RESEARCH ARTICLE

Profiles of Risk and Protection for Violence and Bullying Perpetration Among Adolescent Boys

Lindsay A. Taliaferro, PhD, MPH[a] Jennifer L. Doty, PhD[b] Amy L. Gower, PhD[c] Katherine Querna, PhD, MSSW[d] Michael J. Rovito, PhD[e]

──────────── ABSTRACT ────────────

BACKGROUND: Violence and bullying perpetration among boys are major public health problems. We address gaps in the literature by examining: (1) how risk and protective factors co-occur, and (2) how different risk/protection profiles are associated with violence and bullying perpetration among adolescent boys.

METHODS: Data came from the population-based 2016 Minnesota Student Survey. The analytic sample included boys in grades 8, 9, and 11 (N = 63,818). Latent profile analyses identified patterns of 22 behavioral, intrapersonal, family, and school and community risk/protective factors. Logistic regression analyses examined how these patterns related to violence and bullying perpetration.

RESULTS: We identified 5 groups: Class 1: *Low risk, high safety, high connectedness*; Class 2: *Low risk, moderate safety, moderate connectedness*; Class 3: *Moderate risk, high safety, moderate connectedness*; Class 4: *High risk, moderate safety, low connectedness*; and Class 5: *High risk, low safety, low connectedness*. Compared to Class 1, Class 5 students had the highest odds of all for violence and bullying perpetration. Class 4 students also demonstrated high odds of violence and bullying, compared to Class 1. Though not as high as Classes 4 or 5, Class 2 and 3 students showed higher odds for both outcomes, compared to Class 1.

CONCLUSIONS: Substantive variations exist in boys who engage in violence and bullying. We highlight cumulative, co-occurring risk factors, connectedness to parents and other prosocial adults (eg, teachers), and school and neighborhood safety as important factors to address in school health programs seeking to prevent violence and bullying perpetration among boys.

Keywords: bullying; child and adolescent health; public health; risk behaviors; violence.

Schools should represent environments conducive to learning, where students feel safe and secure.[1] School violence, including bullying and physical fighting,[2] impedes successful learning and instills fear for safety in students, teachers, staff, and communities.[1] Physical violence and bullying perpetration among adolescent boys in the United States have become major public health problems. In general, although most boys do not engage in violence or bullying perpetration, boys are significantly more likely than girls to report involvement in physical violence (eg, physical fighting) and other forms of violence, such as assault, robbery, and weapon carrying, as well as physical bullying perpetration (eg, threatening to beat-up someone).[3-6] Boys might demonstrate greater risk for perpetrating violence[7] due to expectations that

[a] Assistant Professor, (Lindsay.Taliaferro@ucf.edu), Department of Population Health Sciences, College of Medicine, University of Central Florida, 6900 Lake Nona Boulevard, Orlando, FL 32827.

[b] Assistant Professor, (Jennifer.doty@ufl.edu), Department of Family, Youth, and Community Sciences, University of Florida, McCarty Hall D, Gainesville, FL 32611.

[c] Research Associate, (gowe0009@umn.edu), Division of General Pediatrics and Adolescent Health, Department of Pediatrics, University of Minnesota, 717 Delaware Street SE, Minneapolis, MN 55414.

[d] Postdoctoral Fellow, (kquerna@umn.edu), Division of General Pediatrics and Adolescent Health, Department of Pediatrics, University of Minnesota, 717 Delaware Street SE, Minneapolis, MN 55414.

[e] Assistant Professor, (Michael.Rovito@ucf.edu), Department of Health Sciences, University of Central Florida, 12805 Pegasus Drive, HPA I, Orlando, FL 32816.

Address correspondence to: Lindsay A. Taliaferro, Assistant Professor, (lindsay.taliaferro@ucf.edu), Department of Population Health Sciences, College of Medicine, University of Central Florida, 6900 Lake Nona Boulevard, Orlando, FL 32827.

boys will think and act more aggressively and with more carelessness than girls,[8] a lack of prominent male figures in the community (eg, present and active fathers, other key male stakeholders),[9] or social forces that shape an aggressive environment into which boys mature.[10] Different social experiences between sexes often lead to poorer health outcomes among males due to expectations placed upon them to fulfill a certain societal function.[11] In the current study, we sought to address the critical need to identify patterns of risk and protective factors to support adolescent boys demonstrating high-risk of perpetrating violence and/or bullying.

