Testing the Causal Links Between School Climate, School Violence, and School Academic Performance: A Cross-Lagged Panel Autoregressive Model

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The present study explores the causal link between school climate, school violence, and a school's general academic performance over time using a school-level, cross-lagged panel autoregressive modeling design. We hypothesized that reductions in school violence and climate improvement would lead to schools' overall improved academic performance. School-level secondary analysis of the California Healthy Kids Survey was conducted at three points in time. Findings offer credible evidence that a school's overall improvement in academic performance is a central causal factor in reducing violence and enhancing a school's climate. In the discussion, we suggest that when strong efforts to improve academics are taken, schools may tend to include issues of climate and victimization as part of those academic reform efforts.

Keywords: achievement; learning environments; secondary data analysis; social context; structural equation modeling; violence

The school violence and bullying research literatures commonly highlight the importance of school climate in lowering victimization and creating a safe school environment (American Educational Research Association, 2013; Astor, Guerra, & Van Acker, 2010; Benbenishty & Astor, 2005; Cornell, Shukla, & Konold, 2015; Espelage, Gutgsell, & Swearer, 2004; Swearer, Espelage, Vaillancourt, & Hymel, 2010). Similarly, within the school climate research literature, there is extensive research and discussion of the importance of school climate as a contributor or as a measure to prevent victimization (Bradshaw, 2015; Bradshaw, Waasdorp, & Leaf, 2015; Cohen, 2013; Cohen & Freiberg, 2013). The school climate and the school violence literatures have also explored the role of climate and school violence/bullying with regard to academic achievement outcomes (Berkowitz et al., 2015; Espelage, Hong, Rao, & Low, 2013; Lacey & Cornell, 2014; McCoy, Roy, & Sirkman, 2013; Thapa, Cohen, Guffey, & Higgins-D'Allessandro, 2013). This link between improvements in school climate and reductions in school violence and higher levels of a school's overall academic performance was advanced in the school effectiveness literature (Barton, Coley, & Wenglinskey, 1998; McEvoy & Welker, 2000). Researchers have also used these arguments to support school climate improvements and antibullying policies (Interdisciplinary Group on Preventing School and Community Violence, 2013; Marachi, Astor, & Benbenishty, 2012; Pitner, Marachi, Astor, & Benbenishty, 2015). More recently, a movement focusing on social and emotional learning has also stressed the importance of integrating climate and safety with efforts to improve academic outcomes (see www.casel.org for many examples of such programs).

Despite this impressive consensus regarding the importance of positive climate and low school violence on improving academic performance, there are significant gaps in knowledge supporting this causal link. A major limitation of studies in this area is an overreliance and overinterpretation of strong evidence from correlational studies. These studies often lead to causal inferences on how improvements in climate would generate gains in academic performance (e.g., Berkowitz et al., 2015). Convincing evidence on the causal link is lacking.

It is difficult to conduct large-scale controlled experiments that could provide strong evidence showing that improvement in climate and reductions in victimization lead to schools' academic performance gains. Most of the extant empirical evidence is collected in cross-sectional research designs that are limited in their ability to test causal hypotheses. A partial remedy to threats

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to internal validity can be provided by employing longitudinal designs and, specifically, cross-lagged panel autoregressive modeling (Finkel, 1995; Marsh & Yeung, 1997). Using population samples that have strong external and ecological validity for these types of methods would also be important if the nature of the relationships between school climate, school violence, and school academic performance is to be better understood.

The data for testing such panel models should include several constructs measured each for three or more times (Finkel, 1995). In such designs, it is possible to control for previous levels of each variable and to estimate, simultaneously, the cross-lagged causal paths. Such designs control for measurement instability by constraining factor loadings for equality across time, they take into account systematic sources of measurement error by allowing the errors of identical indicators to correlate across time, and they express sources of covariation between constructs unaccounted for by stability and cross-lagged effects as correlations between the constructs' disturbances within each time (Finkel, 1995). This method models the way a change in one variable is related to change in another variable while controlling for a wide array of measurement and specification issues. This is one of the closest methods researchers can employ to model causality in nonexperimental designs (Biesanz, 2012).

