, the group or groups of bullies should report higher level of externalizing problems than the group consisting of those uninvolved in bullying. To explore if there were different classes or different number of classes extracted from boys and girls, the analyses were conducted for all adolescents, as well as for boys and girls separately.

Results

Handling of Missing Data

There were 7,508 adolescents who completed the HBSC 2005–2006 survey with the bully/victim items in the HBSC 2005–2006 survey. In the analyses of LCA with covariates, 33 adolescents were excluded, due to missing values on demographic variables. A chi-square statistic was calculated for each of the five bullying variables, and there was no significant difference between the 33 adolescents with missing data and the analytic sample of adolescents with complete data at an alpha of .05. With full information maximum likelihood estimation, the analytic sample consisting of 7,475 adolescents who had complete data on all demographic variables was used in the LCA with covariates model. To increase generalizability to a national population, the sample of 7,508 adolescents was used in the initial analyses identifying the optimal number of classes, but the reduced sample size of 7,475 was used for the analysis of LCA with covariates.

Step 1: Determining Optimal Number of Classes

LCAs were conducted on the five bullying behavior items with one, two, three, and four classes specified across models. The prevalence of involvement in and the Spearman rank-order correlations between the five bullying behaviors are shown in Table 1. The fit statistics for each model are reported in Table 2. Among statistical criteria, we gave more weight to the BIC and ABIC, as a recent simulation study demonstrated that BIC performs better than other information criteria and likelihood ratio tests in identifying the appropriate number of latent classes (Nylund et al., 2007). The best fitting models, as indicated by the BIC and ABIC values, were the three-class models for all individuals and for boys and girls separately. The three-class model was also supported by the LMR LRT p -values in the model of all individuals, as the three-class model improved the model fit compared to the two-class model ($p < .001$) and the four-class model did not improve the model fit compared to the three-class model ($p = .76$).³ The AIC values decreased substantially with the addition of each class and began to level off after the three-class model. The entropy values for the three-class models were .74, .75 and .75, respectively. In addition, class interpretation was examined for all models and the three-class demonstrated the most meaningful individual classification with adequate class sizes. Thus, the three-class model was selected as the best model to classify individuals into homogeneous groups.

For the three-class models of boys and girls separately, the prevalence of each class and the probability that an individual was involved in each bullying behavior are shown in Figure 1. As shown in Figure 1, both boys and girls demonstrated similar overall patterns of the three latent classes. For both genders, the following three classes were extracted: (a) Class 1: All-Types Bullies (10.5% for boys and 4.0% for girls)—a class of individuals with high probabilities of all five bullying behaviors; (b) Class 2: Verbal/Social Bullies (29.3% for boys and 29.4% for girls)—a class of individuals with a high probability of verbal bullying, moderate probability of social exclusion, and low to moderate probabilities of other bullying behaviors; and (c) Class 3: Non-Involved (60.2% for boys and 66.6% for girls)—a class of individuals with very low probabilities of all five bullying behaviors. Prevalence rates of the three classes for boys and girls combined were 6.5% for Class 1, 29.3% for Class 2, and 64.1% for Class 3. The pattern in the model for all individuals was essentially the same as the pattern observed by gender.⁴

Step 2: Demographic Differences in Latent Class Membership

The results of the 3-class LCA with covariates model are reported in Table 3. Because there were a total of three classes, the model was analogous to a multinomial logistic regression. Class 3, the category of noninvolved, was set as the reference group. Odds ratios and their 95% confidence intervals are reported, and significance level was determined by whether the confidence interval includes 1.0. Demographic variables included gender (girl as the referent), grade (grades 7 and 8 as the referent), and race/ethnicity (Caucasian Americans as the referent).

Gender—Gender was included only in the model for all individuals to test gender differences in involvement in the classes of All-Types and Verbal/Social Bullies. Results showed that compared to girls, the odds to be in the All-Types Bullies class versus in the Non-Involved class was 2.65 times as high for boys (OR = 2.65, 95% CI = 2.07, 3.40).