According to the US Centers for Disease Control and Prevention's 2017 Youth Risk Behavior Survey in schools, 16% of boys were bullied on school property during the previous 12 months, 12% were in a physical fight on school property one or more times during the previous 12 months, and 6% reported not feeling safe enough to attend school at least once during the previous 30 days.[6] Some research suggests younger students (grades 7th and 8th) are more likely than older students (grades 11th and 12th) to perpetrate bullying behavior,[3] and students of color are more likely than white students to be involved in physical fighting and bullying perpetration.[3,6,12,13] Physical violence and bullying not only are associated with deleterious outcomes during adolescence,[14,15] including lower academic achievement,[12] but also negative health outcomes later in life such as criminal behavior, substance use, and suicidality.[16-18]

Problem Behavior Theory suggests that behavior results from the interaction of young people with their environments.[19] The environmental risk and protective factors associated with physical violence and bullying perpetration behavior occur across multiple levels of adolescents' social ecologies—intrapersonal, interpersonal, institutional/community, and societal levels.[20] Intrapersonal factors include internalizing problems, substance use, and impulsivity.[18,21-23] At the interpersonal level, adverse childhood experiences, including family violence, represent examples of important contributing factors,[24-27] whereas family cohesion/connectedness represents an important interpersonal protective factor.[26] In addition, researchers showed that youth involved in bullying perpetration may also be targets of bullying themselves.[23,28] School climates and policies related to bullying and community violence also can act as risk or protective factors for bullying perpetration and violent behavior.[7,8,29] For example, Espelage et al[7] found that teacher, staff, and schools' commitment to prevent bullying and positive perceptions of teacher-student relationships represented protective factors associated with less bullying and fighting among students. At the societal level, youth violence is strongly associated with household and neighborhood poverty.[4,5] Furthermore, the greater the number of risk factors present across levels of adolescents' social ecologies, the increased likelihood youth will demonstrate bullying perpetration and violent behavior,[24,25] and the greater the number of protective factors, the more youth may remain buffered from involvement in health risk behaviors.[26,30]

However, little work has gone beyond using a variable-centered approach and cumulative risk model to examine how substantive variations in risk/protective factor profiles are associated with physical violence and bullying perpetration as outcomes. Using a person-centered approach is important to identify heterogeneity in response strategies and explore intraindividual variation in students' responses.[31,32] To our knowledge, only 2 studies used a person-centered approach to examine profiles of risk and protective factors among youth involved in bullying.[33,34] However, this research did not focus on physical violence or bullying perpetration specifically among males, the population most likely to engage in these behaviors. Thus, researchers need to examine how unique patterns of risk and protective factors increase the likelihood adolescent males might engage in physical violence or bullying perpetration. This information remains essential to better identify high-risk male youth and prevent involvement in violence and bullying perpetration. We sought to address gaps in the literature using data from a population-based sample of adolescent males. Two research questions guided the analyses: (1) How do common risk and protective factors co-occur among adolescent boys? and (2) How are different risk/protection profiles associated with physical violence and bullying perpetration among adolescent boys?

METHODS

Sample

We leveraged the 2016 Minnesota Student Survey (MSS) dataset, a population-based survey of 5th, 8th, 9th, and 11th grade public and charter school students conducted in the state every 3 years. The MSS measures both risk and protective factors as well as health-related and social behaviors. In 2016, each school district in the state was invited to participate, and 85.0% of districts participated. For this analytic sample, we selected male students in 8th, 9th, and 11th grade (N = 63,818; M_{age} = 14.9 years). Fifth grade data were not used because a number of the risk and protective factors were not asked of this age group. Passive consent procedures were used, and data remained anonymous.

Instrumentation

Physical violence and bullying perpetration. One question measured physical violence: "During the last

12 months, how often have you hit or beat up another person?'' Two questions assessed frequency of physical bullying perpetration: ''During the last 30 days, how many times at school have YOU pushed, shoved, slapped, hit or kicked someone when you weren't kidding around,'' or ''threatened to beat someone up?'' Responses were dichotomized at never (for all items comprising a variable) versus once or more for both outcome variables. The bullying perpetration variable was dichotomized based on past research on student interpretation of bullying and studies demonstrating students who report even one or 2 instances of bullying perpetration have elevated rates of emotional distress and substance use, compared to those who have never bullied.[35-37]

Independent variables comprising risk/protection profiles. Latent class analyses were used to derive groups of students with distinct profiles of 22 behavioral, intrapersonal, family, and school and community risk and protective factor indicators. Table 1 shows details and reliability. Behavioral risk factors included running away, self-injury, suicide attempt, bullying victimization, and substance use. Intrapersonal risk included mental health problems. Family risk included family substance use, violence, or abuse, and parental connectedness was included as a family protective factor. School and community protective factors included connectedness to other adults and teachers, school achievement, and safety.

Control variables. Controls included grade, receipt of free/reduced-price lunch, race/ethnicity, and school location. Each students' grade (8, 9, or 11) was recorded categorically. We controlled for grade rather than age, which was not distributed normally. Two questions regarding race and ethnicity were combined into 6 mutually exclusive categories: non-Hispanic American Indian, non-Hispanic Asian/Native Hawaiian/Pacific Islander, non-Hispanic black, non-Hispanic multiple races, non-Hispanic white, and Hispanic/Latino. As a proxy measure for socioeconomic status, students were asked: ''Do you currently get free or reduced-price lunch at school?'' Response options were yes (1) or no (0). School region was determined by location of the school district: metropolitan (0) or non-metropolitan area (1).

