The Relation Between the Prevalence of Teasing and Bullying and Schoolwide Academic Achievement

---

A Dissertation

Presented to

The Faculty of the Curry School of Education

University of Virginia

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

---

by

Anna Lacey, M.Ed.

August 2015

Curry Programs in Clinical and School Psychology
Curry School of Education
University of Virginia
Charlottesville, Virginia

APPROVAL OF THE DISSERTATION

This dissertation, The Relation Between the Prevalence of Teasing and Bullying and Schoolwide Academic Achievement, 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.

Name of Chair (Dr. Dewey G. Cornell)

Committee Member (Dr. Peter Sheras)

Committee Member (Dr. Timothy Konold)

Committee Member (Dr. Michael J. Kennedy)

4/30/14 Date

Abstract

This dissertation is comprised of three manuscripts demonstrating that greater prevalence of teasing and bullying (PTB) in a school is consistently related to lower school passing rates on the Virginia's mandatory achievement tests, the Standards of Learning (SOL) exams.

The first manuscript investigated the relations between PTB, as reported by students and teachers, and the percentage of students who passed SOL exams. Measures of PTB were obtained from a statewide survey of 7,304 ninth grade students and 2,918 teachers aggregated into school level scores for 284 Virginia high schools. Hierarchical regression analyses conducted at the school level found that PTB scores predicted schoolwide achievement on the SOL exams. These findings could not be attributed to the proportion of minority students in the school, student poverty, school size, or personal victimization, which were statistically controlled.

The second manuscript examined the relations between PTB as reported by high school administrators and school performance on SOL exams. In addition, this study aimed to show that the use of evidence-based bullying prevention efforts is positively associated with test performance. School administrators from 301 high schools in Virginia were surveyed on PTB as well as the types of bullying prevention efforts currently used in their schools. School administrator assessments of PTB were negatively associated with schoolwide achievement and evidence-based efforts to prevent bullying were positively associated with schoolwide achievement.

The third manuscript examined the relations between PTB and schoolwide achievement on SOL exams as well. However, this research adds to the literature by

extending the findings to middle schools and by investigating the mechanism behind this relation. Specifically, this research examined how student engagement in school mediates the relations between PTB and academic achievement. Measures of PTB and student engagement were obtained from a statewide survey of 29,203 seventh and eighth grade students and 6,298 teachers from 271 Virginia middle schools. Hierarchical regression analyses conducted at the school level found that the PTB as perceived by students as well as teachers was predictive of schoolwide achievement on the SOL exams. Engagement was found to be a partial mediator in the association between PTB and test passing rates. These findings were not accounted for by the proportion of minority students in the school, student poverty, school size, or personal victimization, which were statistically controlled. These results support notion that PTB is related to student performance, in part, because PTB decreases student engagement in the academic process which, in turn, decreases student achievement on high stakes testing.

In total, these three studies have demonstrated the association between PTB and academic achievement in both middle and high schools. Further, this relation has been shown using student, staff, and administrator reports of PTB. Although the magnitude of the relations is relatively small, the difference in passing rates between schools with high and low PTB may be sufficient to make practical differences for schools near the cut-off for state accreditation standards. These results are correlational and cannot establish a causal effect. However, the findings are consistent with the idea that a school climate characterized by teasing and bullying will have an adverse effect on student achievement.

DEDICATION

I dedicate this dissertation to my fiancé, Miguel. I could not have made it through graduate school without your continued support.

ACKNOWLEDGEMENT

First and foremost, thank you to my advisor, Dewey Cornell, for his sincere interest in my growth throughout graduate school. His candid feedback and genuine support regarding the development of both my research and clinical skills will always be valued.

I would also like to thank the staff of the Youth Violence Project and affiliated faculty members, particularly Timothy Konold and Francis Huang for their support and expertise in the area of statistics. They both contributed to my knowledge base as well as supported my research endeavors.

Thank you to the faculty of the Curry School of Education Programs in Clinical and School Psychology for giving me the opportunity to pursue my doctorate at the University of Virginia. I express particular thanks to Peter Sheras for helping me pursue unique clinical endeavors and supporting my drive to always learn more. I am grateful to my clinical supervisors, Julia Blodgett, Lisa Locke-Downer, Lee Ann Bass, John Schroll, Matthew Zimmerman, and Philip Dupont for guiding and encouraging me in my development as a clinician.

I also want to express my gratitude to all of my graduate school friends for their caring and supportive friendships. I send a special shout out to Erin Nekvasil, Logan Whalen, and Stephany Cox for being true friends through this process. I am so lucky to have each of you in my life.

Finally, I send a special thanks to my family for supporting me in all of my endeavors prior to and during my graduate school experience. Thank you Miguel, Mom, Dad, Meg, and Russ. I love you all.

LIST OF TABLES AND FIGURES

TABLE OF CONTENTS

Page

Overview of the Three Manuscripts Examining the Relation Between the Prevalence of Teasing and Bullying and Schoolwide Academic Achievement

Anna Lacey, M.Ed.

University of Virginia

Note. This dissertation adheres to Option 1 of the "Manuscript-Style Dissertation" described in the *Curry school Dissertation Manual: Guidelines for Doctoral Dissertations* (Revised June 2009).

Overview of the Three Manuscripts Examining the Relation Between the Prevalence of Teasing and Bullying and Schoolwide Academic Achievement

Bullying is a common problem in American schools (Swearer, Espelage, Vaillancourt, & Hymel, 2010). A national survey of adolescents estimated that approximately 38% of males and 41% of females have been victims of bullying (Wang, Iannotti, Luk, & Nansel, 2010). Bullying has been consistently linked to negative outcomes for victims of bullying including social and emotional difficulties as well as low academic achievement (Card & Hodges, 2008; Nansel, Overpeck, Pilla, Ruan, Simons-Morton, & Scheidt, 2001; Nakamoto & Schwartz, 2010; Glew, Fan, Katon, & Rivara, 2008; Juvonen, Wang, & Espinoza, 2011). Research has also shown that bullying negatively affects individuals that are not directly involved in bullying as the perpetrator or victim. Previous research has found that about 63% of students witness peer victimization during a nine week term (Rivers, Poteat, Noret, & Ashurst, 2009). Witnessing peer victimization has also been associated with a variety of mental health risks such as hostility, anxiety, and somatic complaints (Rivers et al., 2009).

School climate is the subjective experience of the students, faculty, and staff of the school environment including the norms, values, and relationships within the school (Cohen, McCabe, Michelli, & Pickeral, 2009). School climate can be measured as individual or collective experiences of the school. Although individuals may differ in their perceptions of school climate, the collective perceptions of everyone in a school is considered to be an important indicator of the school's functioning (Cohen et al, 2009). Research has found that a negative school climate is associated with lower student classroom engagement, higher student dropout rates, and poorer school achievement as

measured by standardized exams and grade point average (Johnson & Stevens, 2006; Cornell, Gregory, Huang, & Fan, 2013; MacNeil, Prater, & Busch, 2009; Ripski & Gregory, 2009; Konishi, Hymel, Zumbo, & Li, 2010).

Teasing and bullying seem to be an important aspect of school climate. Unnever and Cornell (2003) described school climates that support bullying as having a "culture of bullying". They described a "culture of bullying" as having more students who support peer aggression, low willingness in teachers to intervene in bullying situations, and more pervasive teasing and bullying. Bullying prevention literature posits that bullying affects all students in the school regardless of their direct involvement in bullying (Swearer, et.al, 2010). The amount of teasing and bullying in a school may have effects that go beyond individual students due to the creation of a harmful school climate that induces school avoidance, disengagement, and poorer academic performance.

Academic Achievement and Bullying

Results from a meta-analysis of 33 studies revealed that victims of bullying, teasing, and peer exclusion have lower academic functioning (Nakamoto & Schwartz, 2010). In a nationally representative sample of 15,686 students in grades 6 through 10, Nansel and colleagues examined the relations between self-reported bully victimization, bullying perpetration, and self-reported academic achievement (2001). They found that students who reported either bullying perpetration or victimization reported poorer academic achievement in relations to their peers than those not involved in bullying (Nansel et al, 2001). Research with secondary school students have demonstrated that self-reported and peer-reported bully victimization was significantly related to GPA (Glew et al, 2008; Juvonen et al, 2011).

In addition, bully victimization has been linked to student performance on standardized testing at both the individual and school-level. Konishi et al. (2010) investigated the association between the extent of bullying in high schools as reported by principals and individual student achievement. They found that principal reports of the extent of bullying were negatively associated with student math and reading achievement. In a nationally representative sample of 10th grade students, victims of bullying had poorer performance on standardized reading and mathematics tests (Ripski & Gregory, 2008). Students who perceived greater levels of hostility in the school also had lower achievement on both reading and mathematics tests regardless of their personal experiences with bully victimization. In addition, collective perceptions of hostility in a school significantly predicted overall student reading achievement (Ripski & Gregory, 2008). Importantly, this research indicates that the amount of hostility that students perceive in a school negatively affects student performance on academic tasks regardless of their own participation in bullying or other forms of peer aggression.

Research has suggested that bullying affects the student body as a whole including those who are not directly involved as bullies or victims (Swearer et al, 2010; Rivers et al, 2009). Past research linked witnessing peer victimization to several mental health risks including hostility, anxiety, and somatic complaints (Rivers et al., 2009). Negative school climate more generally has been linked to poorer performance on standardized tests (MacNeil et al, 2009; Ripski & Gregory, 2009), lower mean student achievement (Johnson & Stevens, 2006), lower student classroom engagement (Ripski & Gregory, 2009), and higher student dropout rates (Cornell et al, 2013).