This study employs a cross-lagged panel autoregressive modeling design for using public middle and high schools across the entire state of California in order to examine the causal hypothesis that changes in school climate and school victimization lead to changes in school academic performance. Recommendations to improve climate and reduce violence to create school environments more supportive of the academic mission come from studies that identify strong correlations between combined low victimization and positive climate with strong academic performance (McEvoy & Welker, 2000). However, as mentioned, these studies have not determined the causal relationships between these constructs. Furthermore, there are several indications in the literature that the relative importance of climate and academic performance vary over school types. Whereas the social and emotional components of school climate are often perceived as more important in elementary and middle schools, academic performance is a more central mission of high schools (Astor, Benbenishty, Zeira, & Vinokur, 2002; Benbenishty, Astor, Zeira, & Vinokur, 2002; Eccles et al., 1993; Wigfield & Eccles, 2000). Consequently, we explore the interrelationships between school climate, school violence, and school academic performance separately for both middle and high school settings.

Study Assumptions

Because there are wide variations in how school climate, violence, and academic performance are conceptualized and measured (Cohen, McCabe, Michelli, & Pickeral, 2009), it is important to present some of the underlying assumptions and choices made in this inquiry. School climate and school violence may be impacting schools' overall performance through multiple mechanisms. Some of them can be conceptualized as student-based. For instance, a student who feels safe in school may be free to attend to academic tasks rather than focus on worries about safety. Similarly, students who feel supported by their teachers may feel closer to these teachers and engage in more open and meaningful interactions with them, enhancing their involvement in the school's academic pursuit.

School climate and students' involvement in violence may also impact the whole school. For instance, in schools with many manifestations of violence among students, teachers may feel too threatened to engage effectively with violent students. The teaching staff may spend more of their time preventing fights and less on delivering academic content. Such mechanisms operate as a school-level "emergent" phenomenon (i.e., a phenomenon that "originates in the cognition, affect, behaviors, or other characteristics of individuals, is amplified by their interactions, and manifests as a higher-level, collective phenomenon"; Kozlowski & Klein, 2000) rather than as a student-level mechanism. Organizational theory provides numerous examples of how organizational climate, measured at an individual level and aggregated to a higher level as a property of the whole organization, impacts individual members' performance (e.g., Westman, Bakker, Roziner, & Sonnentag, 2011).

In the current inquiry, school-level constructs such as school climate, school violence, and overall academic performance are especially relevant as almost all accountability systems focus mainly on the aggregated school level and decisions are based on assessing schools as units, such as schools making adequate progress, failing schools, and persistently violent schools (see, for instance, New York's accountability system: http://www.p12.nysed.gov/irs/school_safety/school_safety_accountability.html). The present study focuses on climate, violence, and academic performance measured on the student level and then aggregated to the school level. Therefore, it has relevance to how policy and school reform indicator and accountability systems evaluate all of these variables across schools, districts, and states.

This conceptualization has implications for other variables included in this study. On the student level, there is a clear distinction between victimization and perpetration, each with its different etiology and consequences. When a school is considered as a whole, individual-level reports of both victimization and perpetration become part of the overall safety environment in school. Furthermore, even with no specific reports on perpetration or victimizations, students and staff member's general awareness of the overall presence of weapons in school (e.g., Khoury-Kassabri, Astor, & Benbenishty, 2007) and of gang membership (Estrada, Gilreath, Astor, & Benbenishty, 2014) can contribute strongly to a violent environment at a whole-school level. We therefore include in our study a range of behaviors and perceptions that impact the school's overall safety environment.

In summary, the present study uses a school-level longitudinal database to examine a cross-lag autoregressive model to test the causal hypothesis that improvements in school climate and reductions in school violence would promote positive gains in school academic performance. This hypothesis is especially important in expanding theory on the effects of school climate and in contributing to school reform and accountability systems. The cross-lag model is tested separately for middle and high schools.

Data and Analytic Plan

Data

The data for this study come from two sources: the California Healthy Kids Survey (CHKS), conducted by WestEd (WestEd, 2014), and publicly available school-level data from the California Department of Education (CDE).