Data Analysis

First, we conducted descriptive statistics. Then, latent profile analyses were conducted in MPlus 7.2 (Los Angeles, CA)[38] to identify patterns of risk and protective factors. Latent profile analysis identifies subgroups based on participants' responses to items. This type of analysis is especially useful with population-level data. We chose the final model based on model fit, parsimony, and interpretability.[39] We examined fit statistics, including the Akaike Information Criterion (AIC), Bayesian Information

Criterion (BIC), the Likelihood Ratio Test (LRT), and the bootstrapped Likelihood Ratio Test (BLRT). Models with low AIC, BIC, and a significant LRT and BLRT indicate the best model fit.[39] Entropy close to 1.0 is an indicator of certainty in classification such as less classification error. We conducted cross-tabulation analyses to understand differences in demographic characteristics and violence and bullying perpetration by the latent profiles patterns. Finally, we conducted logistic regression analyses in MPlus to examine how patterns of risk and protective factors were related to physical violence and bullying perpetration. We reported significance at the p < .001 level to account for the large sample size.

For both the latent profile analyses and the logistic regression analyses, we used full information maximum likelihood (FIML) integrated with the MPlus software to address missing data on the dependent variables. This approach selects the parameter estimates based on available data.[40] Missing data were less than 5% for each variable. Cross-tabulation analyses were conducted to examine differences in missingness on violence and bullying perpetration items by demographic characteristics. Ninth and 11th graders, students attending schools in a metropolitan area, and those who received free or reduced-price lunch were more likely to be missing responses to violence and bullying perpetration items. Also, Asian, black, and Hispanic students were more likely to be missing responses to these variables. Because FIML is not calculated for the covariates in MPlus logistic regression analysis, the analytic sample was N = 56,953.

RESULTS

Table 2 shows descriptive statistics for outcomes, demographic characteristics, and risk and protective factors. Just over two-thirds of students were white, about one-fourth received free or reduced-price lunch, and just under half attended schools in non-metropolitan settings. Overall, 13.2% reported violence perpetration, and 21.6% reported bullying perpetration. We chose a 5-class model because the AIC and BIC were lower for the 5-class model (AIC = 1,058,810.91; BIC = 1,059,898.32), compared to the 4-class model (AIC = 1,078,354.57; BIC = 1,079,233.56), and the LRT and BLRT were statistically significant, indicating the 5-class model was a better fit than the 4-class model. Models with 6 classes and above were unstable due to possible model nonidentification, and class sizes were so small they would not yield meaningful implications for practice. Entropy was 0.84, suggesting acceptable certainty for most likely latent profile membership.[41]

Latent Profile Analysis

Participants clustered into 5 groups. Table 3 presents the probabilities of each behavioral risk, intrapersonal,

Table 1. Independent Variables

Variable*	Description of Variable	No. Items (α)
Outcomes		
Violence perpetration	On a 5-point scale, during the last 12 months, how often hit or beat up another person (dichotomized to never vs once or more)	1
Physical bullying perpetration at school	On a 5-point scale, during the last 30 days, how many times at school you pushed, shoved, slapped, hit, or kicked someone when were not kidding around; or threatened to beat someone up (dichotomized to never vs once or more)	2
Behavioral risk factors		
Run away from home	On a 5-point scale, during the last 12 months, how often ran away from home (dichotomized to 0 times vs 1 or more times)	1
Non-suicidal self-injury	On a 6-point scale, during the last 12 months, how many times did something to purposely hurt or injure self without wanting to die, such as cutting, burning, or bruising self on purpose (dichotomized to 0 times vs 1 or more times)	1
Suicide attempt	Ever actually attempted suicide during the last year (yes vs no)	1
Bullying victim at school	On a 5-point scale, during the last 30 days, how many times students at school pushed, shoved, slapped, hit, or kicked you when were not kidding around; threatened to beat you up; spread mean rumors or lies about you; or excluded you from friends, other students, or activities (dichotomized to never vs once or more)	4
Binge drinking	On a 7-point scale, during the past 30 days, on how many days had 5 or more drinks of alcohol in a row (dichotomized to 0 days vs 1 or more days)	1
Marijuana use	On a 7-point scale, during the last 12 months, on how many occasions used marijuana or hashish (dichotomized to 0 days vs 1 or more days)	1
Prescription drug misuse	On a 6-point scale, during the last 12 months, on how many occasions used stimulants, ADHD/ADD drugs, pain killers, or tranquilizers that were not prescribed for you or you took only to get high (dichotomized to 0 times vs 1 or more times)	4
Illegal drug use	On a 6-point scale, during the last 12 months, on how many occasions used LSD/PCP, MDMA, cocaine, heroin, or methamphetamine (dichotomized to 0 times vs 1 or more times)	5
Intrapersonal factors		
Mental health problem	Mental health, behavioral, or emotional problems lasting 6 months or more (yes vs no)	1
Positive screen for depression	On a 4-point scale, over the past 2 weeks, how often been bothered by little interest or pleasure in doing things; feeling down, depressed, or hopeless (summed score ranges from 0-6, dichotomized at validated cut-point of 3 vs <3†)	2
Suicidal ideation	Ever seriously considered attempting suicide during the last year (yes vs no)	1
Family factors		
Family substance use	Live with anyone who drinks too much alcohol, uses illegal drugs, or abuses prescription drugs (yes vs no)	2
Witness to family violence	Parents or other adults in your home ever slapped, hit, kicked, punched, or beat each other up (yes vs no)	1
Physical/sexual abuse	Parent or other adults at home ever hit, kicked, or physically hurt you; or any older or stronger family member ever touched you or had you touch them sexually (yes vs no)	2
Parent connectedness	On a 5-point scale, can talk to father/mother about problems; how much feel parents care about you (recoded into 1 = *not at all* to 4 = *yes, most of the time*)	3 (α = .701)†
School and community factors		
Connectedness to other adults	On a 5-point scale, how much feel other adults in your community care about you (recoded into 1 = *very much* to 4 = *not at all*)	2 (α = .654)†
Teacher/school adult relationships	On a 4-point scale, how much agree adults at school treat students fairly, adults at school listen to students, school rules are fair, teachers at my school care about students, most teachers at school are interested in me as a person; how much feel teachers/other adults at school care about you (recoded into 1 = *strongly disagree* to 4 = *strongly agree*)	6 (α = .867)†
School engagement	On a 4-point scale, how often care about doing well in school, paying attention in class, or going to class unprepared; how much agree if something interests me, I try to learn more, I think things I learn at school are useful, being a student is one of the most important parts of who I am (recoded into 1 = *none of the time* to 4 = *all of the time*)	6 (α = .706)†
Academic achievement	Describe grades in school this year (dichotomized to mostly Cs or less vs mostly As and Bs)	1
Sexual abuse	Any adult or person outside your family ever touched you or had you touch them sexually (yes vs no)	1
School safety	On a 4-point scale, feel safe at school (recoded into 1 = *strongly disagree* to 4 = *strongly agree*)	1
Neighborhood safety	On a 4-point scale, feel safe going to and from school and in my neighborhood (recoded into 1 = *strongly disagree* to 4 = *strongly agree*)	2 (α = .757)†
Background factors		
Grade	8th, 9th, or 11th	1
Free/reduced-price lunch	Currently get free or reduced-priced lunch (yes or no)	1
School location	Non-metropolitan vs metropolitan	1
Race/ethnicity	Examined each separately, compared to non-Hispanic White	2

