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EMPIRICAL RESEARCH

Authoritative School Climate and High School Student Risk Behavior: A Cross-sectional Multi-level Analysis of Student Self-Reports

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Abstract Many adolescents engage in risk behaviors such as substance use and aggression that jeopardize their healthy development. This study tested the hypothesis that an authoritative school climate characterized by strict but fair discipline and supportive teacher–student relationships is conducive to lower risk behavior for high school students. Multilevel logistic regression models were used to analyze cross-sectional, student-report survey data from a statewide sample of 47,888 students (50.6 % female) in 319 high schools. The students included ninth (26.6 %), tenth (25.5 %), eleventh (24.1 %) and twelfth (23.8 %) grade with a racial/ethnic breakdown of 52.2 % White, 18.0 % Black, 13.1 % Hispanic, 5.9 % Asian, and 10.8 % reporting another or two or more race/ethnicities. Schools with an authoritative school climate had lower levels of student-reported alcohol and marijuana use; bullying, fighting, and weapon carrying at school; interest in gang membership; and suicidal thoughts and behavior. These results controlled for demographic variables of student gender, race, grade, and parent education level as well as school size, percentage of minority students, and percentage of low income students. Overall, these findings add new evidence that an authoritative school climate is associated with positive student outcomes.

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Introduction

A large body of research has found that students have better social and emotional adjustment and are less likely to engage in high-risk behavior when they attend schools with a positive school climate (Thapa et al. 2013). School climate is variously defined in the literature, but generally refers to the quality of interpersonal relationships and interactions among students and school personnel. The association between school climate and student adjustment has been found for internalizing and externalizing problems (Hung et al. 2015; Kuperminc et al. 2001), aggressive behavior and conduct problems (Hawkins et al. 2014; Henrich et al. 2005), bullying and peer aggression at school (Cornell et al. 2015), suicidal behavior (Hatzenbuehler 2011), and substance abuse (Fletcher et al. 2008) Although most studies are correlational and cross-sectional, there are longitudinal studies and intervention studies that provide stronger evidence of a causal link between school conditions and student risk behaviors (Kidiger et al. 2011; Sznitman and Romer 2014).

The most prevalent explanation for the hypothesized effect of school climate on student adjustment is that a positive school climate reduces the propensity of students to engage in high risk behaviors (Loukas and Murphy 2007). Students become engaged in school when they work in a structured and orderly environment where they feel supported and encouraged (Wang and Eccles 2013). A related view is that students are less inclined to engage in high risk behaviors because they feel more secure and are less vulnerable to emotional disturbance in a structured and supportive school (Kuperminc et al. 2001).

Although high risk behaviors may seem like a diverse collection of problems, interventions aimed at fostering healthy social and emotional development may have a broad impact. For example, a randomized controlled trial of the Communities That Care intervention (Hawkins et al. 2014) found diverse effects on delinquent behavior, violence (including weapon-carrying and assaulting someone), and drug use (including alcohol and marijuana use). The social development strategy underlying Communities That Care maintains that preventive interventions are effective because they increase protective factors that foster healthy social development and reduce risk factors (such as exposure to aggression) that can lead to high risk behaviors. From this perspective, it is important to examine the role of school climate as a protective factor for an array of risk behaviors.

Another study found that a positive school climate was associated with a group of risk factors (Klein et al. 2012). In this study of 3687 high school students, a school climate characterized by low levels of student teasing, bullying, and support for aggressive behavior was associated with lower rates of risk behaviors that included alcohol, tobacco, and marijuana use; weapon-carrying and fighting at school; avoiding school, feeling sad or hopeless, and considering suicide. Exploratory and confirmatory factor analyses clustered these diverse problem behaviors into a single risk behavior factor with good psychometric properties (e.g., pattern coefficients of .88 to .95; Cronbach's alpha .83). This study provides a foundation for testing hypotheses about multiple risk behaviors among high school students.

Studies have varied widely in how they define and measure a positive school climate. In large part, this variability stems from a lack of consensus on the definition of school climate. Wang and Degol (2015) posited that school climate includes academic, community, safety, and institutional environment dimensions that "encompass just about every feature of the school environment that impacts cognitive, behavioral, and psychological development" (p. 3). Such a broad definition of school climate makes it difficult to distinguish school climate from other school characteristics. A more narrow conception of school climate focuses on the interpersonal interactions that take place in a school. One widely cited definition is that school climate encompasses the "quality and character of school life" and is "based on patterns of people's experiences of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures" (Cohen et al. 2009, p. 182). This definition narrows the scope to social behavior and relationships, but is still quite broad and does not specify what qualities are critical to a positive school climate (Cornell and Mayer 2010).

The authoritative school climate model provides a conceptual framework for school climate that helps to specify and measure the features of a positive school climate. Authoritative school climate theory posits that two key dimensions of school climate are disciplinary structure and student support (Gregory and Cornell 2009). Disciplinary structure refers to the idea that school rules are perceived as strict but fairly enforced. Student support refers to student perceptions that their teachers and other school staff members treat them with respect and want them to be successful (Konold et al. 2014). Although these two dimensions do not encompass all aspects of school climate or constitute a comprehensive theoretical model, there is considerable evidence that they deserve a central role in research on school climate.