³The LMR LRT for the separate gender models showed there was an improved model fit from the three-class to the four-class model. However, the four-class models were rejected due to increased BIC and ABIC values and identification of multiple classes with small class size.

⁴Results can be obtained from the first author.

There was no significant gender difference for Verbal/Social Bullies compared to Non-Involved.

Grade—Compared to adolescents in grades 7 and 8, those in grades 9 and 10 were significantly less likely to be All-Types bullies for all and for girls only (for all: OR = 0.59, 95% CI = 0.37, 0.92; for girls only: OR = 0.44, 95% CI = 0.22, 0.88), and less likely to be Verbal/Social Bullies for all and for separate analysis by gender (for all: OR = 0.64, 95% CI = 0.50, 0.81; for boys only: OR = 0.73, 95% CI = 0.54–0.97; for girls only: OR = 0.57, 95% CI = 0.41, 0.77). For boys only, 6th graders were significantly less likely to be Verbal/Social Bullies than those in grades 7 and 8 (OR = 0.59, 95% CI = 0.40–0.87).

Race/ethnicity—Compared to Caucasian adolescents, African American adolescents were significantly more likely to be All-Types bullies (for all: OR = 2.93, 95% CI = 1.57, 5.50; for boys only: OR = 2.15, 95% CI = 1.16, 3.97; and for girls only: OR = 4.85, 95% CI = 1.96, 12.03) and Verbal/Social Bullies (for all: OR = 1.32, 95% CI = 1.01, 1.72; and for girls only: OR = 1.70, 95% CI = 1.11, 2.62). Hispanic adolescents were significantly more likely to be All-Types Bullies (for all: OR = 2.22, 95% CI = 1.38, 3.57; and for girls only: OR = 3.70, 95% CI = 1.80, 7.60), but less likely to be Verbal/Social Bullies (for boys only: OR = 0.66, 95% CI = 0.48, 0.93). Adolescents of Other race/ethnicity were significantly less likely to be verbal/social bullies (for all: OR = 0.69, 95% CI = 0.48, 0.99; and for girls only: OR = 0.41, 95% CI = 0.25, 0.68).

Step 3: Comparison of Externalizing Problems across Latent Classes

For all individuals, the percentage of substance use in the past 30 days was 37.2% ($SE = 1.21$). The weapons carrying items were asked for participants in grades 7 or higher, and the percentage of carrying weapons in the past 30 days was 15.6% ($SE = 0.80$). By gender, 35.9% ($SE = 1.35$) of boys and 38.4% ($SE = 1.61$) of girls reported substance use, and 24.3% ($SE = 1.48$) of boys and 7.6% reported carrying weapons.

The percentages of substance use and carrying weapons in the past month are plotted for boys and girls separately in Figure 2. Pairwise comparisons were conducted across latent class. For substance use, significant differences were found between any two classes, except for the comparison between All-Types Bullies and Verbal/Social Bullies among girls. Specifically, among boys, 61.6% of All-Types Bullies used substances in the past month, compared to 45.9% of Verbal/Social Bullies and 29.8% of Non-Involved. Among girls, 50.4% of All-Types Bullies used substances in the past month, compared to 49.2% of Verbal/Social Bullies and 33.9% of Non-Involved. For carrying weapons, all pairwise comparisons were significant. Specifically, among boys, among boys, 47.8% of All-Types Bullies carried weapons in the past month, compared to 28.9% of Verbal/Social Bullies and 18.2% of Non-Involved. Among girls, 26.7% of All-Types Bullies carried weapons in the past month, compared to 11.8% of verbal/social bullies and 4.8% of Non-Involved.

Discussion

In the current study, we applied LCA models to classify adolescents based on their involvement in five different bullying behaviors, including physical bullying, verbal bullying, social exclusion, spreading rumors, and cyber bullying. Similar to a prior study on subtypes of peer victimization (Wang et al., 2010), a three-class model for bullying was found to be the best solution for all individuals and for boys and girls separately: a latent class of All-Types Bullies (Class 1), a latent class of Verbal/Social Bullies (Class 2), and a latent class of Non-Involved (Class 3). As expected, differences in demographics, substance use, and weapon carrying were also found across the three extracted latent classes.