*High scores indicate more of the behavior/factor.
†PHQ-2 cut-point supported by previous research. For continuous variables, the mean was calculated; Cronbach's alpha coefficient was used to assess internal consistency. Students were classified as "never" if they answered never to all the questions comprising a scale, and classified in the once or more group if they answered once or more to any of the questions comprising a scale.

Table 2. Descriptive Statistics for All Variables Among 8th, 9th, and 11th Grade Boys

	% or M (SD)	Range
Grade		
8th	35.4	0-1
9th	35.8	0-1
11th	28.8	0-1
Race/ethnicity		
American Indian/Alaskan Native	1.4	0-1
Asian or Pacific Islander	6.1	0-1
Black	6.6	0-1
Hispanic	9.6	0-1
Multiracial	7.2	0-1
White	69.1	0-1
Receives free/reduced-price lunch	27.7	0-1
Non-metropolitan school location	46.6	0-1
Outcomes		
Violence perpetration	13.2	0-1
Physical bullying perpetration	14.4	0-1
Behavioral risk factors		
Run away from home	4.8	0-1
Non-suicidal self-injury	9.2	0-1
Suicide attempt	2.1	0-1
Bullying victimization	32.1	0-1
Binge drinking	6.5	0-1
Marijuana use	8.9	0-1
Prescription drug misuse	5.0	0-1
Illegal drug use	.3	0-1
Intrapersonal factors		
Mental health problem	12.3	0-1
Positive screen for depression	16.7	0-1
Suicide ideation	7.3	0-1
Family factors		
Family substance use	11.5	0-1
Witness to family violence	5.3	0-1
Physical/sexual abuse	12.2	0-1
Parent connectedness	3.79 (0.69)	1-4
School and community factors		
Connectedness to other adults	3.79 (0.95)	1-4
Teacher/school adult relationships	2.95 (0.60)	1-4
School engagement	1.88 (0.49)	1-4
Academic achievement (As and Bs)	73.7	0-1
Sexual abuse	1.4	0-1
School safety	3.43 (0.67)	1-4
Neighborhood safety	3.57 (0.54)	1-4

family, and school and community factor indicator for each class, and Table 4 presents the differences in violence, bullying perpetration, and demographic characteristics for each class. We labeled classes high, moderate, and low based on whether most indicators in each set of risk factors (eg, substance use), safety (eg, school safety), and connectedness (eg, parent connectedness) variables were above, within, or below one standard deviation or the semi-interquartile range: Class 1: *Low risk, high safety, high connectedness*; Class 2: *Low risk, moderate safety, moderate connectedness*; Class 3: *Moderate risk, high safety, moderate connectedness*; Class 4: *High risk, moderate safety, low connectedness*; and Class 5: *High risk, low safety, low connectedness*.