Many studies have identified these two key aspects of school climate; for example, Johnson's (2009) review of 25 studies concluded that "schools with less violence tend to have students who are aware of school rules and believe they are fair" and "have positive relationships with their teachers" (p. 451). Several school climate surveys measure these two domains in some capacity (Bear et al. 2011; Brand et al. 2003), but authoritative school climate theory gives them special prominence.

The authoritative school climate model is derived from the work of Baumrind (1968) on authoritative parenting that stimulated a large body of child development research (Larzelere et al. 2013). Parenting research has found that authoritative parents provide a combination of strict discipline and emotional support for their children. Parents are less effective when they are demanding but not supportive (authoritarian), emotionally supportive but not demanding (permissive), or lacking in both demandingness and emotional support (disengaged or neglectful) (Larzelere et al. 2013). Authoritative school climate theory uses the terms *disciplinary structure* and *student support* to refer to constructs that other researchers have variously labeled *demandingness/control* and *warmth/responsiveness*.

A body of research has examined an authoritative model of school climate. The first studies relied on post hoc measures of authoritative characteristics derived from surveys constructed for other purposes. Pellerin (2005) found that high schools using authoritative practices (strict but fair discipline and supportive teacher–student relationships) had less truancy and fewer dropouts than schools using an authoritarian approach. An analysis of National Educational Longitudinal Study data concluded that authoritative schools, characterized as both demanding and responsive, had higher levels of student engagement (Gill et al. 2004). Lee (2012) found that an authoritative school climate was associated with higher student engagement and reading achievement.

Other studies have used not explicitly measured authoritative school climate but employed a conceptual

framework that maps onto authoritative characteristics. Wang and Eccles (2013) investigated how school climate characteristics were associated with different types of student engagement in a sample of 1157 middle school students. Most notably, "school structure support" (defined as the clarity and consistency of teacher expectations) and "teacher emotional support" (defined as level of care and support from teachers) were associated with greater behavioral, emotional, and cognitive engagement.

Three reports specifically tested authoritative school climate theory with measures constructed to measure authoritative practices, using a statewide sample of nearly 300 high schools (Gregory et al. 2010, 2011, 2012). Student survey measures of disciplinary structure and student support were associated with less peer victimization (Gregory et al. 2010), lower levels of student aggression toward teachers (Gregory et al. 2012), and lower suspension rates (Gregory et al. 2011). These studies demonstrated effects across a large and diverse group of schools, controlling for school demographics of enrollment size, ethnic and racial composition, and percentage of students receiving a free or reduced price meal (a commonly used proxy for school-level socioeconomic status). Another study using similar measures of disciplinary structure and student support again found that they were associated with less bullying and peer victimization among middle school students (Cornell et al. 2015). Overall, these studies consistently demonstrated that an authoritative school climate model is associated with lower student aggression and misbehavior, but there is less evidence concerning other kinds of high-risk behavior.

Present Study

The purpose of the present study was to investigate the theory that an authoritative school climate characterized by high levels of disciplinary structure and student support would be associated with lower rates of student risk behavior. An important question concerns the breadth or generality of effects. Are the effects of an authoritative school climate confined to certain risk behaviors, such as those involving school behavior (e.g., fighting at school), or do they extend to a wider array of risk behaviors including those observed primarily outside of school, such as substance use? In order to demonstrate the breadth of effects, this study examined a range of risk behaviors identified in previous studies, including alcohol and marijuana use; bullying, fighting, and weapon carrying at school; interest in gang membership; and suicidal thoughts and behavior.

To provide a more extensive and representative test of the hypothesis that an authoritative school climate is associated with lower rates of high-risk behavior, this study analyzed cross-sectional student self-reports from surveys completed by a statewide sample of 48,027 grade 9–12 students in 323 high schools. The measures of school climate were constructed in a middle school sample (Konold et al. 2014) and then replicated in the same high school sample as the present study (Konold and Cornell 2015). Scale construction used methodological advances in multilevel modeling that are relatively new in the development of measurement scales (Dedrick and Greenbaum 2011). Employing both exploratory and confirmatory factor analyses, the studies identified sets of items that measured disciplinary structure and student support at both student and school levels of analysis. Both scales were derived from previous measures of authoritative school climate and bullying (Gregory et al. 2010, 2011, 2012). The study makes use of demographic control variables at both student and school levels that provide a more rigorous and robust test of relations between school climate and risk behavior.

There is considerable evidence that risk behaviors differ across gender (Byrnes et al. 1999), socioeconomic status (Yoshikawa et al. 2012), and race/ethnicity (KewalRamani et al. 2007). In general, youth who are male, from impoverished homes, or from disadvantaged minority groups engage in higher rates of risk behavior. Therefore, these analyses controlled for a series of student and school demographic variables. At the school level, the analyses controlled for the percentage of minority students, percentage of students eligible for a free or reduced-price meal, and school size. At the student level, the analyses controlled for gender, parental education (a proxy for socioeconomic status), and minority status.

Methods

Participants

The sample of schools was obtained from a statewide survey of Virginia high schools conducted in spring 2014 as part of the state's annual School Safety Audit program (Cornell et al. 2014a). The school participation rate was 99.7 % based on 323 of 324 eligible schools. (Four alternative schools were excluded from the analysis when it was learned that they served special populations, such as pregnant mothers and adult learners). This high rate was obtained in cooperation with the Virginia Department of Education and the Virginia Department of Criminal Justice Services, which endorsed the study and encouraged participation. The study was approved by the University of Virginia Institutional Review Board.