Bullying has also been linked to several factors associated with academic achievement at the individual level including disruption of school work, low school enjoyment, perceptions of school as unsafe and school avoidance (Boulton, 2008, Varjas, Henrich, and Meters, 2009; Card & Hodges, 2008). These results help explain how bullying could lead to poorer academic achievement. For example, students who do not enjoy school due to a climate of teasing and bullying may be less engaged in school work, leading to poorer performance in school.

Prior research using data from the Virginia High School Safety study examined the association between collective perceptions of teasing and bullying in a school and overall student engagement (Mehta, Cornell, Fan, & Gregory, 2013). In this study, engagement was measured as student self-reports of their level of investment and effort in school and their involvement in extracurricular activities. Student perceptions of the pervasiveness of teasing and bullying in a school were negatively associated with student reports of engagement at the school level (Mehta et al, 2013). Notably, this research shows that the overall perceptions of the student body regarding teasing and bullying in a school are related to factors associated with academic achievement at the school level. Given that this research found that schools with higher reports of teasing and bullying had lower student engagement and academic achievement, it follows that student engagement may mediate the relation between teasing and bullying and academic achievement (Rivers, et al, 2009; MacNeil, et al, 2009; Ripski & Gregory, 2009; Johnson & Stevens, 2006; Cornell, et al, 2013). In other words, students in schools with higher perceived prevalence of teasing and bullying may be less interested in school or may be less willing to participate in school activities, and this may lead to lower academic achievement.

Current Research

Although prior research has shown how bullying affects individual students, it is imperative to understand how the prevalence of teasing and bullying in a school affects the academic performance of the student body as a whole. Schoolwide academic achievement has become increasingly important in recent years; particularly school performance on state-mandated tests. The overall performance of the student body on state-mandated high stakes tests is a major factor in school accreditation and funding (Virginia Department of Education, 2010). As a result, school administrators are devoting considerable effort to finding ways to improve student performance on standardized tests.

Virginia schools devote intensive effort to preparing their students for SOL exams. Administrators typically focus on academic programming such as test preparation and tutoring. As a result, school administrators may feel that they cannot devote time and effort to programs concerned with student behavior such as bullying and teasing. However, a body of literature suggest that bullying leads to a climate of fear and intimidation that may negatively affect engagement, learning, and achievement for the student body as a whole (Mehta, et al, 2013; Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Olweus & Limber, 2000; MacNeil et al, 2009; Ripski & Gregory, 2009; Cornell et al, 2013). By examining the link between bullying and academic achievement at the school level, we hope to show the importance of bullying not only for those involved in bullying but for the school as a whole. The results from this research are intended to demonstrate that a climate of bullying and teasing is related to academic achievement. Thus, a climate of bullying is a serious school wide problem that should be addressed systematically.

Virginia Standards of Learning Exams (SOL). For this research, the Virginia Standards of Learning (SOL) exams were used as the measure of academic achievement. The Virginia SOL exams are the standardized exams used to measure student learning and achievement in the state of Virginia (Virginia Department of Education, 2010). Passing rates on these exams were used as the achievement measure in all three papers. These were schoolwide results for each school; individual results for students were not available.

The Prevalence of Teasing and Bullying Scale (PTB). The Prevalence of Teasing and Bullying (PTB) scale measures the pervasiveness of bullying in a school. This scale consisted of four items with response options of *strongly disagree, disagree, agree,* or *strongly agree*.: (1) Bullying is a problem at this school, (2) Students here often get teased about their clothing or physical appearance, (3) Students here often get put down because of their race or ethnicity, and (4) There is a lot of teasing about sexual topics at this school. The PTB scale includes questions about bullying, defined as repeated, intentional, harmful acts by a perpetrator against a victim in which there is a difference in power between the victim and the perpetrator (Olweus, 1993). Questions regarding teasing were also included in accordance with many measures of bullying which ask more general questions about peer aggression (Felix, Sharkey, Green, Furlong, & Tanigawa, 2011; Kert, Codding, Tryon, & Shiyko, 2010; Sawyer, Bradshaw, & O'Brennan, 2008).

A series of studies supported the factor structure of this scale for use in middle school and high school samples (Bandyopadhyay, Cornell, & Konold, 2009). Exploratory and confirmatory factor analyses supported the use of this scale (Bandyopadhyay et al,

2009). A series of multi-group CFAs showed that the scale adequately measures school the prevalence of teasing and bullying without significant bias associated with gender or race (Bandyopadhyay et al, 2009). These results were replicated through CFA in a sample of 9^{th}-12^{th} grade students (Klein, Cornell, & Konold, 2012).

Prior research has demonstrated the predictive value of the PTB scale (Bandyopadhyay, Cornell, & Konold, 2009; Mehta, et.al, 2013; Cornell et al, 2013). In a study of high schools, researchers examined the relation between school-level PTB and several measures of school disorder (Bandyopadhyay et al, 2009). Results show that schools with higher levels of PTB had more suspensions, higher reports of gang-related violence, and lower reports of student help seeking behaviors (Bandyopadhyay et al, 2009).

Research has also found that PTB is predictive of measures related to academic achievement (Mehta et al, 2013; Cornell et al, 2013). Higher PTB scores have been associated with lower student engagement in school, including both commitment to school and involvement in school activities (Mehta et al, 2013). Further, schools with higher PTB scores in ninth grade had higher dropout rates over the subsequent four years of high school (Cornell et al, 2013).

In a series of studies, this three-paper dissertation demonstrates the association between PTB and school level passing rates on SOL exams. In each study, PTB was assessed by surveying different reporters, including students, teachers, or principals. In order to analyze the PTB scale at the school level, average scores for each type of reporter were aggregated for each school. This research intends to show this relation using reports of PTB from students, teachers, and principals in order to better understand

the differences in the predictive value of the perceptions of a variety of reporters. In doing so, there will be greater insight into how schools may best evaluate their schools using measures of PTB. Another contribution of this research is that both high school and middle school samples are studied. This research demonstrates that higher PTB scores are consistently related to lower school passing rates on SOL exams across reporters and grade levels.

The first paper, "The Impact of Teasing and Bullying on Schoolwide Academic Performance", was published in the *Journal of Applied School Psychology* in August 2013. The second and third papers are currently being prepared for submission. I am the principal author on both the first and second papers and intend to be the principal author on the final third paper. The findings of this dissertation are intended to support the need for greater attention to the impact of teasing and bullying on secondary school student performance.

Manuscript One. This paper examined the relation between PTB and schoolwide performance on high stakes testing within public high schools. We hypothesized that student and teacher perceptions of PTB would be associated with schoolwide passing rates on the Virginia Standards of Learning (SOL) exams; the standardized tests used in Virginia schools to measure student achievement. The sample used in this study was drawn from the Virginia High School Safety Study (VHSSS; Cornell & Gregory, 2008), a statewide study designed to collect school climate data from 9th grade students and teachers all public high schools in Virginia in 2007 as part of the state's mandatory school safety audit program. The sample used in the report consisted of 286 high schools

with available data, representing 91% of the 314 eligible schools. Surveys were collected from samples of approximately 25 ninth-grade students and 10 teachers in each school.

The Prevalence of Teasing and Bullying (PTB) scale was completed by both students and teachers via an online survey. In this paper, PTB was analyzed at the school level using two scores: the average student score and the average teacher score aggregated for each school.

Past research indicates that individual bully victimization may skew student perceptions of the pervasiveness of teasing and bullying in a school (Card & Hodges, 2008; Nansel et al, 2001; Nakamoto & Schwartz, 2010; Glew et al, 2008; Juvonen et al, 2011). This research was focused on the relation between observed prevalence of teasing and bullying, rather than personal victimization, and academic achievement. In order to understand the unique contributions of reports of PTB to differences in academic achievement, the impact of personal victimization on reports of PTB was controlled. By controlling for individual victimization, this research showed that PTB is a broader paradigm that involves all students rather than reflecting individual victim experiences.

Personal victimization was measured by asking students to report whether they had been physically, socially, and verbally bullied at school within the past month. An overall bullying victimization score was calculated by summing the three personal bullying victimization questions for each participant. Then, the scores for participants in each school were combined into a school-level average. The school-level personal bullying victimization score was entered as a control variable.

School demographics such as racial composition, measures of socio-economic status, and school size have been found to be important factors in studies of school

disorder, academic performance, and student engagement (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005; Klein & Cornell, 2010; Sutton & Sodderstrom, 1999; Sirin, 2005; Leithwood & Jantzi, 2009; Finn & Rock, 1997). Therefore, three demographic variables were controlled fore: enrollment size of the school, percentage of minority students, and the percentage of students participating in the free/reduced price meal program.

This paper included five SOL subject exams: Algebra 1, Earth Science, World History, Biology, and Geometry. Algebra 1, Earth Science, and World History were primarily taken by 9th graders and Biology and Geometry were primarily taken by 10th graders. However, these exams are taken after a student completes the corresponding course and therefore, can be taken by students in any grade. Passing rates for SOL exams were obtained from the Virginia Department of Education.

Hierarchical regression was conducted in a three-step sequence entering demographic variables in the first step, student reports of personal victimization in the second step, and student and teacher reports of the PTB in the third step. PTB as reported by 9th grade teachers and students accounted for 3.4% to 10.2% of the variance in schoolwide passing rates on SOL exams. Student PTB was a significant predictor for both proficient and advanced passing rates on all five SOL exams. Teacher PTB was a significant predictor of the Earth Science proficient passing rate and both the proficient and advanced passing rates of Algebra 1 and Geometry.

Manuscript Two. To build upon the findings from paper one, paper two examined the relation between PTB as reported by high school principals and schoolwide academic performance on standardized testing. One goal of the study was to show the value of

principal perceptions of school climate as a tool in assessing school functioning. This study used principal rather than student and teacher reports of PTB to show the value of principal perceptions of school climate as an instrument to evaluate school functioning. Principal reports are more accessible and less time consuming and labor intensive than assessing students and teachers and therefore, may be more advantageous. Although school principal ratings do not provide as comprehensive of information as student and teacher surveys, the efficiency of principal surveys may encourage school administrators to participate in school climate surveys.