Class 1 termed *Low risk, high safety, high connectedness*, was the largest (34.0% of students). Students comprising this class had the lowest probability of reporting all risk factors (behavioral, intrapersonal, and family risk factors). These students demonstrated the highest levels of connectedness to parents, teachers, and other non-parental adults, as well as the highest levels of school engagement, academic achievement, and school safety, compared to the other classes. Compared to other classes, a higher percentage of students in Class 1 group identified as white and a lower percentage received free/reduced-price lunch.

Class 2 was termed *Low risk, moderate safety, moderate connectedness* (31.0% of students). Students in Class 2 had below average probability of reporting all risk factors, except bullying victimization. Youth comprising this class demonstrated average levels of school and neighborhood safety, and above average levels of parent and teacher connectedness.

Class 3 was termed *Moderate risk, high safety, moderate connectedness*, included 21.0% of students. Compared to the other groups, students in this class reported the third highest levels on the risk factors, connectedness to parents and other non-parental adults, and second highest levels of teacher connectedness, school engagement academic achievement, and school and neighborhood safety. Compared to other classes, a greater percentage of students in this group were Asian Americans or Pacific Islanders.

Class 4 included 6.9% of students and was called *High risk, moderate safety, low connectedness*. Students in this class demonstrated the highest or second highest levels on all the risk factors. These students reported the lowest levels of connectedness to parents and non-parental adults, and second lowest levels of teacher connectedness, school engagement, academic achievement, and school and neighborhood safety. Compared to Classes 1-3, a greater percentage of students in this group were black and received free/reduced-priced lunch.

Finally, 7.1% of students comprised Class 5, termed *High risk, low safety, low connectedness*. This class consisted of students with the highest or second highest probability of reporting all the risk factors. These students also reported the lowest levels of teacher connectedness, school engagement, academic achievement, and school and neighborhood safety. Compared to other classes, students comprising Class 5 were more likely to be Hispanic.

Logistic Regression Analysis

Results of logistic regression analyses (Table 5) confirmed that, compared to Class 1 (*Low-risk, high safety, high connectedness*), students in Class 5 (*High-risk, low safety, low connectedness*) had the highest odds of all classes for violence (odds ratio

Table 3. Typology of Risk and Protective Factors for Violence and Bullying Perpetration Among 8th, 9th, and 11th Boys

	Class 1: Low Risk, High Safety, High Connectedness, 34% (N = 21,693)	Class 2: Low Risk, Moderate Safety, Moderate Connectedness, 31% (N = 19,671)	Class 3: Moderate Risk, High Safety, Moderate Connectedness, 21% (N = 13,411)	Class 4: High Risk, Moderate Safety, Low Connectedness, 6.9% (N = 4379)	Class 5: High Risk, Low Safety, Low Connectedness, 7.1% (N = 4535)	State Average
Behavioral risk factors						
Run away from home	.00	.02	.06	.23	.20	.04
Non-suicidal self-injury	.00	.05	.13	.37	.33	.09
Suicide attempt	.00	.00	.02	.13	.10	.02
Bullying victimization	.17	.33	.38	.54	.62	.32
Binge drinking	.01	.03	.12	.17	.21	.07
Marijuana use	.00	.05	.16	.25	.30	.09
Prescription drug misuse	.00	.02	.09	.16	.18	.05
Illegal drug use	.00	.00	.00	.03	.02	.03
Intrapersonal factors						
Mental health problem	.04	.09	.16	.34	.34	.12
Positive screen for depression	.05	.13	.22	.44	.45	.17
Suicide ideation	.00	.03	.10	.31	.29	.07
Family factors						
Family substance use	.03	.08	.16	.34	.29	.12
Witness to family violence	.00	.03	.08	.22	.16	.05
Physical/sexual abuse	.00	.08	.20	.43	.31	.12
Connectedness to parents	3.97	3.84	3.81	1.92	3.58	3.73
School and community factors						
Connectedness to other adults	3.23	2.54	2.50	1.65	1.86	2.65
Teacher/school adult relationships	3.39	2.81	2.91	2.44	2.25	2.72
School engagement	3.43	3.07	3.10	2.82	2.69	3.15
Academic achievement	.91	.72	.68	.51	.43	.74
Sexual abuse	.00	.01	.02	.08	.05	.01
School safety	3.92	2.95	3.86	2.95	2.37	3.43
Neighborhood safety	3.96	3.16	3.94	3.15	2.81	3.57

Probabilities or means of risk and protective factors in each class are listed as well as the state average. Standard errors ranged from .00 to .04 for each indicator, although most were .00.

[OR] = 11.01, 95% confidence interval [CI]: 9.95, 12.07) and bullying perpetration (OR = 9.60, 95% CI: 8.76, 10.44), controlling for demographic variables. Students comprising Class 4 (*High-risk, moderate safety, low connectedness*) also demonstrated high odds of engaging in violence (OR = 8.55, 95% CI: 7.71, 9.39) and bullying perpetration (OR = 7.90, 95% CI: 7.17, 8.63), compared to Class 1 (*Low-risk, high safety, high connectedness*), controlling for demographic variables. Though not as high as Classes 4 or 5, students in Classes 2 and 3 also showed significantly higher odds for both outcomes, compared to Class 1.