Student Sample

Schools had two options for sampling students: (1) invite all students to take the survey, with a goal of surveying at least

70 % of all eligible students (whole grade option); (2) use a random number list to select at least 25 students in each grade to take the survey (random sample option). Schools were given these options in order to choose a more or less comprehensive assessment of their students. Schools choosing the random sample option were provided with a random number list along with instructions for selecting students (for more information, see Cornell et al. 2014a). All students were eligible to participate except those unable to complete the survey because of limited English proficiency or an intellectual or physical disability. The principal sent an information letter to parents of selected students that explained the purpose of the survey and offered them the option to decline participation (passive consent).

Student participation rate was defined as the total number of students across all schools who participated in the survey divided by the total number invited to take the survey. Student participation rates were assessed separately for schools choosing the whole grade versus random sampling option based on completed principal surveys. There were 45 schools that used the whole grade option and obtained an estimated participation rate of 82.9 % (21,530 of 25,983). In 254 schools using the random sample option, the estimated participation rate was 93.4 % (30,482 of 32,631). The overall student participation rate was 88.7 % (52,012 student participants from a pool of 58,613 students asked to participate).

School principals completed reports identifying the reasons for student non-participation. The reasons were: student absent due to illness (39 %), schedule conflict (17.8 %), language barrier (2.5 %), student disability (4 %), student declined (16.7 %), parents declined (3.9 %), student was suspended (3 %), or some other reasons (such as a computer problem, 10 %).

Surveys were screened for validity on two criteria: (1) the time it took students to complete the survey and (2) responses to two validity screening questions (described under Measures). In order to determine a reasonable threshold time for completing the survey, the sample was examined for the amount of time each survey was completed and a cut-off was identified for participants who completed the survey so quickly that it is unlikely they could have read each item (for details, see Cornell et al. 2014a). There were 649 students (1.3 % of the sample) excluded because they completed the survey in less than 6 min. An additional 3336 students (6.4 % of the sample) were dropped for reporting on the validity questions that they were not telling the truth.

After excluding students from the four alternative schools and screening, the weighted student sample for analytic purposes consisted of 47,888 cases, with 50.6 % female and participants in ninth (26.6 %), tenth (25.5 %), eleventh (24.1 %) and twelfth (23.8 %) grade. The racial/ethnic breakdown was 52.2 % White, 18.0 % Black, 13.1 % Hispanic, and 5.9 % Asian, with an additional 10.8 % of students identifying themselves with having another or two or more races. Approximately 18.9 % reported speaking a language other than English at home. The distribution of parental education was 24.3 % completed post-graduate studies, 26.3 % completed a 4-year college degree, 14.1 % completed a 2-year college or technical education degree, 27.3 % graduated from high school, and 7.8 % did not graduate from high school. Weighted demographic data of the respondents based on grade, gender, and race/ethnicity approximated the state population of students in grades 9 through 12.

Measures

Students completed the survey in classrooms under teacher supervision using a standard set of instructions. Surveys were administered anonymously online using Qualtrics software. Students were required to answer each item before proceeding to the next page of the survey with the exception of the YRBS items, which were optional. If the YRBS items were left blank, students could still proceed with the survey.

Validity Screening Items

There were two validity screening items to identify students who admitted that they were not answering truthfully or who were answering randomly. The first item, "I am telling the truth on this survey," had four response options: *strongly disagree, disagree, agree,* and *strongly agree*. Students answering s*trongly disagree* or *disagree* were omitted from the sample. At the end of the survey, the second item was "How many of the questions on this survey did you answer truthfully?" This item had five response options: *all of them, all but 1 or 2 of them, most of them, some of them,* and *only a few or none of them*. Students answering *some of them* or *only a few or none of them* were omitted from the sample. Previous research with independent samples of middle and high school students found that the use of these items can identify students who tend to give exaggerated reports of risk behavior and more negative views of school conditions than other students (Cornell et al. 2012, 2014b).

Authoritative School Climate (ASC)

A preliminary analysis found that disciplinary structure and student support were highly correlated ($r = .85$). Therefore, we constructed an overall school ASC measure that combined the two variables, as has been done in prior studies (e.g., Gerlinger and Wo 2014; Jia et al. in press). Disciplinary structure and student support were converted into standardized scores and averaged for each school ($M = 0$, $SD = 0.96$, min $= -2.53$, max $= 3.07$, skew $= 0.22$).

Disciplinary Structure A seven-item scale was designed to measure the perceived fairness and strictness of school discipline with items such as "The school rules are fair" and "The school rules are strictly enforced" (see "Appendix" and Konold and Cornell 2015). Each item was answered on a four-point Likert-scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *agree*, 4 = *strongly agree*). Multilevel confirmatory factor analysis (MCFA) with the same sample found favorable fit to the data with school-level factor loadings ranging from .74 to .97 (Konold and Cornell 2015). In the present study, total scores ranged from 7 to 28, with Cronbach's alpha = .78. The school-level measure of structure was based on the mean score of all students within each school.

