Grade Configuration, School Climate, and Academic Achievement in Middle Grade Students

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Marisa Malone, M.Ed.

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University of Virginia
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APPROVAL OF THE DISSERTATION DEFENSE

This dissertation ("Grade Configuration, School Climate, and Academic Achievement in Middle Grade Students") has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Name of Chair (Dr. Dewey G. Cornell)

_____
Committee Member (Dr. Julia Blodgett)

_____
Committee Member (Dr. Timothy Konold)

_____
Committee Member (Dr. Michael Lyons)

_____Date

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Dissertation Abstract

For decades, educators have been concerned about the low academic achievement observed in middle grade students. Studies that compare middle schools to other school configurations, such as Kindergarten-8th grade elementary schools, generally associate elementary schools with better outcomes. Previous research has hypothesized that one explanation for the lower achievement evident in middle schools is poor school climate. This three-paper dissertation investigated the linkages among school grade configuration, school climate, and academic achievement of Virginia middle grade students. School climate was evaluated through student responses to a school climate survey. Using the framework of authoritative school climate theory, schools with positive climates had high ratings of structure (strict, but fair rules and high academic expectations), and support (respectful teachers who demonstrate willingness to help students succeed). Academic achievement was evaluated using school-level standardized test pass rates provided by the Virginia Department of Education.

The first study examined 7th- and 8th-grade student perceptions of school climate in 418 Virginia elementary, middle, junior high, and high schools. Participants included 39,036 students who completed the 2013 Virginia Secondary School Climate Survey. Multilevel multivariate models were used to account for the nesting of students within schools and controlled for demographics. Seventh grade students in middle schools reported significantly lower disciplinary structure and higher prevalence of teasing and bullying (PTB) in comparison to 7th graders placed in the other configurations. Eighth grade students in middle schools reported significantly lower disciplinary structure, engagement, and higher PTB in comparison to 8th graders placed in high schools. These

findings were consistent with other studies that showed poor outcomes in middle schools. Whereas other studies only examined one grade or analyzed multiple grades together, the examination of 7th and 8th grade separately revealed notable differences between the grades.

The second study examined school-wide reading and mathematics standardized test pass rates for 6th, 7th, and 8th grade students placed in 573 Virginia elementary, middle, and high schools. Latent growth modeling was used to examine achievement across three years, given that changes in state standards or curricula may influence school pass rates in a given year. For 6th and 7th grade, pass rates were significantly higher in elementary schools than middle schools for both subjects. For 8th grade, pass rates were higher in middle schools than high schools. Overall, this study showed that, in regard to academic achievement, the middle school setting was only advantageous for 8th grade students.

The third study examined the relations among grade configuration, school climate and academic achievement. Of particular interest was the examination of whether school climate mediated the association between grade configuration and academic achievement. Participants included 48,451 6th and 7th grade students in 310 Virginia elementary and middle schools who completed the 2017 Virginia Secondary School Climate Survey. Analysis of covariance models showed that students in both grades reported higher ratings of school climate and demonstrated higher reading and mathematics achievement in elementary schools than middle schools. Mediated hierarchical regression analyses indicated that school climate was positively associated with 6th and 7th grade reading

standardized test pass rates, and that school climate partially mediated the relationship between grade configuration and reading achievement.

Taken together, these studies show that 6th and 7th grade students in Virginia middle schools have higher perceptions of school climate, and better academic outcomes in elementary schools in comparison to the more commonly used middle schools. The poor school climate in middle schools is problematic, given that previous research has associated poor school climate with a host of detrimental outcomes. The present studies are correlational and cannot establish causal effects, but they are consistent with the view the school climate plays an important role in the academic achievement of middle grade students. Furthermore, the middle school configuration is not conducive to 6th and 7th grade achievement. Eighth grade students demonstrated higher achievement in middle schools than in high schools (there were too few elementary schools with 8th grade to examine), but more research is needed to determine the best configuration for this grade. Based on the present findings, we recommend that educational authorities consider expanding elementary schools through at least 7th grade. In existing middle schools, educators should consider strategies to improve school climate as a means to improve academic achievement.

Project Overview

The middle school years are widely considered a challenging time for young adolescents, who often experience a decline in academic performance, as well as increased prevalence of other social, emotional, and behavioral problems (e.g. Fink et al., 2015; Wigfield, Lutz, & Wagner, 2005). Many researchers and educators have suggested that the school climate of middle schools contributes to these concerns (Juvonen, Le, Kaganoff, Augustine, & Constant, 2004). For much of the 20th century, most 7th-9th grade students attended junior high school, which served as a transitional period intended to prepare students for the demands of high school. Expectations in junior high schools were often strict and unyielding, and emphasis was placed on content mastery rather than exploration. Early studies that evaluated junior high schools showed that students demonstrated academic decline, poor self-esteem, low motivation, and poor quality relationships with their teachers (Eccles, Lord, & Midgley, 1991; Simmons & Blyth, 1987).

In response to criticisms about the junior high school model, school systems began to shift to a 6th-8th grade middle school model in the 1970s. Middle schools were envisioned to be emotionally responsive environments that facilitated learning by emphasizing close teacher-student relationships and by creating curricula that appropriately matched young adolescents' increased cognitive capabilities (Juvonen, et al., 2004). The number of middle schools in the United States more than doubled between 1980 and 2014 (6,003 middle schools in 1980 vs. 13,322 in 2014), and the number of junior high schools decreased by over 50% (5,890 junior high schools in 1980 vs. 2,719 in 2014; U.S. Department of Education, 2014).

Studies of middle school students revealed that these students continued to experience many of the same difficulties as those who attended junior high. For example, longitudinal research shows that students report decreased self-esteem and higher rates of depression as they progress through middle school (Way et al., 2007). Students in middle school also demonstrate a higher number of behavioral infractions, which increase from 6th to 8th grade (Wang & Dishon, 2011). Further, students feel less academically competent after the transition into middle school (Anderman & Midgley, 1997) and have more absences (Schwerdt & West, 2013). While the current research suggests that students experience increased problems in middle schools, it is evident that there are variations among students. Students who reported feeling stressed about the transition to middle school experience higher test anxiety, lower grade point averages, and less attachment to their school (Goldstein, Boxer, & Rudolph, 2015).

Studies that examined school grade configuration (i.e. the span of grades served by an individual school), suggest that some of these academic, social-emotional, and behavioral problems experienced by many middle grade students may not be present in all schools. Grade configuration studies show that middle grade students who are grouped in schools with elementary grades are generally better adjusted than their same-grade peers that attend middle school. For example, middle grade students in Kindergarten-8th grade (K-8) schools demonstrate higher self-esteem than students in middle schools (Eccles et al., 1991; Weiss & Kipnes, 2006). Middle grade students in K-8 schools also have higher rates of attendance (Coladarci and Hancock, 2002; Franklin & Glascock, 1998; Pardini, 2002, Schwerdt & West, 2013), fewer disciplinary infractions (Cook, MacCoun, Muschkin, & Vigdor, 2008; Franklin & Glascock, 1998), and lower

suspension rates (Arcia, 2007). In regard to academic achievement, studies at the division (e.g. Rockoff & Lockwood, 2010; Wren, 2003) and state levels (e.g. Cook et al., 2008, Franklin & Glascock, 1998; Schwerdt & West, 2013) generally identify K-8 schools as being the most favorable setting for 6th, 7th, and 8th grade students.

There are various theories why middle grade students are more successful in elementary configurations. There is some evidence that the timing of the transition into middle school is problematic, given that many students move into middle school at about the same time that they begin to experience the physical, social, and emotional changes associated with puberty (Eccles & Midgley, 1989). Eccles and colleagues (Eccles & Midgley, 1989; Eccles et al., 1991) proposed a stage-environment fit theory, which hypothesized that poor middle school adjustment is likely a cumulative effect of puberty and school transition, made worse by the continued developmental mismatch between middle schools and young adolescent needs. Eccles' (2004) later work extended the stage-environment fit theory by discussing specific aspects of school climate that may be associated with middle grade student success, such as teacher-student relationships, classroom management (e.g. teacher predictability and control), and student motivation or engagement in the classroom setting. Other researchers have also suggested that middle school climate is problematic and requires attention (Roeser, Eccles, & Sameroff, 1998; Wang & Dishion, 2011; Way, Reddy & Rhodes, 2007).

School climate is a multidimensional construct that is broadly defined as the "quality and character of school life" including "norms, values, and expectations that support people feeling socially, emotionally, and physically safe" (Cohen, McCabe, Michelli, & Pickeral, 2009, p. 182). Positive school climate is associated with a host of

favorable outcomes, including academic achievement, lower dropout rates, and high academic aspirations (Jia, Konold, & Cornell, 2016 Shukla, Konold, & Cornell, 2016; Wang & Degol, 2015). Few studies have directly compared student perceptions of school climate across grade configurations, but there is some evidence that middle school students experience problems associated with unfavorable school climate, including more bullying (Anderman & Kimweli, 1997; Weiss & Kipnes, 2006), poorer engagement (Malone, Cornell, & Shukla, 2016), and high rates of behavioral problems (Cook et al., 2008).

This review of literature found nothing written about the decisions underlying the current educational practice of grouping students in middle schools versus other grade configurations. While the elementary school environment is often associated with more favorable academic and social-emotional outcomes, the vast majority of middle grade students in Virginia (approximately 87%[1]) attend middle schools (Virginia Department of Education, 2017a). Discussions with superintendents across the state revealed that school divisions are often bound by multiple constraints that limit the feasibility of restructuring schools. For example, in rural locales, schools are sometimes configured based on geographic considerations that reduce transportation costs. In some cases, schools might expand their grade configuration span so that student can attend the schools closest to their residences (M. Burnette, personal communication, August 7, 2017). In other divisions, configurations are shaped by financial and structural constraints; schools may be closed or consolidated to save money, resulting in elementary schools that add one or

[1] There is some variation by grade: 79% of 6th grade, 93% of 7th grade, and 89% of 8th grade students attend middle school.

more higher grades or high schools that extend downward. Divisions that have more latitude in choosing their grade configuration groups tend to make decisions based on enrollment projections, public opinion, and overall cost of maintaining the school division (H. Kiser, personal communication, August 17, 2017).

The purpose of this three-paper dissertation is to investigate the associations among school grade configuration, school climate, and academic achievement of middle grade students. The first paper compared the school climate in middle schools to the school climate in other configurations, such as elementary or high schools that included the middle grades. The second paper compared standardized test pass rates in reading and mathematics in middle schools to pass rates in other grade configurations. Building upon the first two papers, the third paper examined whether school climate mediates the relationship between grade configuration and achievement for middle grade students in elementary and middle schools.

Paper one. This study compared student perceptions of school climate in middle schools with students in schools with other grade configurations. At the time of this study, statewide school climate data were available for grades 7 and 8, but not grade 6. It was hypothesized that 7th and 8th grade students in Virginia middle schools would report a less positive school climate than same-grade students in schools with other grade configurations. Participants were 20,337 7th graders and 18,699 8th graders nested in 418 schools that participated in the 2013 wave of a statewide survey in the spring of the 2012-2013 academic year. The survey was presented to students as the Virginia Secondary School Climate Survey, but consisted primarily of scales making up the Authoritative School Climate Survey (Cornell, 2016).

The anonymous survey contained approximately 120 items that assessed student perceptions of school climate and safety conditions. In this paper, school climate was measured using items from four empirically validated scales from the Authoritative School Climate Survey: disciplinary structure, student support, student engagement, and prevalence of teasing and bullying (Konold et al., 2014).

Schools were sorted into four grade-configuration groupings: elementary schools that contained both elementary and middle grade students (e.g. K-7 grade schools), conventional middle schools that contained grades 6-7-8, junior high schools that contained grades 7-8, and high schools that contained both middle grade and high school students (e.g. 8^{th}-12^{th} grade). Middle and junior high schools were examined separately given that middle schools are intended to provide a different educational experience than junior high schools (Juvonen et al., 2004).

This study used multilevel multivariate modeling to account for the nesting of students within schools. The analyses controlled for three student-level demographic measures (gender, minority status, and parental education level) and four school-level measures (school size, community population density, mean parental education level, and percentage of minority students). Seventh and 8^{th} grade students were examined separately given the possibility that they might have different perceptions of their school climates.

Middle schools were used as the reference group for both grades. Seventh grade students in middle schools reported significantly lower disciplinary structure in comparison to 7^{th} graders placed in elementary and junior high schools. Seventh grade students placed in middle schools also reported higher prevalence of teasing and bullying

than those in the elementary, junior high, and high school configurations. Eighth grade students in middle schools reported significantly lower disciplinary structure, student engagement, and higher prevalence of teasing and bullying in comparison to 8th graders placed in high schools. There were no differences between grade configurations for student support for either grade.

Consistent with previous studies (e.g. Anderman & Kimweli, 1997; Cook et al., 2008; Weiss & Kipnes, 2006), this study found that students in middle schools generally reported less favorable aspects of school climate in comparison to students in other configurations. This study added to the grade configuration literature by examining 7th and 8th grade students separately, and by comparing multiple grade configurations, whereas many other studies only compared 7th and 8th grade students in elementary and middle school configurations. By comparing the grades separately, it became evident that 7th and 8th grade students differed in their perceptions of which grade configuration provided the most favorable school climate: 7th grade students had higher ratings of school climate in elementary configurations, while 8th grade students reported more favorable school climates in high schools.

The paper "Association of Grade Configuration with School Climate for 7th and 8th Grade Students" (Malone, Cornell, & Shukla, 2016) was first presented as a poster at the American Psychological Association annual convention in August, 2015. It was accepted for publication in *School Psychology Quarterly* in July, 2016 and was published in September, 2017.

Paper two. Whereas the first study examined the association between grade configuration and school climate, the second study examined differences in academic

achievement. Although the first study was limited to students in grades 7 and 8, the second study additionally included 6th grade. The study compared school-level test passing rates in reading and mathematics for students placed in middle schools versus elementary and high school configurations across three years. School-level pass rates and average scaled scores were obtained from the Virginia Department of Education for the 6th, 7th, and 8th grade English: Reading and Mathematics Standards of Learning (SOL) exams.

One potential problem in measuring school performance on the SOL exams is that testing pass rates could fluctuate from one year to the next, particularly when the test is modified in response to changes in state curriculum standards[2]. For example, test performance may drop after a revision while teachers are modifying their curriculum to adapt to a new test. To assess the stability of findings across years, test score data were obtained for the 2012-2013, 2013-2014, and 2014-2015 academic years.

All Virginia schools with 6th, 7th, and/or 8th grade pass rates were eligible for this study with the exception of a small number of schools that 1) did not report pass rates for all three years, 2) had fewer than 15 students per grade, or 3) had an unusual grade configuration (e.g. a school with 8th grade only). Pass rates, rather than scaled scores were chosen as the outcome variables because schools are held accountable by the state based on school-wide passing rates. Though not included in the journal manuscript due to space considerations, supplemental analyses were conducted using scaled scores rather than pass rates. Findings for scaled scores were consistent with those for pass rates.

[2] Standards are updated every seven years in Virginia. Updates for each academic subject are generally staggered so that schools do not need to adjust to multiple curriculum changes at once.

Latent growth models were conducted separately for each grade and each SOL exam (six models in all). Four school-level demographics known to influence academic achievement were controlled: school size, percentage of minority students within a school, percentage of students eligible for free or reduced priced meals, and population density of the school attendance zone. Sixth and 7th grade middle school pass rates were compared to elementary school pass rates. Middle school pass rates for 8th grade were compared to 8th grade pass rates in high schools.

Results indicated that 6th and 7th grade students in elementary schools outperformed those in middle schools for reading and mathematics measures across all three years. For 6th grade, the pass rates for elementary schools were, on average, significantly higher than middle schools for reading (78.9% vs. 72.0%) and mathematics (82.5% vs. 76.3%). For 7th grade, elementary school pass rates were again higher for reading (78.5% vs. 75.9%) and mathematics (83.1% vs. 69.2%) in comparison to middle schools. The present study's findings for 6th and 7th grade are consistent with previous literature that shows higher achievement for middle grade students in elementary schools.

Lastly, pass rates for 8th grade were significantly higher in middle schools than high schools for reading (74.7% vs. 70.0%) and mathematics (63.3% vs. 52.0%). This finding was unexpected given that 7th grade students demonstrated the same trend (i.e. more favorable school climate and academic achievement in the same configuration) across both papers. One explanation for better academic performance for 8th grade students in middle schools may be that most of these students have attended middle school for at least three years, whereas 8th grade students in high schools may still be adjusting to the new school setting. Previous research shows that students experience a

drop in achievement in the academic year of a school transition (e.g. Grigg, 2012; Schwerdt & West, 2013).

Overall, this study contributes to the relatively small grade configuration literature by using a large, statewide sample to examine achievement differences in middle grade students in elementary, middle, and high schools. To our knowledge, previous studies have not examined 6th, 7th, and 8th grade in one paper. By analyzing each grade separately, it was evident that, despite being commonly grouped together within one school, the middle school setting was only advantageous for 8th grade academic achievement.

Preliminary results for this paper were first presented as a poster at the American Psychological Association annual convention in August, 2016.The manuscript, "Grade Configuration is Associated with School-level Standardized Test Pass Rates for 6th, 7th, and 8th Grade Students," is currently under review.

Paper three. The third paper of the dissertation, "Does School Climate Mediate the Relations between Grade Configuration and Academic Achievement?," built upon the first two studies by examining whether the linkages between grade configuration and academic achievement can be explained by school climate. Further, this study was strengthened by the inclusion of 6th grade school climate data, which were unavailable at the time of the first study. Sixth grade students were included for the first time in the 2017 wave of the Virginia Secondary School Climate Survey (Cornell et al., 2017). The present study addressed the following research questions:

1) Is there a significant difference in student perceptions of school climate for students in elementary schools in comparison to same-grade students in middle schools?
2) Is there a significant difference in reading and mathematics achievement for students in elementary schools in comparison to same-grade students in middle schools?
3) Does school climate mediate the relationship between grade configuration and academic achievement for students in elementary and middle schools?

The study sample consisted of 48,451 students in 6th and 7th grade from 310 elementary (e.g. K-7; 42 schools) and middle schools (i.e. 6-8 grade; 268 schools) who participated in the 2017 Virginia Secondary School Climate Survey, a component of the state's annual School Safety Audit program (Cornell et al., 2017), during the spring of the 2016-2017 academic year. This study did not include 8th grade students because there were few elementary schools in Virginia that serve 8th grade. All analyses were conducted separately for 6th and 7th grade.

The anonymous school climate survey contained approximately 100 items that assessed student perceptions of school climate and safety conditions. Of interest in this study were three scales associated with authoritative school climate theory: disciplinary structure, academic expectations, and student support. Previous research shows that these three components of school climate are together associated with favorable student outcomes (Cornell et al., 2015; Cornell et al., 2016).

Academic achievement was measured using the school-level pass rates for the 6th and 7th grade Virginia Standards of Learning (SOL) 2016-2017 end-of-year reading and

mathematics exams. The state-mandated exams fulfill state standards for accreditation and were in compliance with the federal accountability requirements of the new Every Student Succeeds Act (ESSA, 2015; Virginia Department of Education, 2017b). The reading and mathematics exams show good reliability (Cronbach's alpha $\geq$ .85) across gender and race for both 6th and 7th grade (Virginia Department of Education, 2015).

All analyses were conducted separately by grade and research question. Preliminary confirmatory factor analyses supported combining the three school climate scales into one unitary measure of authoritative school climate (ASC), which was then used in all subsequent analyses. The first research question, "Is there a significant difference in student perceptions of school climate for students in elementary schools in comparison to same-grade students in middle schools?" was addressed using analysis of covariance (ANCOVA) models that examined the relation between grade configuration and school climate while controlling for four school demographic variables (i.e. population density, school size, percent minority students, and percent of students eligible for free or reduced-priced meals). Results showed that 6th grade students placed in middle schools reported poorer school climate *(M* = 9.52) than 6th grade students in elementary schools (*M* = 9.68). The same trend was also evident for the 7th grade sample (*M* = 9.07 vs. 9.48 for elementary and middle school, respectively). Grade configuration accounted for 2% of the variance in authoritative school climate for 6th grade and 10% of the variance for 7th grade.