In this study, the All-Types Bullies had high probabilities of both cyber bullying and all four types of traditional bullying. Together, they represent the most aggressive group, who attack others using all possible means; they accounted for a small portion of the sample (10.5 % of boys and 4.0% of girls). Class 2 adolescents had high probability of performing verbal bullying, moderate probability of social bullying, and low to moderate probabilities of other bullying behaviors. This group of moderately aggressive individuals was marked by verbal and social bullying and accounted for 29.3% of boys and 29.4% of girls. Class 3 adolescents had low probabilities of engaging in any of the five bullying behaviors and accounted for the majority of the sample. As shown in Figure 1, the patterns of item probabilities of conducting each bullying behaviors in the latent classes were similar for both genders.

In addition to group classification, LCA models can be used for examining associations among multiple behaviors. As shown in Table 1, cyber bullying has a moderate correlation with traditional bullying, ranging from .32 (verbal) to .47 (rumor spreading). Results from the LCA models show that in Class 1, the probability of cyber bullying was .81 and the probabilities of traditional bullying ranged from .83 to .99. It is consistent with previous studies that students' roles in traditional bullying predicted the same role in cyber bullying and vice versa (Juvonen & Gross, 2008; Raskauskas et al., 2007). In addition, as the probability of performing cyber bullying was low in Class 2 and was close to 0 in Class 3, we could conclude that most cyber bullies were in Class 1. This finding not only extends previous studies showing that cyber bullying and traditional bullying are correlated, but it also demonstrates that adolescents who engage in cyber bullying are likely to belong to a very aggressive group—the All-Types Bullies in this study. In other words, cyber bullying was found to have a high probability of co-occurring with not only verbal, social exclusion, and spreading rumor subtypes of bullying (which tend to be more socially oriented), but it also co-occurred with physical bullying. This pattern suggests the importance of teachers, school counselors, psychologists, and parents attending to adolescents' cyber bullying because conducting cyber bullying could be indicative of involvement in several other subtypes of bullying.

Demographic Characteristics: Gender, Grade, and Race/Ethnicity

We found more boys in the group of All-Types Bullies. As suggested in previous studies, this finding may reflect a more aggressive nature in boys (Olweus, 1993). Grade differences show that adolescents in grades 6 to 8 were more likely to be All-Types Bullies or Verbal/Social Bullies than those in grades 9 and 10. In addition, sixth grade boys were less likely to be Verbal/Social Bullies than middle school boys. The grade differences are similar to other studies that show that the prevalence of bullying may peak during middle school and decrease during high school (Bjorkqvist, 1994; Williams et al., 2007). These results suggest that intervention efforts might be particularly needed in the middle school years. Future research should elucidate the reasons that underlie these changes across development.

There are mixed findings in the literature on racial/ethnic differences in bullying (Seals et al., 2003). In this study, we found that, compared to Caucasian adolescents of the same gender, African American boys and girls as well as Hispanic girls were more likely to be All-Types Bullies. In addition, African American girls were more likely to be Verbal/Social Bullies and Caucasian boys were more likely to be Verbal/Social Bullies than Hispanic or Other adolescents of the same gender. These findings indicate that racial/ethnic differences seem to apply only to certain gender groups and are specific to certain patterns of involvement in bullying and suggest the utility of examining racial/ethnic differences separately by gender and types of bullying. Future studies should explicitly test potential interaction between race/ethnicity and gender on specific bullying subtypes or patterns of bullying involvement.