Student Support This eight-item scale was designed to measure the perceived supportiveness of teacher–student relationships with items such as how much they agree that adults in their school "really care about all students" and whether they would seek help from an adult in their school if "another student was bullying me" (see "Appendix" and Konold and Cornell 2015). Each item was answered on a four-point Likert-scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *agree*, 4 = *strongly agree*). A MCFA found favorable fit to the data with all school-level factor loadings greater than .75 (Konold and Cornell 2015). In the present study, total scores ranged from 8 to 32, with Cronbach's alpha = .87. The school level measure of support was based on the mean score of all students within each school.

Risk Behaviors

The risk behaviors of fighting and weapon-carrying, alcohol and marijuana use, and considering and attempting suicide were taken verbatim from the widely used Youth Risk Behavior Survey (Centers for Disease Control and Prevention 2015). These questions were chosen because they would demonstrate the relevance of school climate to indicators that are widely used to measure risk behavior at local, state, and national levels. The question about bullying others has been used in previous studies of bullying and has demonstrated correspondence with teacher and peer reports of bullying (Cole et al. 2006) and with measures of peer aggressiveness and school misbehavior (McConville and Cornell 2003). A final question was used to identify students at risk for gang membership by asking whether the student was interested in joining a gang. This question was derived from questions on the National Youth Gang Survey (National Gang Center 2015) but modified so that students were not asked to explicitly identify themselves as gang members. As with several studies that have used the YRBS items (e.g., David et al. 2013; Stack 2014), outcomes were dichotomized to indicate whether the respondent had

engaged in the activity within the past 12 months or the past 30 days (1 = yes) or not (0 = no). Items related to gang membership and bullying others were dichotomized as well.

Demographic Information

Demographic variables obtained from the student survey included gender (female = 1), race/ethnicity (dummy coded variables with White as the reference group) and parent educational level. The highest education level achieved by either parent was used as a proxy for socioeconomic status (1 = *did not graduate from high school*, 2 = *graduated from a high school*, 3 = *graduated from a 2-year college or technical school*, 4 = *graduated from a 4-year college*, 5 = *completed post-graduate studies*). Additional school demographic information was obtained from the Virginia Department of Education, including school enrollment size, the percentage of students eligible for free or reduced price meals (FRPM), and percentage of minority students.

Gender, race/ethnicity, and parental education were used as control variables at the student level. School size (in hundreds of students; $M = 11.90$, $SD = 7.09$), FRPM ($M = 37.82$, $SD = 18.93$), and percentage of minority students ($M = 38.86$, $SD = 26.42$) were used as control variables at the school level. In our sample, parent education level aggregated at the school level was correlated $r = .76$ with FRPM.

Data Analysis

Descriptive statistics were examined for all predictors and outcomes. Because student data were nested within schools, multilevel logistic regression was used to properly partition variance between and within schools (Raudenbush and Bryk 2002). In addition, accounting for the clustering effect results in more properly estimated parameters and standard errors (Guo and Zhao 2000). To account for the uneven selection probabilities resulting from the schools' use of two sampling methods, we used normalized weights, calculated as the inverse of the student's probability of selection at the school divided by the mean of the weights (Hahs-Vaughn 2005).

R (R Core Team 2014) was used for data analyses. Multilevel generalized linear models with a logit link function and a binary outcome used the MASS package (Venables and Ripley 2002). As is often done with multilevel models, we computed the intraclass correlations (ICCs) for the outcome variables. ICCs represent the amount of variability attributed to the group level in linear regression models and were computed using the linear threshold method appropriate for logit models where $ICC = \frac{V_g}{\left(V_g + \frac{\pi^2}{3}\right)}$ (Merlo et al. 2006). V_g represents the variance of the

intercept on the logit scale using a null multilevel model (i.e., a model with no predictors).

Missing data analysis showed that the range of missing data for the outcome variables ranged from a low of 0.2 % (for marijuana use, $n = 109$) to 1.1 % (for considered suicide, $n = 546$). Data were complete for questions related to joining a gang and bullying others. Overall, data were complete for 97.2 % of respondents. Using guidelines suggested by Allison (2012) and Bodner (2008) we imputed five complete datasets for analysis using the MICE (multivariate imputation by chained equations) package (van Buuren and Groothuis-Oudshoom 2011). Multiple imputation is considered a modern and principled method for handling missing data (Dong and Peng 2013).

All regression analyses results were combined using formulas provided by Rubin (2004) for estimating the corresponding standard errors accounting for the within and between imputation variance. Results are shown using the conventionally-used odds ratios (ORs) as well as the 95 % confidence intervals. Odds refer to the probability of an event occurring divided by the probability of the event not occurring. If the OR is greater than one, then the likelihood of engaging in the outcome variable (e.g., drinking, fighting) is higher. ORs less than one reflect a reduced likelihood of engaging in the activity and ORs of approximately one mean that the odds are about the same. Variables that have confidence intervals that contain one are not statistically significant at the .05 level.

Results

Prevalence rates for the various risk behaviors were examined. Of the six YRBS items, the lowest prevalence rate was for bringing a weapon to school at 3.4 % and the highest was for drinking alcohol within the past 30 days at 23.3 % (see Table 1). Approximately 2.6 % of students had considered joining a gang and 2.0 % reported bullying others within the past year. Intraclass correlations ranged from .03 for thoughts of suicide to a high of .16 for joining a gang (see Table 1). Higher ICCs suggest the importance of accounting for the clustering effect of students nested within schools and recommended practice is to account for the clustering effect rather than ignoring it (Huang 2016).