The second research question, "Is there a significant difference in reading and mathematics achievement for students in elementary schools in comparison to same-grade students in middle schools?" was investigated with ANCOVAs that separately

examined the associations among grade configuration and mathematics and reading achievement, while controlling for school demographics. All results favored the elementary school configuration. For 6th grade, reading (77% vs. 85%) and mathematics (81% vs. 86%) standardized test pass rates were lower in middle schools than elementary schools. Grade configuration accounted for 11% and 2% of the variance in 6th grade reading and mathematics achievement, respectively. For 7th grade, the pass rates for reading (81% vs. 87%) and mathematics (64% vs. 75%) were again lower in middle schools than in elementary schools. Grade configuration accounted for 6% of the variance in academic achievement for both reading and mathematics.

The third research question, "Does school climate mediate the relationship between grade configuration and academic achievement for students in elementary and middle schools?" was addressed with mediated hierarchical regression analyses. Analyses were conducted for each of the four outcome variables (6th grade Reading, 6th grade Mathematics, 7th grade Reading, 7th grade Mathematics). Step 1 of the models included the four school demographic variables. Grade configuration (Elementary = 0; Middle School = 1) and authoritative school climate were added in Step 2. For the outcome of 6th and 7th reading, grade configuration was directly and separately associated with student perceptions of authoritative school climate and school-level academic achievement, favoring the elementary school configuration. Likewise, authoritative school climate was also significantly and positively associated with reading SOL pass rates. Additionally, the significant indirect effect indicated a mediating effect of grade configuration and reading SOL pass rates through authoritative school climate.

For 6th and 7th grade mathematics, grade configuration was again directly and separately associated with student perceptions of authoritative school climate and school-level academic achievement, favoring the elementary school configuration. Authoritative school climate was not directly associated with academic achievement for mathematics, and the indirect effect of grade configuration and reading SOL pass rates through authoritative school climate was also not significant.

Consistent with previous studies, the present study found that, when controlling for school demographics, students in middle schools reported poorer perceptions of school climate, and experienced poorer academic achievement in comparison to same-grade students in elementary school configurations. This study extended beyond previous research by examining the mediating effect of authoritative school climate on the association between grade configuration and academic achievement, and found that authoritative school climate partially mediates this relationship for reading achievement. Overall, this study adds to the current body of evidence that middle grade students experience more favorable outcomes when placed in elementary school configurations. The present study also identified a weaker school climate as one explanation for lower standardized test passing rates in middle schools. One implication of this study is that improvements in school climate may have a positive effect on academic achievement, which may be particularly beneficial for the lower-achieving middle school configuration.

Conclusion

In selecting school grade configurations, educational authorities must take into consideration a variety of factors that often go beyond the scope of most research studies.

However, the three studies that comprise this dissertation contribute to the grade configuration and middle school literature in several ways. Together, the three large-scale studies examined school climate and achievement data over several academic years, with consistent and stable results across the studies. The findings suggest that educators should consider extending elementary schools through at least 7th grade, given that this grade configuration is associated with significantly higher academic achievement and more positive school climate than in middle schools. Additional research is needed to examine the most favorable configuration for 8th grade. In the present studies, 8th grade students reported more positive school climate in high schools but demonstrated higher achievement in middle schools. Previous longitudinal research has shown that 8th grade students in elementary schools outperform same-grade students in middle schools (Rockoff & Lockwood, 2010; Schwerdt & West, 2013, and other cross-sectional studies indicate that 8th grade students in elementary schools report more favorable aspects of their school climate, such as less bullying and greater attachment to their school (Anderman & Kimweli, 1997, Kim, Schwartz, Cappella, & Seidman, 2014). At present, there are too few elementary schools in Virginia that contain 8th grade to examine this configuration in the current research.

For school divisions where restructuring schools is not a feasible option, these studies identified components of school climate, namely disciplinary structure, academic expectations, and student support, that are associated with academic achievement outcomes in elementary and middle schools. This information can be used to guide more targeted school improvement efforts. Given that high school academic achievement and drop-out rates can be predicted in early middle school (Balfanz, 2009; Kaplan, Liu, and

Kaplan, 2005), middle grade officials must strive to create the most favorable school climate conducive to academic success. Lastly, this research is particularly timely because states are now required to choose a non-academic indicator, such as school climate, to evaluate their schools for accountability purposes (ESSA, 2015).

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Abstracts

Manuscript One: Association of Grade Configuration with School Climate for 7th and 8th Grade Students

Educational authorities have questioned whether middle schools provide the best school climate for 7th and 8th grade students and have proposed that other grade configurations such as K-8th grade schools may provide a better learning environment. The purpose of this study was to compare 7th and 8th grade students' perceptions of four key features of school climate (disciplinary structure, student support, student engagement, and prevalence of teasing and bullying) in middle schools versus elementary or high schools. Multilevel multivariate modeling in a statewide sample of 39,036 7th and 8th grade students attending 418 schools revealed that students attending middle schools had a more negative perception of school climate than students in schools with other grade configurations. Seventh grade students placed in middle schools reported lower disciplinary structure and a higher prevalence of teasing and bullying in comparison to those in elementary schools. Eighth grade students in middle schools reported poorer disciplinary structure, lower student engagement, and a higher prevalence of teasing and bullying compared to those in high schools. These findings can guide school psychologists in identifying aspects of school climate that may be troublesome for 7th and 8th grade students in schools with different grade configurations.

Manuscript Two: Grade Configuration Is Associated with School-level Standardized Test Pass Rates for 6th, 7th, and 8th Grade Students

Educators and researchers have long debated the best grade configuration grouping for middle grade students. The present study examined school-level differences in reading and mathematics standardized test pass rates for students placed in middle schools versus alternative grade configurations. Latent growth modeling was conducted separately for 6th, 7th and 8th grades across a three-year sampling period. For 6th grade, pass rates were significantly higher in elementary schools (e.g. K-7th grade) than middle schools for both reading (78.9% vs. 72.0%) and mathematics (82.5% vs. 76.3%). Pass rates for 7th grade students followed the same trend; pass rates in elementary schools were significantly higher than middle schools for reading (78.5% vs. 75.9%) and mathematics (83.1% vs. 69.2%). For 8th grade, pass rates were significantly higher in middle schools than high schools (e.g. 8th-12th grade) for both subjects (74.7% vs. 70.0% for reading, 63.3% vs. 52.0% for mathematics). These findings suggest that students benefit from remaining in an elementary school at least through 7th grade.

Manuscript Three: Does School Climate Mediate the Relations Between Grade Configuration and Academic Achievement?

The vast majority of middle grade students in the United States attend 6th-8th grade middle schools. However, educational research on school grade configuration generally associates K-8th elementary grade schools with more favorable student outcomes. The present study examined linkages between school climate and academic achievement for 6th and 7th grade students who attend elementary versus middle schools. The sample consisted of 48,337 students in 6th and 7th grade from 41 elementary and 269 middle schools who completed a statewide school climate survey. The measure of school climate was comprised of three components that are central to authoritative school climate theory: disciplinary structure, academic expectations, and student support. Academic achievement was measured by school-level pass rates for end-of-year standardized reading and mathematics exams. Results indicated that elementary schools demonstrated higher test passing rates and more favorable student perceptions of school climate. School climate partially mediated the relations between grade configuration and test passing rates for 6th and 7th grade reading, but not mathematics. This study contributes to middle school research by showing how a positive school climate could help explain the higher achievement of students in elementary school grade configurations than in middle schools.

Manuscript One

Association of Grade Configuration with School Climate for 7th and 8th Grade Students

Marisa Malone, Dewey Cornell, and Kathan Shukla

Curry School of Education, University of Virginia

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Abstract

Educational authorities have questioned whether middle schools provide the best school climate for 7th and 8th grade students and proposed that other grade configurations such as K-8th grade schools may provide a better learning environment. The purpose of this study was to compare 7th and 8th grade students' perceptions of four key features of school climate (disciplinary structure, student support, student engagement, and prevalence of teasing and bullying) in middle schools versus elementary or high schools. Multilevel multivariate modeling in a statewide sample of 39,036 7th and 8th grade students attending 418 schools revealed that students attending middle schools had a more negative perception of school climate than students in schools with other grade configurations. Seventh grade students placed in middle schools reported lower disciplinary structure and a higher prevalence of teasing and bullying in comparison to those in elementary schools. Eighth grade students in middle schools reported poorer disciplinary structure, lower student engagement, and a higher prevalence of teasing and bullying compared to those in high schools. These findings can guide school psychologists in identifying aspects of school climate that may be troublesome for 7th and 8th grade students in schools with different grade configurations.

Association of Grade Configuration with School Climate for 7th and 8th Grade Students

The concept of middle school is relatively new in American education. Prior to the 1970s, junior high schools (grades 7-8 or 7-9) commonly served as a transitional phase to prepare students for the demanding nature of high school. However, studies found that students who attended junior high schools had both academic and socio-emotional difficulties in comparison to children who moved directly from elementary school to high school. For instance, Simmons and Blyth (1987) found that students who attended junior high school had a decline in GPA while their K-8th grade peers had an increase in GPA. Moreover, girls in junior high schools experienced lowered self-esteem, and boys reported higher levels of peer victimization, in comparison to students who went to K-8th grade schools. Another study found that students in junior high had decreased motivation and school attachment, and poorer quality teacher-student relationships (Eccles, Lord, & Midgley, 1991).

Starting in the 1980s, educators (see review by Juvonen, Le, Kaganoff, Augustine, & Constant, 2004) began to favor a more independent "middle school" (grades 6-7-8) that was structured less like high school and would provide a developmentally appropriate educational setting that attended to the unique needs of young adolescents (Cook, MacCoun, Muschkin, & Vigdor, 2008). Contrary to this well-intended effort, research has shown that students who attend middle schools have similar difficulties as those who attended junior high schools. For instance, Cook and colleagues (2008) found that students in conventional middle schools had more disciplinary problems and were twice as likely to be disciplined as same-age peers in school configurations that included elementary grades. These disciplinary problems were significant through at least 9th

grade. Another study found that students in middle and junior high schools reported poorer school attachment and peer support than students in K-8th grade schools (Kim, Schwartz, Cappella, & Seidman, 2014). Students in middle schools were also more likely to experience academic problems (Byrnes & Ruby, 2007; Kieffer, 2013), poor self-esteem (Weiss & Kipnes, 2006), and increased rates of bullying and victimization (Anderman & Kimweli, 1997; Weiss & Kipnes, 2006) in comparison to students in other grade configurations.

School Climate

School psychologists working in middle schools might consider that school climate could contribute to the declining motivation and increasing discipline problems of their students. Several authorities have suggested that middle school climate is problematic (Wang & Dishion, 2011; Way, Reddy & Rhodes, 2007). Though there is a large body of research dedicated to school climate (Thapa, Cohen, Guffey, & Higgens-D'Alessandro, 2013), its definition remains quite broad. One definition characterizes school climate as the "quality and character of school life," including "norms, values, and expectations that support people feeling socially, emotionally, and physically safe" (Cohen, McCabe, Michelli, & Pickeral, 2009, p. 182). Positive school climate has been related to academic success (Jia et al., 2009), higher levels of student engagement (Konold et al., 2014), and lower rates of bullying and victimization (Gregory et al., 2010).

School psychology research has posited that Baumrind's (1968) model of authoritative parenting might inform our understanding of a positive school climate (e.g., Brophy, 1996; Gill, Ashton, & Algina, 2004; Gregory & Cornell, 2009; Hughes, 2002;

Pellerin, 2005; Wentzel, 2002). Authoritative parenting research has found that parents are most effective when they are both demanding and supportive (or emotionally responsive) with 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 support (disengaged or neglectful) (Larzelere et al., 2013). Authoritative parenting of adolescents has been associated with high self-esteem (Milevsky, Schlechter, Netter, & Keehn, 2007), academic achievement (Masud, Thurasamy, & Ahmad, 2015), and overall positive psychological adjustment (Steinberg, Mounts, Lamborn, & Dornbusch, 1991).

Authoritative school climate theory suggests that students benefit from high levels of both disciplinary structure (demandingness) and supportive teacher-student relationships (Gregory & Cornell, 2009). A variety of studies have found that schools with authoritative school climate characteristics have better student outcomes. Fair and strict discipline in schools is associated with fewer discipline problems (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005; Way et al., 2007; Welsh, 2000) and fewer instances of bullying (Ma, 2002). Supportive teacher-student relationships have been associated with greater effort and perseverance on academic tasks and higher academic achievement (Lee, 2012). Students who feel supported by their teachers demonstrate a greater interest in their schoolwork, higher motivation, and a stronger sense of belongingness at school (Lee, 2012; Stroet, Opdenakker, & Minnaert, 2013).

Although disciplinary structure and student support are regarded as the defining features of an authoritative school climate, they are linked to at least two other important aspects of school climate: the level of student engagement in school and the prevalence of

teasing and bullying at school (Konold & Cornell, 2015). Many school climate instruments include measures of student engagement and peer aggression but do not specifically link them to an authoritative school climate (Wang & Degol, 2015). In their study of middle school students, Wang and Eccles (2013) found that "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 linked to higher behavioral, emotional, and cognitive engagement. Another study found that students in schools with an authoritative school climate characterized by high disciplinary structure and student support were more engaged in learning, had higher educational aspirations, and attained higher grades (Cornell, Shukla, & Konold, 2016). In addition, students in an authoritative school climate were less likely to engage in peer aggression that included less teasing and bullying, as well as general peer victimization (Cornell, Shukla, & Konold, 2015). This body of research suggested that the four qualities of disciplinary structure, student support, student engagement, and prevalence of teasing and bullying were important aspects of school climate.

The Authoritative School Climate Survey (ASCS; Cornell, Huang et al., 2013) was developed to assess student perceptions of disciplinary structure and student support. High disciplinary structure is defined as a strict but fair school environment where students are aware of school rules and the consequences of misbehavior, and perceive that discipline is fairly administered. High support is demonstrated by positive teacher-student relationships in which students perceive that their teachers convey interest, respect, and a willingness to help them succeed (Gregory & Cornell, 2009).

In addition to disciplinary structure and student support, the ASCS measures student engagement in school and the prevalence of teasing and bullying. Student engagement refers to students' cognitive commitment to learning and emotional attachment to school (Appleton, Christenson, & Furlong, 2008). Student engagement is widely recognized as an important factor in school success. High engagement in middle grade students is related to several important outcomes, including academic achievement (Froiland & Oros, 2014; Wang & Holcombe, 2010) and likelihood of graduating from high school (Archambault, Janosz, Fallu, & Pagani, 2009). Despite the importance of high student achievement, Juvonen (2007) found that middle grade students in the United States have lower ratings of student engagement and more negative perceptions of school climate in comparison to students in other countries.

School psychologists find that bullying and related forms of peer aggression are a common problem for young adolescents in middle schools (Perkins, Perkins, & Craig, 2014). However, few studies have compared the bully climate reported by middle grade students in schools with different grade configurations. One large nationally representative study of 8th graders (Anderman & Kimweli, 1997) found that students within 6th-8th grade or 7th-9th grade configurations reported significantly higher levels of victimization than students in K-8th grade or K-12th grade configurations. Eighth graders in middle schools also perceived their school as more unsafe than students in K-8th grade or K-12th grade configurations. These results were supported by Weiss and Kipnes (2006), who also found that adolescents in middle schools felt less safe than those attending K-8th grade schools. A climate of teasing and bullying may affect bystanders as well as victims. For example, studies have found that student observations of teasing and

bullying, beyond personal victimization, were associated with lower academic test performance (Lacey, Cornell, & Konold, 2015) and higher dropout rates (Cornell, Gregory, Huang, & Fan, 2013).

Present Study

The purpose of the present study was to investigate the hypothesis that middle schools have a less positive school climate for 7th and 8th grade students than schools with other grade configurations. School climate was measured by four scales from the Authoritative School Climate Survey: disciplinary structure, student support, student engagement, and prevalence of teasing and bullying. This survey was completed by a statewide sample of 39,036 7th and 8th grade students attending 418 schools in Virginia. Given that previous research indicates that students in middle schools have a more negative school experience than students in schools with other grade configurations, it was hypothesized that 7th and 8th grade students in middle schools would report lower disciplinary structure and student support, poorer engagement, and a higher prevalence of teasing and bullying than students in other grade configurations.

The current study extends previous research in several ways. First, this study examines a large sample of schools that allows us to compare conventional middle schools to both elementary schools and high schools that include 7th or 8th grades. Although previous studies have examined individual student effects, our research question concerns schools as the unit of analysis and thus requires a large sample of schools. A multi-level analysis of both school and student level effects is valuable because it accounts for the nesting of students within schools, given that students from the same school likely have similar perceptions of their school climate. Multilevel

analysis allows us to distinguish within-school variation from between-school variation in the outcomes. The study uses measures of school climate that have been developed to measure an authoritative school climate and which have demonstrated validity at both school and student levels of analysis.

The present study goes beyond previous studies by separately examining 7th and 8th grades. There are a number of reasons why 7th and 8th grade students might have different school experiences. For instance, 8th grade students are typically the oldest students in middle schools, so that they are more familiar with the school, may have higher status in the school, and experience less bullying than 7th grade students. Additionally, 8th grade students in conventional middle schools tend to report a poorer school climate than 7th graders (Wang & Dishion, 2011; Way et al., 2007).

Previous research indicates that school demographic variables influence student perceptions of school climate, student engagement, and bullying (Gottfredson et al., 2005; Klein & Cornell, 2010; Leithwood & Jantzi, 2009; Sullivan, Perry, & McConney, 2014; Tayli, 2013). For instance, school size has been negatively associated with student engagement and academic achievement in secondary school students (Leithwood & Jantzi, 2009). School size has also been associated with rates of teasing and bullying, although findings are mixed (Klein & Cornell, 2010; Tayli, 2013). Additionally, students in high-poverty schools with a high proportion of minority students reported a poorer school climate (Gottfredson et al., 2005). Lastly, an Australian study found that students in urban schools reported more supportive teacher-student relationships and more positive disciplinary practices than students in rural schools (Sullivan et al., 2014). To separate the effects of grade configuration from potentially confounding demographic

variables, the analyses controlled for three student-level demographic measures: gender, minority status, and parental education level. At the school level, analyses controlled for school size, community population density, mean parental education level, and percentage of minority students. Parental educational level was chosen as a measure for socioeconomic status over the percentage of students eligible for free or reduced-price meals (FRPM) because parental education was available as a control variable for both the student- and school-levels of analysis, whereas FRPM was only measured at the school level. Mean parental education level was correlated $r = .76$ with FRPM in this sample.

Method

Participants

Student data were obtained from the Virginia Secondary School Climate survey, which is part of the state's annual School Safety Audit program (Cornell, Huang et al., 2013). The survey was administered in the spring of 2013 to all state public schools with 7th and/or 8th grade enrollment. Of the 430 eligible schools, student surveys were returned from 423 schools, a participation rate of 98.4%. Five schools with unusual grade configurations (e.g. 8th grade only) were omitted, reducing the sample to 418 schools. Students were nested in 325 middle or junior high schools (grades 5-8, 6-8, or 7-8) and 93 schools that variously placed their 7th and 8th graders in elementary or high schools. Given that some schools did not contain both 7th and 8th grades, the number of schools studied varied for each grade. The final sample included 387 schools for 7th grade and 371 schools for 8th grade.

Schools were given the option to give the survey to all 7th and 8th grade students (whole grade option) or, to minimize school burden, randomly select 25 students each

from 7th and 8th grade (random sample option). Schools that chose the random sample option were given detailed instructions and a random number list to select participants (Cornell, Huang et al., 2013). In 274 schools using the whole-grade option, the estimated participation rate was 85.3% (28,582 of 33,494). For the 149 schools using the random sample option, the estimated participation rate was 83.9% (15,223 of 18,144). The overall student participation rate was 84.8% of students invited to take the survey (43,805 of 51,638).