Patterns of Bullying and Externalizing Problem Behaviors

Finally, we evaluated whether increased co-occurrence of subtypes of bullying is associated with externalizing problem behaviors. Specifically, we compared the percentages of involvement in two externalizing problem behaviors—substance use and carrying weapons—across the three latent classes extracted. Compared to the group of noninvolved, All-Types Bullies and Verbal/Social Bullies reported higher percentages of substance use and carrying weapons in the past 30 days. This finding is consistent with prior research showing a positive association between bullying and externalizing problems (e.g., Gini & Pozzoli, 2009; Nansel et al., 2004). As shown in Figure 2, there were also significant differences between the All-Types Bullies and the Verbal/Social Bullies on weapon carrying for both boys and girls. In the models including all individuals and boys only, we found significant differences on substance use between the All-Types Bullies and the Verbal/Social Bullies, which suggested that boy adolescents who engaged in all bullying subtypes were particularly at risk for substance use. Importantly, the results indicate that the three extracted latent classes were generally different in substance use and weapon carrying—two externalizing problems that could further disrupt the learning environment at school concomitant with the effects of bullying alone. As such, teachers and school counselors should be prepared to address multiple problem behaviors among students who exhibit all types of bullying behaviors.

Strengths and Limitations

The current study contributes to the literature on adolescent bullying in four distinct ways. First, our study extended current literature on the co-occurrence of cyber bullying and traditional bullying. For instance, we found that the probabilities of performing cyber bullying in the three latent classes were high in the All-Types Bullies class and low in the other two classes (.81, .12 and .01, respectively) supporting the notion that cyber bullying is an extension of traditional bullying from school to cyber space (Juvonen et al., 2003). Moreover, it suggests that most cyber bullies belong to a group of highly aggressive adolescents who conduct all types of bullying. This finding not only improves our understanding of the relation between cyber bullying and traditional bullying, but it also suggests that prevention and intervention efforts could target cyber bullies as a high-risk group for elevated externalizing problems. Second, we used a large and nationally representative sample with sufficient representation from multiple age and racial/ethnic groups. The complex pattern of racial/ethnic differences that were specific to a particular gender and class of bullies may offer an explanation of mixed findings in previous studies and calls for future research. Third, our study also extended previous studies that showed a link between bullying and externalizing behaviors (Barker et al., 2008; Sourander et al., 2007). Specifically, this study used a person-centered approach to show that the degree of co-occurrence of subtypes of bullying within students was positively associated with their levels of substance use and weapon carrying, supporting the predictive validity of the three latent classes extracted in current analyses.

There were, however, several limitations in this study. First, the cross-sectional nature of the survey limits our ability to draw causal inferences. For example, it is possible that substance use is not an outcome of bullying but actually a cause of some subtypes of bullying, such as physical bullying. Alternately, it is also possible that all these problem behaviors are caused by a third underlying variable (e.g., behavioral disinhibition) that was not modeled in this study. Longitudinal studies may partly overcome this limitation by delineating the temporal sequence of bullying and externalizing behaviors, which in turn could strengthen our ability to make causal inferences. Second, our data derived solely from students' self-report. It is possible that students introduced recall and reporter biases in their involvement in bullying behaviors and a recent study showed that the correlation between self-reported bully and

peer nominations for bullying is only modest (Lee et al., 2010). As such, students may introduce recall and reporter biases in their self-report of bullying behaviors. Moreover, although prior research suggested reasonable reliability and validity for adolescents' self-report of substance use and violent behaviors (Kyriakides et al., 2006; Rosenbaum, 2009), future studies should include information from multiple sources (e.g., peer nomination) to reduce potential reporter bias by students and ensure independence of predictor and outcome.

In addition, we used dichotomized variables as indicators for involvement in bullying in the current study because we were interested in occurrence of the bullying events. Each extracted latent class was defined by probabilities of conducting physical bullying, verbal bullying, exclusion, rumor, and cyber type of bullying, respectively. Future studies are recommended to fully explore the role of engagement frequency on pattern of conducting cyber and traditional bullying. Fourth, the measurement of cyber bullying did not differentiate specific cyber bullying behaviors as in the measures of traditional types of bullying. This lack of specificity may lead to bias in the estimated prevalence of cyber bullying. Future studies should specify common cyber bullying behaviors in the measurement such as teasing others using computers. Finally, data used in this study were collected in 2006. It is possible that our results do not reflect the most recent patterns between cyber bullying and other subtypes of bullying. Future studies should test whether the patterns identified in this study could be replicated with the use of more recent data.