In prior research on the relationship between principal perceptions of bullying and academic achievement, principal reports of bullying were measured using a single item and analyses did not control for school demographic variables. The current research intended to show that the same relation using the four-item PTB scale to predict student academic achievement at the school level.

In addition, this research examined the relation between principal perceptions of prevention efforts to reduce bullying and teasing and school test performance beyond that of PTB. Given the attention given to school performance on standardized tests, administrators have placed a high priority placed on improving academic performance. This focus may have lead administrators to focus on academic interventions; allocating less time to problems seemingly unrelated to achievement such as student teasing and bullying. By demonstrating the relation between bullying prevention and school wide academic achievement, this research showed the importance of anti-bullying practices in the schools for the school as a whole.

As in Paper 1, three school demographics were entered as control variables: enrollment size of the school, percentage of minority students, and the percentage of students participating in the free/reduced price meal program. In addition, the schools location in an urban or non-urban location was also added as a control.

The sample consisted of 301 high schools representing 100% of the public high schools in Virginia. The data used in this report were collected by the Virginia School Safety Audit Survey, which is a state-mandated annual survey of school principals regarding the safety conditions in their school. This survey included the PTB scale as well as questions about the extent of bullying prevention efforts in the school. Specifically, principals were asked to indicate which bullying prevention efforts implemented at their school from a list of 11 such as a schoolwide conference or assembly on bullying and videos for students on bullying.

A three-step model of hierarchical regression was used with school demographics entered first, followed by principal reports of PTB, and principal reports of prevention efforts entered last. Principal reports of PTB and school efforts to prevent bullying were predictive of schoolwide passing rates on SOL exams. Principal reports of PTB were predictive of passing rates on six of the SOL exams: Algebra 1, Geometry, Biology, Earth Science, English Reading, and Writing. The number of bullying program elements made a statistically significant contribution to the prediction of SOL pass rates for five of the SOL exams: Algebra 1, Algebra 2, Geometry, Earth Science, and English Reading.

Results of Paper 2 extended the findings from Paper 1 to principals by linking principal reports of PTB with SOL passing rates. Although the association between principal reports of PTB and SOL passing rates were not large (1.2% to 4.7% of the

variance), these results indicate that principal reports of PTB are meaningful assessments of school climate and can provide insight into the school's functioning as a whole. Principal reports are not a substitute for a more comprehensive assessment of bullying and teasing collected from students and/or teachers. However, principal reports provide an efficient measure of school climate that can predict school outcomes. In addition, the results linking bullying prevention efforts with SOL passing rates support the notion that bullying prevention efforts have a positive impact on the school as a whole. Importantly, the results imply that school administrators should give attention to the school climate in order to improve academic performance of schools.

Manuscript Three. In order to substantiate the findings from Paper 1 and expand the findings to other populations, the third study examined the relation between PTB and SOL passing rates with a middle school sample. In addition, this study aimed to increase our understanding of the mechanism by which PTB is related to academic performance by investigating the potential influence of self-reported student engagement on the relation between PTB and SOL passing rates. Research has shown that engagement is negatively related to bullying (Juvonen et al, 2011; Mehta et al, 2013) and positively related to academic outcomes (Fredricks, Blumenfeld, and Paris, 2004; Marks, 2000). Therefore, student engagement was expected to mediate the relation between PTB and SOL passing rates. In other words, increases in bullying would predict decreases in student engagement which, in turn, will decrease SOL passing rates

The data used in this study was drawn from the Virginia Secondary School Climate Survey (VSSCS, 2013), a statewide study designed to assess school climate and safety conditions from in Virginia secondary schools. The sample used in this report

consisted of the 271 schools that only housed grades 6-8; representing 62.4% of the 423 eligible schools. In order to ensure that the results are reflective of the traditional middle school, only schools offering grades 6th-8th grade were included in the sample. This research focused on the relation between PTB as reported by 7th and 8th grade teachers and students and middle school passing rates on SOL exams. Approximately 29,203 students and 6,298 teachers participated in this study. On average, 108 students (range = 8-748, SD=125) and 25 teachers (range = 1-72, SD=13) participated in each school.

Both teachers and students completed the PTB scale as a measure of the pervasiveness of bullying in the school. In addition, students completed questions regarding student engagement in school-related activities as well as reported on their commitment and interest in school. Further, students reported on personal experiences with bullying victimization. Student and teachers responses to the PTB scale and student responses to engagement and victimization questions were aggregated to create school-level scores.

SOL exams taken in 7th and 8th grades were used as the measures of academic achievement. A total of 6 SOL exams were examined: English Reading Grade 7, English Reading Grade 8, English Writing Grade 8, Mathematics Grade 7, Mathematics Grade 8, and Science. School passing rates for SOL exams were obtained from the VDOE; individual results for the students in this study are not available.

As in Paper 1, potential effect of individual student victimization on student perceptions of PTB was controlled. In doing so, this research demonstrated that PTB represents the perceptions of the student body as a whole rather than just the experiences of individual victims. Three school demographic variables were also included as control

variables in all analyses: enrollment size of the school, percentage of minority students, and the percentage of students participating in the free/reduced price meal program.

Hierarchical linear regression was used to investigate the predictive association between teacher and student PTB and SOL passing rates. Each regression was performed in a three-step sequence with student demographic variables entered at step 1, personal bullying victimization at step 2, and PTB at step 3. Results showed that middle school student and teacher perceptions of PTB significantly predicted school passing rates on the Virginia SOL exams. The present findings extend findings from Papers 1 and 2 by demonstrating the relation between PTB and standardized test performance in a middle school sample.

In order to determine the influence of student engagement on the association between PTB and academic achievement, we completed additional multiple regression analyses as well as the Sobel test and Bootstrapping Method to test the significance of the indirect effects. Results indicate that the association between both student and teacher PTB and SOL passing rates is mediated by student reports of engagement in school for two of the SOL exams (Grade 7 English Reading and Science). These results suggest that the relation between PTB and standardized test performance may be partially explained via the relation between PTB and student engagement.

Conclusion

Together, the three manuscripts that comprise this dissertation have improved our understanding of the relation between PTB and academic achievement. This dissertation has demonstrated the association between PTB and academic achievement in both middle and high schools as well as reported by different sources. As previously stated, schools

understandably devote time and resources preparing students academically for standardized exams. However, less attention is given to efforts to maintain a safe and healthy school climate. By demonstrating the link between PTB and academic achievement, this dissertation has asserted the importance of the assessment of school climate and the implementation of school-wide bully prevention programming in order to support school achievement.

References

Bandyopadhyay, S., Cornell, D., & Konold, T. (2009). Internal and external validity of three school climate scales from the School Climate Bullying Survey. *School Psychology Review*, *38***,** 338-355.

Boulton, M. (2008). Pupils' perceptions of bullying and disruptions to concentration and attention to school work, *Pastoral Care in Education, 26* (2), 83-89. doi:10.1080/02643940802062592

Brand, S., Felner, R., Shim, M., Seitsinger, A., Dumas, T. (2003). Middle school improvement and reform: Development and validation of a school-level assessment of climate, cultural pluralism, and school safety. *Journal of Educational Psychology*, *95*, 570-588.

Card, N.A. & Hodges, E.V.E. (2008). Peer victimization among schoolchildren: Correlations, causes, consequences, and considerations in assessment and intervention. *School Psychology Quarterly*, *23*, 451-461. doi: 10.1037/a0012769

Cohen, J. (2006). Social, emotional, ethical, and academic education: Creating a climate for learning, participation in democracy, and well-being. *Harvard Educational Review*, *76*(2), 201-237.

Cohen, J., McCabe, E.M., Michelli, N.M. & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. *Teachers College Record*, *111*(1), 180-213.

Cornell, D. G., & Gregory, A. (2008). *Virginia High School Safety Study: Descriptive report of survey results from ninth grade students and teachers.* Charlottesville, Virginia: University of Virginia

Cornell, D., Gregory, A., Huang, F., & Fan, X. (2013). Perceived prevalence of bullying and teasing predicts high school dropout rates. *Journal of Educational Psychology, 105*, 138-149.

Felix, E. D., Sharkey, J. D., Green, J. G., Furlong, M. J., & Tanigawa, D. (2011). Getting precise and pragmatic about the assessment of bullying: the development of the California Bullying Victimization Scale. *Aggressive Behavior, 37*, 234-247.

Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of Applied Psychology, 82*, 221-234.

Fredricks, J. A., Blumenfeld, P. C., and Paris, A. (2004). School engagement: potential of the concept: state of the evidence. *Review of Educational Research, 74*, 59–119.

Glew, G.M., Fan, M.Y., Katon, W., & Rivara, F.P. (2008). Bullying and school safety, *Journal of Pediatrics*, 152(1), 123-128.

Gottfredson, G. D., Gottfredson, D. C., Payne, A. A., & Gottfredson, N. C. (2005). School climate predictors of school disorder: Results from a national study of delinquency prevention in schools. *Journal of Research in Crime and Delinquency, 42*, 412-444.

Johnson, B. & Stevens, J.J. (2006) Student achievement and elementary teachers' perceptions of school climate. *Learning environment Research, 9*, 111-122. doi:10.1007/s10984-006-9007-7.

Juvonen, J., Wang, Y., & Espinoza, G. (2011). Bullying Experiences and Compromised Academic Performance Across Middle School Grades, *Journal of Early Adolescence, 31*(1), p 152-173.