The analytic sample consisted of 20,337 7th graders and 18,699 8th graders. Based on student self-report, the racial/ethnic breakdown of the students (51.7% female; 52.2% 7th grade) was 52.3% Caucasian, 18.3% African American, 12.8% Hispanic, 3.4% Asian American, 1.6% American Indian or Alaska Native, 0.5% Native Hawaiian or Pacific Islander, and 15.6% who identified with more than one race. Students with intellectual disabilities or limited English proficiency that prevented them from completing the survey were not included in the sample.

Grade Configuration Groups

Analyses were conducted separately for 7th and 8th grade. Schools were sorted into four groups: (1) schools with both elementary and middle grade students (labeled "elementary group") such as schools with grades K-7 or K-8; (2) conventional middle schools ("middle") such as schools with grades 6-8; (3) junior high schools ("junior high") with grades 7-8; and (4) schools with middle grade and high school students ("high school") such as grades 7-12 or 8-12. Despite being similar in grade structure, middle schools and junior high schools were analyzed separately, given that middle

schools were developed with the intention of being an improvement over junior high schools.

Since many schools did not have both 7th and 8th grade students, school groups differed slightly in the analyses for 7th and 8th grade. The grade configuration groups for 7th graders consisted of 50 elementary schools (30 Pre- K or 1st-7th grade, 11 4th or 5th-7th grade, and 9 Pre-K through 8th grade), 295 middle schools (271 6th-8th grade, 18 5th-8th grade, and six 6th-7th grade), 30 junior high schools (7th-8th grade), and 12 high schools (6th or 7th through12th grade). Eighth grade configuration groupings included nine elementary schools (Pre-K-8th grade), 289 middle schools (271 6th-8th grade, 18 5th-8th grade), 30 junior high schools (7th-8th grade), and 43 high schools (31 8th-12th grade, 12 6th or 7th-12th grade). Three dummy variables for grade configurations (elementary, junior high, & high school) were created with middle school as the reference group.

Data Screening and Validity

Surveys were assessed for completion time and answers to validity screening questions. Participants who completed the survey in less time than an empirically determined cut-off (approximately 7.2 minutes, see Cornell, Huang, et al., 2013) were excluded from analyses. Two validity-screening items excluded participants who approached the questions in a careless or admittedly dishonest manner (Cornell, Klein, Konold, & Huang, 2012; Cornell, Lovegrove, & Baly, 2014). The first item, "I am telling the truth on this study," had four response options, including: "*strongly agree,*" "*agree*," "*disagree*," "*strongly disagree.*" Participants who selected the "*disagree*" or "*strongly disagree*" were omitted from the sample. The second validity item, "How many questions on this survey did you answer truthfully?" had five response options: "*All of them*," "*All*

but 1 or 2 of them," "*Most of them*," "*Some of them*," "*Only a few or none of them*." Those who responded with "*Some of them*" or "*Only a few or none of them*" were excluded from the sample.

Measures

The survey of approximately 120 items assessed student perceptions of school climate and safety conditions. The survey was administered anonymously online using Qualtrics software with a median completion time of 18.5 minutes. Students completed the surveys in classrooms with teacher supervision. Student responses were aggregated within schools to calculate school means.

Four school climate scales relevant to our study were analyzed: Disciplinary Structure, Student Support, Student Engagement, and Prevalence of Teasing and Bullying. Other scales on the survey were not included in these analyses (e.g. Student Values, Peer Aggression, and Personal Experiences of Bullying, see Cornell, Huang et al., 2013 for a description of additional scales). These scales have been previously assessed for reliability and validity for this sample. Konold and colleagues (2014) used multilevel factor analyses to construct these scales as both student- and school-level measures. Confirmatory factor analyses indicated that all items on the four school climate scales measured their intended factor in student- and school-level analyses. Students rated all items on a four-point scale: "*strongly disagree*," "*disagree*," "*agree*," and "*strongly agree.*"

Disciplinary Structure. This 7-item scale assessed student perceptions of school discipline as strict but fair. Students answered items such as *"The school rules are fair"* and *"Students at this school are only punished when they deserve it."* Previous studies

using confirmatory factor analysis indicated significant loadings for all items at both within (student) and between (school) levels (Gregory et al., 2010; Konold et al., 2014). High disciplinary structure has been associated with lower student victimization (Cornell et al., 2015; Gregory et al., 2010). Cronbach's alpha was .76 for 7th grade and .78 for 8th grade in this sample.

Student Support. This 8-item scale asked students to rate how strongly they agreed that teachers and school staff respect and care about all students (e.g. *"Most teachers listen to what students have to say"*), and student willingness to seek help from adults at school (e.g. "*There are adults at this school I could talk with if I had a personal problem*"). Previous studies using the Student Support scale have supported its factor structure, criterion-related validity, and reliability in adolescent populations (Bandyopadhyay, Cornell, & Konold & 2009; Gregory et al., 2010; Konold et al., 2014; Konold & Cornell, in press). High student support is associated with academic success, higher school safety, and lower problem behavior and victimization (Cornell et al., 2015; Gregory et al., 2010). Cronbach's alpha for the combined scale was .85 for 7th grade and .85 for 8th grade.

Engagement. The 6-item student engagement scale is comprised of two subscales: Affective Engagement (*"I am proud to be a student at this school," "I feel like I belong at this school")* and Academic Engagement (*"I want to learn as much as I can at school," Getting good grades is very important to me").* Confirmatory factor analyses indicated that both Student Engagement subscales have good model fit separately and as a combined measure of engagement (Konold et al, 2014). Schools with high student engagement have lower rates of bullying and higher standardized test scores (Lacey et al.,

2015; Mehta, Cornell, Fan, & Gregory, 2013). Cronbach's alpha for this scale was .76 for 7th grade and .76 for 8th grade.

Prevalence of Teasing and Bullying. The 5-item Prevalence of Teasing and Bullying scale was used to assess student observations of the types of teasing and bullying that occur at their school. Participants answered items such as "*Students here often get teased about their clothing or physical appearance*," and "*Bullying is a problem at this school*." Previous studies have found that the prevalence of teasing and bullying scale had a good overall model fit for 6th-8th graders (Bandyopadhyay et al., 2009; Konold et al., 2014) and high school students (Bandyopadhyay et al., 2009; Klein, Cornell, & Konold, 2012). High prevalence of teasing and bullying has been associated with poor school performance and high school dropout (Cornell, Gregory et al., 2013; Lacey et al., 2015). In the current study, the prevalence of teasing and bullying scale had an internal consistency of .81 for 7th grade and .81 for 8th grade students.

Data Analysis

Preliminary analyses examined descriptive statistics for all variables. Bivariate correlations among predictor and school-level outcome variables are shown in Table 1. For 7th grade, interclass correlations (ICCs) were .07, .06, .07, and, .08 for disciplinary structure, student support, engagement, and prevalence of teasing and bullying, respectively. For 8th grade, ICCs were .09, .06, .07, and, .07 for disciplinary structure, student support, engagement, and prevalence of teasing and bullying. Design effects were calculated for each of the four outcome variables to examine the effect of independence violations on standard error estimates. The values ranged from 4.18 to 5.27 for 7th grade and 3.89 to 5.38 8th grade. Design effects of 2.0 or greater indicate the need for multilevel

modeling to correct for bias resulting from nested data (Peugh, 2010). Therefore, a multi-level, multivariate analysis was used to account for relationships among the four outcome variables and allowed for between-school comparisons while controlling for within-school variation.

Evaluation of this model proceeded in two steps. The first model examined all student-level variables (gender, minority status, and parental education level) and school-level variables (school size, population density, mean parental education level, and percentage of minority students) for each of the four school climate measures. Model 2 included the addition of four school types: elementary, middle, junior high, and high schools. In order to have meaningful intercepts, school-level predictors were grand mean centered (Raudenbush & Bryk, 2002). Student-level predictors and parent education level were school mean centered. Statistical analyses were conducted in Mplus 6.1 using a maximum likelihood estimator with robust standard errors; the nesting of students within schools was accounted for through specification of a two-level analysis.

Results

Descriptive statistics for school-level measures are presented in Table 2. Spearman rank correlations ranged from .56 to .81 among the Disciplinary Structure, Student Support, Student Engagement, and Prevalence of Teasing and Bullying scales for 7^{th} grade and .48 to .78 for 8^{th} grade. Schools with a higher proportion of minority students were associated with higher prevalence of teasing and bullying, and lower disciplinary structure, student support, and student engagement for both grades. Schools with higher mean parental education were associated with lower prevalence of teasing and bullying, and higher disciplinary structure, student support, and student engagement

for 7th grade. For 8th grade, higher parental education was associated with lower prevalence of teasing and bullying and higher disciplinary structure and student engagement.

Seventh Grade Students

Multilevel path models for 7th grade are presented in Table 3. Model 1 presents relations among the control variables at the student and school levels. At the student level, higher parental education was associated with higher structure, support, and engagement, and lower prevalence of teasing and bullying (all *p*-values < .01). Male students reported lower levels of engagement and prevalence of teasing and bullying than female students (all *p*-values < .05). Students who identified as African American, Hispanic, Native American, and multiracial reported significantly lower disciplinary structure, student support, student engagement, and higher prevalence of teasing and bullying than Caucasian students. Asian American students reported the opposite trend: high disciplinary structure, student support, and student engagement. At the school level, higher parental education was associated with favorable school climate ratings for all four measures, and schools in more populated settings had similar trends (all *p*-values < .05). Larger schools tended to have higher prevalence of teasing and bullying ($B = .23$, $p < .01$). A higher percentage of minority students in a school was associated with less favorable ratings for disciplinary structure ($B = .28$, $p < .001$), student support ($B = .25$, $p < .001$, and PTB ($B = -.17$, $p < .05$). These model covariates jointly explained 19%, 14%, 24%, and 25% of between-school variance in disciplinary structure, student support, student engagement, and prevalence of teasing and bullying, respectively.

Model 2 built upon Model 1 with the introduction of the four grade configuration grouping variables: elementary, middle school, junior high, and high school. Model 2 fit the data significantly better than Model 1 as indicated by the likelihood-ratio test (χ^2 [12] = 60.89, $p < .001$). Controlling for all model covariates, the four grade configuration predictors alone explained 5%, 3%, 2% and 12% of variance in disciplinary structure, student support, student engagement, and prevalence of teasing and bullying, respectively. Seventh grade students in middle schools reported significantly lower disciplinary structure in comparison to 7th graders placed in elementary schools ($B = -.17$, $p < .05$) and junior high schools ($B = -.16$, $p < .05$). Students placed in middle schools also reported higher prevalence of teasing and bullying than those in elementary ($B = .33$, $p < .001$), junior high ($B = .14$, $p < .05$), and high schools ($B = .14$, $p < .01$).

Eighth Grade Students

The multilevel path models for 8th grade are presented in Table 4. Results from Model 1 show, at the student-level, higher levels of parental education were associated with higher structure, support, and engagement, and lower prevalence of teasing and bullying (all p-values < .01). Male students reported higher disciplinary structure ($B = .02$, $p < .05$) and lower PTB ($B = -.10$, $p < .001$) than female students. The pattern of minority group differences for 8th grade students was the same as for 7th grade student (see Table 4).

School-level analyses revealed that high parental education was associated with higher student engagement ($B = .28$, $p < .001$), and lower prevalence of teasing and bullying ($B = -.44$, $p < .001$). Larger schools tended to have higher PTB ($B = .20$, $p < .05$). Generally, schools with a higher percentage of minority students had lower

disciplinary structure, student support, and student engagement. These model covariates jointly explained 8%, 8%, 19% and 19% of between-school variance in disciplinary structure, student support, student engagement, and prevalence of teasing and bullying.

Model 2 included the four grade configuration grouping variables. A likelihood-ratio test revealed significantly better fit for Model 2 than Model 1 (χ^2 [12] = 37.2, p < .001). The four predictors alone explained an additional 4%, <1%, 6%, and 3% of variance in disciplinary structure, student support, student engagement, and PTB, respectively. Eighth grade students in middle schools reported significantly lower disciplinary structure (B = -.19, p < .01), student engagement (B = -.26, p < .001), and higher prevalence of teasing and bullying (B = .17, p < .05) in comparison to 8th graders placed in high schools. There were no significant differences between middle schools and junior high schools or elementary schools for any of the four outcome variables.

Discussion

This study compared 7th and 8th grade student perceptions of school climate in elementary, middle, junior high, and high schools. As hypothesized, students in both grades perceived their middle school experience more negatively than students in other grade configurations. Overall, these findings support and extend previous studies indicating that students placed in middle schools have less favorable experiences than those in other grade configurations (Anderman & Kimweli, 1997; Cook et al, 2008; Kim et al., 2014; Weiss & Kipnes, 2006). Though both 7th and 8th grade students in middle schools reported a less supportive, more adverse school environment when compared to those in other grade configurations, the 7th and 8th graders differed in which grade configuration provided the more favorable school climate conditions.

Seventh Grade Students

Seventh grade students placed in conventional middle schools reported less disciplinary structure than students placed in schools with elementary grades. Disciplinary structure refers to the perceived clarity and fairness of school rules. One explanation for this finding may be that students in middle schools often have classes with multiple teachers who may have different classroom expectations, which can result in a poorer understanding of school rules (Cook et al., 2008). Additionally, students in middle schools have more autonomy and less supervision than those in elementary schools. This may allow for more instances of misbehavior and disciplinary action, which may contribute to the student perception that the adults in middle schools are too strict and that the rules are unfair. Research suggests that schools with poor disciplinary structure have detrimental outcomes, including higher rates of disciplinary infractions and student victimization (Gottfredson et al., 2005; Welsh, 2000).

In addition to low disciplinary structure, 7th graders in middle school reported more teasing and bullying than 7th grade students in elementary and junior high schools. Teasing and bullying was also more prevalent for 7th graders in middle schools than in high schools. Together, these results parallel Ma's (2002) finding that middle grade students in schools with poor disciplinary climates had significantly higher reports of bullying. Although the effect size for disciplinary structure was relatively small, grade configuration accounted for 12% of the variance for prevalence of teasing and bullying, which was significantly greater in middle schools than elementary and high schools at the school level. Although the prevalence of teasing and bullying scale measured student observations of peer victimization, which is more inclusive than the student's own victim

experiences, it is notable that 7th graders in high schools reported less teasing and bullying than 7th graders in middle schools. This is unexpected because 7th graders in a high school would be the youngest in their schools and potentially the most likely to be bullied by older students.

Contrary to our hypotheses, student support and student engagement did not differ across grade configurations. The 7th graders in middle schools had similar perceptions of feeling supported and encouraged by staff members, and felt similarly engaged in school as 7th graders in schools with other grade configurations.

Eighth Grade Students

Previous studies found that 8th grade students in K-8 schools have a better school experience than students in middle schools. For example 8th graders in elementary schools experience less bully victimization (Anderman & Kimweli, 1997), have fewer disciplinary problems (Cook et al., 2008), and report a more positive overall school environment than students in middle schools (Kim et al., 2014). In our study, 8th graders in elementary schools did not perceive their school climate more or less favorably than those in middle schools for each of the four school climate measures.

Contrary to the findings for 7th grade students, which favored elementary schools, 8th grade students in our sample reported more favorable conditions in high schools. Eighth grade students in middle schools reported lower disciplinary structure, less student engagement, and higher prevalence of teasing and bullying when compared to 8th grade students placed in high schools. This might seem unexpected since 8th grade students might be at a disadvantage in high school compared to older students. On the contrary, our findings suggest that high school may be a more appropriate environment for these

students and that they might be better able to handle the additional academic and social demands required in a high school. Grade configuration accounted for about 4%, 6%, and 3% of the variance for structure, engagement, and prevalence of teasing and bullying, respectively. Eighth grade students placed in high schools reported better understanding of school rules and were more engaged in their school experience. Additionally, 8th graders perceived a higher rate of teasing and bullying in middle school, suggesting that the middle schools may be more conducive to bullying than high schools. Previous research clearly suggests that there is a lower prevalence of bullying, as well as fewer disciplinary problems and suspensions, in high schools (Nansel et al., 2001, State Department of Education, 2015). Perhaps 8th grade students follow the lead of the older, more mature students in the school, resulting in fewer overall problem behaviors and higher levels of engagement. To our knowledge, this study is the first to compare 8th graders in middle schools to 8th graders in high schools.

School-Level Demographics

For both grades, higher parental education at the school level was associated with higher student engagement and lower prevalence of teasing and bullying. High parental education was also associated with high disciplinary structure and support for 7th grade students. These findings align with previous meta-analyses that suggest that high socioeconomic status is associated with better school outcomes, including higher academic achievement and lower levels of bully victimization (Sirin, 2005; Tippett & Wolke, 2014). Schools with higher average parental education may be located in communities with better funding and greater parental involvement, thus creating a more positive school atmosphere.

Larger schools had a higher prevalence of teasing and bullying for both grades. Previous research suggests that, although students in larger schools report more teasing and bullying, bully victimization rates do not correlate with school enrollment size. One explanation for these findings may be that students observe more teasing and bullying because there are more students in the school, not because there is a higher proportion of students being bullied (Klein & Cornell, 2010). This explanation makes the high prevalence of teasing and bullying in middle schools more notable, since middle schools tend to be smaller than elementary or high schools because they contain fewer grades. It is plausible that the poor disciplinary climate in middle schools is conducive to teasing and bullying (Ma, 2002).

Schools with a higher percentage of minority students had lower ratings of disciplinary structure. Additionally, 7th graders in schools with a higher percentage of minority students reported lower student support, and 8th graders reported lower engagement. These findings align with a previous study which suggested that schools with a high proportion of minority students had a poorer school climate (Gottfredson et al., 2005). Schools with high proportions of minority students may be located in high-crime or disadvantaged areas, which may contribute to students' negative perceptions of their school environment.

Lastly, schools in more urban areas (i.e. higher population density) had more favorable ratings for student support, student engagement, and prevalence of teasing and bullying, with 7th grade students additionally reporting higher disciplinary structure. Previous research has found that urban school students report more reasonable disciplinary practices, more supportive teacher-student relationships, and less prevalence

of teasing and bullying than students in more rural schools (Klein & Cornell, 2010; Sullivan et al., 2014). In Virginia, there are a large number of well-funded urban schools located in the northern region of the state. Schools in more rural regions often have teachers with less experience, have high teacher turnover, and have fewer special education resources (Monk, 2007). Further examination is needed to assess whether urban schools have more resources for teachers and students that are associated with more favorable impressions of school climate.

Limitations and Future Directions

This study has several methodological limitations. First, correlational analyses cannot determine a causal relationship between positive school climate factors and grade configuration. Although an experimental trial that randomly assigned students to different school types would be the most rigorous way to determine any causal effects of grade configuration, it is not feasible to assign children to different schools or create various grade configurations for this purpose. Therefore, the current study takes advantage of existing differences across school systems that have used different configurations. Though we controlled for demographic influences of parental education, minority status, and school size, other factors may influence the strength and direction of the relations among the variables. For instance, level of experience and quality of school staff may differ between grade configurations. Another possibility is that the staff of elementary and high schools with 7th or 8th graders may recognize the vulnerability of these students and make special efforts to accommodate them.

Additionally, 7th and 8th students in elementary or high school configurations may not be held to the same expectations as students that are significantly younger or older

than they. One study found that middle school students are significantly more likely to be suspended than their same-grade peers in K-8 schools, and that suspensions in middle schools are significantly longer in duration (Arcia, 2007). Research suggests that students in schools with high suspension rates report poorer school climates (Gregory, Cornell, Fan, 2011). Future studies should consider whether school suspension practices mediate the relation between grade configuration and school climate.