DISCUSSION

Key *Healthy People 2020* objectives identified by the US Department of Health and Human Services include reducing physical fighting among adolescents (IVP-34), reducing bullying among adolescents (IVP-35), and reducing the proportion of public schools with a serious violent incident (AH-10).[42] To address these significant public health problems, we sought to identify profiles of male youth who showed increased risk of involvement in physical violence and bullying perpetration. Consistent with the literature, the greater the number of risk factors present across adolescents' social-ecologies, the greater the likelihood of involvement in health-risk behaviors, including physical violence and bullying perpetration.[25] However, we add to the literature by going beyond a simple cumulative risk model and identifying 5 distinct classes of adolescent boys who demonstrate varying levels of involvement in violence and bullying perpetration based on shared behavioral, intrapersonal, family, and school and community risk and protective factors.

In particular, high-risk adolescent males who reported weaker connections to parents or other non-parental adults (*High-risk, low safety, low connectedness* class) demonstrated the greatest likelihood of engaging in physical violence and bullying perpetration. This finding supports the literature on the importance of strong connections with prosocial adults for healthy youth development.[26,33,43,44] For example, researchers found that family and community disconnection represented important indicators of vulnerability

Table 4. Differences in Violence, Physical Bullying, and Demographic Characteristics by Classes

	Class 1: Low Risk, High Safety, High Connectedness, 34% (N = 21,693) % or M (SD)	Class 2: Low Risk, Moderate Safety, Moderate Connectedness, 31% (N = 19,671) % or M (SD)	Class 3: Moderate Risk, High Safety, Moderate Connectedness, 21% (N = 13,411) % or M (SD)	Class 4: High Risk, Moderate Safety, Low Connectedness, 6.9% (N = 4379) % or M (SD)	Class 5: High Risk, Low Safety, Low Connectedness, 7.1% (N = 4535) % or M (SD)	State Average %
Outcomes						
Violence perpetration*	4	12	17	29	35	13
Violence perpetration	1.05 (.28)	1.16 (.49)	1.24 (.64)	1.48[†] (.92)	1.55[†] (.94)	M = 1.19
Physical bullying perpetration*	5%	14	18	30	35	22
Physical bullying perpetration	1.04 (.21)	1.11 (.35)	1.16 (.44)	1.36[†] (.77)	1.41[†] (.80)	M = 1.13
Demographics						
8th*	37	37	32	32	34	35
9th*	37	37	32	35	35	36
11th*	26	26	36	33	31	29
American Indian/Alaskan Native*	1	2	1	3	2	1
Asian/Pacific Islander*	5	8	5	7	6	6
Black*	5	7	7	8	8	7
Hispanic*	7	11	10	12	13	10
Multiracial*	5	7	8	10	10	7
White*	76	64	69	59	60	69
Receives free/reduced-price lunch*	18	32	28	40	40	28
Non-metropolitan school location*	46	46	47	48	49	47

*In unadjusted cross-tabulation analyses, differences were significant at p < .001.

[†]Indicates the only pair of mean differences that was not significant at p < .001, after a Games-Howell adjustment to account for multiple comparisons.

to and risk of mental health problems among adolescent males specifically,[44] as well as violence among adolescents in general.[4,33] The more connected adolescent males feel to parents and other non-parental adults, the more protected they are from poor health outcomes, including violent behavior.[45]

Another relatively important factor identified in this study were students' varying patterns of perceived safety within school and neighborhood environments. The *High-risk, low safety, low connectedness* class (Class 5), which reported the lowest levels of school and neighborhood safety, as well as the lowest levels of teacher/school adult connections, showed the highest levels of past year or 30-day, respectively, physical violence and bullying perpetration, closely followed by the *High risk, moderate safety, low connectedness* class (Class 4). However, there was no significant difference in the frequency that students in these classes reported violence and bullying perpetration, even though Class 4 had moderate levels of school and neighborhood safety. Adolescent boys may demonstrate particular sensitivity/vulnerability to family, school, and neighborhood environments that lack protective resources and connections that prevent aggressive and violent behavior.[46,47] Additionally, the *Moderate risk, high safety, moderate connectedness* group (Class 3) demonstrated higher risk for violence perpetration than peers in a similarly safe school environment, but who were more likely to have higher levels of connectedness with family and other

adults (Class 1). Thus, the variation between groups regarding perceived school and neighborhood safety did not necessarily match progression of risk in physical violence and bullying perpetration. These patterns imply that family and school connectedness (eg, teacher connectedness, school engagement) may be a more consistent leverage point for preventing violence among male students compared to perceived safety. Our findings are consistent with research suggesting not only do factors related to school connectedness and safety influence violence and bullying perpetration among adolescents, but family safety impacts these outcomes as well.[7,8,24]