Kert, A. S., Codding, R. S., Tryon, G. S., & Shiyko, M. (2010). Impact of the word "bully" on the reported rate of bullying behavior. *Psychology in the Schools*, *47*, 193-204. DOI: 10.1002/pits.20464

Klein, J., Cornell, D., & Konold, T. (2012). Relationships between school climate and student risk behaviors. *School Psychology Quarterly*, *27*, 154-169.

Konishi, C., Hymel, S., Zumbo, B.D., & Li, Z. (2010). Do school bullying and student-teacher relationships matter for academic achievement? A multilevel analysis. *Canadian Journal of School Psychology*, *25*, 19-39. doi: 10.1177/0829573509357550 .

MacNeil, A.J., Prater, D.L., & Busch, S. (2009) The effects of school culture and climate on student achievement, *International Journal of Leadership in Education, 12*, 73-84. doi:10.1080/13603120701576241

Marks, H. M. (2000). Student engagement in instructional activity: patterns in the elementary, middle, and high school years. *American Educational Research Journal, 37*, 153–184.

Mehta, S., Cornell, D., Fan, X., & Gregory, A. (2013). Bullying climate and school engagement in ninth grade students. *Journal of School Health*, 83, 45-52.

Nakamoto, J. &Schwartz, D. (2010). Is peer victimization associated with academic achievement? A meta-analytic review, *Social Development, 19*, 2010. doi: 10.1111/j.1467-9507.2009.00539.x

Nansel, T., Overpeck, M., Pilla, R., Ruan., W. Simons-Morton, B. & Scheidt, P. (2001). Bullying behaviors and US youth: Prevalence and association with psychosocial adjustment. *Journal of the American Medical Association,285*(16), 2094-2100.

doi:10.1001/jama.285.16.2094

Olweus, D. (1993). *Bullying at school: What we know and what we can do*. Oxford, UK: Blackwell.

Olweus, D. & Limber, S. (2000). *Blueprints for violence prevention, book nine: Bullying prevention program*. Golden, CO: Venture Publishing and Denver, CO: C & M Press.

Ripski, M.B. & Gregory, A. (2009). Unfair, unsafe, and unwelcome: Do high school students' perceptions of unfairness, hostility, and victimization in school predict engagement and achievement. *Journal of School Violence, 8*, 355-375. doi:10.1080/15388220903132755

Rivers, I., Poteat, V.P., Noret, N., & Ashurst, N. (2009). Observing bullying at school: The mental health implications of witness status. *School Psychology Quarterly, 24*, 211-223. doi: 10.1037/a0018164

Sawyer, A. L., Bradshaw, C. P., & O'Brennan, L. M. (2008). Examining ethnic, gender, and developmental differences in the way children report being a victim of "bullying" on self-report measures. *Journal of Adolescent Health, 43*, 106-114.

Sirin, S.R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75, 417-453. doi: 10.3102/00346543075003417.

Sutton, A. & Soderstrom, I. (1999) Predicting elementary and secondary school achievement with school-related and demographic factors. *The Journal of Educational Research*, 92(6), 330-338.

Swearer, S. M., Espelage, D. L., Vaillancourt, T. & Hymel, S. (2010). What can be done about school bullying? Linking research to educational practice. *Educational Researcher*, *39*, 38-47.

Unnever, J.D. & Cornell, D.G. (2003). The culture of bullying in middle schools. *Journal of School Violence*, *2*(2), 5-27. doi:10.1300/J202v02n02_02

Varjas, K, Henrich, C.C., & Meyers, J. (2009). Urban Middle School Students' Perceptions of Bullying, Cyberbullying, and School Safety. *Journal of School Violence*, 8, 159-176.

Virginia Department of Education (2010). Virginia Standards of Learning and Common Core Standards.

Retrieved from http://www.doe.virginia.gov/testing/common_core/index.shtml

Wang, J., Iannotti, R. J., Luk, J. W., & Nansel, T. R. (2010). Co-occurrence of victimization from five subtypes of bullying: Physical, verbal, social exclusion, spreading rumors, and cyber. *Journal of Pediatric Psychology*, *35*, 1103-1112.

ABSTRACTS

The first paper of this dissertation was published in the *Journal of Applied School Psychology* in August 2013. The second and third papers are currently being prepared for submission. The abstracts for all three papers are presented here:

Manuscript One

The Impact of Teasing and Bullying on Schoolwide Academic Performance

Hierarchical regression analyses conducted at the school level found that the perceived prevalence of teasing and bullying was predictive of schoolwide passing rates on state-mandated achievement testing used to meet No Child Left Behind requirements. These findings could not be attributed to the proportion of minority students in the school, student poverty, school size, or personal victimization, which were statistically controlled. Measures of the prevalence of teasing and bullying were obtained from a statewide survey of 7,304 ninth grade students and 2,918 teachers aggregated into school level scores for 284 Virginia high schools. These results support the need for greater attention to the impact of teasing and bullying on high school student performance on high stakes testing.

Manuscript Two

School Administrator Assessments of Bullying and State-Mandated Testing

Bully victimization is associated with lower academic performance for individual students; however, less is known about the impact of bullying on the academic performance of the school as a whole. This study examined the relation between both high school administrator assessments of the prevalence of teasing and bullying (PTB) and the use of evidence-based bullying prevention efforts and schoolwide performance on state-mandated testing. Hierarchical regression analyses conducted at the school level with 301 Virginia high schools found that principal reports of both PTB and evidence-based efforts to prevent bullying were associated with the proportion of students that passed achievement testing. Findings could not be attributed to the proportion of Caucasian students in the school, student poverty, school size, or urban location, which were statistically controlled.

Manuscript Three

The Relations between Teasing and Bullying and Middle School Standardized Exam Performance

This study examined the relations between the prevalence of teasing and bullying (PTB) and schoolwide performance on state-mandated testing in middle schools. Measures of PTB and student engagement were obtained from a statewide survey of 29,203 seventh and eighth grade students and 6,298 teachers. Student and teacher responses were aggregated to the school level for 271 Virginia middle schools. Hierarchical regression analyses conducted at the school level found that PTB as perceived by students and teachers predicted schoolwide performance on achievement testing. Engagement partially mediated the association between PTB and test performance. These findings were not accounted for by the proportion of minority students in the school, student poverty, school size, or personal victimization, which were statistically controlled. These results support notion that PTB is related to student test performance, in part, because PTB decreases student engagement in school which, in turn, decreases student performance on high stakes testing.

Manuscript One

The Impact of Teasing and Bullying on Schoolwide Academic Performance

Anna Lacey, M.Ed. and Dewey Cornell, Ph.D.

Curry School of Education

University of Virginia

2013, *Journal of Applied School Psychology*

Author Notes

Anna Lacey, M.Ed. is with the Programs in Clinical and School Psychology, Curry School of Education, University of Virginia. Dewey Cornell, Ph.D. is with the Curry School of Education, University of Virginia.

We thank Donna Bowman Michaelis of the Virginia Department of Criminal Justice Services and Arlene Cundiff of the Virginia Department of Education, and their colleagues, for their support of the Virginia High School Safety Study. We also thank our research assistants Sharmila Bandyopadhyay, Megan Eliot, Francis Huang, Tse-Hua Shih, Erica Shirley, Aisha Thompson, Jennifer Klein, Talisha Lee, and Farah Williams. Finally, we thank Peter Sheras for his contribution to the manuscript.

This project was supported in part by a grant from the Office of Juvenile Justice and Delinquency Prevention of the U.S. Department of Justice, but the views in this article do not necessarily reflect policies or recommendations of the funding agency.

Correspondence concerning this article should be addressed to Anna Lacey at apl4gu@virginia.edu, P.O. Box 400270, Charlottesville, VA 22904-4270.

Abstract

Hierarchical regression analyses conducted at the school level found that the perceived prevalence of teasing and bullying was predictive of schoolwide passing rates on state-mandated achievement testing used to meet No Child Left Behind requirements. These findings could not be attributed to the proportion of minority students in the school, student poverty, school size, or personal victimization, which were statistically controlled. Measures of the prevalence of teasing and bullying were obtained from a statewide survey of 7,304 ninth grade students and 2,918 teachers aggregated into school level scores for 284 Virginia high schools. These results support the need for greater attention to the impact of teasing and bullying on high school student performance on high stakes testing.

Keywords: bullying, school climate, academic achievement testing

The Impact of Teasing and Bullying on Schoolwide Academic Performance

Peer victimization, especially bullying, is a pervasive problem in schools (Swearer, Espelage, Vaillancourt, & Hymel, 2010). A U.S. national survey estimated that approximately 38% of male adolescents and 41% of female adolescents could be classified as victims of some form of bullying (Wang, Iannotti, Luk, & Nansel, 2010). A study from the United Kingdom found that about 63% of students witnessed peer victimization (Rivers, Poteat, Noret, & Ashurst, 2009).

Bullying has been linked to negative outcomes for both victims of bullying and bystanders (Swearer et. al., 2010). Bully victimization is correlated with low school enjoyment, perceptions of school as unsafe, school avoidance, and low academic achievement (Card & Hodges, 2008). Almost all studies of bullying rely on self-report, which is a relatively simple and efficient way to collect schoolwide information. Olweus (2010) has argued that anonymous self-report is the most comprehensive way to assess bullying because school personnel and classmates may not be aware of some instances of bullying. However, the impact of bullying on the whole school may be greater than simply the cumulative reports of victims, since witnesses to bullying may be affected as well. Witnessing peer victimization has been associated with a variety of mental health risks such as hostility, anxiety, and somatic complaints (Rivers et al., 2009).

Studies have shown that self-reported peer victimization is related to academic achievement in individual victims (Nansel, Overpeck, Pilla, Ruan, Simons-Morton, & Scheidt, 2001). A meta-analysis of 33 studies revealed that victims of peer victimization have lower academic functioning (Nakamoto & Schwartz, 2010). Among secondary

students, self-reported victims of bullying had lower grade point averages than non-victims (Glew, Fan, Katon, & Rivara, 2008; Juvonen, Wang, & Espinoza, 2011).