Another study limitation is that all measures were based on student self-report. Students might not be the most accurate reporters of school conditions, and teacher perceptions might provide an important perspective. The effect sizes for school climate were relatively small, and there might be stronger measures of school climate or different features of school climate that have a stronger relation to grade configuration. There was much more variance in school climate scores within schools than between schools, which is a common observation in multi-level studies of school climate (e.g., Konold & Cornell, 2015). For example, individual student engagement within schools may range from the bottom of the scale to the top of the scale, whereas school-level means are aggregated across students and will vary within a more narrow range.

Data were only available for 7th and 8th graders in this study. Given that most conventional middle schools include 6th grade, future research that includes 6th graders can provide a more comprehensive look at school climate in middle schools. Additionally, the small number of high schools that contained 7th graders (12 schools) and elementary schools that contained 8th graders (9 schools) resulted in lower power when these configurations were compared in middle schools. Furthermore, a longitudinal study would be helpful to determine how and when student perceptions of school climate

change for students placed in various grade configurations. A previous longitudinal study of 6th-8th grade students in a conventional middle school found that student perceptions of teacher support and consistency in school rules declined over the three years (Way et al., 2007).

An important direction for further study is to determine whether differences in school climate are also linked to better academic outcomes. Previous research assessing the association between grade configuration and academic achievement suggests that middle grade students perform better academically in elementary configurations, but it is not clear why students in these configurations are more successful (Byrnes & Ruby, 2007; Keiffer, 2013; Rockoff & Lockwood, 2010; Weiss & Kipnes, 2006). It is possible that the positive school climate observed in non-middle school configurations may contribute to student academic success.

Conclusion and Implications

Educational authorities have made various attempts to improve the historically poor school experience for early adolescent students. The most substantial attempt involved the restructuring of junior high schools into more developmentally responsive middle schools. This shift was widely adopted without research to demonstrate its effectiveness, and more recent research suggests that it did not achieve the desired effects (Juvonen et al., 2004). Results from the current study indicate that there are no significant differences between middle schools and junior high schools for any of the four school climate variables for 8th graders, but that 7th graders in junior high schools report a more favorable school climate than those in middle schools. These findings suggest that the intended purpose of middle schools to provide a more favorable school environment for

young adolescents has not been successful, according to student perceptions of school climate.

The schools in our sample included 7th-12th grade configurations that, to our knowledge, have not been examined in other grade configuration studies. Whereas other studies compared middle school students to those in configurations that typically include elementary grades, results from the current study indicate that 7th graders reported a more positive climate when grouped with younger students and 8th grade students reported a more positive climate when placed with older students.

Bullying in middle schools continues to be a prevalent problem for many students. Research suggests that bully victimization is associated with poorer student engagement, leading to poor academic achievement in middle school students (Totura, 2014). Our findings reinforce the need to address bullying in middle schools.

A recent meta-analysis suggests that bully prevention programs have significant effects on bullying for young students, but they lose their effectiveness by 7th grade (Yeager, Fong, Lee, & Espelage, 2015). An examination of middle student perceptions of antibullying efforts found that many early adolescents found them unappealing (Cunningham et al., 2016). Students in focus groups complained of boring presentations about bullying, teacher inability or unwillingness to detect bully perpetrators, and ineffective consequences for bullying. One promising alternative to conventional anti-bullying programs is the finding that a more general improvement of school climate can also reduce bullying (Cornell & Bradshaw, 2015).

Given that middle school students in this sample, and also previous studies (e.g. Anderman & Kimweli, 1997; Kim et al., 2014; Weiss & Kipnes, 2006), reported a less

favorable school experience than students in other configurations, one implication that deserves serious consideration is that school authorities may consider keeping 6th and 7th graders in elementary schools and placing 8th graders in high school settings. The allocation of resources to create middle schools may not be justified if students do not demonstrate any clear benefits from this grade configuration and on the contrary seem to fare less well than students in other grade configurations. The current literature tends to support the inclusion of 6th and 7th grade students in elementary schools, but there is much less research on the most suitable placement for 8th graders. Although more research is needed, our findings are contrary to the common view that 8th graders might be subject to a more hostile school climate in high school settings.

Another study implication is that school psychologists should advocate for evidence-based programs and practices that would create a more positive middle school experience for their students. Our findings suggest that although middle school students may feel supported and respected by their teachers, the school rules are perceived as unclear or unfair. Given that both disciplinary structure and student support are related to positive outcomes (Cornell et al., 2015; Cornell, Shukla, & Konold, 2016), it is important that both components are carefully monitored in schools. The Positive Behavioral Interventions and Supports (PBIS) model of school improvement has been found to improve disciplinary practices and reduce the prevalence of bullying in schools by using a multitier approach (Bradshaw, 2013; Horner, Sugai, & Anderson, 2010; Pas & Bradshaw, 2012). An effective PBIS program should help students to regard disciplinary practices as fair and their teachers as supportive, consistent with an authoritative school climate.

Another program that can be used to improve school climate is My Teaching Partner- Secondary (MTP-S). The MTP-S program is designed in part to promote supportive relationships between teachers and students. By strengthening teacher-student relationships, MTP-S has been found to improve student engagement and academic achievement in middle school students (Allen, Pianta, Gregory, Mikami, & Lun, 2011; Gregory, Allen, Mikami, Hafen, & Pianta, 2014).

In addition to advocating for best practices for their schools, school psychologists in middle schools are encouraged to consult with teachers and staff directly to facilitate improvement of the school environment (Ysseldyke et al., 2006). Through these consultations, school psychologists can effectively target aspects of their school's climate that may be lacking, such as poor disciplinary practices. Given that most public school students attend conventional middle schools, it is vital that school psychologists, administrators, and other staff members recognize potential problems with the middle school environment and strive to promote a more positive school climate.

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Table 1

Correlations Among School-Level Variables by Grade

	1	2	3	4	5	6	7	8
1. Disciplinary Structure	--	.78**	.75**	-.52**	-.01	-.07	.12*	-.29**
2. Student Support	.81**	--	.72**	-.48**	-.08	-.11*	.03	-.18**
3. Student Engagement	.76**	.72**	--	-.51**	.09	-.01	.26**	-.21**
4. Prevalence of Teasing and Bullying	-.61**	-.56**	-.57**	--	.03	-.05	-.22*	.12*
5. School Size	.02	-.02	.17**	.05	--	.48**	.48**	.41**
6. Population Density	-.11*	-.06	.02	.08	.48**	--	.35**	.63**
7. Mean Parental Education	.23**	.14**	.35**	-.25**	.48**	.35**	--	.07
8. Percent Minority	-.39**	-.27**	-.18**	.29**	.41**	.63**	.07	--

Note: *p < .05; ** p < .01. Correlations for 7th grade are below the diagonal line; Correlations for 8th grade are above diagonal line.

Table 2

School-Level Descriptive Statistics

Grade	Measure	N	M	SD	Minimum	Maximum
7th	Disciplinary Structure	385	19.12	1.37	15.00	23.00
	Student Support	385	24.18	1.47	20.00	30.00
	Student Engagement	385	12.60	1.27	16.00	22.00
	PTB	385	12.60	1.28	8.00	16.00
8th	Disciplinary Structure	366	18.54	1.41	14.00	23.00
	Student Support	366	23.56	1.36	20.00	27.00
	Student Engagement	366	18.38	1.08	13.00	22.00
Overall	School Size	418	720.00	417.03	61.00	4033.00
	Population Density	418	1023.80	1704.17	5.60	9493.00
	Mean Parental Education	418	3.25	.50	2.09	4.69
	Percent Minority	418	.39	.28	0	1.00

Table 3

Standardized Model Coefficients for Grade 7 Students

Measures	Structure		Support		Engagement		PTB	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Student-level								
Male	.003	.003	.002	.002	-.02*	-.02*	-.06***	-.06***
Parental Education	.03***	.03***	.02**	.02**	.11***	.11***	-.03***	-.03***
Black	-.07***	-.07***	-.02**	-.02**	-.03**	-.03**	.02*	.02*
Hispanic	-.07***	-.07***	-.05***	-.05***	-.05***	-.05***	.03**	.03**
Asian	.01*	.01*	.02**	.02**	.03***	.03***	.001	.001
Multi-race	-.08***	-.08***	-.05***	-.05***	-.05***	-.05***	.04***	.04***
American Indian	-.02**	-.02**	-.02**	-.02*	-.02**	-.02**	.02*	.02*
R-squared	.014	.014	.06	.006	.019	.019	.008	.008
School-level								
Parental Education	.19**	.18*	.15*	.15*	.36***	.34***	-.42***	-.45***
Population Density	.16*	.19**	.14*	.16*	.15*	.16*	-.16**	-.23***
School size	.08	.09	.02	.04	.11	.10	.16*	.16**
Percent Minority	-.28***	-.24**	-.25***	-.21**	-.12	-.11	.17*	.06
Elementary	-	.17*	-	.14	-	.05	-	-.33***
Junior High	-	.16*	-	.10	-	.11	-	-.14*
High School	-	.03	-	.001	-	.06	-	-.14**
R-squared	.187	.234	.136	.161	.236	.251	.251	.368
Change R-squared		.047		.026		.015		.117

Table 4

Standard Model Coefficients for Grade 8 Students

	Structure		Support		Engagement		PTB	
Measures	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Student-level								
Male	.02*	.02*	.01	.01	.01	.01	-.10***	-.10***
Parental Education	.03***	.03***	.04***	.04***	.12***	.12***	-.02**	-.02**
Black	-.05***	-.05***	.01	.01	-.004	-.004	-.003	-.003
Hispanic	-.07***	-.07***	-.03**	-.03**	-.04***	-.04***	.04***	.04***
Asian	.03***	.03***	.03**	.03**	.04***	.04***	.002	.002
Multi-race	-.07***	-.07***	-.04***	-.04***	-.03***	-.03***	.04***	.04***
American Indian	-.02*	-.02*	-.004	-.004	-.02*	-.02*	.01	.01
R-squared	.012	.012	.005	.005	.019	.019	.014	.014
School-level								
Parental Education	.08	.11	.06	.08	.28***	.33***	-.44***	-.47***
Population Density	.08	.12	.14*	.16*	.09	.15*	-.16*	-.19**
School size	.07	.04	-.05	-.06	.11	.06	.20*	.23**
Percent Minority	-.21**	-.16*	-.18*	-.15	-.21**	-.13*	-.06	-.11
Elementary	-	.06	-	.005	-	.06	-	-.06
Junior High	-	.10	-	.01	-	.08	-	-.04
High School	-	.19**	-	.10	-	.26***	-	-.17**
R-squared	.075	.116	.080	.088	.187	.250	.184	.213
Change R-squared		.041		.008		.063		.029

Note: *p < .05; ** p < .01; ***p < .001. PTB = Prevalence of Teasing and Bullying

Manuscript Two

Grade Configuration Is Associated with School-level Standardized Test Pass Rates for 6th, 7th, and 8th Grade Students

Marisa Malone and Dewey Cornell

University of Virginia

Kathan Shukla

Indian Institute of Management Ahmedabad

Author Note

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Abstract

Educators and researchers have long debated the best grade configuration grouping for middle grade students. The present study examined school-level differences in reading and mathematics standardized test pass rates for students placed in middle schools versus alternative grade configurations. Latent growth modeling was conducted separately for 6th, 7th and 8th grades across a three-year sampling period. For 6th grade, pass rates were significantly higher in elementary schools (e.g. K-7th grade) than middle schools for both reading (78.9% vs. 72.0%) and mathematics (82.5% vs. 76.3%). Pass rates for 7th grade students followed the same trend; pass rates in elementary schools were significantly higher than middle schools for reading (78.5% vs. 75.9%) and mathematics (83.1% vs. 69.2%). For 8th grade, pass rates were significantly higher in middle schools than high schools (e.g. 8th-12th grade) for both subjects (74.7% vs. 70.0% for reading, 63.3% vs. 52.0% for mathematics). These findings suggest that students benefit from remaining in an elementary school at least through 7th grade.

Grade Configuration Is Associated with School-level Standardized Test Pass Rates for 6th, 7th, and 8th Grade Students

The middle school years are a challenging period for adolescents. Simultaneous with physical, social, and emotional changes (Larson, Moneta, Richards, & Wilson, 2002; Nelson, Leibenluft, McClure, & Pine, 2005), many young adolescents also navigate the transition to middle school. The middle school experience is associated with a decline in academic motivation and achievement (e.g. Goldstein, Boxer, & Rudolph, 2015; Rockoff & Lockwood, 2010) and has stimulated calls for middle school reform (Juvonen, Le, Kaganoff, Augustine, & Constant, 2004).

Over the past several decades, researchers have investigated whether the middle grade decline in academic achievement is developmentally normative or is specific to adolescents attending middle schools by comparing student achievement in schools with differing grade configurations. School grade configuration is the span of grades served by an individual school. While most adolescents in the United States attend a 6th-8th grade middle school, other students attend schools with a different grade configuration, such as those in elementary or high school grades (e.g. K-8 or 7-12 grade schools). School grade configuration is important because it affects the number of schools children attend and how old they are at the time of each transition. Additionally, student experiences may differ between configurations. For example, students in elementary schools tend to have one teacher for most of their subjects, whereas students in middle school typically move from classroom to classroom for each subject, thus limiting the opportunity to develop strong relationships with their teachers.

What is the best grade configuration to facilitate achievement in middle grade students? Until the 1970s, most American public school students attended elementary school through grade 6 before moving into junior high schools. Junior high schools typically consisted of grades 7-8 or 7-9 and were intended to prepare students for the more demanding and rigorous high school curriculum. Early studies showed that students who attended junior highs experienced poorer outcomes than students who stayed in elementary school through 8th grade. A review by Eccles, Lord, and Midgley (1991) found that the transition to junior high school was associated with poorer academic achievement, decreased motivation, lower sense of school belongingness, and poor self-esteem. Eccles et al. (1991), along with other researchers, argued that middle grade students need a more developmentally appropriate and supportive school environment that recognizes and attends to the unique developmental characteristics of students in this age range.

School districts around the country began to shift to 6th-8th grade middle schools in the early 1970s. From 1970 to 2013, the number of middle schools (most containing grades 6-8) in the United States increased by 528%, and the number of junior high schools decreased by 62% (U.S. Department of Education, 2014). There was little scientific rationale for this rapid restructuring of schools, and studies now conclude that attending middle school is linked to poor academic and behavioral outcomes (Juvonen, et al., 2004). For example, 6th grade students in middle schools are more likely to exhibit lower academic competency (Anderman & Midgley, 1997), more disciplinary problems (Cook et al., 2008) and poorer attendance (Schwerdt & West, 2013) than 6th graders in elementary schools. These negative associations appear to be evident throughout middle

school; eighth graders in middle schools report lower self-esteem (Weiss & Kipnes, 2006), a weaker sense of belonging at school, and lower grade point averages (Anderman, 2002).

Six and Seventh Grade Studies

Given that most students begin middle school in 6th or 7th grade, most of the grade configuration research has examined academic and behavioral outcomes for these students. Studies generally show that students entering middle school in 6th grade demonstrate poorer academic achievement in comparison to students in K-8 schools. One study of over 44,000 students in 243 North Carolina schools found that students who entered middle school in 6th grade had reduced academic performance for reading achievement in comparison to 6th grade students who remained in elementary schools (Cook, MacCoun, Muschkin, & Vigdor, 2008). Similarly, Poncelet and colleagues (2009) found that 6th graders in K-8 schools in Cleveland demonstrated greater mathematics and reading achievement than students in 6-8 grade schools. In contrast, Dove, Pearson, and Hooper (2010) found no relationship between grade configuration and mathematics or literacy scores for 6th grade students in Arkansas middle schools.

Two large, longitudinal studies also support the use of an elementary school configuration for middle grade students. Tracking a sample of over 100,000 students in New York City over a 10-year period, Rockoff and Lockwood (2010) found large differences in academic achievement for 6th and 7th grade students attending middle school versus those who did not attend middle school. Students entering middle schools in either 6th or 7th grade demonstrated lower mathematics and reading achievement scores during the transition year (about .15 standard deviations) than students who did not

change schools, with poorer scores persisting through at least 8th grade. Furthermore, students entering middle school in 6th grade had a greater loss of achievement than those entering in 7th grade (Rockoff & Lockwood, 2010).

A second study obtained similar findings using a longitudinal statewide sample in Florida. Schwerdt and West (2013) found that students who entered middle school in 6th or 7th grade showed large drops in mathematics and writing achievement, which persisted through at least 10th grade. Boys and girls experienced similar drops in achievement after starting middle school. This decline in academic performance after entering middle school was most evident for students in urban settings, but was also significant for suburban and rural areas. These two studies demonstrate the need for concern for 6th and 7th grade students, but say little about 8th grade. They also focused on student-level effects and did not examine school-level outcomes or the impact of school-level demographics such as the racial/ethnic and socioeconomic composition of the school. Previous studies have documented the powerful influence of student demographics on school-level achievement (e.g. Hopson, Lee, & Tang, 2014; Sirin, 2005).

Eighth Grade Studies

While 6th and 7th grade studies of academic achievement generally favor elementary schools, grade configuration studies examining 8th grade are fewer and have produced less clear results. Whereas the previously described longitudinal studies found that 8th grade students in middle school underperform in comparison to 8th grade students in elementary schools, other studies found no differences in 8th grade achievement between the elementary and middle school configurations (Byrnes & Ruby, 2007; Weiss & Kipnes, 2006). Although 8th grade students most commonly attend middle schools,

approximately 17% of high schools in the United States also have 8th grade students (U.S. Department of Education, 2014). To our knowledge, only two studies have examined 8th grade students in high schools. Using a nationally representative sample of about 2,700 students from the Early Childhood Longitudinal Study, Carolan, Weiss, and Matthews (2015) found no statistically significant association between 8th grade mathematics achievement and grade configuration (e.g. K-8, 6-8, 7-12 grade schools). In contrast, an older study using a primarily rural sample found that 8th grade students in elementary schools performed better on achievement measures in comparison to those in middle schools (e.g. 6-8 grade) and junior/senior high schools (e.g. 6, 7 or 8-12 grades), with students in junior/senior high schools demonstrating the poorest academic performance (Wihry, Coladarci, & Meadow, 1992). Both of these studies suggest there is no benefit for 8th grade students to be placed in a high school over elementary or middle school configurations.

The Importance of School-Level Studies

The majority of grade configuration studies examined academic achievement at the individual student level (e.g. Rockoff & Lockwood, 2010, Schwerdt & West, 2012). While student-level analyses are important to identify associations between achievement and personal factors (e.g. student's special education status or financial background), government requirements in No Child Left Behind (NCLB) Act and the Every Student Succeeds Act (ESSA) evaluate the functioning of schools as a whole. Under ESSA, over 50% of a school's accountability is comprised of school-level academic achievement outcomes (ESSA, 2015). Accountability measures are used to determine how schools can improve student success as a whole, and can determine the level of state and federal

funding received. Therefore, it is important to examine school-level achievement scores and to make comparisons between schools with different grade configurations.

Previous research indicates that school demographic variables influence academic achievement and other predictors of student success (Hopson, et al., 2014; Klein & Cornell, 2010; Leithwood & Jantzi, 2009; Sutton & Sodderstrom, 1999). For instance, school enrollment size has been negatively associated with student engagement and academic achievement in secondary school students (Holas & Huston, 2012; Leithwood & Jantzi, 2009). Low socioeconomic status has previously been linked to poorer academic achievement (Sirin, 2005; Sutton & Sodderstrom, 1999). Additionally, schools with a high proportion of minority students have been found to have lower academic achievement (Hopson, et al., 2014; Sutton & Sodderstrom, 1999). Lastly, a nationally representative study found that urbanicity is associated with significant differences in academic achievement, with students in suburban schools having higher mathematics and reading achievement than students in urban and rural schools (Miller & Votruba-Drzal, 2015).