CHKS. The CHKS is a survey administered biannually by WestEd (in contract with the CDE) to 5th-, 7th-, 9th-, and 11th-grade students in approximately 85% of all public school districts in California (Austin & Duerr, 2004; WestEd, 2014). The survey is conducted as a census among all school districts, schools, and students in the relevant grades. Typically, districts are surveyed in the second semester, typically in the spring and close to the period of annual standardized testing. WestEd recommends sampling of schools within a district only if the district has 1,600 or more students per grade. WestEd provides very detailed instructions on how to administer the survey to ensure ethical conduct (e.g., parental consent), high response rates, and representativeness. Prior statewide studies using this state database report that approximately 85% of school districts in California participate in this census-like data collection (e.g., Gilreath, Astor, Cederbaum, Atuel, & Benbenishty, 2013; Gilreath, Astor, Estrada, Benbenishty, & Unger, 2014). Likewise, multiple studies using CHKS data from a Consortium of several school districts in the Southern California region report about an 87% student-level response rate (Cederbaum et al., 2013; Estrada et al., 2014; Gilreath et al., 2014; Gilreath, Astor et al., 2013; Gilreath et al., 2015).

The core CHKS module consists of questions that gather student demographic background data (e.g., age, sex, race/ethnicity) and enquires about students' tobacco, alcohol, and drug use; health-related behaviors; violence perpetration and victimization; school climate; and school safety. Most districts are surveyed every other academic year, and thus, each 2-year wave (e.g., 2007–2008 and 2008–2009) provides a representative sample of the entire state of California (WestEd, 2014).

Three waves of data, representing six academic school years, were used for this study: 2007–2009, 2009–2011, and 2011–2013. We used only measurements that were consistently implemented across time. Because this is a school-level analysis, we used data originating only from schools with a minimum of 10 respondents. In total, the sample consists of 1,862 middle schools and 1,310 high schools that participated in at least one of the three waves of the CHKS. On average between waves, there were 181.14 (SD = 145.39) respondents in each middle school and 501.76 (SD = 408.75) respondents in each high school. Almost 51% of middle school respondents and 51.4% of high school respondents were females.

CDE school data. We use a 6-year administrative panel of publicly available data from the CDE. Specifically, we utilize data on school enrollment demographics including school size; proportions of students in the school who are Black/African American, Asian, Hispanic, and White; the proportion of English language learners; and the proportion of students at the school who qualify for free or reduced-price meals. The CDE also provides data on the Academic Performance Index (API), California's state-level school accountability measure established in 1999. The API is calculated as a weighted average of student test scores on annual state standardized tests in English/language arts, math, history, and science. The API is a single number, ranging from a low of 200 to a high of 1,000, where 800 reflects meeting the state target for performance. The API score reflects a school's yearly performance based on the results of statewide assessments. The API does not track individual student progress across years but rather compares snapshots of school performance results each year. The average first-wave API score in our sample of middle schools was 762.99, and the average high school API score was 705.28.

Measures. School composition indices were derived from the CDE data. The indices include school total student enrollment, the proportion of students from different race/ethnicity groups (e.g., Hispanic, White), the proportion of students receiving free and reduced-price lunch, and the proportion of English language learners.

Utilizing the CHKS, we create measures of school climate and school violence (see Table 1 for the specific CHKS questions). School climate was measured by mean scores of three subsets of questions: school belongingness, school adult support, and school participation. The internal consistency coefficients of the climate construct based on these three scores ranged between .84 and .87 across school levels and waves. We also used three indicators to measure school violence: involvement in multiple forms of violence, involvement with weapons, and gang membership. The internal consistency of the construct based on these three scores across school levels and waves ranged from .73 and .82.

Analytic Plan

The principle method for data analysis was Structural Equation Modeling (Muthén & Muthén, 1998–2012). School climate and violence constructs were each indicated by their three constituent measures. The single API score available for each school indicated school performance. For single-item measures, a reliability score cannot be estimated. We followed Brown (2006, p. 139) and set the reliability of the single indicators to a plausible a priori value, which we assumed to be .90.