Implications

Results from this study may have important implications for intervention and policy design. Specifically, the identification of distinct patterns of co-occurring bullying behaviors may improve the specificity and accuracy of prevention and intervention efforts. For example, tailored interventions can be developed for subgroups of adolescents to match the intensity and chronicity for their bullying and associated externalizing behaviors. From a policy design perspective, results suggest that a universal solution for prevention and intervention may not be optimal in addressing the diverse needs of students. Future research should examine whether interventions targeting adolescents at the highest risks for bullying and externalizing behaviors may be a more cost-effective approach than interventions targeting all adolescents. Moreover, interdisciplinary research is needed to integrate basic research on the patterns of bullying behaviors and applied research on how personnel on the school and district level can act to reduce bullying among school-aged children.

Conclusion

We extracted three latent classes in this study with a latent class of individuals who engage in cyber bullying along with a range of traditional subtypes of bullying, a class of individuals who mainly engage in verbal and social bullying, and a class of uninvolved adolescents. Demographic differences were found across the three latent classes, which may provide useful information to identify adolescents at risk for bullying. Differences in externalizing problems were found across the latent classes, suggesting that increased co-occurrence of subtypes of bullying behaviors is linked to substance use and weapon carrying, which in turn calls for the need for intervention especially among students who engage in all subtypes of bullying behaviors.

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Figure 1.

Item Probability for Each Latent Class: Involvement in Five Bullying Behaviors

Note. Class 1: All-Types Bullies; Class 2: Verbal/social bullies; Class 3: Non-Involved.

Analyses were conducted separately by gender. The graph for the model with all students is not shown, but it demonstrated the same pattern as the separate graphs for boys and girls.

Figure 2.

Comparison on Problematic Behaviors across Latent Classes: Substance Use and Carrying Weapons

Note. Categories with different letters in the superscript were significantly different at alpha of .05 within gender. Analyses were conducted separately by gender. For comparisons, the percentage of substance use for all individuals was 37.2% ($SE = 1.21$). The carrying weapon variable was only asked for participants in grades 7 or higher and the percentage of carrying weapons in the last 30 days was 15.6% (SE of percent = 0.80).

Table 1Involvement in Each Bullying Behavior by Gender: Prevalence and Correlation ($N = 7508$)

All ($N = 7508$)	Physical (13.8%)	Verbal (37.8%)	Social Exclusion (24.4%)	Rumor Spreading (11.9%)	Cyber (8.9%)
Physical	1.00				
Verbal	.40	1.00			
Social Exclusion	.36	.44	1.00		
Rumor Spreading	.38	.35	.392	1.00	
Cyber	.41	.32	.35	.47	1.00
Boy ($N = 3585$)	Physical (18.8%)	Verbal (40.8%)	Social Exclusion (24.9%)	Rumor Spreading (13.1%)	Cyber (10.6%)
Physical	1.00				
Verbal	.45	1.00			
Social Exclusion	.43	.49	1.00		
Rumor Spreading	.45	.39	.47	1.00	
Cyber	.43	.35	.41	.57	1.00
Girl ($N = 3916$)	Physical (9.2%)	Verbal (35.0%)	Social Exclusion (23.9%)	Rumor Spreading (10.8%)	Cyber (7.3%)
Physical	1.00				
Verbal	.34	1.00			
Social Exclusion	.30	.40	1.00		
Rumor Spreading	.31	.31	.33	1.00	
Cyber	.37	.28	.28	.35	1.00

Note. Percentages were calculated by controlling for the design variables, including stratification, clustering and weighting. Seven students had missing information on gender.