Present Study

In 1995 Virginia became one of the first states to develop statewide curriculum standards and institute mandatory achievement testing for the purpose of school accountability and accreditation. The Virginia Standards of Learning (SOL) exams are administered starting in grade 3 and continue through high school. The current study investigated state-mandated SOL exams for reading and mathematics in grades 6, 7, and 8. We examined school-level pass rates separately for 6^{th}, 7^{th}, and 8^{th} grades in 573 public schools of various grade configurations. Pass rates were used as the outcome variables

because schools are evaluated on the basis of passing rates rather than mean scores. Pass rates for 6th and 7th students in middle schools were compared to those in elementary schools, and pass rates for 8th grade students in middle schools were compared to those in high school configurations (there were insufficient numbers of schools with other grade configurations, such as 8th graders in elementary school).

The Commonwealth of Virginia has 133 public school divisions with each school division corresponding to a county or independent city. School divisions are led by elected school boards that serve Kindergarten through 12th grade students and have considerable autonomy in deciding how to organize their schools. Most divisions use middle schools with grades 6-7-8, but some incorporate these grades into elementary schools (e.g. K-7th) and high schools (e.g., 8th-12th grade). Decisions about grade configurations are based on judgments made by the school board about the most appropriate way to serve their students. For example, school divisions with smaller enrollment might use two rather than three schools to cover grades k-12. However, there is wide variation in school grade configurations across rural, town/suburban, and urban locales. For this reason, school demographic characteristics were assessed along with grade configuration.

One contribution of the present study is that our large and diverse sample of schools in rural, suburban, and urban locales across the state of Virginia allowed us to examine school demographic differences that may influence the relationship between grade configuration and academic achievement. For example, many of the previous grade configuration studies examined academic achievement differences in primarily urban locales (e.g. Byrnes & Ruby, 2007; Poncelet & Associates, 2009; Rockoff & Lockwood,

2010). In addition to controlling for urbanicity, the analyses controlled for school enrollment size, percentage of minority students, and percentage of students eligible for free or reduced-price meals (FRPM).

A second contribution is that the study examined achievement scores over a three-year period rather than from a single year in order the assess the consistency of findings over time. As expected, studies show that students demonstrate greater achievement gains when the content of standardized assessment closely aligns with the taught curriculum (Squires, 2009). Given that standards and achievement measures are frequently revised to reflect new practices, test performance may be affected after a revision while teachers are modifying their instruction to adapt to a new test or curriculum. A three-year time sampling increases confidence that the findings are replicable and generalizable across years. The current study examined relations between grade configuration and achievement within years (intercepts) as well as across years (slopes) to account for changes in curriculum and other factors that may affect test performance in any given year.

Third, most previous studies examined a single grade or combined 6th and 7th grades. Despite being commonly grouped together in the middle school setting, it is possible 6th, 7th, and 8th grade students may have better academic experiences in different configurations. To our knowledge, this study is the first to separately examine the relationship between grade configuration and academic achievement in all three middle grades. Lastly, whereas most studies compare students in middle schools to students in elementary schools, less is known about the academic achievement of students placed in high schools. Given that a significant proportion of high schools in Virginia include 8th

grade, we examined differences in achievement between the middle and high school configurations. Our research questions were:

1. Are 6th grade mathematics and reading pass rates in middle school different from 6th grade pass rates in elementary school?
2. Are 7th grade mathematics and reading pass rates in middle school different from 7th grade pass rates in elementary school?
3. Are 8th grade mathematics and reading pass rates in middle school different from 8th grade pass rates in high school?

Method

Sample

Analyses were conducted separately for 6th, 7th, and 8th grade. The 6th grade sample consisted of 149 elementary schools (e.g. K-6) and 270 middle schools (i.e. 6-8 grade). The 7th grade sample included 323 middle schools and 34 elementary schools (e.g. K-7 grade). The 8th grade sample contained 314 middle schools and 31 high schools (i.e. 7th or 8th-12th grade). Sixth and 7th grade analyses did not include high schools, and the 8th grade analyses did not include elementary schools due to insufficient schools with those grade configurations. Eleven schools were not included in the study because student enrollment was fewer than 15 students per grade.

School demographics are reported in Table 1. Overall, the 573 schools enrolled an average of 713 students (range 109 to 4,033), with 42% eligible for free or reduced price meals (range 1% to 99%) and 44% of racial/ethnic minority background (range 0% to 99%). The average population density (number of people per square mile within each school division) was 1,502 people (range 9 to 9,314).

Measures

Academic achievement for the 2012-2013, 2013-2014, and 2014-2015 academic years was measured using school-level pass rates for the Virginia Standards of Learning (SOL) exams. The SOL exam scores and pass rates were obtained at the school level for 6th, 7th and 8th grade students for testing in English Reading and Mathematics. The web-based state-mandated exams measure student achievement in core classes at the end of each school year to assess whether students meet the minimum expectations indicated by state standards of learning. The SOL exams both fulfill state standards for accreditation and are in compliance with the federal requirements of the *No Child Left Behind Act* (NCLB, 2006; Virginia Department of Education, 2015). For each exam, students receive a scaled score of 0 to 600, with 400 indicating a passing score and 500 indicating advanced proficiency in the subject.

The SOL exams contain test items intended to assess student knowledge and skills related to the curriculum framework for four core areas, including English, mathematics, science, and history, as well as other areas including computer technology, fine arts, economics, etc. Of these content areas, 6th, 7th, and 8th grade students are required to take mathematics and English Reading, and 8th grade students also take English Writing and Science. The state standards are reviewed and updated every seven years. In addition, test development experts and content specialists engage in a multi-phased item development process every year to assess content accuracy, grade-level appropriateness, and fairness of test items (Virginia Department of Education, 2015). New items that are approved by the Virginia Department of Education are then field-tested during the spring test administration. Overall, the 2013-2014 and 2014-2015 reading and mathematics exams

(the most recent available) demonstrated good reliability (Cronbach's alpha $\geq$.83) across gender and race for 6th, 7th, and 8th grade (Virginia Department of Education, 2014; Virginia Department of Education, 2015).

Procedure

School-level standardized test score data for the 2012-2013, 2013-2014, and 2014-2015 academic years were obtained for each school from the Virginia Department of Education (VDOE) website. The present study used pass rates in lieu of scaled scores given that schools are often held accountable based on standardized test pass rates. Analyses conducted using scaled scores yielded findings consistent with those of pass rates; however, we only report the results for pass rates given their policy relevance. School passing rates were for six Virginia Standards of Learning exams: 6th Grade Reading, 6th Grade Mathematics, 7th Grade Reading, 7th Grade Mathematics, 8th grade Reading, and 8th Grade Mathematics. School demographics (percentage of students eligible for free and/or reduced price meals, school size, percent minority students) for school year 2012-2013 were also obtained from VDOE public records. The population density for each school's attendance zone was obtained from U.S. census data (United States Census Bureau, 2012).

In order to study the differences in mathematics and reading pass rates over three years by school grade configuration, latent growth models were conducted for 6th, 7th, and 8th graders separately. For the schools with 6th and 7th grades, grade configuration was defined as 1 = elementary, and 2 = middle school. For the 8th grade schools, grade configuration was 1 = middle and 2 = high school. The factor loadings for the latent variable of intercept were fixed at 1 across all years. For the latent variable of slope, the

factor loadings of pass rates in 2013, 2014, and 2015 were fixed at 0, 1, and 2, respectively. A latent growth model for the 6th grade reading pass rate outcome is represented in Figure 1. School demographic variables (percentage of students eligible for free and/or reduced price meals, school size, percent minority students, and population density) for the year 2013 were introduced in the model as baseline covariates. All analyses were conducted in M*plus* 7.3 with the full information maximum likelihood estimation procedure to deal with missing data for covariates.

Results

Descriptive statistics were examined for all of the continuous predictors and the outcomes of mathematics and reading pass rates for the three years (Tables 1 & 2). Independent sample t-tests revealed that school demographics varied significantly by configuration, though the trends differed for the 6th, 7th, and 8th grade samples (see Table 1). In regard to SOL scores, significant differences in reading and mathematics pass rates were found across all three years for the 6th grade sample. Fewer differences in reading and mathematics achievement were found for the 7th and 8th grade samples (see Table 2).

Preliminary analyses also included the examination of Pearson's product moment correlations among the continuous variables for 6th, 7th, and 8th grades (Table 3). Reading and mathematics pass rates over the three years were generally highly correlated for each grade. Schools with higher percentages of minority students and students eligible for free or reduced price meals tended to have lower pass rates for reading and mathematics. School size was positively correlated with higher pass rates, with some variation among the grades. Lastly, population density was negatively associated with pass rates for the 7th grade sample for mathematics and reading across each of the years. There was no

relationship between population density and pass rates for 6th grade, and the relationship for 8th grade was inconsistent across the three years.

Elementary School Vs. Middle School

Sixth grade. Results of latent growth models are presented in Table 4. On average, 6th grade students in elementary schools outperformed those in the middle schools on both reading (β = -0.26, p < .001) and mathematics pass rates (β = -0.24, p < .001) across all three years after controlling for school demographics. Across the three years, the pass rates for elementary schools were, on average, 6.9% higher for reading (78.9% vs. 72.0%) and 6.2% higher for mathematics (82.5% vs. 76.3%) than middle schools. As expected, higher prevalences of FRPM and percentage of minority students in the school were significantly linked with lower reading (β = -0.74, p < .001; β = -0.13, p < .01) and mathematics pass rates (β = -0.47, p < .001; β = -0.16, p < .05). Population density and school size were not significantly associated with reading (β = -0.0002, p > .05; β =0.02, p > .05) or mathematics (β = -0.05, p > .05; β = -0.16, p > .05) pass rates. Grade configuration uniquely explained 6.3% and 10.5% of the variation in reading and mathematics pass rates, respectively. Moreover, grade configuration was not a significant predictor of slope, meaning that the relationship between grade configuration and pass rates did not change significantly across years.

Seventh grade. Results for 7th grade (Table 4) were similar to those for 6th grade. Seventh grade students in elementary schools had significantly higher pass rates than those in middle schools (β = -0.07, p < .05; β = -0.22, p < .001). After controlling for school demographics, 7th grade students in elementary schools had 2.7% higher pass rates for reading (78.5% vs. 75.9) and 14.0% higher pass rates for mathematics (83.1% vs.

69.2%) than middle schools. Schools with higher rates of FRPM and minority students had lower pass rates in 7th grade schools, whereas population density and school size were not significant predictors (see Table 4). Grade configuration uniquely explained 0.5% and 5% of the variation in reading and mathematics pass rates, respectively. Grade configuration was a significant predictor of slope for mathematics pass rates ($\beta = 0.23$, $p < .001$), but not for reading pass rates. In other words, the relationship between grade configuration and mathematics pass rates strengthened over time in 7th grade schools.

Middle School Vs. High School

8th grade. On average, 8th grade students in middle schools had higher pass rates than those in high schools on reading ($\beta = -0.11$, $p < .01$) and mathematics passing rates ($\beta = -0.17$, $p < .01$) across all three years after controlling for school demographics. In comparison to high schools, middle schools had 4.6% higher pass-rates for reading (74.7% vs. 70.0%) and 11.2% higher pass rates for mathematics (63.3% vs. 52.0%). Higher prevalence of FRPM in school was significantly associated with lower levels of 8th grade reading ($\beta = -0.79$, $p < .001$) and mathematics pass rates ($\beta = -0.30$, $p < .001$). A higher percentage of minority students was associated with lower pass rates for reading ($\beta = -0.13$, $p < .05$). Again, school size and population density did not predict achievement. Grade configuration uniquely explained 7% and 3.4% of the variation in reading and mathematics pass rates, respectively. It was not a significant predictor of slope.

Discussion

The present study found that school-level pass rates for 6th and 7th grade reading and mathematics exams were consistently lower in middle schools than in elementary

schools. Results were reliable across a three-year sampling period, and after controlling for potentially confounding school demographics. These findings align with previous grade configuration studies that found lower academic achievement for 6th and 7th grade students in middle schools in comparison to students who are placed in elementary schools through at least 7th grade (e.g. Cook et al., 2008; Poncelet &Associates, 2004; Rockoff & Lockwood, 2010).

For both 6th and 7th grade, reading pass rates were stable across the three years. For 7th grade mathematics, however, statewide pass rates increased over the three-year sampling period. This is likely the result of a restructure of the mathematics SOL assessment during the first sampling year; pass rates were significantly lower for that academic year than the following two years. These findings highlight the importance of using multiple time samples because changes in standards and curricula will influence test performance (Squires, 2009). Overall, these results suggest that the commonly used 6th-8th grade middle school configuration may not be the most suitable placement for 6th and 7th grade students.

Eighth grade pass rates in middle schools were significantly higher than high school pass rates for both reading and mathematics. These results are in contrast to a study that found no significant differences in mathematics achievement for 8th grade students in middle and high schools (Carolan et al., 2015). However, the previous study was based on student-level data from a large number of schools in multiple states averaging only 2.7 students per school, and used only one time point to assess achievement. Results from the current study are partially supported by an older school-level study that found that 8th grade students in middle schools had higher achievement

than 8th grade students in high schools, though the study found that students in elementary school showed the highest achievement (Wihry, et al., 1992).

Notably, the effect sizes for grade configuration on pass rates were the strongest for 6th and 8th grades. Effect sizes for reading were 6.3%, 0.5%, and 4.6% for 6th, 7th, and 8th grade, respectively. For mathematics, grade configuration accounted for 10.5%, 5%, and 11.2% of the variance in achievement for each of the respective grades. Sixth and 7th grade pass rates were highest in elementary configurations (e.g. K-6th or 7th grade schools), where most students have been in attendance for several years. For 8th grade, pass rates were highest in middle schools, where most students have been in attendance for nearly three years, in comparison to one or two years in the high school configuration (i.e. 7th-12th or 8th-12th grade schools). The smaller effect sizes for 7th grade pass rates may be because, with few exceptions, 7th grade is not typically a transition year in Virginia. Seventh grade students in middle schools, although still demonstrating weaker academic performance than those in elementary schools, have had more time to adjust to the new environment. These findings show some consistency with research concluding that students who change schools, regardless of whether the transition was compulsory (e.g. starting middle school) or non-compulsory (e.g. family move), show lower achievement growth the year immediately following the transition (Grigg, 2012).

The current study controlled for four school demographics: school size, urbanicity, school racial composition, and socioeconomic status. Consistently across grades, schools with high numbers of students who qualified for free or reduced price meals had lower achievement scores. These findings align with meta-analyses that identify a strong negative correlation between school-level socioeconomic status and

academic achievement (Sirin, 2005). Additionally, schools in our sample with a high proportion of minority students also had lower achievement, consistent with another middle school study (Hopson et al., 2014).

Unlike other studies (Leithwood & Jantzi, 2009; Miller & Votruba-Drzal, 2015), neither urbanicity nor school size were associated with academic achievement in our sample. One reason for these findings may be that our sample had a large and diverse sample of schools with a range of socioeconomic status and minority composition in both large and small schools from urban, suburban, and rural settings. This allowed us to distinguish effects of race and socioeconomic status from urbanicity and school size, which are often confounded in smaller samples, such as studies of urban school systems serving largely minority and low income populations. Although U.S. Census data show that children in urban areas have higher poverty rates than children in more rural areas, in the state of Virginia, a large number of school systems are located in affluent urban locales (United States Census Bureau, 2016). Large-scale studies have found that urbanicity moderates the relationship between SES and achievement, though with varying outcomes. For example, one meta-analysis found that SES had the largest effects on achievement for suburban schools (Sirin, 2005), while results from a recent nationally representative study suggest that SES is most strongly correlated with achievement in urban locales (Miller & Votruba-Drzal, 2015). In sum, while the present study found a significant relationship between grade configuration and academic achievement notwithstanding demographic differences, it is important to recognize the effect of demographics on achievement.

One possible explanation for these findings is that the transition into a new school has detrimental effects on student achievement. Many researchers (e.g. Eccles, Lord, & Midgley, 1989; Simmons & Blyth, 1987) have blamed the developmental timing of the transition into middle school for poorer achievement and other negative outcomes. Early adolescence has been associated with a host of psychological and social-emotional difficulties, including the emergence of psychological disorders (Mendle, 2014; Merikangas, Nakamura, & Kessler, 2009), high rates of bullying (Nansel et al., 2001), less academic motivation (Goldstein et al., 2015), and low self-esteem (Robins, & Trzesniewski, 2005). When directly compared to students in other grade configurations, middle school students report even lower self-esteem (Simmons & Blythe, 1987, Weiss & Kipnes, 2006) and higher rates of bullying and victimization (Anderman & Kimweli,1997; Malone, Cornell, & Shukla, 2016) than their same-grade peers, thus placing them at a disadvantage. It is possible that incurring a school transition during the middle grades may exacerbate the vulnerability that early adolescents typically experience, thus resulting in poorer academic engagement, motivation, and achievement.

It is also important to consider classroom factors associated with student achievement. In one grade configuration study, there was no direct association between 6th grade school transition and academic achievement; however, classroom quality was indirectly associated with student academic achievement and perceived self-competence (Holas & Huston, 2012). Students with supportive teachers have higher academic achievement and demonstrate greater effort and persistence, are more academically motivated, and are more engaged at school (Lee, 2012; Stroet, Opdenakker, & Minnaert, 2013). However, a recent statewide study of middle grade students in Virginia found no

significant differences in perceived teacher support for middle grade students in elementary, middle, and high school grade configurations, indicating that middle school students perceive their teachers as equally supportive as students in other grade configurations (Malone, et al., 2016).

Limitations and Future Directions

This study has several methodological limitations. First, this study is correlational in nature. For obvious reasons, students could not be randomly assigned to a specific grade configuration. Second, school divisions that choose to place their middle grade students in elementary and high school configurations may have other differences that were not measured in this study, such as higher quality teachers and administration, or more favorable school climates. Third, this study was unable to examine 8th grade academic achievement in elementary schools because K-8 grade schools are an uncommon grade configuration in Virginia. Having this comparison group would have provided additional information about potential benefits of extending elementary school through the middle grades.

Though it is important to analyze student performance at the school level given that schools are held accountable based on school-level achievement, student-level test performance and demographic data can also be beneficial in recognizing student characteristics (e.g. socioeconomic status) associated with achievement gains or drops after a transition into a new school. Future studies may consider using both student- and school-level academic achievement. Multi-level models that account for the nesting of students within schools can provide important information about school wide

performance, and also how individual students perform before and after transitioning into a new school.

Another important direction for future study is to consider potential school-level mediators, such as school climate or teacher quality, that influence the relations between grade configuration and academic achievement. It is possible that middle schools with more favorable school climates or higher quality teachers have pass rates comparable to those in elementary or high schools. Finally, this study was concerned with test passing rates, which is a limited basis for comparing grade configurations. There may be other academic or socio-emotional advantages to middle schools that were not considered in this study.

Conclusion and Implications

The current study adds to the growing body of research that experiencing a school transition during early adolescence is associated with detrimental outcomes. While some studies show non-significant differences between grade configurations, to our knowledge there is no empirical evidence that shows negative outcomes for placing students in elementary schools through at least 7th grade. Although we were not able to examine 8th grade achievement in elementary schools due to the limited number of elementary schools configured through 8th grade in the state of Virginia, previous studies support the practice of limiting the number of school transitions for 8th grade students, as well. We recommend that school administrators and other officials examine evidence-based practices for middle school reformation (Juvonen et al., 2007), and consider the possibility that the elimination of middle school is a viable option.

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Table 1

School-level demographics.

	6th Grade					7th Grade					8th Grade				
	Elementary		Middle			Elementary		Middle			Middle		High School		
	Mean	SD	Mean	SD	t-test	Mean	SD	Mean	SD	t-test	Mean	SD	Mean	SD	t-test
FRPM[1]	37.54	24.84	43.38	20.99	-2.63**	56.53	13.58	42.69	20.96	5.31***	42.34	21.04	44.37	15.64	-.67
Total Enrollment	626.82	228.74	775.63	310.59	-5.90***	478.59	273.74	771.08	315.00	-5.84***	780.52	311.03	820.26	992.94	-.22
Percent Minority	48.42	28.08	43.72	26.33	1.80	21.45	25.82	42.97	25.79	-4.62***	43.61	25.53	16.41	17.90	7.71***
Population Density[2]	2167.09	1295.05	1205.70	1825.29	6.59***	726.89	1859.15	1067.14	1593.77	-1.01	1089.16	1612.48	466.14	855.28	3.44***

*$p < .05$, **$p < .01$, ***$p \leq .001$

Note: In a few cases, schools did not report SOL scores for mathematics or reading for a particular grade or year, and were omitted from analyses. Therefore, sample sizes for mathematics and reading differ slightly across analyses.