There were missing values in the data sets, with minimal covariance coverage in the variance–covariance matrix of .46. The data deviated from normality: The values of Mardia's multivariate kurtosis, calculated on cases with nonmissing data for all variables, were highly significant (ps < .001 for both samples). Therefore, we used the Mplus MLR estimator that allows for maximum likelihood estimation with robust standard errors and chi-square calculation in the presence of missing values. To estimate the models' goodness-of-fit, we follow the recommendations of Schreiber et al. (2006) and report, in addition to the chi-square statistic, three approximate fit indices: the Tucker–Lewis index (TLI), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). TLI and

Table 1
California Health Kids Survey (CHKS) Questions for School Climate and Violence Constructs, With Cronbach Alpha

Construct	CHKS Questions	Response Scale
School climate		
School belongingness	I feel close to people at this school	1 = *strongly disagree* and 5 = *strongly agree*
	I am happy to be at this school	
	I feel like I am part of this school	
	The teachers at this school treat students fairly	
	I feel safe in my school	
School adult support (At my school, there is a teacher or some other adult who):	Really cares about me	1 = *strongly disagree* and 5 = *strongly agree*
	Tells me when I do a good job	
	Notices when I'm not there	
	Always wants me to do my best	
	Listens to me when I have something to say	
	Who believes that I will be a success	
School participation (At school, I):	Decide things like class activities or rules	1 = *not at all true* and 4 = *very much true*
	Do things that make a difference	
	Do interesting things	
School violence		
Involvement in severe violence (In the past 12 months, how many times on school property have you):	Been pushed, shoved, slapped, hit, or kicked by someone who wasn't just kidding around	1 = *zero times* and 4 = *four or more times*
	damaged school property on purpose	
	been offered, sold, or given an illegal drug	
Involvement with weapons (In the past 12 months, how many times on school property have you):	Carried a gun	1 = *zero times* and 4 = *four or more times*
	Carried any other weapon (such as a knife or club)	
	Been threatened or injured with a weapon (gun, knife, club, etc.)	
	Seen someone carrying a gun, knife, or other weapon	
Gang membership	Do you consider yourself a member of a gang	0 = *no* and 1 = *yes*

CFI close to .95 and RMSEA of .06 or lower indicate reasonably good fit (Hu & Bentler, 1999).

Preliminary analyses show that school composition was highly stable across the three waves of data. In addition, the school composition variables from Wave 1 did not have an effect on school performance, school climate, or school violence/victimization measures at Waves 2 and 3 after their effects were controlled for at Wave 1. Therefore, we controlled for school composition only at Wave 1.

Variance resulting from specific measurement occurrences in our cross-lagged panel models was accounted for by correlating the unique factors within waves (Marsh & Hau, 1996). Factorial invariance across time points is considered to be a major requirement of a valid autoregressive model (Finkel, 1995). To assure factorial invariance, we used a series of increasingly rigorous tests proposed by Meredith (1993): whether the indicators are related to the same factors in each wave (configural invariance), whether the factor loadings are equal across waves (weak factorial invariance), whether the indicator intercepts are equal (strong factorial invariance), and whether indicator error terms are equal (strict factorial invariance). Weak factorial invariance is considered to be a minimal requirement for assessing autoregressive models. Finally, we tested for stationarity of correlations across time by comparing the fit of a model in which all path coefficients were estimated freely to a model in which they were set to be invariant across waves.

Results

We started the analyses by examining the descriptive statistics for all measures utilized in our model. The results are presented separately for middle schools and high schools (Table 2). As can be seen, the average public middle school in our sample serves approximately 775 students, whereas high schools, on average, serve 1,460 students each year. Both middle schools and high schools serve large proportions of students identified as Hispanic/Latino (44% and 42%, respectively) and White (34% and 35%, respectively). In middle schools, more than half of students (54%) receive free or reduced-price meals. At the high school level, 46% of students receive free or reduced-price meals. With a possible score ranging from 0 to 5, school climate scores, on average, range from 2.97 to 3.01 in middle schools and 2.88 to 2.89 in high schools across our three waves. The average school violence measure ranges from .85 to .94 across the three waves of data and two school levels. Finally, average school performance ranges from 762.99 to 799.69 at the middle school level and 705.28 to 737.94 at the high school level.