Regarding demographics, factors significant in regression analyses included younger age (8th vs 9th and 11th graders), receiving free/reduced-price lunch, identifying as black or multiracial (for violence), and attending school in less metropolitan areas of Minnesota (for bullying). Furthermore, these findings support research showing the association between poverty and increased violence among adolescents,[4] as well as greater involvement in violent and bullying behavior among some racial/ethnic minorities (in this study, black or multiracial), compared to their peers.[3,5] Minority adolescents, especially black and Hispanic youth, are more likely to live in resource-poor neighborhoods,[48,49] where violence is particularly common.[4]

Multiracial and black adolescent boys consistently report less school connectedness and lower academic

Table 5. Logistic Regression of 8th, 9th, and 11th Grade Boys' Violence and Bullying Perpetration Modeled on Risk and Protective Profiles (N = 56,953)

	Est.	Odds Ratio	SE	95% Confidence Interval	
Violence perpetration					
Grade[†]					
9th	−0.22	0.81*	0.02	0.77	0.85
11th	−0.55	0.58*	0.02	0.54	0.62
Free/reduced-price lunch, yes		1.40*	0.04	1.32	1.48
Race[‡]	0.34				
American Indian	−0.06	0.94	0.07	0.80	0.14
Asian/Pacific Islander	−0.52	0.60*	0.03	0.54	0.66
Black	0.30	1.35*	0.06	1.23	1.47
Hispanic	0.01	1.01	0.04	0.93	1.09
Multiracial	0.29	1.33*	0.05	1.23	1.43
Non-metropolitan school location	0.04	1.04	0.03	0.98	1.10
Risk/protective patterns[§]					
Class 5: High risk, low safety, low connectedness	2.40	11.01*	0.54	9.95	12.07
Class 4: High risk, moderate safety, low connectedness	2.15	8.55*	0.43	7.71	9.39
Class 3: Moderate risk, high safety, moderate connectedness	1.50	4.45*	0.19	4.08	4.82
Class 2: Low risk, moderate safety, moderate connectedness	1.05	2.86*	0.12	2.62	3.10
Physical bullying perpetration					
Grade[†]					
9th	−0.22	0.80*	0.02	0.76	0.83
11th	−0.62	0.54*	0.02	0.50	0.58
Free/reduced-price lunch, yes	0.22	1.24*	0.03	1.18	1.30
Race[‡]					
American Indian	−0.02	0.98	0.06	0.86	1.10
Asian/Pacific Islander	−0.32	0.73*	0.04	0.65	0.81
Black	0.28	1.32*	0.05	1.22	1.42
Hispanic	0.01	1.01	0.04	0.93	1.09
Multiracial	0.08	1.09	0.04	1.01	1.17
Non-metropolitan school location	0.21	1.24*	0.03	1.18	1.30
Risk/protective patterns[§]					
Class 5: High risk, low safety, low connectedness	2.26	9.60*	0.43	8.76	10.44
Class 4: High risk, moderate safety, low connectedness	2.07	7.90*	0.37	7.17	8.63
Class 3: Moderate risk, high safety, moderate connectedness	1.40	4.04*	0.16	3.73	4.36
Class 2: Low risk, moderate safety, moderate connectedness	1.06	2.89*	0.11	2.67	3.11

*$p < .001$.
[†]Reference group is 8th graders.
[‡]Reference group is White.
[§]Reference group is low risk group (class 1).

achievement, compared to their white counterparts. Consistent with theories of cultural ecology and cultural discontinuity, as well as problem behavior theory, experiences of low school connectedness among black and multiracial males could reflect their perception that the cultural ecology of their school tolerates and/or enables racial discrimination.[50-53] Furthermore, discontinuity between school adults' expectations for black and multiracial adolescent boys and experiences of these youth themselves and their families, could lead these youth to feel misunderstood, disrespected, or not cared for by adults at school, reducing their feelings of school connectedness.[54-56]

Strengths and Limitations

A major strength of this analysis involved the person-centered approach used to identify sub-groups of adolescent males most likely to engage in violence and bullying perpetration that may not have been detected using variable-centered methods. This approach represented a good fit for the population-level data, and allowed us to model heterogeneity in the data and group students who shared a common pattern of responses into most likely latent classes.[32,57] Another strength involved the examination of a diverse set of factors associated with both violent and bullying behavior among adolescent males, the population most likely to engage in these behaviors. Finally, we addressed an important gap in the literature by examining protective factors malleable to intervention that schools and communities can leverage to prevent violence and bullying perpetration among adolescent males. Still, the logistic regression could not account for classification error, and class profiles identified in this study may not translate to other states. Thus, to test

the generalizability of our findings, researchers need to replicate our study in other locales and with students of different racial/ethnic and socioeconomic profiles. The measures also could represent a limitation. Several of the variables were assessed with only one or 2 items, which could reduce the reliability of these variables. Eighth graders were not asked about sexual orientation or gender identity, so we could not examine these factors. Finally, data were self-report and cross-sectional, precluding us from making causal inferences.