[1]Percent of students in school eligible for free or reduced priced meals

[2]Average number of residents per square mile within school division

Table 2

School-level pass rates by year.

	6th Grade					7th Grade					8th Grade				
	Elementary		Middle			Elementary		Middle			Middle		High School		
	Mean	SD	Mean	SD	t-test	Mean	SD	Mean	SD	t-test	Mean	SD	Mean	SD	t-test
2013 Reading Pass Rate	79.4	13.08	71.7	11.80	6.58***	73.7	9.90	74.2	11.71	-.258	70.3	12.48	66.5	10.49	1.91
2013 Mathematics Pass Rate	82.3	12.11	76.2	12.11	5.13***	60.3	19.47	53.0	19.94	2.06*	50.6	20.38	40.7	17.69	2.88**
2014 Reading Pass Rate	79.4	12.57	71.1	12.26	6.98***	72.6	10.36	75.3	11.30	-1.38	69.8	12.77	65.4	10.46	2.18*
2014 Mathematics Pass Rate	82.5	12.26	73.9	14.55	6.85***	63.3	16.55	58.4	19.42	1.78	56.4	19.80	53.3	20.05	.78
2015 Reading Pass Rate	83.0	10.27	74.6	11.16	8.17***	81.8	9.19	80.6	10.03	.75	74.9	11.44	74.4	7.12	.39
2015 Mathematics Pass Rate	86.1	9.61	81.1	12.03	4.99***	69.9	14.51	66.4	17.81	1.30	65.6	17.86	63.3	14.98	.78

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

Table 3

Correlations of pass rates by year and demographics.

		1	2	3	4	5	6	7	8	9
1	2013 Reading Pass Rate									
	6th	-								
	7th	-								
	8th	-								
2	2014 Reading Pass Rate									
	6th	0.88**	-							
	7th	0.85**	-							
	8th	0.82**	-							
3	2015 Reading Pass Rate									
	6th	0.84**	0.84**	-						
	7th	0.79**	0.84**	-						
	8th	0.77**	0.81**	-						
4	2013 Mathematics Pass Rate									
	6th	0.72**	0.66**	0.62**	-					
	7th	0.74**	0.64**	0.61**	-					
	8th	0.50**	0.38**	0.35**	-					
5	2014 Mathematics Pass Rate									
	6th	0.67**	0.73**	0.62**	0.75**	-				
	7th	0.66**	0.71**	0.65**	0.77**	-				
	8th	0.40**	0.47**	0.40**	0.72**	-				
6	2015 Mathematics Pass Rate									
	6th	0.65**	0.65**	0.74**	0.68**	0.73**	-			
	7th	0.64**	0.67**	0.72**	0.71**	0.83**	-			
	8th	0.42**	0.43**	0.50**	0.65**	0.77**	-			
7	FRPM									
	6th	-0.84**	-0.81**	-0.79**	-0.55**	-0.53**	-0.53**	-		
	7th	-0.79**	-0.80**	-0.72**	-0.62**	-0.60**	-0.58**	-		
	8th	-0.78**	-0.79**	-0.76**	-0.31**	-0.35**	-0.36**	-		
8	School Size									
	6th	0.16**	0.15**	0.13*	-0.004	0.02	0.03	-0.28**	-	
	7th	0.24**	0.23**	0.19**	0.12*	0.13*	0.08	-0.42**	-	
	8th	0.30**	0.30**	0.20**	0.03	0.02	-0.009	-0.37**	-	
9	Percent Minority									
	6th	-0.41**	-0.43**	-0.43**	-0.34**	-0.39**	-0.49**	0.49**	0.15**	-
	7th	-0.49**	-0.48**	-0.48**	-0.46**	-0.44**	-0.48**	0.37**	0.34**	-
	8th	-0.35**	-0.41**	-0.49**	-0.19**	-0.31**	-0.37**	0.43**	0.25**	-
10	Population Density									
	6th	-0.002	-0.004	0.03	-0.06	-0.07	-0.07	-0.05	0.04	0.52**
	7th	-0.18**	-0.16**	-0.15**	-0.15*	-0.16**	-0.15**	0.11*	0.15**	0.47**
	8th	-0.07	-0.08	-0.11**	-0.08	-0.15**	-0.24**	0.11*	0.18**	0.46**

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

Table 4

Latent Growth Model Results

	6th Grade		7th Grade		8th Grade	
	Reading	Mathematics	Reading	Mathematics	Reading	Mathematics
Intercept						
Population Density	-0.002	-0.05	-0.01	0.04	0.05	-0.05
FRPM	-0.74***	-0.47***	-0.79***	-0.64***	-0.79***	-0.30***
School Size	0.02	-0.07	0.02	0.01	0.07	-0.03
Percent Minority	-0.13**	-0.16*	-0.21***	-0.20**	-0.13*	-0.10
Grade Configuration	-0.26***	-0.24***	-0.7*	-0.22***	-0.11**	-0.17**
R2	0.811	0.409	0.80	0.54	0.76	0.15
Change in R2	0.063	0.105	0.005	0.049	0.07	0.034
Slope		-				
Population Density	0.06	-0.001	0.14	0.04	0.06	-0.08
FRPM	0.63**	0.30**	0.53**	0.28**	0.40*	0.13
School Size	0.14	0.19*	0.01	-0.02	-0.12	0.06
Percent Minority	-0.38**	-0.26*	-0.06	-0.17	-0.36*	-0.18
Grade Configuration	-0.16	-0.09	-0.01	0.23**	0.09	0.07
R2	0.196	0.05	0.29	0.09	0.26	0.05

**p < .05, **p < .01, ***p < .001*

Note. Grade configuration was coded as 1= elementary & 2= middle school for 6th & 7th graders; and 1= middle & 2 = high school for 8th graders.

Manuscript Three

Does School Climate Mediate the Relations Between Grade Configuration and Academic Achievement?

Marisa Malone, Dewey Cornell, & Tim Konold

Curry School of Education, University of Virginia

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Abstract

The vast majority of middle grade students in the United States attend 6th-8th grade middle schools. However, educational research on school grade configuration generally associates K-8th elementary grade schools with more favorable student outcomes. The present study examined linkages between school climate and academic achievement for 6th and 7th grade students who attend elementary versus middle schools. The sample consisted of 48,337 students in 6th and 7th grade from 41 elementary and 269 middle schools who completed a statewide school climate survey. The measure of school climate was comprised of three components that are central to authoritative school climate theory: disciplinary structure, academic expectations, and student support. Academic achievement was measured by school-level pass rates for end-of-year standardized reading and mathematics exams. Results indicated that elementary schools demonstrated higher test passing rates and more favorable student perceptions of school climate. School climate partially mediated the relations between grade configuration and test passing rates for 6th and 7th grade reading, but not mathematics. This study contributes to middle school research by showing how a positive school climate could help explain the higher achievement of students in elementary school grade configurations than in middle schools.

Does School Climate Mediate the Relations Between Grade Configuration and Academic Achievement?

In the United States, most public school students currently attend 6th-8th grade middle schools. Middle school is a relatively new construct in American education that began when educators observed that students attending junior high schools experienced decreased engagement, weaker teacher-student relationships, and academic decline (Eccles, Lord, & Midgley, 1991; Simmons & Blyth, 1987). Junior high schools were intended to serve as a transitional period that prepared students for the demands of high school. Consequently, expectations in junior high schools were often strict, with emphasis placed on content mastery rather than exploration (Juvonen, Le, Kaganoff, Augustine, & Constant, 2004). In addition, junior high school students needed to adapt to structural changes, including larger class and school sizes, and accountability to a greater number of teachers (Herman, 2004).

Beginning in the 1970s, researchers began to develop a middle school concept that was intended to meet the unique developmental needs of emerging adolescents. Reformists envisioned middle schools to be emotionally and developmentally responsive environments that facilitated learning by creating positive school climates that emphasize close teacher-student relationships and appropriate rules and expectations that promote student engagement in learning (Eccles et al., 1993; Juvonen, et al., 2004). In response to efforts to improve the school experience for middle grade students, thousands of school divisions throughout the United States restructured their junior high schools into middle schools that serve 6th, 7th, and 8th grade students. The number of middle schools in the United States has more than doubled from 6,003 in 1980 to 13,322 in 2014), and the

number of junior high schools was reduced by over 50% (5,890 junior high schools in 1980 vs. 2,719 in 2014; U.S. Department of Education, 2014).

Despite the push by researchers and educators to redesign middle schools, many of the known problems of attending junior high school remain prevalent. Middle school students still experience considerable changes in expectations after the transition from elementary school, including increased academic and behavioral demands. Consistent with earlier research on junior high schools, students in middle schools continue to report low self-esteem, motivation, and perceived academic abilities, have lower grade point averages, and demonstrate high rates of truancy (Anderman, 2002; Anderman & Midgley, 1997; Goldstein, Boxer, & Rudolph, 2015; Schwerdt & West, 2013; Weiss & Kipnes, 2006).

While most American public school students attend middle schools, there are still a significant proportion of middle grade students that attend other grade configurations, such as elementary schools that contain middle grades (e.g. K-8th grade), high schools that contain middle grades (e.g. 7th-12th grade), or combined schools that serve all grades (i.e. K-12th grade). There are various reasons why school divisions configure their grades in a particular manner. Some school authorities across the United States have considered developmental theory and educational research when choosing how to structure their schools (Herman, 2004). More often, however, school systems are bound by practical and financial constraints that limit their options for the grade configurations used in their schools. For example, in rural divisions, schools are sometimes configured based on geographic considerations such as minimizing transportation cost and allowing students to attend schools closer to their residences (M. Burnette, personal communication,

August 7, 2017). Financial considerations are also important; some schools are closed or consolidated to save money, which may result in fewer schools that serve more grades. Divisions that have more flexibility in choosing their grade configuration groups tend to make decisions based on enrollment projections, public opinion, and overall cost of maintaining the school system (H. Kiser, personal communication, August 17, 2017).

Grade Configuration and Achievement

An emerging body of research generally indicates that students in 6th and 7th grade show more favorable academic achievement outcomes when enrolled in schools that contain elementary grades (e.g. K-8) in comparison to middle schools. A large, 10-year longitudinal study of reading and mathematics achievement for students in New York City schools found that 6th and 7th grade students in elementary schools demonstrated higher achievement scores than same-grade students who experienced a transition into middle school in either 6th or 7th grade (Rockoff & Lockwood, 2010). The timing of the school transition was also important; students who entered middle school in 6th grade had a greater loss of achievement than those who began middle school in 7th grade.

A longitudinal statewide sample of students in Florida also found that students who entered middle school in 6th or 7th grade experienced sharp declines in academic performance, which was prevalent through at least 10th grade (Schwerdt & West, 2013). Students in urban schools were at the greatest risk for low achievement; however, students in suburban and urban locales also experienced lower achievement. The transition into middle school in 6th grade was also associated with greater likelihood of high school drop out by 10th grade.

Other statewide, non-longitudinal samples provide similar findings. For example, in North Carolina, students who entered middle school in 6th grade experienced poorer reading achievement in comparison to 6th grade students who remained in elementary schools (Cook, MacCoun, Muschkin, & Vigdor, 2008). In Virginia, 6th and 7th grade pass rates for standardized reading and mathematics assessments were significantly lower in middle schools than elementary schools (Malone, Cornell, & Shukla, 2017). In a randomly selected sample of schools in Louisiana, 6th and 7th grade students in middle schools consistently had lower achievement scores for mathematics and language arts than students in elementary schools (Franklin & Glascock, 1998). Students in the elementary schools also demonstrated more positive school behaviors, including better school attendance and lower suspension rates. Other smaller studies also reported favorable academic outcomes for middle grade students placed in elementary configurations (e.g. Alspaugh, 1998; Poncelet & Metis Associates, 2009; Wren, 2003).

School Climate

An important factor to consider within the middle school context is school climate. School climate is broadly defined as the "quality and character of school life," and includes the "norms, values, and expectations that support people feeling socially, emotionally, and physically safe" at school (Cohen, McCabe, Michelli, & Pickeral, 2009, p. 182). School climate is a multidimensional construct generally linked to student engagement and academic achievement, and educators assert that it is important to recognize and examine how specific facets of school climate separately and cumulatively relate to academic success (Wang & Degol, 2016).

Eccles, Roeser, and colleagues advocated for positive school and classroom environments (i.e. school climate) that would meet the psychological, social, and academic needs of emerging adolescents (Eccles et al., 1993; Roeser et al., 1998). In a series of studies, Roeser et al. (1998) conceptualized a "positive school psychological environment" as consisting of three constructs: support of competence, support of autonomy, and quality of relationships. Support of competence includes students' perceptions that their teachers emphasize task mastery and engagement over ability, a non-competitive academic setting, and recognition of academic improvement. Support of autonomy consists of students' sense of independence and decision making in the classroom. Lastly, quality of relationships with teachers is defined as supportive teacher-student relationships that appear to be equitable across gender and race. Results showed that favorable perceptions of these three constructs were associated with higher academic motivation, grade point averages, and overall positive emotional functioning (Roeser et al. 1998). Similarly, Way, Reddy, & Rhodes (2007) found that positive school climate predicts psychological adjustment (i.e., high self-esteem and low depressive symptoms) and fewer behavioral problems in middle school students.

Authoritative school climate (ASC) theory (Gregory & Cornell, 2009) is another conceptual model of school climate that identifies facets of school climate that should be related to academic achievement. ASC theory is derived from Baumrind's (1968) model of authoritative parenting which has found that parents who are both demanding and emotionally responsive (authoritative) are more effective than parents who are demanding but not emotionally responsive (authoritarian), emotionally responsive but not demanding (permissive), or lacking in both demandingness and responsiveness

(disengaged or neglectful) (Larzelere et al., 2013). Parental demandingness and emotional responsiveness have been associated with higher grade point averages or achievement test scores both separately, and when used together (i.e. authoritative parenting style; Pinquart, 2016). ASC theory postulates that high levels of structure (i.e. demandingness) and student support by teachers and other school staff are associated with favorable student outcomes.

Authoritative School Climate and Academic Achievement

In ASC theory, structure, also referred to as demandingness, consists of two elements: disciplinary structure and academic expectations. Disciplinary structure refers to high behavioral expectations for students and is operationally defined as student perceptions that school rules are strict, but fair. Academic expectations refer to perceptions that teachers demand a high level of effort and academic performance from their students. High student support is defined as positive teacher-student relationships in which students perceive that their teachers are respectful, interested in their success, and demonstrate willingness to help them succeed (Gregory & Cornell, 2009).

Student support and both components of structure have been linked to academic success. A systematic review of teacher-student relationships also associated student support with greater student effort, motivation, engagement, and academic achievement in young adolescents (Stroet, Opdenakker, & Minnaert, 2013). High student support is also associated with higher self-esteem and fewer depressive symptoms in middle school students (Jia et al., 2009). High academic expectations, often referred to as academic press in the educational literature, has been associated with student engagement (Lee, 2012; Pellerin, 2005), and higher mathematics and science achievement in middle and

high school students (Dever & Karabenick, 2011; Hoy, Tarter, & Hoy, 2006). In a large sample of 7th and 8th grade students, Cornell, Shukla, and Konold (2016) found that high disciplinary structure and student support were separately associated with higher levels of engagement, self-reported grades, and educational aspirations (e.g. planning to attend college). Using latent class modeling, a study of high school students revealed that students in a positive school climate group (e.g. highest reports of disciplinary structure, academic expectations, and other components of school climate) reported the highest self-reported grades and educational aspirations in comparison to students experiencing less favorable climates (Shukla, Konold, & Cornell, 2016).

Grade Configuration and School Climate

Few studies have directly compared differences in student perceptions of school climate of middle schools in comparison to other grade configurations. Malone, Cornell, and Shukla (2016) examined student perceptions of school climate for 7th and 8th grade students across four areas of school climate: disciplinary structure, student support, student engagement, and prevalence of teasing and bullying. Multilevel analyses revealed that 7th grade students in middle schools reported poorer disciplinary structure and a higher prevalence of teasing and bullying than 7th grade students in elementary school configurations. There were no differences between school configurations for student reports of engagement or teacher-student support. Eighth grade students in middle schools reported poorer student engagement and high rates of prevalence of teasing and bullying than students in high schools (Malone et al., 2016). Other studies indicated that students in middle schools report higher rates of personal experiences of bullying and

victimization in comparison to students in other grade configurations (Anderman & Kimweli, 1997; Weiss & Kipnes, 2006).

A related study analyzed school climate practices and academic achievement in 42 West Virginia high schools (9 of which were high schools that also included elementary and middle grades; Whisman, 2013). Positive school climate was characterized by high student engagement, favorable ratings of the environmental setting (e.g. low disciplinary problems, supportive learning environment) and perceptions of physical and emotional safety (e.g. low rates of fighting or bullying). High overall ratings of school climate were associated with positive academic outcomes, including high proficiency in social studies and reading, high growth percentiles in mathematics. The study controlled for various school-level demographics, including student SES, percentage of students with disabilities, school size, and grade configuration (Whisman, 2013). Analyses revealed that positive school climate moderated the relationship between mathematics/reading proficiency and school-level demographics, including grade configuration, by 16.5% and 60.4%, respectively. Grade configuration was not analyzed individually, but instead was considered along with other school-level demographic variables given that it had a small effect on most of the academic achievement outcomes. Other studies that examined the transition into high school found that students do not experience declines in achievement upon entering high school as substantial as they do in middle school (Schwerdt & West, 2013).

Demographic Considerations

Previous research shows that school-level demographic variables significantly contribute to differences in students' perceptions of school climate and differences in

academic achievement. For instance, school size has been negatively associated with student engagement (Holas & Huston, 2012) and academic achievement in secondary school students, particularly among those who have a history of struggling academically (Leithwood & Jantzi, 2009). There is also some evidence that students in large schools perceive higher rates of teasing and bullying, though findings are mixed and may not be directly associated with actual rates of student victimization (Klein & Cornell, 2010; Tayli, 2013).

School-level socioeconomic (SES) and racial minority status are both negatively associated with school climate and academic achievement, though the relations among these demographic characteristics are often complex (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005; Hopson, Lee, & Tang, 2014). A large meta-analysis found an overall strong association between school-level SES status and academic achievement (Sirin, 2005). The relationship between SES and achievement was significantly higher in middle school samples than in elementary or high school samples; however, the association weakened when schools had a greater number of minority students.

Lastly, urbanicity is often associated with significant differences in academic achievement, though the relationship is generally moderated by other demographic factors, such as family socioeconomic status (Miller & Votruba-Drzal, 2015; Sirin, 2005). One nationally representative study found that students in suburban schools outperformed students in rural and urban schools in mathematics, reading, and science (Miller & Votruba-Drzal, 2015). The magnitude of the relationship differed when family income was considered; income was more strongly associated with reading and science performance in urban than in rural and suburban areas. In sum, these studies emphasized

the importance of recognizing individual and combined effects of school-level demographics when analyzing student outcomes.

Present Study

Researchers have proposed that the school climate of middle schools is problematic and may be associated with unfavorable academic outcomes (Eccles, 2004). The present study examined the role of school climate as having both a direct association with academic achievement, and as functioning as a mediator between grade configuration and student achievement. Our measure of school climate captured three primary facets of ASC theory: disciplinary structure, academic expectations, and student support. Analyses were conducted on a statewide sample to examine whether school grade configuration (i.e. elementary vs. middle school) and school climate were associated with 6th and 7th grade academic achievement. This study did not examine 8th grade because few schools in Virginia grouped their 8th grade students in elementary schools. All analyses were conducted separately for 6th and 7th grade.