For illicit substance use (i.e., alcohol and marijuana), school demographic variables were not statistically significant predictors (see Table 2). However, for a one-point increase in ASC (approximately a standard deviation), students had 20–23 % lower odds of drinking alcohol or using marijuana in the past 30 days (ORs 0.80 and 0.77, ps < .001, respectively) while controlling for student gender, race/ethnicity, parental education, and grade level.

With regard to aggressive behaviors (i.e., engaging in fights in the past 12 months or carrying a weapon on school property in the past 30 days), school-level demographic variables had a statistically significant association with the behaviors but the ORs were approximately 1.00 which can be considered negligible (see Table 2). However, higher ASC was associated with a lower likelihood of engaging in both weapon carrying (OR 0.70, $p < .001$) and fighting (OR 0.79, $p < .001$) at school while controlling for all other student and school related variables.

School-level demographic variables did not have any statistical association with suicidal ideation or attempts, but a one-point increase in ASC was associated with a statistically significant lower likelihood of considering (OR 0.94, $p < .05$) and attempting (OR 0.84, $p < .001$) suicide (see Table 3). Finally, a one-point increase in ASC was also associated with a lower likelihood of joining a gang (OR 0.70, $p < .001$) and bullying others (OR 0.70 $p < .001$). All ORs accounted for the observed school-level and student-level covariates.

Probabilities

Although logistic regression results are often presented in terms of odds and odds ratios, a display of the prevalence rates can be informative. Table 1 shows the prevalence rates of students in schools with average levels of ASC in comparison to schools with high (>1 SD) and low (<1 SD) levels of ASC. A series of two-proportion z tests found that students in high ASC schools reported less risk behavior compared to students in low ASC schools (all ps < .001). Table 1 also shows the percentage reduction in risk behavior that is found high ASC schools compared to low ASC schools. For example, the alcohol consumption rate of 19 % reported by students in high ASC schools was 36.9 % lower than the rate of 30 % in low ASC schools. In terms of illicit substance use, students in high ASC schools had alcohol and marijuana use (19 and 9 %, respectively) that were notably lower than students in low ASC schools (30 and 19 %, respectively). For items related to violence, peer-victimization, and gang membership, students in high ASC schools had prevalence rates that were at least 60 % lower than students in low ASC schools. Finally, students in high ASC schools had less suicide ideation and fewer suicide attempts than students in low ASC schools (11 vs. 14 and 4 vs. 8 % respectively).

Discussion

Adolescence is a developmental period characterized by high levels of engagement in risky behavior such as substance abuse and peer aggression, with elevated rates of

Table 1 Intraclass correlations (ICCs) and prevalence rates of risk behaviors

	ICC	Prevalence rates (% who engaged in activity)			Percent lower in high ASC schools compared to low ASC schools
		Average	High ASC schools	Low ASC schools	
Alcohol use	.04	23.33	18.66	29.58	36.92
Fighting	.07	7.09	4.64	11.54	59.79
Weapon carrying	.12	3.44	2.09	6.37	67.19
Marijuana use	.05	13.18	9.04	19.43	53.47
Suicide (thoughts)	.03	11.89	10.66	13.58	21.50
Suicide (attempted)	.05	5.42	4.26	7.81	45.45
Considered joining a gang	.16	2.57	1.53	4.75	67.79
Bullied others	.10	2.00	1.26	3.68	65.76

Table 2 Multilevel logistic regression model results for drinking alcohol[a], fighting[b], carrying a weapon[a], and using marijuana[a] ($n = 47,888$)

	Drinking alcohol			Fighting			Weapon carrying			Use of marijuana		
	OR	LB	UB	OR	LB	UB	OR	LB	UB	OR	LB	UB
School variables												
ASC	0.80***	0.76	0.84	0.79***	0.74	0.85	0.70***	0.63	0.77	0.77***	0.73	0.82
Size[c]	1.00	0.99	1.01	0.99*	0.98	1.00	0.99	0.97	1.00	1.01	1.00	1.01
FRPM%	1.00	0.99	1.00	1.01*	1.00	1.01	1.01*	1.00	1.01	1.00	1.00	1.00
Minority%	1.00	1.00	1.00	1.00**	0.99	1.00	0.99***	0.98	0.99	1.00	1.00	1.00
Student variables												
Black[d]	0.60***	0.56	0.64	1.72***	1.55	1.91	0.88	0.76	1.03	0.99	0.92	1.08
Hispanic[d]	0.93*	0.86	1.00	1.76***	1.57	1.97	1.37***	1.18	1.60	1.16***	1.06	1.26
Asian[d]	0.38***	0.33	0.43	0.76*	0.61	0.95	1.05	0.82	1.35	0.52***	0.44	0.60
Other[d]	1.06	0.99	1.14	1.97***	1.77	2.20	1.37***	1.18	1.60	1.47***	1.36	1.61
Female	0.98	0.94	1.03	0.46***	0.42	0.49	0.37***	0.34	0.41	0.76***	0.72	0.80
Parental education	0.97***	0.95	0.98	0.87***	0.85	0.90	0.90***	0.86	0.93	0.91***	0.89	0.93
Grade 10[e]	1.32***	1.23	1.40	0.77***	0.71	0.85	1.05	0.91	1.20	1.27***	1.17	1.38
Grade 11[e]	1.77***	1.66	1.89	0.67***	0.60	0.73	1.08	0.94	1.24	1.70***	1.57	1.83
Grade 12[e]	2.50***	2.35	2.66	0.52***	0.47	0.58	1.31***	1.14	1.49	2.12***	1.96	2.28