We assessed the hypothesized measurement model. To establish configural factorial invariance, we tested a model with six intercorrelated factors (school climate and school violence/victimization measured each with three indicators at three times) and with cross-wave correlations between errors of the same measures. The model fit fairly well both with the middle school data, with χ^2(102,

Table 2
Descriptive Statistics for Middle and High School Samples

	Middle Schools			High Schools		
	N	*M*	*SD*	*N*	*M*	*SD*
School enrollment	1,746	775.41	419.51	1,182	1,460.13	1,044.84
Proportion of African American students	1,746	.07	.09	1,182	.07	.10
Proportion of Asian students	1,746	.08	.12	1,182	.08	.12
Proportion of Hispanic/Latino students	1,746	.44	.28	1,182	.42	.27
Proportion of White students	1,746	.34	.27	1,182	.35	.26
Proportion of students receiving free or reduced-price lunch	1,744	.54	.28	1,181	.46	.26
Proportion of English language learners	1,721	.20	.16	1,160	.15	.13
School climate						
Wave 1	1,490	2.97	.18	983	2.88	.16
Wave 2	1,354	2.97	.18	846	2.89	.14
Wave 3	1,030	3.01	.19	739	2.89	.17
School violence						
Wave 1	1,489	.91	.09	982	.94	.08
Wave 2	1,354	.89	.08	846	.91	.06
Wave 3	1,029	.85	.07	739	.90	.10
School performance						
Wave 1	1,738	762.99	85.14	1,174	705.28	103.50
Wave 2	1,743	784.11	81.02	1,180	729.46	104.06
Wave 3	1,724	799.69	79.58	1,175	737.94	110.56

N = 1,751) = 503.28, p < .001, TLI = .94, CFI = . 96, RMSEA = .047 (90% confidence interval [CI] = .043, .052) and with the high school data, with $\chi^2(102, N = 1{,}188) = 362.04$, p < .001, TLI = .93, CFI = .95, RMSEA = .046 (90% CI = .041, .052). Next, we tested weak factorial invariance by constraining factor loadings to equality across waves. The resulting models did not differ significantly from the baseline, with rescaled $dif\,\chi^2(8) = 4.09$, p = .85, for the middle school data and $dif\,\chi^2(8) = 11.40$, p = .18, for the high schools. Following this, we tested strong factorial invariance by constraining the intercepts of factor indicators to equality across waves. These models differed significantly from the previous models, with rescaled $dif\,\chi^2(12) = 323.47$, p < .001, for the middle school data and $dif\,\chi^2(12) = 132.84$, p < .001, for the high schools. Therefore, we assumed weak factorial invariance (no strong factorial invariance) and proceeded to test the structural models with equality imposed upon factor loadings across waves.

The initial autoregressive cross-lagged model with covariates fit fairly well with both the middle school data, $\chi^2(278, N = 1{,}751) = 1{,}323.03$, p < .001, TLI = .93, CFI = .95, RMSEA = .046 (90% CI = .044, .049), and the high school data, $\chi^2(278, N = 1{,}188) = 987.73$, p < .001, TLI = .92, CFI = .93, RMSEA = .046 (90% CI = .043, .050). Subsequently, we tested the final model, in which stationarity constraints were imposed upon within-wave correlations between disturbances, stability paths, and cross-lagged paths. This model did not differ significantly from the initial model both for the middle schools, rescaled $dif\,\chi^2(12) = 12.82$, p = .38, and for the high schools, $dif\,\chi^2(12) = 20.09$, p = .07. The correlations and structural paths between the content variables of this model appear in Figure 1 (middle schools) and Figure 2 (high schools). The paths from control variables to the Wave 1 content variables are presented in Table 3.

Figures 1 and 2 indicate that the school domains of violence, climate, and performance are highly connected over time (i.e., across waves of data). In both middle and high schools, higher school performance at Wave 1 leads to lower school violence and higher school climate ratings at Wave 2. This pattern remains true for school performance at Wave 2, leading to reductions in violence and improvements in climate at Wave 3. The magnitudes of these relationships are consistent across the model replications (i.e., from Wave 1 to Wave 2 and from Wave 2 to Wave 3) for both middle and high schools.

In contrast to our hypothesis, we do not find evidence of school violence or school climate influencing future school academic performance at the middle school level. In high schools, on the other hand, there is evidence for small negative effects of violence and climate at one point in time on academic performance at later waves. We do not find, in either middle schools or high schools, a relationship between violence at Wave 1 or 2 and climate at Wave 2 or 3, respectively. Similarly, our models do not find a relationship at either school level (i.e., middle and high schools) between climate in Waves 1 or 2 and school violence in Waves 2 or 3, respectively.