Although previous research has documented the effects of personal victimization on individual students, less attention has been given to the impact of the prevalence of bullying and other forms of peer victimization on schoolwide academic performance. A basic principle of bullying prevention is that bullying affects all students in the school, even those who are not directly involved as bullies or victims (Swearer, Espelage, Vaillancourt, & Hymel, 2010). The schoolwide prevalence of bullying may have effects that go beyond individual students, such as leading students to perceive school as an unwelcome and unsafe place. A recent study reported that schools with more pervasive teasing and bullying had students who were less engaged in school, with school level effects on both student commitment to school and involvement in school activities (Mehta, Cornell, Fan, & Gregory, 2013).

The prevalence of bullying is an important aspect of school climate. School climate has been defined as the subjective experience of the school environment from the perspective of the students, faculty, and staff (Cohen, 2006). Although there may be individual differences in the perception of school climate, the collective perceptions of students in a school can be an important indicator of the school's functioning (Cohen, McCabe, Michelli, & Pickeral, 2009). In a school with positive climate, students interact in mutually respectful and supportive ways (Cohen et al, 2009).

Negative school climate, as reported by principals, teachers, and students, has consistently been found to be associated with poor school achievement (Johnson & Stevens, 2006; Cornell, Gregory, Huang, & Fan, 2013; MacNeil, Prater, & Busch, 2009;

Ripski & Gregory, 2009; Konishi, Hymel, Zumbo, & Li, 2010). Students in schools in which principals perceived higher rates of bullying had lower individual math and reading achievement than students in schools in which principals perceived lower amounts of bullying (Konishi et. al, 2010). Studies have also found that teachers' reports of a negative school climate are associated with lower mean student achievement (Johnson & Stevens, 2006) and poorer performance on standardized tests (MacNeil, Prater, & Busch, 2009). It has also been demonstrated that student perceptions of a negative school climate are associated with lower student classroom engagement, lower performance on standardized math and reading tests (Ripski & Gregory, 2009), and higher student dropout rates (Cornell et al, 2013).

The Current Study

The current study extends previous research on the academic impact of peer victimization to schoolwide effects that might not be detected from the assessment of individual victim experiences. In order to comply with the No Child Left Behind Act (NCLB, 2006), schools are under great pressure to assess and improve schoolwide performance on high-stakes examinations. We hypothesized that perceptions of the prevalence of bullying victimization would be associated with schoolwide passing rates on standardized tests above and beyond the association between personal bullying victimization and schoolwide passing rates. Bullying victimization may be associated with poor performance on standardized tests because the experience of being teased or bullied adversely affects the victims. However, a schoolwide climate of victimization might have broader motivational effects on school engagement that affect bystanders as well as victims (Mehta et al, 2013; Juvonen, Graham, & Shuster, 2003; Swearer et al.,

2010; Unnever & Cornell, 2003). Pervasive teasing and bullying in a school may create a noxious school climate that induces school avoidance, disengagement, and poorer academic performance.

For the purposes of this article, peer victimization and peer aggression are used broadly to encompass all forms of verbal and physical aggression between children and youth, while bullying is used when referring to studies that specifically addressed bullying and typically defined the term using the concept of a power imbalance. Teasing is a broader term that can have both playful and hostile connotations in everyday usage, but here teasing is limited to derogatory behavior, such as criticizing someone's personal appearance or clothing. There is no convention that teasing requires an imbalance of power, so it can be regarded as a form of peer aggression that may or may not meet the criteria for bullying.

Methods

School Sample

The sample of schools was drawn from the Virginia High School Safety Study (VHSSS; Cornell & Gregory, 2008), a statewide study designed to collect school climate data from all public high schools in Virginia in 2007 as part of the state's mandatory school safety audit program. Eligible schools offered regular 9^{th}-12^{th} grade classes leading to a high school diploma, excluding alternative schools that offered part-time classes or served a special population such as juvenile corrections residents.

The sample used in this report consisted of 286 schools with available data, representing 91% of the 314 eligible schools. This high participation rate was achieved through the cooperation and endorsement of the study from the Department of Education

and the Virginia Department of Criminal Justice Services. The VHSSS provides an especially useful sample of schools because it includes a wide range of student demographics from urban, suburban, and rural locations. The total school enrollment for grades 9-12 varied between 171 and 4,080 students (M = 1,243, SD =708). The percentage of students in each school who received free or reduced price meals (FRPM) ranged from 1.1 to 82.7 (M = 30.4, SD = 15.8). The percentage of racial minority students in each school ranged from 0 to100 (M = 34, SD = 25.7).

Student and Teacher Sample

Surveys were collected from samples of approximately 25 ninth-grade students and 10 teachers in each school. Ninth grade was selected for study because it is the first year of high school and a pivotal year for high school adjustment and achievement (Donegan, 2008; Neild, Stoner-Elby, & Furstenberg, 2008). Ninth graders occupy the lowest rung in the high school status hierarchy and are most vulnerable to bullying by older students.

A target sample of 25 students was selected in order to minimize the burden on schools and because it represented the size of a typical classroom of students that could be tested on one occasion. A sample of 25 students is comparable to the samples obtained in several national studies of student performance, including the National Educational Longitudinal Study, NELS: 88 (Ingels, 1990) and the National Assessment of Educational Progress (NAEP) program (Chromy, 1998). Schools with fewer than 25 ninth grade students were encouraged to have all available ninth graders complete the survey.

Student and teacher surveys were completed online in the spring of 2007. The samples of students and teachers were selected by a random number process carried out by school principals. Each school principal received a memorandum from the state superintendent advising them of the requirement to participate in the survey. This memo was followed by a packet of instructions from the researchers. The packet included written instructions as well as a CD containing a video explaining the purpose of the study and the sample selection process. Each principal received a random number list that was used to identify students by matching the numbers with an alphabetized ninth-grade roster. These random numbers were based on class size and alphabetically matched with ninth-grade rosters. Principals were asked to identify enough ninth grade students in order to gain a sample of 25 student surveys from each school. Students who were not able to participate for any reason were replaced with the next student identified by the random number list. Student (and teacher) participants were provided an opportunity to decline participation in the study without penalty. Additionally, parents were provided with information regarding the study and the option to decline their child's participation in the study.

Students were ineligible for participation if they could not read English or if they had cognitive or physical limitations that prevented them from understanding the survey. Principals completed a survey reporting results of the sample selection process. About 73% of contacted students agreed to participate and completed the survey, resulting in a sample of 7,304 ninth grade students. Principals reported that students did not participate because the parent declined (6% of non-participants) or because the student declined

(16%), was sick (32%), was suspended (5%), had moved (7%), had a language barrier (3%), or had some other reason (such as a field trip, 31%).

On average, 25 ninth-grade students were chosen to complete the survey at each school. Approximately 63% of the students self-identified as Caucasian, 22% as African American, 5% as Hispanic, 3% as Asian American, 5% as some other ethnicity, and less than 1% as American Indian. The students were 49% female and age ranged from 13 to 17 years ($M = 14.8$, $SD = 0.69$).

Approximately 10 ninth grade teachers from each school were invited to complete the survey using a similar random number list. If a school had fewer than 10 ninth grade teachers, all ninth grade teachers were asked to complete the survey. The participation rate for teachers was 83%. Teachers did not participate because they declined (163), were absent during the survey administration (140), or for unknown reasons (162). Altogether, 2,918 teachers completed the survey. Nearly two-thirds (64%) of the teachers were female. The majority (83%) of the teachers were Caucasian, with 12% African American, 2% Hispanic, 1% Asian American, 2% other, and less than 1% American Indian. Teacher experience varied widely: 36% had 1-5 years, 21% had 6-10 years, 13% had 11-15 years, and 30% had more than 15 years.

Procedure

Student and teacher surveys were completed anonymously online at computer stations in school. All participants viewed a video introduction to the survey that explained the purpose of the survey and then read standard instructions. The student surveys were supervised by teachers or other school personnel.

Measures

Students and teachers completed a 137-item school climate survey that included the School Climate Bullying Survey (Cornell, 2011) and some additional scales to measure perceptions of the supportiveness of school climate and the enforcement of school rules, as well as student engagement in school. Detailed project information is available elsewhere (Virginia Youth Violence Project, n.d.; Cornell & Gregory, 2008). The survey presented participants with the following definition of bullying:

> "Bullying is defined as the use of one's strength or popularity to injure, threaten, or embarrass another person on purpose. Bullying can be physical, verbal, or social. It is not bullying when two students of about the same strength argue or fight."

Victimization. Consistent with other measures of bullying (Olweus, 2007), the survey asked students to report whether they had been physically, socially, and verbally bullied at school. The timeframe was the past month with response options of *never, once or twice, about once per week,* or *several times per week.* An overall bullying victimization score was calculated by summing the three personal bullying victimization questions for each participant. Then the scores for participants in each school were combined into a school-level average. The overall victimization score had an internal consistency (Cronbach's alpha) of .75.

Three validation studies have shown that this measure of bullying corresponds to peer and teacher nominations of victims of bullying (Baly, Cornell, & Lovegrove, 2014; Branson & Cornell, 2009; Cornell & Brockenbrough, 2004). Further, self-reported bullying victimization was correlated with depression, negative school perceptions, and lower grade point average (Branson & Cornell, 2009). A three-year longitudinal study

found that bullying victimization scores had good stability and were predictive of student perceptions of the safety and supportiveness of school climate, feelings of sadness, and thoughts of suicide (Baly, Cornell, & Lovegrove, 2014.