Table 2

Model Fit Statistics of the Models with One-Four Classes

Criteria	All (<i>N</i> = 7508) Number of Classes			
	1	2	3	4
AIC	34204.82	28756.56	28147.01	28132.89
BIC	34239.44	28832.72	28264.71	28292.13
Sample-Size Adjusted BIC	34223.55	28797.77	28210.69	28219.04
Entropy	--	.80	.74	.73
LMR LRT	--	.00	.00	.76
Criteria	Boys (<i>N</i> = 3585) Number of Classes			
	1	2	3	4
AIC	17469.80	14172.51	13771.71	13770.70
BIC	17500.72	14240.54	13876.84	13912.94
Sample-Size Adjusted BIC	17484.84	14205.59	13822.83	13839.86
Entropy	--	.83	.75	.81
LMR LRT	--	.00	.00	.00
Criteria	Girls (<i>N</i> = 3916) Number of Classes			
	1	2	3	4
AIC	16468.47	14325.42	14126.46	14117.06
BIC	16499.84	14394.43	14233.10	14261.33
Sample-Size Adjusted BIC	16483.95	14359.47	14179.08	14188.25
Entropy	--	.77	.75	.77
LMR LRT	--	.00	.00	.00

Note. AIC = Akaike's Information Criteria, BIC = Bayesian Information Criteria, and LMR LRT= Lo-Mendell-Rubin likelihood ratio test.

^a AIC, BIC, and ABIC are information criteria with a lower value indicating better fit.

^b Entropy closing to 1 indicates less discrepancy between the specified model and data.

^c LMR LRT compares an estimated model with a model with one less class, with a significant *p*-value (< .05) indicating improved model fit. The model with 3 classes, with the lowest BIC and ABIC values, was selected as the model with the optimal number of classes.

Table 3

Results of LCA with Covariates: Demographic Differences

	All (N = 7475) ^a		Boys (N = 3572)		Girls (N = 3903)	
	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
All-Types Bullies vs. Non-Involved^b						
Boy vs. Girl	2.65	[2.07, 3.40]	--	--	--	--
Grade 6 vs. Grades 7 and 8	0.92	[0.61, 1.38]	0.94	[0.59, 1.50]	0.88	[0.45, 1.72]
Grade 9 & 10 vs. Grades 7 and 8	0.59	[0.37, 0.92]	0.67	[0.43, 1.05]	0.44	[0.22, 0.88]
Race/Ethnicity (vs. Caucasian)						
African American	2.93	[1.57, 5.50]	2.15	[1.16, 3.97]	4.85	[1.96, 12.03]
Hispanic	2.22	[1.38, 3.57]	1.57	[0.95, 2.59]	3.70	[1.80, 7.60]
Other	1.31	[0.75, 2.30]	0.89	[0.50, 1.59]	2.08	[0.61, 7.14]
Verbal/Social Bullies vs. Non-Involved^c						
Boy vs. Girl	1.09	[0.95, 1.26]	--	--	--	--
Grade 6 vs. Grades 7 and 8	0.73	[0.52, 1.02]	0.59	[0.40, 0.87]	0.85	[0.53, 1.36]
Grade 9 & 10 vs. Grades 7 and 8	0.64	[0.50, 0.81]	0.73	[0.54, 0.97]	0.57	[0.41, 0.77]
Race/Ethnicity (vs. Caucasian)						
African American	1.32	[1.01, 1.72]	0.99	[0.71, 1.38]	1.70	[1.11, 2.62]
Hispanic	0.79	[0.60, 1.05]	0.66	[0.48, 0.93]	0.93	[0.64, 1.36]
Other	0.69	[0.48, 0.99]	0.41	[0.25, 0.68]	1.14	[0.74, 1.76]

Note.

^aThe latent class of Non-Involved was set as the reference group for all three multinomial logistic regression models. A number of 33 students were deleted because of missing data on the demographic variables.

^bWith the covariates in the models, the All-Types Bullies consisted of 6.5% for all adolescents, 10.4% for boys, and 3.8% for girls, respectively.

^cThe latent class of Verbal/Social Bullies consisted of 29.2% for all adolescents, 29.0% for boys, 29.3% for girls, respectively.