Overall, these results suggest that improvement in a school's academic performance is a central factor in reducing violence and enhancing a school's climate. We do not find evidence to suggest that improving school climate or reducing incidences of violence leads to improved school performance over time.

Discussion

Only very few studies utilize cross-lagged panel analysis to test causal hypotheses related to school climate and performance (see Kosir & Tement, 2014, study of teacher–student relationships

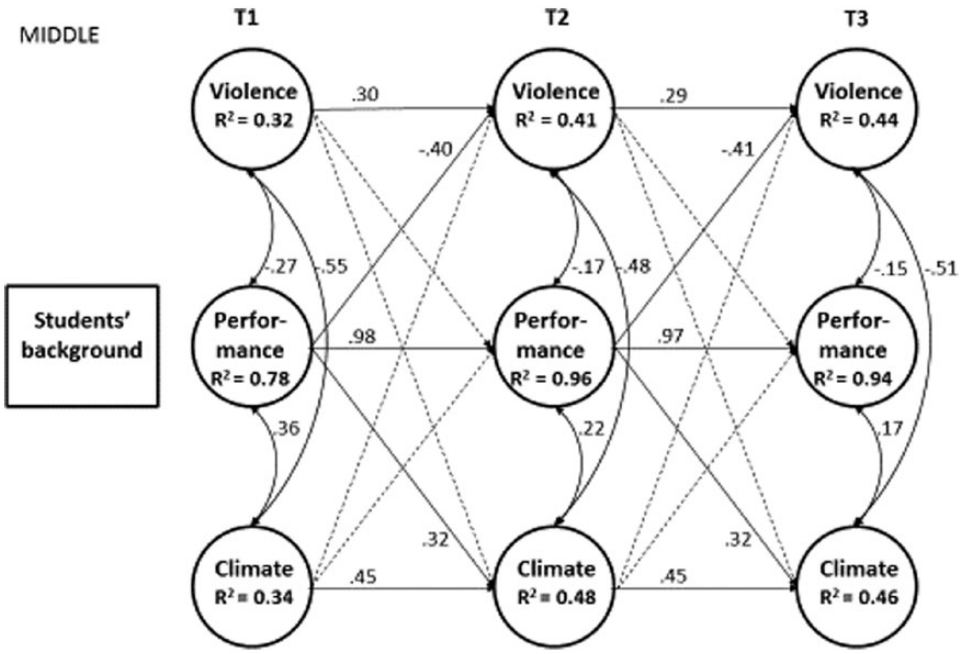

FIGURE 1. *Middle school structural equation model of cross-lagged school climate, violence, and performance effects with standardized parameters*

The solid lines indicate paths statistically significant at $p < .01$. The dotted lines indicate nonsignificant paths. $\chi^2(290, N = 1{,}751) = 1{,}340.37$, $p < .001$, TLI = .93, CFI = .95, RMSEA = .045 (90% CI = .043, .048).