Prevalence of Teasing and Bullying. The Prevalence of Teasing and Bullying (PTB) scale was completed by both students and teachers. Although students were provided with the survey definition of bullying, it is not feasible to ask students to apply a strict definition of bullying to their observations of bullying they see taking place in school, since they may see incidents and not know whether the behavior is repeated or may not be able to judge whether there is a power imbalance in the students' social status or popularity. Further, students also may have biases about the term "bullying" because of its negative connotations. For these reasons, some researchers have recommended against using the term "bullying" and advocate asking students about specific behaviors such as teasing and threatening (Felix, Sharkey, Green, Furlong, & Tanigawa, 2011; Kert, Codding, Tryon, & Shiyko, 2010; Sawyer, Bradshaw, & O'Brennan, 2008). Therefore, the PTB scale was designed to ask more general questions about teasing and bullying that may be observed at school.

The four items, with response options of *strongly disagree, disagree, agree,* or *strongly agree*, were: (1) Bullying is a problem at this school, (2) Students here often get teased about their clothing or physical appearance, (3) Students here often get put down because of their race or ethnicity, and (4) There is a lot of teasing about sexual topics at this school. Other measures of bullying (e.g., Juvonen, Nishina, & Graham, 2001; Olweus, 2007) include similar questions about peer harassment and teasing. In the

present sample, PTB was analyzed at the school level using two scores: the average student score and the average teacher score aggregated for each school.

Although the original intention was to construct a scale using items that encompassed a wide range of bullying behaviors, a series of exploratory and confirmatory factor analyses indicated that a shorter, four-item scale was a better measure (Bandyopadhyay, Cornell, & Konold, 2009). In a study of 2,111 middle school students who completed a survey measuring different aspects of school climate, four questions about bullying and teasing clustered together in exploratory and confirmatory factor analyses in a scale labeled "Prevalence of Teasing and Bullying" (Bandyopadhyay, Cornell, & Konold, 2009). In the initial exploratory factor analysis, loadings for the four items on the PTB scale ranged from .54 to .67. A confirmatory analysis produced good overall model fit. Next, a series of multi-group confirmatory factor analyses supported its use across gender and race groups. In a second part of the Bandyopadhyay study, the PTB scale was replicated in confirmatory factor analysis (CFA) of the sample of ninth grade students used in the present study. Finally, a third study using CFA supported the PTB scale in a sample of 3,687 high school students (Klein, Cornell, & Konold, 2012).

Studies have also supported the criterion-related validity of the PTB scale. In a previous study using the VHSSS schools, school-level PTB scores were predictive of several measures of school disorder, including the number of suspensions in the school, teacher reports of gang-related violence in school, and teacher reports of student willingness to seek help for bullying and threats of violence at school (Bandyopadhyay, Cornell, & Konold, 2009). Another study found that PTB scores were predictive of student engagement in school, including both commitment to school and involvement in

school activities (Mehta, Cornell, Fan, & Gregory, 2013). A third study found that high PTB scores in ninth grade were predictive of dropout rates over the subsequent four years of high school (Cornell et al, 2013).

Academic Achievement. The Virginia Standards of Learning (SOL) exams were used as the achievement measure. The Virginia SOL exams are state-mandated tests that are administered at the end of courses required for high school graduation (Virginia Department of Education, 2010). This program helps fulfill requirements of the No Child Left Behind Act and follows the requirements set forth by the Common Core State Standards Initiative (CCSSI, 2010). School performance on these exams is considered during evaluation for school accreditation and funding (Virginia Department of Education, 2010).

The Virginia SOL exams were designed to measure student learning and achievement (Virginia Department of Education, 2007). In order to ensure appropriate item difficulty, content coverage, and to limit item bias, test development included the use of test blueprints, item development specifications, SOL review committees, field testing, and item banking. Bi-yearly test construction is completed by Virginia Department of Education (VDOE) with the assistance of Pearson and ETS psychometricians. Overall, the 2007 SOL exams were found to have acceptable reliability across race and gender; Cronbach's $\alpha > .70$ (Virginia Department of Education, 2007).

Passing rates for SOL exams were obtained from the VDOE. These were schoolwide results for each school; individual results for the students in this study were not available. The SOL subject exams most commonly completed in the ninth grade were used as the measures of academic achievement: Algebra 1, Earth Science, and World

History. Biology and Geometry SOL subject exams – most often taken in tenth grade - were also examined to investigate the possibility of generalizing the results to other grades. SOL exams can be completed at any grade; as a result, the passing rates were not grade specific and could not be disaggregated by grade.

In order to recognize high levels of performance, the SOL exams have a basic or proficient passing level and a higher, advanced passing level. Consequently, both basic and advanced passing rates were examined in this study. Because students that pass at the advanced level are also included in the basic passing rates, the two rates are highly correlated (see Table 2).

School Demographics. School demographic information was obtained from public records of the Virginia Department of Education. The student composition of a school has been associated with both levels of bullying and academic performance (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005). Therefore, three school demographic variables—school size, percentage of minority students, and percentage of students eligible for free or reduced price meals (FRPM) —were used as control variables.

Results

Preliminary Data Analyses

Prior to all analyses, the data were inspected for outliers, extreme values, missing data and multicollinearity. Boxplots indicated that there were between 19 and 27 univariate outliers depending on the SOL test being examined. Although these outliers were present in the data, descriptive data showed that none of the variable values exceeded the range of possible values. Further, results excluding univariate outliers did

not differ substantially from the results presented in this paper. Therefore, none of the cases were excluded based on the interpretation of descriptive data and boxplots.

Mahalanobis Distance analyses indicated between 5 and 15 multivariate outliers for the 5 different SOL exams using the cutoff of $D^2 = 22.45$. However, all multivariate outlier variable values were within a reasonable range and therefore, were not removed from the data set. Results for this study do not change substantially when multivariate outliers were excluded from the data. Tolerance statistics were interpreted in order to identify multicollinearity between the variables. The Tolerance statistics for all variables used in these analyses fell above the standard cutoff of .10. Finally, histograms of the residual statistics indicated that all residuals were randomly distributed for all variables.

Intercorrelations

Table 1 provides descriptive statistics and Table 2 provides intercorrelations for study variables. In summary, at the .05 level of statistical significance, FRPM and percentage of minority students correlated with passing rates and advanced passing rates for all five exams with the exception of Algebra 1 advanced passing rates. School size was correlated with Earth Science, World History, Biology, and Geometry advanced passing rates and World History passing rate. Student reports of victimization were correlated with Biology exam passing rates and World History advanced exam passing rates. Both student and teacher reports of the prevalence of teasing and bullying correlated with basic and advanced passing rates for all five exams, with the exceptions of the advanced passing rate for Earth Science. Student and teacher measures of PTB were modestly correlated ($r = .31$, $p < .001$).

Multiple Regression Analyses of Passing Rates

Regression was used rather than hierarchical linear modeling because individual student SOL exam scores were not available. Separate regression analyses were conducted for both basic and advanced passing rates for Algebra 1, Earth Science, World History, Biology, and Geometry. Each regression was performed in a three-step sequence with student demographic variables entered at step 1, personal bullying victimization at step 2, and PTB at step 3. Because of the large number of analyses, only step 3 of each regression is summarized here. Details of each step are found in Tables 3 and 4.

Algebra 1 passing rate. At Step 3, the percentage of minority students and school enrollment significantly contributed to the model. FRPM and personal bullying victimization were not significant predictors. For PTB, both student perceptions ($\beta = -.155$, $p < .05$) and teacher perceptions ($\beta = -.251$, $p < .01$) were statistically significant. The total variance accounted for by the model was $R^2 = .158$, $p < .001$; the increase associated with PTB was $\Delta R^2 = .102$, $p < .001$.

Algebra 1 advanced passing rate. At step 3, all three demographic variables (percentage minority students, FRPM, and school enrollment) were statistically significant. Personal bullying victimization was not a significant predictor. For PTB, both student ($\beta = -.215$, $p < .01$) and teacher perceptions ($\beta = -.193$, $p < .01$) significantly contributed to the regression model. The total variance accounted for by the model was $R^2 = .183$, $p < .001$. The portion explained by PTB was $\Delta R^2 = .096$, $p < .001$.

Earth Science passing rate. At step 3, all three demographic variables were statistically significant contributors to the model. Personal bullying victimization was not a significant predictor. Both student ($\beta = -.172$, $p < .01$) and teacher ($\beta = -.110$, $p < .05$) perceptions of PTB were significant. The total variance in SOL passing rates explained

by the model was $R^2 = .329$, $p < .001$. The variance accounted for by PTB was $\Delta R^2 = .046$, $p < .001$.

Earth Science advanced passing rate. At step 3, all three demographic variables were significant predictors. Personal bullying victimization did not significantly contribute to the model. Student reports of PTB ($\beta = -.210$, $p < .01$) was statistically significant whereas teacher reports of PTB was not a significant predictor. The total variance accounted for by the model was $R^2 = .339$, $p < .001$; the portion of variance attributable to PTB was $\Delta R^2 = .034$, $p = .001$.

World History passing rate. At step 3, all three demographic variables significantly contributed to the model. Personal bullying victimization did not significantly add to the model. For PTB, only student perceptions ($\beta = -.242$, $p < .01$) was statistically significant. The total variance accounted for by the model was $R^2 = .331$, $p < .001$. The portion of the variance accounted for by PTB was $\Delta R^2 = .064$, $p < .001$.

World History advanced passing rate. At step 3, all three demographic variables significantly contribute to the model. Personal bullying victimization was not a significant predictor. Student reports of PTB ($\beta = -.166$, $p < .01$) was significant whereas teacher reports of PTB was not significant. The total variance attributable to the model was $R^2 = .350$, $p < .001$. The variance accounted for by PTB was $\Delta R^2 = .035$, $p = .003$.