The present study addressed the following research questions:

1) Is there a significant difference in student perceptions of school climate for students in elementary schools in comparison to same-grade students in middle schools?
2) Is there a significant difference in reading and mathematics achievement for students in elementary schools in comparison to same-grade students in middle schools?
3) Does school climate mediate the relationship between grade configuration and academic achievement for students in elementary and middle schools?

Method

Participants

The sample consisted of 48,337 students 6th and 7th grade students from 310 schools who participated in the 2017 Virginia Secondary School Climate Survey, a component of the state's annual School Safety Audit program (Cornell et al., 2017). The survey was administered in the spring of 2017 to all state public schools with 7th and/or 8th grade enrollment. This was the first year that the survey was made available for 6th grade students; therefore, the state decided that only schools with 7th and/or 8th grade students would be asked to include their 6th grade students in the survey process (e.g. K-6th grade schools were not invited to participate).

All students were eligible to participate with the exception of students with limited English proficiency or students with intellectual disabilities that prevented them from completing the survey. School principals were given the option to invite all of their 6th, 7th, and 8th grade students to participate in the survey (whole grade option), or to randomly select 25 students from each grade (random sample option). For schools that chose the random sample option, detailed instructions and a random number list for participant selection were provided. Student surveys were returned from 410 of the 418 eligible schools, a participation rate of 98.7%. The student participation rate was approximately 85.1% for schools that used the whole grade option, and 73.3% for schools that used the random sample option. Overall, the student participation rate was 82.8% of students invited to take the survey. Of the participating 6th-8th grade students, 271 student surveys (0.3%) were excluded because it was judged that they were completed in less time than would have been necessary to read and carefully answer all items (see Cornell

et al., 2017), and 5,260 additional surveys (5.8%) were excluded from analyses due to student report of not answering items truthfully on two validity-screening items.

Of the initial screened sample of 410 schools, 310 schools were eligible for analysis because they either included 6th and 7th grade in an elementary school configuration (e.g. K-7th grade; 42 schools) or were a traditional middle school (i.e. 6th-8th grade; 270 schools). Of the omitted schools, 24 did not include 6th or 7th grade (e.g. 8th-12th grade schools), and 76 schools had less-commonly used grade configurations (e.g. 7th-12th grade schools). Lastly, two additional schools were omitted from analyses because they did not report SOL exam pass rates. Analyses were conducted separately by grade because 6th and 7th grade students may have different perceptions of their school environment (e.g. Wang & Dishion, 2011; Way, Reddy, & Rhodes, 2007). The sample sizes vary slightly by grade because a small number of schools did not survey their 6th or 7th grade students despite being prompted to do so (e.g. a few schools surveyed their 6th grade students but not 7th grade).

The analytic sample for 6th grade consisted of 24,111 students (50.3% female) from 304 schools (40 elementary and 264 middle schools). Based on student self-report, the racial/ethnic breakdown of the students was 52.3% Caucasian, 16.8% African American, 14.9% Hispanic, 4.7% Asian American, 3.0% American Indian or Alaska Native, 0.8% Native Hawaiian or Pacific Islander, and 22.4% who identified with more than one race. Approximately 38.9% of students report receiving a free or reduced-priced meal at school.

The 7th grade sample included 24,226 students (51.2% female) from 310 schools (41 elementary and 269 middle schools). The racial/ethnic breakdown of the students

surveyed was 54.4% Caucasian, 16.1% African American, 13.6% Hispanic, 5.0% Asian American, 2.3% American Indian or Alaska Native, 0.8% Native Hawaiian or Pacific Islander, and 21.4% who identified with more than one race. Approximately 36.5% of students reported receiving a free or reduced-priced meal at school.

Measures

School climate. Students completed a statewide school climate survey that consisted of approximately 100 items that assessed student perceptions of school climate characteristics and safety conditions. The survey was administered anonymously online under teacher supervision using Qualtrics software. The median completion time was 17.6 minutes. Student responses were aggregated within schools to calculate school means. Three scales that together represent the authoritative school climate model (see Appendix A for items) were included in our investigation: Disciplinary Structure, Academic Expectations, and Student Support. Previous multilevel factor analyses of these scales revealed strong evidence of construct validity at the item level for both student- and school-levels of investigation (Konold et al., 2014). Students rated all items on a four-point scale: "*strongly disagree,*" "*disagree,*" "*agree,*" and "*strongly agree.*" Descriptions for each of the scales are provided below. Previous analysis of the full sample of 410 schools showed excellent reliabilities (range: .88 to .96) for the scales at the school level (Cornell et al., 2017).

Disciplinary structure. This 7-item scale assessed student perceptions of school discipline as strict, but fair. In previous studies, high disciplinary structure has been associated with high student-reported grades, academic aspirations, and student

engagement (Cornell, et al., 2016), as well as lower student victimization (Cornell, Shukla, & Konold, 2015; Gregory et al., 2010).

Academic expectations. This 5-item scale assessed student perceptions of teachers' academic expectations. Sample items include "*My teachers expect a lot from students*" and "*My teachers really want me to learn a lot.*" High academic expectations are associated with student engagement (Lee, 2012; Pellerin, 2005), middle school mathematics performance (Dever & Karabenick, 2011), and lower high school dropout rates (Jia, Konold, & Cornell, 2015).

Student support. The 8-item Student Support scale assessed student perceptions that teachers and school staff respect and care about all students, and student willingness to seek help from adults at school. High ratings of student support are associated with academic achievement, engagement, and academic aspirations (Cornell et al., 2015), and lower dropout rates (Jia et al., 2015). Student support is also associated with higher perceptions of school safety, and lower bullying and victimization (Cornell et al., 2015; Gregory et al., 2010).

Student achievement. Academic achievement was measured using 2017 school-level pass rates for the 6th and 7th grade Virginia Standards of Learning (SOL) end-of-year reading and mathematics exams. The state-mandated exams fulfilled state standards for accreditation and were in compliance with the federal accountability requirements of the new Every Student Succeeds Act (ESSA, 2015; Virginia Department of Education, 2017). The SOL exams were untimed and administered on a computer at the end of the academic year. For 6th and 7th grade students, the exams were similar in format and were designed to assess academic competency based on the Virginia Standards of Learning

and Curriculum Framework (Virginia Department of Education, 2017). Students receive a scaled score of 0 to 600 for each exam, with 400 indicating a passing score and 500 indicating advanced proficiency in the subject.

The 6th and 7th grade SOL exams contain test items intended to assess student knowledge and skills related to the curriculum framework for reading and mathematics. The state standards are reviewed and updated every seven years; however, test development experts and content specialists engage in a multi-phased item development process every year to assess content accuracy, grade-level appropriateness, and fairness of test items (Virginia Department of Education, 2015). New items approved by the Virginia Department of Education are field-tested during the spring test administration. Overall, the 2014-2015 reading and mathematics exams (the most recent available) demonstrated good reliability (Cronbach's alpha $\geq$ .85) across gender and race for 6th and 7th grade (Virginia Department of Education, 2015).

Beginning in 2014-2015 academic year, computerized adaptive testing (CAT) was added to the 6th grade mathematics SOL exam, which used an algorithm that adjusts difficulty of test items based on students' ability level, and resulted in fewer number of items administered to measure student achievement level. CAT was used for the 6th, 7th, and 8th grade mathematics SOL exams beginning in the 2015 academic year (Virginia Department of Education, 2015). The overall reliability for the new 6th grade mathematics exam was high across gender and race (Cronbach's alpha $\geq$ .92). Reliabilities for the most recent 6th and 7th grade mathematics exams are not yet available.

Covariates. Given that previous research shows the influence of demographics on school climate and achievement (e.g. Cornell et al., 2016; Hopson, et al., 2014; Konold,

2017; Leithwood & Jantzi, 2009; Miller & Votruba-Drzal, 2015; Sirin, 2005), the present study controlled for school size, population density, percentage of students eligible for free and/or reduced price meals, and percentage of minority students within a school. School demographics were obtained from the Virginia Department of Education public records for the 2016-2017 academic year and included percentage of students eligible for free and/or reduced price meals, school size (i.e. total enrollment), and percent of minority students enrolled. The population density for each school's attendance zone was obtained from U.S. census data (United States Census Bureau, 2012).

Data Analytic Plan

The analytic samples were previously screened for invalid responders (e.g. admitting to answering survey items dishonestly) and exclusionary criteria (e.g. completing the survey too quickly) (see Cornell, et al., 2017). Preliminary analyses showed that the correlations amongst the school climate scales were moderate to large (.53 to .86; see Table 1). As a preliminary step, confirmatory factor analysis examined the viability of a single ASC factor comprised of the three primary ASC scales. A global measure of ASC also supports the theoretical framework of ASC theory, such that high ratings across disciplinary structure, student support, and academic expectations are together associated with favorable student outcomes (Cornell et al., 2015; Cornell et al., 2016).

To address the first research question, analysis of covariance (ANCOVA) was used to compare the elementary and middle school configuration groups on student-reported perceptions of school climate, controlling for school demographics (i.e., population density, school size, percent minority students, and percentage of students eligible for

free or reduced-price meals). To address the second research question, four ANCOVAs were conducted to examine differences between school configuration groups for 6th and 7th grade reading pass rates and 6th and 7th grade mathematics pass rates, controlling for the four school demographics. To address the third research question, four mediated hierarchical regression models were conducted using bias-corrected bootstrapped (= 20,000) confidence intervals to examine whether school climate mediated the relationship between grade configuration (Elementary School = 0; Middle School = 1) and each of the academic achievement outcome variables (i.e. 6th grade Reading, 6th grade Mathematics, 7th grade Reading, and 7th grade Mathematics). Each model was investigated in two steps. In step one, the amount of variance in student achievement that could be accounted for by the school level covariates listed above was examined without the inclusion of the grade configuration or ASC variables. In step two, grade configuration and ASC were added to the model in order to examine the direct effect of ASC on achievement scores, and the direct and indirect effect of grade configuration on achievement scores, while controlling for school-level demographics (see Figure 1). Contrasts between steps one and two allowed for an assessment of the change in the proportion of variance could be accounted for between steps (ΔR^2). Model results are reported in standardized form (β) with respect to the outcome, where a one-point change in the predictor represents β standard deviation change in the outcome. Given that the outcome variable of interest resides at the school level, all analyses were single level models. All analyses were conducted in Mplus version 7.11.

Results

As a preliminary step, confirmatory factor analyses (CFA) were conducted separately for the 6th and 7th grade samples to assess the unidimensionality of the disciplinary structure, student support, and academic expectations scales. Results of the three indicator single factor models revealed good fit as judged by the comparative fit index (CFI) and Tucker-Lewis index (TLI) in both 6th (CFI = .988, TLI = .965) and 7th (CFI = .997, TLI = .992) samples, where good fitting models would be expected to yield values of .95 or greater (Hu & Bentler, 1999). Likewise, 90% confidence intervals for the root mean square error of approximation (RMSEA) captured values that are considered indicative of reasonable fit (i.e., < .08; Browne & Cudeck, 1989) in both the 6th (90% CI: .059, .248) and 7th (90% CI: .000, .187) grade samples. Internal consistency reliability estimates for the single factor scales were also favorable in both the 6th (Cronbach alpha = .86) and 7th (Cronbach alpha = .89) grade samples.

Descriptive statistics were examined by grade and school grade configuration type for the continuous predictors, and the outcomes of reading and mathematics pass rates (Table 2). For the 6th grade sample, middle schools had significantly higher enrollments (796 students vs. 474 students) and higher percentages of minority students (44% vs. 25%) in comparison to elementary schools. Elementary schools had a higher percentage of students eligible for free or reduced price meals (56% vs. 44%). There was no significant difference in population density between groups; however, there was a large amount of variation within school types. Comparisons between school types were consistent across the 6th and 7th grade sample. Refer to Table 2 for demographic statistics specific to the 7th grade sample.

Preliminary independent sample t-tests that did not control for school demographic characteristics revealed that 6th and 7th grade students in elementary schools reported higher ratings of ASC in elementary schools than middle schools (see Table 2). Standardized test pass rates also varied significantly by configuration. For the 6th grade sample, pass rates were higher in elementary schools than middle schools for reading (83.0% vs. 76.8%) and mathematics (87.3% vs. 80.7%). For the 7th grade sample, elementary schools also outperformed middle schools for the reading (85.1% vs. 81.2%) and mathematics (74.7% vs. 63.5%) exams.

Preliminary analyses also examined the Pearson product moment correlations among the continuous variables (Table 3). Correlations were generally consistent in regard to significance and direction of significance for both grades. School-level reading and mathematics pass rates were highly correlated. High ratings of ASC were associated with higher pass rates. Schools with higher percentages of minority students, students eligible for free or reduced price meals, and schools located in densely populated locales had lower pass rates for both reading and mathematics. Similarly, these demographic variables were negatively associated with ASC school climate. School size was not significantly associated with standardized test pass rates for the 6th grade sample, though larger schools had lower ratings of ASC. For 7th grade, there was no association between school size and ASC or mathematics pass rates. There was a small, but significant positive correlation between school size and reading pass rates.

The ANCOVA results for Research Question 1 showed that grade configuration was significantly associated with 6th grade students' perception of ASC when adjusted for school demographics, $F(1, 298) = 5.25$, $p = .02$, $\eta 2 = .02$. Grade 6 students placed in

middle schools reported poorer school climate (M = 9.52) than 6th grade students in elementary schools (M = 9.68). For 7th grade, results also favored the elementary school configuration (M = 9.48) over middle schools (M = 9.07), $F(1, 304) = 34.02$, $p < .001$, $\eta 2 = .10$. Grade configuration accounted for 2% of the variance in ASC for 6th grade and 10% of the variance for 7th grade.

Consistently, results for Research Question 2 indicated poorer academic achievement for the middle school configuration for both grades (Table 5). When adjusted for school demographics, the 6th grade reading SOL pass rates were significantly lower in middle schools (M =77%) than elementary schools (M = 85%), $F(1, 298) = 37.26$, $p < .001$, $\eta 2 = .11$. The 6th grade mathematics pass rates were also lower in middle schools (M = 81%) compared to elementary schools (M = 86%), $F(1, 298) = 5.25$, $p = .02$, $\eta 2 = .02$. Grade configuration accounted for 11% and 2% of the variance in academic achievement for reading and mathematics, respectively.

For 7th grade, the reading SOL pass rates averaged 81% in middle schools in comparison to 87% in elementary schools, $F(1, 304) = 20.60$, $p < .001$, $\eta 2 = .06$. For mathematics, pass rates were again lower in middle schools (M =64%) in comparison to elementary schools (M = 75%), $F(1, 287) = 17.50$, $p < .001$, $\eta 2 = .06$. Grade configuration accounted for 6% of the variance in academic achievement for both reading and mathematics.

The third research question was addressed with mediated hierarchical regression analysis (Table 6). For the outcome of 6th grade reading pass rates, Step 1 revealed that demographics accounted for 51% of the variance in the pass rates ($R^2 = .51$). Step 2 demonstrated significant direct and indirect effects among grade configuration, ASC, and

reading SOL pass rates. The *a* path (see Figure 1) from grade configuration to ASC was significant (β = -.64, p = .001), indicating that ratings of ASC were .64 standard deviations higher in elementary schools. Likewise, ASC was significantly and positively associated with reading SOL pass rates (*b* path; β = .14, p = .001). Grade configuration was also directly associated with reading SOL pass rates (*c* path; β = -.73, p < .001), with higher pass rates observed in elementary schools. The significant indirect effect revealed a mediating effect of grade configuration on reading SOL pass rates through ASC (*ab* path; β = -.09, p = .03) The full model accounted for an additional 4% of the variance in reading SOL pass rates.

For the outcome of 6th grade mathematics pass rates, demographics accounted for 33% of the variance in achievement in Step 1. Step 2 revealed a significant direct effect from grade configuration to ASC (*a* path; β = -.64, p < .001), and from grade configuration to mathematics SOL pass rates (*c* path: β = -.38, p < .01). The *b* path from ASC to mathematics SOL pass rates was marginally significant (β = .11, p = .06). The indirect effect of grade configuration on mathematics SOL pass rates through ASC did not indicate a statistically significant mediation (*ab* path; β = -.07 p = .14).

For the outcome of 7th grade reading, demographics accounted for 45% of the variance in reading SOL pass rates (R^2 = .45; Step 1). Step 2 showed significant direct and indirect effects among grade configuration, ASC, and reading SOL pass rates. The *a* path from grade configuration to ASC was significant; ratings of ASC were approximately a full standard deviation higher in elementary schools than middle schools (β = -1.01, p < .001). ASC was significantly and positively associated with reading SOL pass rates (*b* path; β = .14, p = .001). Grade configuration was also directly associated

with reading SOL pass rates (*c* path; β = -.50, p = .001), with higher pass rates observed in elementary schools. The indirect effect of grade configuration on reading SOL pass rates through ASC was also statistically significant (*ab* path; β = -.14, p = .003). The full model accounted for an additional 2% of the variance in reading SOL pass rates.

For the outcome of 7th grade mathematics pass rates, demographics accounted for 41% of the variance in achievement in Step 1. Step 2 revealed a significant direct effect between from grade configuration and ASC (*a* path; β = -1.01, p < .001), and grade configuration and mathematics SOL pass rates (*c* path: β = -.54, p = .001). The *b* path from ASC to mathematics SOL pass rates was not significant (β = .09, p = .09). The indirect effect of grade configuration on mathematics SOL pass rates through ASC did not indicate a statistically significant mediation (*ab* path; β = -.09 p = .10).

Discussion

The present research examined the associations among grade configuration and student perceptions of school climate on school-level standardized test pass rates. Specifically, this study compared 6th and 7th grade students in traditional middle schools (i.e. 6th-8th grade) to 6th and 7th grade students placed in schools with primarily elementary grades (e.g. K-7th grade). Definitions of school climate vary broadly across studies; the present study examined school climate in the context of authoritative school climate theory. Authoritative schools are characterized by high levels of disciplinary structure (fair and consistent rules and disciplinary practices), academic expectations, and supportive teachers and staff.

In the present study, the associations among grade configuration and authoritative school climate (Research Question 1), and grade configuration and academic

achievement (Research Question 2) were initially examined separately. In regard to the first research question, results indicated that middle school students reported poorer perceptions of their school climate in comparison to their same-grade peers in elementary school configurations. This was consistent with previous research that showed that middle schools reported poorer perceptions of their school climate than their counterparts in other grade configurations (Anderman & Kimweli, 1997; Holas & Huston, 2012; Malone et al., 2016).

In regard to Research Question 2, pass rates for end-of-year standardized reading and mathematics exams were also lower in middle schools than elementary schools, again consistent with other findings (e.g. Hopwood, Hay, & Dyment, 2017; Malone et al., 2017; Rockoff & Lockwood, 2010; Schwerdt & West, 2013). For 6th grade, there was an 8-percentage point difference in pass rates between elementary and middle schools for reading, and a 5-percentage point difference for mathematics. For 7th grade, there was a 6-percentage point difference in reading pass rates between the configurations, and an 11-percentage point difference for mathematics achievement. When controlled for school demographics, the average passing rate for the 7th grade mathematics exam in middle schools (64%) in our study fell below the 70% needed for full accreditation by the Virginia Department of Education (Virginia Department of Education, 2017). This indicates that the weaker achievement evident in middle schools is below state standards, which may have ramifications on state and federal funding.

The present study extended beyond previous studies to examine the relations among school and grade configuration on academic achievement. In regard to Research Question 3, analyses revealed that ASC partially mediated the direct association between

grade configuration and reading standardized test pass rates. That is, middle schools had poorer ratings of school climate, which partially explained the lower pass rates achieved in this configuration in comparison to elementary schools. While middle schools also had lower mathematics achievement and poorer ratings of school climate than elementary schools, ASC did not explain the association between grade configuration and mathematics achievement in our model. Further research is needed to better understand this finding. One explanation is that the population of students who take the reading and mathematics SOL exams may differ; whereas all 6th and 7th grade students take the same reading SOL exam, respective to their grade, students who are higher achieving in mathematics may take more advanced courses and therefore a different achievement test. Other lines of research describe other reasons for variable or reduced mathematics performance in adolescents, including developmental considerations (e.g. increased need for abstract thinking; Susac, Bubic, Vrbanc, & Planinic, 2014), and less parental help with mathematics assignments (Boonk, Gijselaers, Ritzen, & Brand-Gruwel, 2018; Casad, Hale, & Wachs, 2015).