Conclusion

This study provides evidence of substantive variations among adolescent boys who engage in physical violence and bullying perpetration and indicates a general cumulative risk approach may not be sufficient in determining males who might demonstrate violent and bullying behavior. For example, our findings highlight the importance of strong connections to parents and other non-parental adults, possibly more so than feelings of safety, in the prevention of physical violence, in particular, among high-risk adolescent boys. Efforts to prioritize school safety, such as police officers in school buildings, while eliminating funding for bullying prevention programs that emphasize strengthening social connections in favor of greater safety measures, may be misguided.[58]

Future research should apply a social-ecological perspective to understanding and preventing violence and bullying perpetration, while addressing both social connections and perceived safety, not one or the other. We also encourage investigators to explore in greater depth violence and bullying perpetration in non-metropolitan areas to determine factors associated with these behaviors, which might include limited opportunities for youth involvement in civic life, fewer community resources, such as community centers or organized youth activities, higher overt racism/discrimination, and more wealth disparities. Qualitative research could provide in-depth data needed to understand these issues, as well as how protective factors identified in this study and other unexamined factors work for male students. Further, researchers should take a youth participatory action approach to learn from adolescents what would help them feel more engaged, connected, and empowered in their school experiences. Finally, researchers could implement and evaluate professional development programs that incorporate adult learning and developmental theories to explore ways to engage adults in positions to support high-risk young males (parents, caregivers, teachers, community leaders).

IMPLICATIONS FOR SCHOOL HEALTH

Applying a social-ecological perspective, schools should implement and enforce evidence-based bullying and violence prevention policies and programs.[59-62] Prevention efforts should address intrapersonal, interpersonal, institutional/community, and, if possible, structural societal factors associated with violence and bullying perpetration among adolescent males.[20] Further, we strongly encourage school personnel to take a youth development perspective by enhancing protective factors and promoting resilience among high-risk adolescent boys. Focusing on strengths and enhancing protective factors across adolescents' social ecologies does not negate risks, or eliminate powerful social stratifiers, such as racism, but rather attempts to provide critical perspective and enhance individual and community strengths to support well-being.[63,64]

Support for implementation of bullying and violence prevention policies and staff training to accomplish these goals is critical.[65] Results of the current study reinforce the need for a tiered approach to address different patterns of bullying and violence risk. The first tier involves primary prevention for all students implemented by training key stakeholders, including students, parents, teachers, and school staff. At the second tier, evidence-based prevention programs can be delivered to at-risk students with multiple risk factors in group settings. At the third tier, high-risk students involved in chronic bullying or violence could receive individual counseling and support. High-risk adolescent males may prefer solution-oriented approaches that emphasize assets as opposed to pathologizing behavior.[64] We suggest school administrators:

- Encourage and reinforce positive, supportive teacher-student relationships (Tier 1—primary prevention for all students).
- Eliminate issues that cause students to feel unsafe on school grounds, such as discrimination or confrontations in school bathrooms, so all students feel a greater sense of safety in and connectedness to their schools (Tier 1—primary prevention for all students).[50]
- Help parents enhance connections with their children by talking with them about problems their children are facing and letting their children know how much they care about them (indicators of parent connectedness within the current study; Tier 1—primary prevention for all students).
- Consider implementing social-emotional learning programs associated with increased academic performance, a protective factor in the present study (Tier 2—secondary prevention for at-risk students).[66,67]
- Ensure parents understand the important roles they play in promoting healthy youth development and reducing aggressive and violent behavior among their children[68] by modeling healthful emotion regulation skills and positive conflict resolution

within the home (Tier 2—secondary prevention for at-risk students).[69,70]

- Facilitate healthful connections between adolescent males and non-parental adults in the community who can teach them constructive problem-solving skills, as well as offer additional support and care (Tier 2—secondary prevention for at-risk students).
- Facilitate connections to parenting education programs for parents of high-risk adolescent males where, for example, parents might receive relational coaching (Tier 3—tertiary prevention for high-risk students).[71,72]
- Provide individual counseling for youth who are chronically involved in bullying and violence to work on skill sets that would increase protective factors such as anger management, empathy, etc. (Tier 3—tertiary prevention for high-risk students).[73]
- Meet with parents to develop an action plan and clear understanding about discipline (Tier 3—tertiary prevention for high-risk students).[73]

School personnel also must focus on creating positive school climates in which all students, regardless of race, ethnicity, sexual orientation, gender identity, etc., feel safe, supported, and welcome.[20,74] Efforts aimed at increasing teacher connectedness and creating positive mentoring programs for high-risk boys, especially those of color, are vital to curbing violence and bullying perpetration, as well as supporting the well-being of all students.[13,75] Additionally, school counselors can be integral in delivering training to students and facilitating group sessions of students focused on strengthening protective factors.[73] Overall, our findings highlight cumulative, co-occurring risk factors, connectedness to parents and other prosocial adults, including community members and teachers, and school and neighborhood safety as important factors to address in school health programs that seek to prevent physical violence and bullying perpetration, particularly among male students.

Human Subjects Approval Statement

The University of Central Florida's Institutional Review Board approved this secondary data analysis.

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