Biology passing rate. At step 3, percentage minority students, FRPM, and personal bullying victimization significantly contributed to the model whereas school enrollment was not a significant predictor. For PTB, student perceptions ($\beta = -.228$, $p < .01$) was statistically significant. The portion of variance explained by the model was $R^2 = .367$, $p < .001$; the portion of the variance attributable to PTB was $\Delta R^2 = .057$, $p < .001$.

Biology advanced passing rate. At step 3, all three demographic variables significantly contributed to the model. Personal bullying victimization was not significant. Student perceptions of PTB ($\beta = -.227$, $p < .01$) was a significant predictor whereas teacher reports of PTB was not significant. The portion of variance in SOL passing rates explained by the model was $R^2 = .440$, $p < .001$; the variance explained by PTB was $\Delta R^2 = .055$, $p < .001$.

Geometry passing rate. At step 3, all three demographic variables significantly contributed to the model. Personal bullying victimization was not a significant predictor. For PTB, both student ($\beta = -.134$, $p < .05$) and teacher ($\beta = -.215$, $p < .01$) perceptions were statistically significant. The portion of variance attributable to the model was $R^2 = .241$, $p < .001$. The portion of variance explained by PTB was $\Delta R^2 = .075$, $p < .001$.

Geometry advanced passing rate. At step 3, all three demographic variables were significant predictors. Personal bullying victimization did not significantly contribute to the model. For PTB, both student ($\beta = -.198$, $p < .01$) and teacher ($\beta = -.180$, $p < .01$) perceptions were significant predictors. The portion of variance attributable to the model was $R^2 = .274$, $p < .001$; the portion explained by PTB was $\Delta R^2 = .082$, $p < .001$.

Passing rates for schools with high, medium, and low PTB. In order to present findings in a format that illustrated the magnitude of the effect, schools were grouped into low, medium, and high terciles based on PTB scores. Using student reports, schools with low teasing and bullying had passing rates that were 2.8 to 5 percent higher than schools with high teasing and bullying (See Figure 1). Using teacher reports, the differences in passing rates were 3.3 to 6.6 percent (See Figure 2).

Discussion

The No Child Left Behind Act of 2001 requires schools to meet Adequate Yearly Progress (AYP) goals of increasingly high schoolwide passing rates in math, reading, and science (NCLB, 2006). From this perspective, it is especially noteworthy that the prevalence of teasing and bullying was consistently related to both basic and advanced passing rates on five of Virginia's required exams. PTB scores accounted for 3.4% to 10.2% of the variance. These findings were not limited to the three tests (Algebra 1, Earth Science, and World History) typically taken by ninth grade students, but extended to two tests typically taken by tenth grade students (Biology and Geometry).

These results are consistent with previous studies showing a relationship between school climate and schoolwide achievement (Ripski & Gregory, 2009; MacNeil et al, 2009; Johnson & Stevens, 2006). For example, Johnson and Stevens (2006) found that schools with a more positive school climate on average had higher mean student achievement at the school-level. However, the present findings extend previous studies of the impact of peer victimization on individual academic performance to show an association with whole-school passing rates on standardized exams. Such findings should help school psychologists to make a strong case to school administrators concerning the relevance of teasing and bullying for the academic performance of students on mandated testing.

Teacher and student PTB scores correlated modestly ($r = .31$), but both made independent contributions to the prediction of passing rates. Student perceptions were more consistently related to passing rates than were teacher perceptions. This finding is consistent with previous research indicating that teachers are less well-informed about the

extent of bullying in their schools (Bradshaw, Sawyer, & O'Brennan, 2007). In one study, researchers found that school staff members consistently under-estimate the amount of bullying occurring in schools even though staff and students expressed equal concern about bullying (Bradshaw et al, 2007).

The three demographic variables accounted for approximately 20% of the variance in school achievement on average. Demographic variables explained more of the variance for science (Earth Science 27.7%, Biology 27.3%) and history (World History, 26.6%) than for mathematics (Algebra 1 4.8%, Geometry 16%). These findings are consistent with previous research linking academic performance with the composition of the school population (Gottfredson et al, 2005).

The statistical effects of PTB were comparable in magnitude to those for the student demographic variables. For example, with regard to Algebra 1 passing rates, the beta coefficients for PTB were as large as or larger than the corresponding coefficients for school size, student poverty, and the percentage of minority students in the school. These findings are noteworthy because school administrators may regard the demographic composition of their school as a powerful controlling influence on their students' test performance. School psychologists can point out that the prevalence of teasing and bullying at school is just as strongly associated with test performance and may be amenable to improvement.

Self-reported bullying victimization did not predict passing rates on four out of the five SOL exams. These results are not consistent with previous research that has indicated that bullying victimization is related to individual academic achievement (Glew, Fan, Katon, Rivara, & Kernic, 2005; Glew et al, 2008). However, we did not have

the ability to assess whether personal victimization was related to individual test performance because our test data were aggregated at the school level. Instead, the victimization measure served primarily as a control variable to distinguish personal experiences of bullying from perceptions of how pervasive teasing and bullying is in the school. These findings suggest that the lower school level performance was not a result of the proportion of students who reported being bullied, but reflects a broader phenomenon in the school. It appears that the broader context of teasing and bullying assessed in the PTB measure was a better predictor of school level achievement. This suggests that an atmosphere of teasing and bullying in a school could have a general effect on student motivation and engagement, which is consistent with findings by Mehta et al (2013).

Limitations and Directions for Future Research

This was a correlational study that cannot establish a causal relationship or determine the direction of effects. It is possible that the relationship between the prevalence of teasing and bullying and academic achievement is bidirectional or the product of other variables. For example, it may be that less capable teachers permit more teasing and bullying behaviors and their students are less successful on their exams. Underdeveloped classroom management skills, low cooperation among teachers, and low staff consensus on rules and instructional practices have been tied to high levels of bullying (Roland & Galloway, 2002; Roland, & Galloway, 2004).

Although this was a correlational study, its findings were consistent with the view that a climate of teasing and bullying in a school has an effect on schoolwide exam performance. Many different mechanisms involving students and teachers might explain this relationship. Students in schools with more pervasive bullying may have poorer

engagement in learning due to concerns about bullying (Ripski & Gregory, 2009). There also may be a more general level of school disorder associated with bullying and teasing that affects learning or test performance. Research has shown that collective perceptions of school safety and hostility predict reading achievement and student engagement (Ripski & Gregory, 2009). Another possibility is that teachers may be less effective in schools in which there are high levels of teasing and bullying because they spend more time on discipline. Future research could examine whether efforts to help teachers improve classroom management skills and implement bully prevention programs have a beneficial impact on performance on standardized tests.

A final limitation is that the analyses were based on school level passing rates and individual student test scores were unavailable. A more comprehensive assessment would include the SOL test performance for individual students along with their perceptions of school climate, permitting analyses with hierarchical linear modeling techniques.

Implications for Practice and Conclusions

School psychologists can play an important role in advising schools on effective policies and practices to improve student academic performance as well as behavior. Our study suggests that the prevalence of teasing and bullying may play a larger role in school functioning than generally recognized. Beyond the well-established effects on individual victims, bullying may have schoolwide impact on student academic performance.

In the era of No Child Left Behind, American schools are devoting considerable effort to finding ways to improve student performance on standardized tests. Much of this effort has focused understandably on academic instruction, tutoring, preparation in test-taking skills, etc. The 2.8 to 6.6% difference in passing rates between schools in the

lower and upper third of PTB is substantial. Virginia schools are currently meeting state accreditation standards but struggling to meet the increasingly high requirements for the NCLB Act. For example, in 2011, 61% of all public schools in Virginia did not meet the AYP goals for SOL passing rates for the 2010-2011 school year (Virginia Department of Education, 2011a). Schools failing to meet these standards in Virginia are typically within a few percentage points of passing (Virginia Department of Education, 2011b).

In addition to the identification and treatment of individual perpetrators and victims, school psychologists should consider schoolwide psychoeducational efforts designed to improve peer relations. Card and Hodges (2008) recommended a comprehensive schoolwide approach that aims to change the perceptions and behavior of school personnel, students, and parents. Results from meta-analyses found that school-based anti-bullying programs effectively reduced bullying and victimization (Ttofi & Farrington, 2011).Ttofi and Farrington (2009, 2011) identified several program components that were associated with a decrease in bullying, such as parent training and counseling with parents and consultation with teachers on classroom management.

School psychologists can also take a leadership role in advocating more effective discipline and student support practices, such as the implementation of schoolwide positive behavior interventions and supports (Sullivan, Long, & Kucera, 2011). Sprague and Nishioka (2012) emphasized that bullying and harassment affect bystanders as well as victims, making schoolwide interventions essential. Interestingly, there is now evidence from 12 school-based programs that bullying prevention programs can be effective by increasing bystander intervention in bullying situations (Polanin, Espelage, & Pigott, 2012). A schoolwide model of service delivery places more emphasis on

ecological assessment and universal prevention efforts than on traditional individual services, although there is clearly a role for both in dealing with problems like bullying.

References

Baly, M., Cornell, D., & Lovegrove, P., (2014). A longitudinal comparison of peer- and self-reports of bullying victimization across middle school. *Psychology in the Schools*, 51, 217-240.

Bandyopadhyay, S., Cornell, D., & Konold, T. (2009). Internal and external validity of three school climate scales from the School Climate Bullying Survey. *School Psychology Review***,** *38*, 338-355.

Bradshaw, C.P., Sawyer, A.L., and O'Brennan, L.M. (2007). Bullying and peer victimization at school: Perceptual differences between students and school staff, *School Psychology Review, 36,* 361-382.