Many studies examine student engagement and prevalence of teasing and bullying as additional indicators of school climate. Previous research indicates that schools with authoritative climates (high structure and support) have higher student engagement (Konold & Cornell, 2015; Konold et al., 2014; Wang and Eccles, 2013) and lower rates of teasing and bullying (Konold et al., 2014; Shukla, Konold, & Cornell, 2016). Both engagement and teasing/bullying have been linked with achievement across multiple academic subjects. An Australian study found that students who identified strongly with their school (e.g. student connectedness and belongingness) demonstrated higher

mathematics and writing achievement (Reynolds, Lee, Turner, Bromhead, & Subasic, 2017). In another middle school sample, student-reported sense of belongingness (e.g. affective engagement) mediated the relationship between teacher emphasis on mastery and performance goals (e.g. high expectations) and teacher support on academic achievement (Wang & Holcombe, 2010).

Bully victimization at school is associated with poor attendance, lower engagement, and poor academic achievement (e.g. Juvonen, Wang, & Espinoza, 2011; Nakamoto & Schwartz, 2010; Steiner & Rasberry, 2015; Wang et al., 2014). Further, high prevalence of teasing and bullying at the school level is associated with school-wide lowered academic performance (Lacey & Cornell, 2013; Lacey, Cornell, & Konold, 2015). In a large sample of middle schools, Lacey and colleagues (2015), found that teacher and student reports of the prevalence of teasing and bullying within a school were directly associated with standardized test pass rates across multiple content areas. Furthermore, student engagement fully mediated the association between student ratings of teasing and bullying and standardized test pass rates. The authors concluded that high rates of teasing and bullying within a school leads to lower levels of student engagement, thus resulting in poorer academic performance (Lacey et al., 2015).

While the present study demonstrated a cross-sectional association between school climate and academic achievement (e.g. Cornell et al., 2016; Dever & Karabenick, 2011; Stroet et al., 2013), longitudinal research suggests that students' perception of their school environment in middle school predicted later achievement in high school. Kaplan, Liu, and Kaplan (2005) examined middle grade students' perception of school-related stress (e.g. teacher and peer rejection, feeling academically inept) and academic

aspirations (i.e. how far they expected to go in school), and their association with self-reported grades in middle and high school. Academic achievement in high school was negatively associated with middle school school-related stress and positively associated with self-expectations. However, students with high ratings of school-related stress, paired with high expectations for themselves, had lower academic achievement in high school, even when middle school academic achievement was controlled. While not examining school climate specifically, other longitudinal studies show that lower achievement experienced by middle school students persists into high school (e.g., Schwerdt & West, 2013).

One explanation for middle school students' poorer perceptions of their school environment and lower academic achievement is Eccles and colleagues' (Eccles et al., 1991; Eccles & Midgley, 1989) stage-environment fit theory, which hypothesized that poor middle school adjustment is likely an effect of the timing of the transition to middle school that is made worse by the developmental mismatch between junior highs/middle schools and young adolescent needs. Many students move into middle school at about the same time that they begin to experience the physical, social, and emotional changes associated with entering puberty (Simmons & Blyth, 1987; Eccles, et al., 1991). Additionally, there is significant incongruity between student experiences in middle schools and normative adolescent development. For example, Eccles and Midgley (1989) explained that students in middle schools often have many teachers, who in turn have many students, at a time that they can benefit most from supportive adult role models. Middle school is often more competitive and evaluative than elementary school, at this increased pressure comes at a time of increased self-consciousness and weakened

perception of competence. Lastly, students in middle schools are required to adhere to stricter rules and expectations just as they are developing an increased need for autonomy and independence (Eccles & Midgley, 1989; Eccles et al., 1993; Roeser, Eccles, & Sameroff, 1998). Eccles (2004) emphasized that "understanding the interaction of different school features with the developmental needs of adolescents is critical to understanding the role of schooling in young people's development" (p. 127).

To our knowledge, only one study has examined the association among puberty and academic achievement through the use of hormonal testing and self-reported pubertal status. Martin and Steinbeck (2017) found that youth (ages 10-15) who were farther along in puberty experienced lower academic motivation, which was in turn associated with poorer academic achievement. Furthermore, pubertal status was more strongly associated with motivation than age, gender, or type of school attended (elementary or high school). In sum, findings from this study suggest that lower academic achievement may, in part, be associated with factors outside of the school context, such as puberty. These developmental changes, paired with less contact with each of their teachers, and more responsibilities in middle school (Eccles, 2004) may be associated with lower scores.

In the context of the school environmental factors associated with stage-environment fit theory, Zimmer-Gembeck and colleagues (2006) examined the associations among adolescents' perception of 'school fit', student engagement, and self-reported academic achievement. The measure for school fit was a composite of students' perceptions that their teacher-student relationships, peer relationships, and the overall school environment fostered student autonomy, relatedness to others, and competence. Through the use of structural equation modeling, results indicated that positive teacher-

student relationships were directly associated with higher perceptions of school fit and student engagement. School fit mediated the relationship between student engagement and achievement. Though not a direct comparison, the findings from the present study suggest that middle school students perceive their school environment as less favorable, which may indicate that their developmental needs are not met to the same extent that they are in elementary schools.

Limitations and Future Directions

This study has a series of limitations. First, this study is correlational in nature; the causal relations between grade configuration, school climate, and academic achievement cannot be determined. A longitudinal study that examines students' academic achievement and perceptions of their school climate before and after the transition to middle school would be helpful in understanding the poorer achievement identified in middle schools. The identification of causal factors associated with weaker academic achievement in this population would aide educators in the selection of appropriate interventions.

Second, this study used school-level, as opposed to student-level, achievement standardized test achievement data. Student-level test scores were not available for this study. Additionally, the school climate survey used in this study was anonymous; therefore student responses could not have been mapped onto their achievement scores even if student-level achievement data were available. While schools use school-level data for accountability purposes, student-level studies may provide more information about individual factors associated with academic achievement before and after the transition to middle school. Given that some students do not experience a drop in their

grades after the transition to middle school (Goldstein et al., 2015), individual-level studies can identify differences in student trajectories and factors associated with declines in achievement in middle school.

A third limitation to this study is the absence of K-6 grade elementary schools. The 2017 Virginia Secondary School Climate Survey was only administered to 6th grade students in schools that also had 7th (and often 8th) grades. This reduced the number of schools in the elementary school configuration group, which may have had an effect on the results for the 6th grade sample. Given that previous longitudinal research suggested that the transition to middle school in 6th grade is associated with poorer achievement than making the transition in 7th grade (Rockoff & Lockwood, 2010), a closer examination of 6th grade students' perception of school climate and school experiences is warranted.

Fourth, this study examined academic achievement for only one year. Previous research (e.g. Squires, 2009) highlighted the importance of using multiple time points to ensure stability in achievement scores over time. A previous study that examined 6th and 7th grade SOL scores found the scores in Virginia to be generally stable across years (Malone et al., 2017). The only exception was for the 7th grade mathematics SOL exam; the average pass rate and scaled scores for this exam were significantly lower in the year following a curriculum change, but then stabilized over the next two years. For the current study, there were no major changes to SOL exam items during the evaluation year.

Finally, although the state of Virginia uses the SOL exams for accreditation purposes, the exams do not provide a comprehensive assessment of student academic

performance. Students in 6th and 7th grade are only required to participate in the reading and mathematics exams, therefore a broader assessment of students' abilities across multiple academic areas is not available. Further, most students meet the threshold for passing, and students are permitted to take the exams more than once. A more rigorous and multi-faceted assessment may better capture changes in academic achievement over time.

Implications for Practice

This study contributes to the small, but growing body of empirical and theoretical grade configuration research. We recommend that school authorities consult the relevant research when considering consolidating their schools or creating new schools. The findings of this study in conjunction with others provide support to keep middle grade students in elementary schools through at least 7th grade.

For middle schools that cannot restructure, but would benefit from improvements in school climate, educators could consider the use of empirically validated professional development programs to improve student outcomes. One program, My Teaching Partner-Secondary (MTP-S; Gregory et al., 2017), is a year-long teacher coaching program that was initially developed for use in elementary classrooms and was adapted to coach middle and high school teachers to use instructional practices that are developmentally appropriate for adolescents, such as encouraging students to engage in leadership opportunities, provide students with greater autonomy, and to promote higher-level thinking and problem solving skills in the classroom (Gregory et al., 2017). Randomized controlled trials associate MTP-S with improved academic achievement

(Allen, Hafen, Gregory, Mikami, Pianta, 2015; Allen, Pianta, Gregory, Mikami, Lun, 2011) and student engagement (Gregory, Allen, Mikami, Hafen, Pianta, 2014).

Another school improvement model is school-wide Positive Behavior and Intervention Supports (PBIS; Horner, Sugai, & Anderson, 2010). PBIS is a three-tiered model intended to improve student behavior and disciplinary outcomes through the implementation of clear, consistent, and positive rules (e.g. "Be respectful, responsible, and ready to learn"), paired with tangible reinforcers and positive affirmations from teachers (Bradshaw, 2013). PBIS has been widely evaluated, and studies have shown school-wide reductions in problem behaviors and office disciplinary referrals, and improved interactions between teachers and students, and among peers (Solomon, Klein, Hintze, Cressey, & Peller, 2012), though there is less evidence that the school climate improvements associated with PBIS are directly related to increases in academic achievement (Gage, Sugai, Lewis, & Brzozowy, 2015). One meta-analysis showed particularly large effects in reductions in problem behaviors in unstructured school settings (e.g. transition time between classes, in the lunchroom) in schools that implemented PBIS (Solomon et al., 2012). The authors of the study suggested that consistency of rules and expectations associated with PBIS is particularly useful in middle schools, given that students attend classes with multiple teachers and have more unsupervised time throughout the academic day than their elementary school peers. In sum, we recommend that educational authorities routinely assess student perceptions of school climate and consider improvements in their schools' climate as one strategy to improve the lower achievement that is observed in the middle grades.

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Table 1

Correlations Among School Climate Scales

	1	2	3
1. Disciplinary Structure	--	.53**	.86**
2. Academic Expectations	.66**	--	.68**
3. Student Support	.85**	.74**	--

Note: ** $p < .01$. Correlations for 6th grade are above the diagonal line; Correlations for 7th grade are below diagonal line.

Table 2

Comparisons Between Grade Configurations for Predictor and Outcome Variables

	6th Grade					7th Grade				
	Elementary		Middle			Elementary		Middle		
	Mean	SD	Mean	SD	t-test	Mean	SD	Mean	SD	t-test
Demographics										
FRPM[1]	56.0	17.56	44.0	23.20	3.88***	55.5	17.38	44.2	23.40	3.70***
Total Enrollment	473.6	289.33	795.8	340.62	-6.40***	464.5	292.60	793.8	337.83	-5.91***
Percent Minority	24.9	26.67	44.4	25.88	-4.44***	24.3	26.58	44.7	26.01	-4.64***
Population Density[2]	813.8	1900.21	919.9	1603.91	-0.38	796.0	1879.76	922.3	1597.60	-0.46
Predictor										
ASC[3] scale	9.8	0.47	9.5	0.39	3.83***	9.5	0.37	9.1	0.44	6.40***
Outcomes										
Reading pass rate	83.0	9.33	76.8	10.94	3.39***	85.1	8.39	81.2	10.10	2.35*
Mathematics pass rate	87.3	10.90	80.7	12.95	3.05**	74.7	15.10	63.5	18.72	3.45***

Note: *p < .05, **p < .01, ***p ≤ .001.

[1]Percent of students in school eligible for free or reduced priced meals.

[2]Average number of residents per square mile within school division.

[3]Authoritative school climate.

Table 3

Correlations among school-level variables by grade

	1	2	3	4	5	6	7
1. FRPM[1]	--	-.37**	.38**	.17**	-.23**	-.65**	-.41**
2. School Size	-.36**	--	.41**	.25**	-.13*	.11	-.07
3. Percent Minority	.40**	.41**	--	.42**	-.47**	-.51**	-.52**
4. Population Density	.18**	.25**	.43**	--	-.07	-.21**	-.27**
5. Authoritative School Climate	-.28**	-.06	-.44**	-.04	--	.40**	.35**
6. Reading SOL Pass Rate	-.63**	.15*	-.45**	-.21**	.40**	--	.75**
7. Mathematics SOL Pass Rate	-.53**	-.03	-.54**	-.24**	.39**	.71**	--

Note: *p < .05; ** p < .01. Correlations for 6th grade are above the diagonal line; Correlations for 7th grade are below diagonal line.

[1]Percent of students eligible for free or reduced-price meals.

Table 4

The Association Between Grade Configuration and Authoritative School Climate

	6th Grade					7th Grade				
	F	*p*	η^2	*Mgroup1*	*Mgroup2*	*F*	*p*	η^2	*Mgroup1*	*Mgroup 2*
Main Effect										
Grade Configuration	5.25	.02	.02	9.68	9.52	34.02	<.001	.10	9.48	9.08
Demographics										
Population Density	6.36	.01	.02			8.02	.01	.03		
FRPM[1]	.91	.34	.00			5.32	.02	.02		
School Size	.61	.44	.00			2.80	.10	.00		
Percent Minority	44.01	<.001	.13			34.02	<.001	.10		

Note: Group 1= elementary school, group 2 = middle school.

[1]Percent of students eligible for free or reduced price meals.

Table 5

Associations Between Grade Configuration and Academic Achievement

	Reading									
	6th Grade					7th Grade				
	F	*p*	η^2	*Mgroup1*	*Mgroup2*	*F*	*p*	η^2	*Mgroup1*	*Mgroup2*
Main Effect										
Grade Configuration	37.26	<.001	.11	0.85	0.77	20.60	<.001	.06	0.87	0.81
Demographics										
Population Density	.34	.56	.001			1.03	.31	.00		
FRPM	103.88	<.001	.26			83.15	<.001	.22		
School Size	4.22	.04	.01			4.22	.04	.01		
Percent Minority	23.57	<.001	.07			11.66	.001	.04		
	Mathematics									
Main Effect										
Grade Configuration	7.41	.01	.02	0.86	0.81	17.51	<.001	.06	0.75	0.64
Demographics										
Population Density	2.28	.13	<.01			.48	.49	.00		
FRPM	14.48	<.001	.05			30.05	<.001	.10		
School Size	.83	.36	.00			4.14	.04	.01		
Percent Minority	30.35	<.001	.10			17.50	<.001	.06		

Note: Group 1= elementary school, group 2 = middle school.

Table 6

Mediation Model Results

	6th Grade				7th Grade			
	Reading		Mathematics		Reading		Mathematics	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
Covariates								
Population Density	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FRPM	-2.11***	-2.43***	-0.94**	-1.09**	-2.10***	-2.30***	-1.28***	-1.49***
School Size	0.02	0.03	0.01	0.02	0.03	0.03	0.03	0.03
Percent Minority	-1.37***	-0.82***	-1.63***	-1.28***	-1.06***	-0.60*	-1.72***	-1.34***
Direct Effects								
GC→ASC	--	-0.64***	--	-0.64***	--	-1.01***	--	-1.01***
ASC→SOL	--	0.14***	--	0.11	--	0.14***	--	0.09
GC→SOL	--	-0.73***	--	-0.38**	--	-0.50***	--	-0.54***
Indirect Effect							--	
GC→ASC→SOL	--	-0.09*	--	-0.07	--	-0.14**		-0.09
R^2	0.51	0.55	0.33	0.33	0.45	0.47	0.41	0.42
R^2 change	--	0.04	--	0.00	--	0.02	--	0.01

Note: *p < .05, **p < .01, ***p ≤ .001.

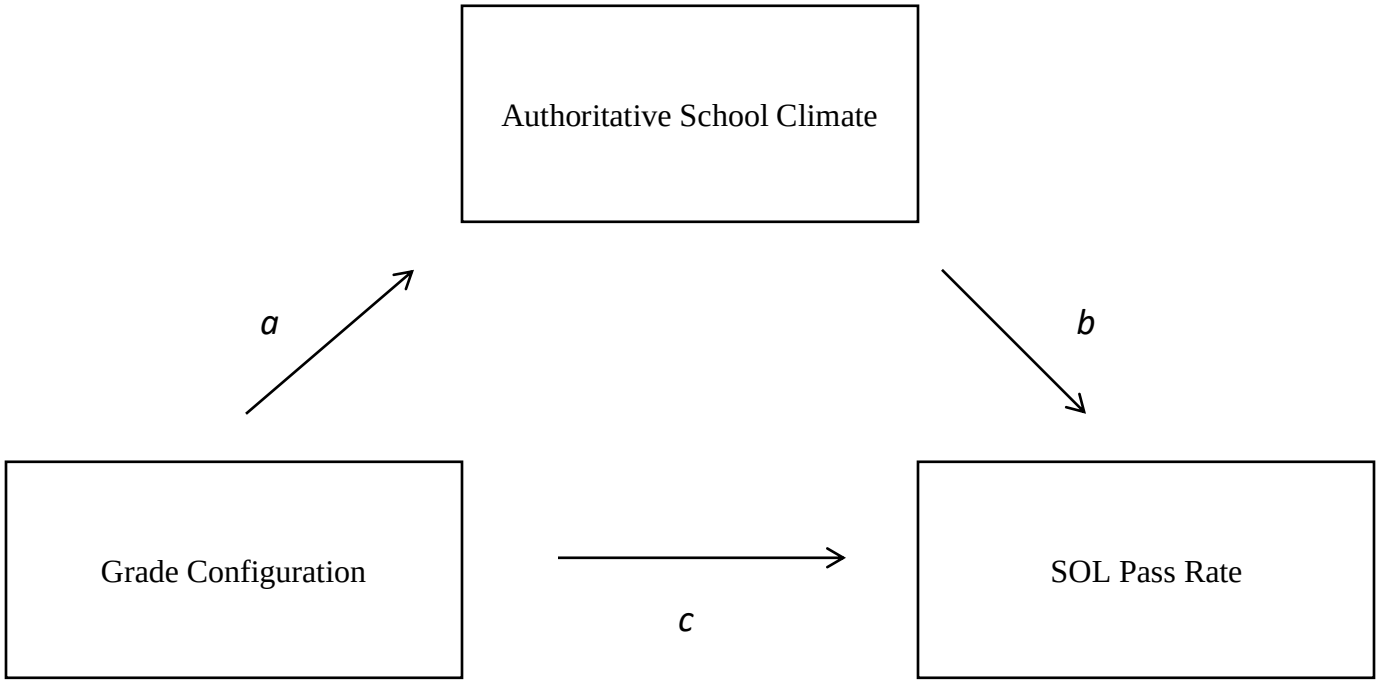

Figure 1. Depiction of the mediating role of authoritative school climate in the relations between grade configuration and SOL pass rates.

Appendix A

Authoritative school climate items

Disciplinary Structure

1. The school rules are fair.
2. The punishment for breaking school rules is the same for all students.
3. Students at this school are only punished when they deserve it.
4. Students are suspended without a good reason. *(reverse scored)*
5. When students are accused of doing something wrong, they get a chance to explain.
6. Students are treated fairly regardless of their race or ethnicity.
7. The adults at this school are too strict. *(reverse scored)*

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 schoolwork.
8. There is at least one teacher or other adult at this school who really wants me to do well.

Academic Expectations

1. My teachers expect me to work hard.
2. My teachers really want me to learn a lot.
3. My teachers expect a lot from students.
4. My teachers do not really care how much I learn. *(reverse scored)*
5. My teachers expect me to attend college.