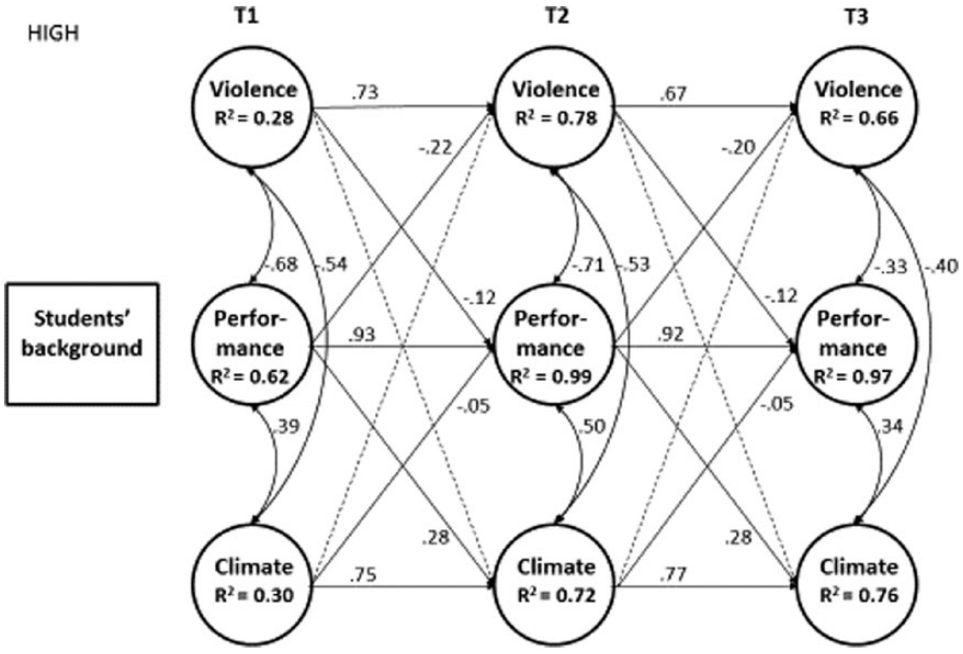

FIGURE 2. *High school structural equation model of cross-lagged school climate, violence, and performance effects with standardized parameters*

The solid lines indicate paths statistically significant at $p < .01$. The dotted lines indicate nonsignificant paths. $\chi^2(290, N = 1{,}188) = 1{,}018.62$, $p < .001$, TLI = .92, CFI = .93, RMSEA = .046 (90% CI = .043, .049).

and academic achievement for a rare example). None of the existing studies attempted to represent middle schools and high schools across a large and populous state such as California. The current study examined data at three points in time in a representative sample of 1,862 middle schools and 1,310 high schools in the state of California, examining the hypothesis that improvements in school climate and reductions in school violence lead to improved school academic performance.

This research confirms that violence on school grounds and school climate are strongly associated with each other at any given

Table 3
Correlations Between School Characteristics and Wave 1 Content Variables in the Middle and High School Samples (SEM Model Standardized Estimates)

	Middle Schools			High Schools		
School Characteristic	Climate	Violence	Performance	Climate	Violence	Performance
School enrollment	−.22*	.04	−.03	−.18*	−.25*	.24*
Proportion of African American students	−.08	.02	−.16*	−.16*	.13	−.27*
Proportion of Asian students	.14*	−.38*	.30*	.20*	−.38*	.27*
Proportion of Hispanic/Latino students	.22	−.46*	.10	.27	−.18	−.04
Proportion of White students	.35*	−.47*	.19*	.30*	−.22	.16
Proportion of students receiving free or reduced-price lunch	−.43*	.42*	−.57*	−.24*	.02	−.14*
Proportion of English language learners	.12*	.00	−.16*	−.17	.15	−.29*

*$p < .01$.

period of time. This could explain why many cross-sectional studies exploring school climate and violence have found strong connections between the two variables (e.g., Berkowitz et al., 2015). Similar to prior cross-sectional studies, our findings indicate that at any given time, the combination of low levels of victimization and positive climate is consistently associated with high levels of school academic performance (Berkowitz et al., 2015; Espelage et al., 2013; Lacey & Cornell, 2016; McCoy et al., 2013). Such findings in the past have led to recommendations to improve school climate and reduce victimization in order to create an environment more conducive to academic performance (McEvoy & Welker, 2000). Our findings using a longitudinal sample point in a different direction. They suggest that the causal direction is going the other way—high levels of overall improvements in school academic performance predict better climate and much lower school victimization over time. This could mean that schools that succeed with strong efforts to improve school-level academics also decrease violence and improve climate through those improvements in academics.

The bullying, school climate, school safety, and school reform empirical literatures do not provide strong theoretical explanations as to why improvement in academic performance is an engine of change to improve climate and reduce violence. One potential explanation focuses on teachers' perceptions and behaviors as a mediating mechanism. As Kosir and Tement (2014) note, students' academic achievements were shown to influence the ways teachers perceive their students and the degree to which they prefer them. Consequently, when students have higher academic achievements, teachers may present more positive relationships with students, leading to lower levels of school violence. Such improved attitudes may be mediating the link found in this study leading from improved achievements to improved climate. This hypothetical model needs to be tested in future studies.

One potential implication of this hypothesis is that school climate and antibullying efforts should especially target school staff, helping them identify their own (sometimes biased and discriminatory) attitudes and responses to students and provide opportunities to identify how their perceptions, attitudes, and behaviors have a positive or negative impact on students' behaviors and academic performance. Furthermore, improvements in school climate and antibullying efforts should be more closely tied to teachers' overall school efforts to improve academic outcomes in their schools. The motivation to improve the school's academic standing may provide a strong impetus to also apply efforts to reduce violence and improve climate. This means that climate improvement and violence reduction may be strongly associated with teachers and staff members that focus more on math, reading, writing, and academic achievement.