ASC authoritative school climate measure, *FRPM* free or reduced price meals, *OR* odds ratio, *LB* lower bound of the 95 % confidence interval, *UB* upper bound of the 95 % confidence interval

[a] In the past 30 days

[b] In the past 12 months

[c] Size is per 100 students

[d] White is the reference group

[e] Grade 9 is the reference group

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

depression, injury, homicide, and suicide (DiClemente et al. 2009). Accordingly, a body of research has examined how school climate can provide a protective environment that reduces student risk behavior (Thapa et al. 2013). The present study used a cross-sectional analysis of student-self report surveys to investigate Authoritative School Climate theory as a framework for conceptualizing key features of school climate that are associated with student risk behavior. An authoritative school climate characterized by strict but fair discipline and supportive teacher–student relationships was associated with lower levels of alcohol and marijuana use, less bullying, fighting, and weapon-carrying at school; less interest in gang membership; and lower rates of suicidal thoughts and behavior. The odd ratios (ORs) for these findings ranged from 0.70 to 0.94. High authoritative schools, (i.e., authoritative school climate scores > 1 *SD*) had 22 to 68 % lower rates of risk behavior than schools with low authoritative climates (<1 *SD*).

Table 3 Multilevel logistic regression model results for considering and attempting suicide, considering joining a gang, and bullying others (n = 47,888)

	Suicide (considered)			Suicide (attempted)			Joining a gang			Bullying others		
	OR	LB	UB	OR	LB	UB	OR	LB	UB	OR	LB	UB
School variables												
ASC	0.94*	0.89	0.99	0.84***	0.78	0.90	0.70***	0.64	0.77	0.70***	0.63	0.78
Size[a]	1.01	1.00	1.02	1.00	0.99	1.01	0.97***	0.95	0.99	1.00	0.98	1.02
FRPM%	1.00	0.99	1.00	1.00	1.00	1.01	1.01***	1.01	1.02	1.01	1.00	1.01
Minority%	1.00	1.00	1.00	1.00	1.00	1.00	1.00*	0.99	1.00	0.99**	0.99	1.00
Student variables												
Black[b]	0.79***	0.73	0.87	1.00	0.88	1.13	2.62***	2.35	2.92	1.51***	1.27	1.80
Hispanic[b]	1.16**	1.06	1.27	1.71***	1.52	1.92	2.28***	2.01	2.58	1.77***	1.47	2.13
Asian[b]	1.01	0.90	1.15	1.00	0.83	1.21	0.92	0.69	1.21	1.46**	1.11	1.94
Other[b]	1.25***	1.14	1.37	1.48***	1.31	1.68	2.07***	1.83	2.35	1.67***	1.39	2.01
Female	2.02***	1.91	2.14	2.03***	1.87	2.21	0.50***	0.46	0.54	0.46***	0.41	0.52
Parental education	0.91***	0.89	0.93	0.90***	0.87	0.93	0.82***	0.79	0.84	0.93**	0.89	0.98
Grade 10[c]	1.01	0.93	1.09	0.89*	0.80	0.98	1.03	0.93	1.14	0.86	0.73	1.00
Grade 11[c]	0.93	0.86	1.01	0.74***	0.67	0.83	0.83***	0.75	0.93	0.79**	0.67	0.93
Grade 12[c]	0.87***	0.80	0.94	0.65***	0.58	0.73	0.77***	0.69	0.86	0.80**	0.68	0.95

All risk behavior questions concerned the past 12 months

ASC authoritative school climate measure, *FRPM* free or reduced price meals, *OR* odds ratio, *LB* lower bound of the 95 % confidence interval, *UB* upper bound of the 95 % confidence interval

[a] Size is per 100 students

[b] White is the reference group

[c] Grade 9 is the reference group

* *p* < .05; ** *p* < .01; *** *p* < .001

More broadly, this study supports a social-ecological perspective that school climate is an important factor in student behavioral adjustment across a variety of outcomes (Thapa et al. 2013). These results add to previous studies finding that an authoritative school climate was associated with lower rates of student aggression toward peers (Cornell et al. 2015; Gregory et al. 2010) and teachers (Gregory et al. 2012; Berg and Cornell 2015), lower school suspension rates (Gregory et al. 2010) and lower dropout rates (Jia et al. in press). The previous studies are noteworthy because they did not rely entirely on student self-report, but incorporated reports by teachers as well as school records of student outcomes.

Demographic Effects

Consistent with previous studies (Byrnes et al. 1999), there were large gender effects on risk behavior. Female students were much less likely to carry weapons (OR 0.37) or fight (OR 0.46) at school, and less likely to report bullying others (OR 0.46) or interest in joining a gang (OR 0.41). Another difference is that female students were somewhat less likely to report marijuana use (OR

0.76) but did not differ from male students in reports of alcohol use. These findings are comparable to results from the National Comorbidity Survey (Swendsen et al. 2012) which found that male and female adolescents had comparable levels of alcohol use but that male adolescents had higher illicit drug use. Consistent with research on gender differences in depression and suicide (Wade 2012), female students were much more likely to report suicide thoughts and attempts.

School demographic factors such as the size of the school and the percentages of low-income and minority students are often associated with higher discipline problems, lower student engagement, and lower academic achievement (Gottfredson et al. 2005; Lacour and Tissington 2011). However, in this study after including the influence of an authoritative school climate and individual student demographics, the school demographics of size, percentage of students eligible for free or reduced price meals, and percentage of minority students had little or no relation to risk behaviors. Higher levels of low-income students were associated with approximately one-percent higher odds of alcohol use, fighting, and weapon-carrying, which is a negligible difference.

The lack of demographic effects at the school level is noteworthy because it may appear to educators that the demographics of their student body have a strong impact on the prevalence of risky behavior. There may be an assumption that schools with high percentages of low income and minority students will have more prevalent problems with aggressive behavior and substance use. On the contrary, the correlational evidence from this study suggests that school climate is more strongly associated with student risk behavior than school demographics. This suggests that schools with an authoritative school climate might protect against the risk associated with low income and minority status (Hawkins et al. 2014).

Authoritative School Climate

The assessment of school climate has become a nationwide goal because of its recognized impact on school quality and student outcomes (Dary and Pickeral 2013). Although there is insufficient consensus on the key qualities of a positive school climate, the present study helps to build a theoretical framework that can more precisely identify key elements of school climate. In previous studies of authoritative school climate, disciplinary structure and student support have been associated with the prevalence of teasing and bullying in a school, bullying victimization, and general peer aggression (Cornell et al. 2015; Gregory et al. 2010). Other studies have linked authoritative school climate to lower levels of student aggression toward teachers (Berg and Cornell 2015) and lower suspension rates (Gregory et al. 2011). This study extends the research on authoritative school climate to a wider variety of student risk behaviors.

A theory of authoritative school climate is still under development. Most school climate surveys include some assessment of the degree to which students perceive school discipline as fair, but they do not define it as fundamental to a positive school climate (Thapa et al. 2013). In an authoritative model, disciplinary structure is defined as student perceptions that school rules are fair and reasonable. Higher disciplinary structure means that students have a chance to explain themselves when accused of doing something wrong and are punished fairly. Disciplinary structure is important because students are more willing to comply with school rules when they recognize that authorities are fair and unbiased (Tyler 2006). Fairness includes a critical element that students are treated fairly regardless of their race or ethnicity. Fairness has become a national education issue because of the prevalence of racial disparities in school discipline (U.S. Departments of Justice and Education 2014).

It is important to distinguish the high disciplinary structure characteristic of authoritative schools from the more punitive structure observed in authoritarian schools. School discipline can be strict and fair without being harsh or castigatory. Similar to the rigid and controlling practices of authoritarian parents (Baumrind 1968), an authoritarian school would have a zero tolerance philosophy of school discipline (American Psychological Association Zero Tolerance Task Force 2008). Pellerin's (2005) work supported this distinction in finding that authoritarian schools emphasizing the use of punishment had higher dropout rates than authoritative schools.

The other fundamental element of an authoritative school is the supportiveness of teacher–student relationships (Thapa et al. 2013). In this study, student support was conceptualized as student perceptions that teachers care about all students and want them to do well, and that students feel comfortable seeking help from them. These findings are consistent with previous research finding that adolescents who are exposed to supportive adults in the school have higher academic achievement (e.g., Gregory and Weinstein 2004) and lower problem behavior (Henrich et al. 2005).

A distinctive feature of an authoritative model is that both disciplinary structure and student support are regarded as foundational to a positive school climate. In practice, school administrators often think of school discipline in a more dichotomous manner that makes disciplinary structure and student support seem mutually exclusive. For example, two studies have found that principal attitudes toward discipline can be grouped into contrasting views valuing strict discipline versus a more supportive and prevention-oriented approach (Nickerson and Martens 2008; Skiba et al. 2007). As Gregory et al. (2010) concluded, school authorities do not have to choose between a "get tough" versus "be supportive" approach.

Limitations and Directions for Further Study

Correlational, cross-sectional findings cannot establish causal relationships and are open to multiple interpretations. There may be bidirectional or reciprocal causal effects between school climate and student risk behavior. For example, the strong associations between authoritative school climate and fighting and bullying found in this study suggests that a positive school climate could have a protective effect on student aggression, but it is also possible that students who come to school with a greater propensity to engage in aggression will be negatively oriented toward school and report more negative perceptions of their teachers. Moreover, such students might elicit less supportive and more punitive responses from their teachers and other school authorities. The most effective way to disentangle these causal effects is to undertake experimental interventions that improve school discipline

practices or teacher–student relationships, and to track resulting changes in student risk behavior. Nevertheless, the study's findings are consistent with our hypothesized model by demonstrating a statistical effect of school structure and support on student risk behavior after controlling for known demographic influences and using a model that considers the nesting of students within schools.

A related study limitation is that school climate and risk behaviors were based on student self-report. This study screened out surveys that were completed very rapidly and surveys in which the students reported that they were not telling the truth, but other self-report problems remain. Students may be biased to give favorable self-reports and correlations may be increased by shared method variance. It will be useful in future studies to include independent measures of school climate such as scales based on teacher perceptions, and to include student outcomes based on more objective measures such as performance on standardized tests (Brand et al. 2008). Along these lines, a study of the high school sample used in this study found that student and teacher measures of authoritative school climate were associated with lower dropout rates (Jia et al. in press). An important direction for future study is to use measures other than student reports, such as teacher and staff measures of school climate. In addition, it would be useful to examine interaction effects to discern whether school climate has comparable associations with risk behavior across gender, race/ethnicity, age, and socioeconomic status.