It is interesting to note that in high schools, there is evidence for small negative effects of violence and climate at one point in time on academic performance at later waves but not in middle schools. This is an unexpected pattern, as we assumed that climate would be more meaningful and influential in middle schools than in high schools. Clearly, the patterns of findings require more in-depth exploration into the differential impact of school climate and violence on academic performance and vice versa in the various school levels, including elementary schools.

Critics of current school accountability systems, such as California's API, have argued that standardized tests do not reflect all learning that occurs within schools and that a broader set of school-level outcomes (e.g., school climate) should be included to ensure that some aspects of the educational system are not privileged over others (Figlio & Ladd, 2008; Houston, 2007). School climate researchers suggest that accountability systems should include indicators of school climate and safety; the narrow focus of current school accountability systems denies schools the chance to improve performance through school climate policies and programs (Cohen et al., 2009). Some argue that school climate assessment should be a central tenant of future accountability systems because a positive climate promotes academic learning (National School Climate Council, 2007). In other words, there is a standing belief that schools must improve climate to improve school performance and the ways in which we assess schools should reflect this belief. Our research suggests that improved academic performance leads to improvements in climate and school violence and strengthens the recommendation that climate, violence, and academics should be examined together in school accountability systems.

Some countries (e.g., Israel) do collect school safety, climate, and academic measures as part of their indicator systems. It is important to examine whether accountability systems that have a dual emphasis on academic performance and on climate and safety exhibit a different pattern of influence, compared with a system such as California's that examines only academic achievement. It may be the case that when climate and safety are included in accountability systems and are valued as important aspects of school functioning, they receive higher priority and may have a greater impact on the school's academic functioning.

The findings and our interpretations should be considered with the study limitations in mind. This manuscript is based on a secondary analysis of the CDE and CHKS longitudinal data. Although these large-scale and representative data have many advantages, they are also limited in their items and indexes that pertain to school violence, climate, and academic performance. For instance, the API is a limited measure of academic performance, and school climate consists of many more components than utilized here. To illustrate, the National School Climate Center's Comprehensive School Climate Inventory (Guo, Choe, & Higgins-D'Allessandro, 2011) consists of multiple constructs related to students (e.g., orderly school environment), staff (e.g., school rules and norms), parents (e.g., respect and diversity), and community members (social support of adults in school). Other examples are instruments developed by Bear, Gaskins, Blank, and Chen (2011) and others (see a review in Haggerty, Elgin, & Woolley, 2010). Similarly, our measurement of school violence is limited. As Benbenishty and Astor (2005) note, there are many types of school victimization, and each type may be associated differently with student characteristics and with outcomes. Hence, it is possible that if we were able to employ a more comprehensive measurement of school violence, some of our findings may have varied, according to the victimization types measured. Additionally, details on high response rates of the CHKS are approximations but are not precise.

The data also restrict our capacity to examine the study hypotheses for different groups of students. As Bottiani, Bradshaw, and Mendelson (2014) show, student racial subgroups (White vs. Black) do not only differ in their perceptions of schools but may also be influenced differently by the school's organizational health. This issue is an example of what future studies could examine to address what could not be explored in the present study.

Future studies are needed to address some of these research limitations and examine interpretations and hypotheses derived from the present study. Our findings suggest that more mixed-method studies need to focus on what happens to climate and violence when efforts to increase academics are successful. It may very well be that when strong efforts to improve academics are taken, the school setting automatically includes issues of climate and victimization as part of those academic reform efforts. Examples of pilot and exemplar districts suggest this may be the case (McMurrer, 2012; National School Climate Council, 2007). It is also important to investigate how climate, violence/victimization, and performance variables play out on the student level to determine whether the same patterns of influence identified in this study remain consistent for individual students over time, especially those personally exposed to incidents of violence/victimization and/or schools with low climate ratings. Finally, researchers who conduct studies on bullying and school climate along with researchers who focus on subject-matter school reform could align their currently separate designs and foci to explore further and test the findings of this study. For example, our findings pointed to overall performance. However, it is possible that specific subject matter or combinations work better to improve climate and reduce violence.

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