This study examined disciplinary structure and student support, but the U.S. Department of Education devised a Safe and Supportive Schools model of school climate model with 13 components organized into domains of engagement, safety, and environment (Bradshaw et al. 2014). There are components of the U.S. Department of Education model that align with authoritative school climate, but the way all 13 components are related to one another and how they are associated with risk behavior should be a direction for future research. A related limitation is that school climate may also interact with family and community variables that were not considered in this study.

An authoritative climate is generally conceptualized as involving components of demandingness and responsiveness (Gregory and Cornell 2009). This study used disciplinary structure as an index of demandingness and student support as an index of responsiveness, but other indicators of an authoritative school climate might be included. For example, some studies have used the degree to which teachers demand high academic performance from their students (sometimes called academic press) as an indication of demandingness or structure (Jia et al. in press). Several studies have found that a school climate characterized by high academic expectations will have greater student achievement (e.g., Brault et al. 2014).

An authoritative school climate theory could provide a useful conceptual framework for school intervention efforts. For example, the Positive Behavioral Interventions and Supports (PBIS) model of school improvement sets positive school wide expectations for student behavior (e.g., "Be respectful to others") and establishes a reward system to reinforce positive behavior (Bradshaw 2013). The principles of an authoritative school climate could help inform these goals and guide teacher behavior. Another example is My Teaching Partner-Secondary (MTP-S), a professional development program that coaches teachers to improve teacher–student interactions (Gregory et al. 2014). One of the primary goals of MTP-S is to build an emotionally supportive relationship between teachers and students. According to the MTP-S model, a supportive relationship is characterized by feelings of warmth and connection, as well as responsiveness to the student's academic and social/emotional needs, which seems to dovetail with the authoritative conception of support. School intervention studies could assess authoritative characteristics as evidence of successful climate change and a potential mediator of student outcomes.

Conclusion

Many studies have identified a positive school climate as conducive to student academic achievement and other positive outcomes (Thapa et al. 2013). The present report is one of a series of studies advancing an authoritative school climate model for conceptualizing key features of school climate (Konold and Cornell 2015). An authoritative school climate is chiefly characterized by strict but fair discipline (high structure) and supportive teacher–student relationships (high support). Although previous studies have linked an authoritative school climate to higher academic performance (Cornell et al. in press) and lower dropout rates (Jia et a. in press), as well as more positive peer interactions (Cornell et al. 2015), the present study extends these findings to a wide range of risk behaviors including measures of substance abuse, aggression, and suicide attempts.

Cross-sectional data were obtained from student self-report surveys administered in a racially and socioeconomically diverse sample of 47,888 students attending 319 public high schools. The sample represented 99.7 % of eligible schools and had a participation rate of 88.7 % for students invited to complete the survey. A series of multi-level (school and student) logistic regression analyses found that high schools with a higher index of authoritative school climate had lower levels of alcohol and marijuana use; bullying, fighting, and weapon carrying at school; interest in gang membership; and suicidal thoughts and behavior.

Notably, compared to schools with low authoritative school climate scores (<1 *SD*), schools with high authoritative school climate scores (>1 *SD*) had a 37 % lower rate of alcohol consumption, a 54 % lower rate of marijuana use, a 45 % lower rate of suicide attempts, and 60 % or more lower rates of aggressive behaviors, including fighting, weapon-carrying, and bullying others. Our analyses controlled for both student and school demographic variables, showing that the association between a positive school climate and risk behavior was not attributable to socioeconomic status or minority group membership of the student population. In conclusion, these findings support the value of an authoritative school climate as a protective factor to facilitate healthy adolescent development.

Authors' Contributions DC conceived of the study, participated in its design and implementation, and drafted the manuscript. FH participated in the design and implementation of the study, conceptualized and carried out the data analyses, and helped to draft the manuscript. Both authors read and approved the manuscript.

Conflicts of interest The authors report no conflict of interests.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed Consent The survey data used in this study were collected anonymously from students by school personnel as part of school procedures to comply with the state's annual school safety audit. Parents were informed of the survey and given the option to decline participation for their child. School demographic data were obtained as aggregated school level totals from school records with no identification of individual students.

Appendix

See Table 4.

Table 4 Items for authoritative school climate scales

	Disciplinary structure
1	The punishment for breaking school rules is the same for all students
2	Students at this school only get punished when they deserve it
3	Students are treated fairly regardless of their race or ethnicity
4	Students get suspended without good reason (reverse scored)
5	The adults at this school are too strict (reverse scored)
6	The school rules are fair
7	When students are accused of doing something wrong, they get a chance to explain it
	Student support
1	Most teachers and other adults at this school care about all students
2	Most teachers and other adults at this school want all students to do well
3	Most teachers and other adults at this school listen to what students have to say
4	Most teachers and other adults at this school treat students with respect
5	There are adults at this school I could talk with if I had a personal problem
6	If I tell a teacher that someone is bullying me, the teacher will do something to help
7	I am comfortable asking my teachers for help with my school work
8	There is at least one teacher or another adult at this school who really wants me to do well

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