Branson, C. E., & Cornell, D. G. (2009). A comparison of self and peer reports in the assessment of middle school bullying. *Journal of Applied School Psychology*, *25*, 5–27. doi:10.1080/15377900802484133

Card, N.A. & Hodges, E.V.E. (2008). Peer victimization among schoolchildren: Correlations, causes, consequences, and considerations in assessment and intervention. *School Psychology Quarterly*, *23*, 451-461. doi: 10.1037/a0012769

Chromy, I.R. (1998). *The effects of finite sampling corrections on state assessment sample requirements.* Paper (Draft No. 3) prepared for the NAEP Validity Studies Panel. Palo Alto, CA: American Institutes for Research.

Cohen, J. (2006). Social, emotional, ethical, and academic education: Creating a climate for learning, participation in democracy, and well-being. *Harvard Educational Review*, *76*(2), 201-237.

Cohen, J., McCabe, E.M., Michelli, N.M. & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. *Teachers College Record*, *111*(1), 180-213.

Common Core State Standards Initiative (CCSSI) (2010). The Standards, Retrieved from http://www.corestandards.org/.

Cornell, D. (2011). *The School Climate Bullying Survey: Description and research summary*. Charlottesville, Virginia: Curry School of Education, University of Virginia.

Cornell, D. G., & Brockenbrough, K. (2004). Identification of bullies and victims: A comparison of methods. *Journal of School Violence*, *3*, 63–87. doi:10.1300/J202v03n02_05

Cornell, D. G., & Gregory, A. (2008). *Virginia High School Safety Study: Descriptive report of survey results from ninth grade students and teachers.* Charlottesville, Virginia: University of Virginia

Cornell, D., Gregory, A., Huang, F., & Fan, X. (2013). Perceived prevalence of bullying and teasing predicts high school dropout rates. *Journal of Educational Psychology*, 105, 138-149.

Donegan, B. (2008). The Linchpin Year, *Educational Leadership*, 65(8), 54-56.

Felix, E. D., Sharkey, J. D., Green, J. G., Furlong, M. J., & Tanigawa, D. (2011). Getting precise and pragmatic about the assessment of bullying: the development of the California Bullying Victimization Scale. *Aggressive Behavior*, *37*, 234-247.

Glew, G. M., Fan, M., Katon, W., Rivara, F. P., & Kernic, M. A. (2005). Bullying,

psychosocial adjustment, and academic performance in elementary school. *Archives of Pediatric and Adolescent Medicine, 159,* 1026-1031

Glew, G.M., Fan, M.Y., Katon, W., & Rivara, F.P. (2008). Bullying and school safety, *Journal of Pediatrics*, 152(1), 123-128.

Gottfredson, G. D., Gottfredson, D. C., Payne, A. A., & Gottfredson, N. C. (2005). School climate predictors of school disorder: Results from a national study of delinquency prevention in schools. *Journal of Research in Crime and Delinquency*, *42*, 412–444.

Johnson, B. & Stevens, J.J. (2006) Student achievement and elementary teachers' perceptions of school climate. *Learning environment Research, 9,* 111-122. doi:10.1007/s10984-006-9007-7.

Juvonen J., Graham S., & Schuster, M. A. (2003). Bullying among young adolescents: The strong, the weak, and the troubled. *Pediatrics, 112,*1231-1237.

Juvonen, J., Nishina, A., & Graham, S. (2001). Self-views versus peer perceptions of victim status among early adolescents. In J. Juvonen & S. Graham (Eds.), *Peer harassment in school: A plight of the vulnerable and victimized* (pp. 105-124). New York: Guilford Press.

Juvonen, J., Wang, Y., & Espinoza, G. (2011). Bullying Experiences and Compromised Academic Performance Across Middle School Grades, *Journal of Early Adolescence*, *31*(1), p 152-173.

Kert, A. S., Codding, R. S., Tryon, G. S., & Shiyko, M. (2010). Impact of the word "bully" on the reported rate of bullying behavior. *Psychology in the Schools*, *47*, 193-204. DOI: 10.1002/pits.20464

Klein, J., Cornell, D., Konold, T. (2012). Relationships between school climate and student risk behaviors. *School Psychology Quarterly*, 27, 154-169.

Konishi, C., Hymel, S., Zumbo, B.D., & Li, Z. (2010). Do school bullying and student-teacher relationships matter for academic achievement? A multilevel analysis. *Canadian Journal of School Psychology*, *25*, 19-39. doi: 10.1177/0829573509357550 .

MacNeil, A.J., Prater, D.L., & Busch, S. (2009) The effects of school culture and climate on student achievement, *International Journal of Leadership in Education, 12*, 73-84. doi:10.1080/13603120701576241

Mehta, S., Cornell, D., Fan, X., & Gregory, A. (2013). Bullying climate and school engagement in ninth grade students. *Journal of School Health*.

Nakamoto, J. &Schwartz, D. (2010). Is peer victimization associated with academic achievement? A meta-analytic review, *Social Development, 19*, 2010. doi: 10.1111/j.1467-9507.2009.00539.x

Nansel, T., Overpeck, M., Pilla, R., Ruan., W. Simons-Morton, B. & Scheidt, P. (2001). Bullying behaviors and US youth: Prevalence and association with psychosocial adjustment. *Journal of the American Medical Association,285*(16), 2094-2100. doi:10.1001/jama.285.16.2094

Neild, R. C., Stoner-Eby, S. and Furstenberg, F. (2008). Connecting Entrance and Departure the Transition to 9th Grade and High School Dropout, *Education and Urban Society*, *40*(5), 543-569.

No Child Left Behind Act, 20 U.S.C. § 6311(b)(2)(B), § 7351c(e) (2006).

Olweus, D. (2007). *The Olweus Bullying Questionnaire.* Center City, MN: Hazelden.

Olweus, D. (2010). Understanding and researching bullying: Some critical issues. In S.R. Jimerson, S.M. Swearer, & D. L. Espelage (Eds.) *Handbook of bullying in schools: An international perspective* (pp. 9-34). New York: Routledge.

Polanin, J.R., Espelage, D. L., & Pigott, T. D. (2012). A meta-analysis of school-based bullying prevention programs' effects on bystander intervention behavior. *School Psychology Review*, *41*, 47-65.

Ripski, M.B. & Gregory, A. (2009). Unfair, unsafe, and unwelcome: Do high school students' perceptions of unfairness, hostility, and victimization in school predict engagement and achievement. *Journal of School Violence, 8*, 355-375. doi:10.1080/15388220903132755

Rivers, I., Poteat, V.P., Noret, N., & Ashurst, N. (2009). Observing bullying at school: The mental health implications of witness status. *School Psychology Quarterly, 24*, 211-223. doi: 10.1037/a0018164

Roland R. & Galloway, D. (2002). Classroom influences on bullying. *Educational Research, 44*, 299–312.

Roland, R. & Galloway, D. (2004). Professional cultures in schools with high and low rates of bullying. *School Effectiveness and School Improvement, 15*(3-4), 241-260.

Sawyer, A. L., Bradshaw, C. P., & O'Brennan, L. M. (2008). Examining ethnic, gender, and developmental differences in the way children report being a victim of "bullying" on self-report measures. *Journal of Adolescent Health, 43*, 106-114.

Solberg, M. E., & Olweus, D. (2003). Prevalence estimation of school bullying with the Olweus Bully/Victim questionnaire. *Aggressive Behavior, 29,* 239–268. doi:10.1002/ab.10047

Sprague. J., & Nishioka, V. (2012). Preventing and responding to bullying and harassment in schools: What we know and what can be done. In B. G. Cook, M. Tankersley, T. Landrum (Eds.), Classroom behavior, contexts, and interventions (Advances in Learning and Behavioral Disabilities, Vol. 25) (pp. 217-245). Cambridge, MA, Emerald Group Publishing Limited.

Sullivan, A. L., Long, L., & Kucera, M. (2011). A survey of school psychologists' preparation, and perceptions related to positive behavior interventions and supports, *Psychology in the Schools*, *48*, 971-985. doi: 10.1002/pits.20605

Swearer, S. M., Espelage, D. L., Vaillancourt, T. & Hymel, S. (2010). What can be done about school bullying? Linking research to educational practice. *Educational Researcher*, *39*, 38-47.

Ttofi, M.M. & Farrington, D.P. (2009). What works in preventing bullying: effective elements of anti-bullying programmes, *Journal of Aggression, Conflict, and Peace Research, 1*, 13-24.

Ttofi, M.M. & Farrington, D.P. (2011). Effectiveness of school-based programs to reduce bullying: a systematic and meta-analytic review, *Journal of Experimental Criminology, 7*, 27-56. doi: 10.1007/s11292-010-9109-1

Unnever, J. D., & Cornell, D. G. (2003). The culture of bullying in middle school. *Journal of School Violence*, *2*, 5-27.

Virginia Department of Education (2007). *Virginia SOL Assessments: Technical Report 2006- 2007 Administration Cycle*. Richmond, VA: Author.

Virginia Department of Education (2010). Virginia Standards of Learning and Common Core Standards.

Retrieved from http://www.doe.virginia.gov/testing/common_core/index.shtml

Virginia Department of Education (2011a). *Adequate Yearly Progress (AYP) Reports.* Retrieved from http://www.doe.virginia.gov/statistics_reports/accreditation_federal_reports/ayp/index.shtml

Virginia Department of Education (2011b). State, Division, and School Report Card. Retrieved from https://p1pe.doe.virginia.gov/reportcard/

Virginia Youth Violence Project (n.d.). Virginia High School Safety Study. Retrieved from http://curry.virginia.edu/research/projects/virginia-high-school-safety-study

Wang, J., Iannotti, R. J., Luk, J. W., & Nansel, T. R. (2010). Co-occurrence of victimization from five subtypes of bullying: Physical, verbal, social exclusion, spreading rumors, and cyber. *Journal of Pediatric Psychology*, *35*, 1103-1112.

Table 1

Descriptive Statistics for Study Variables

Variable	Mean	SD	Min	Max
Algebra 1				
% Passing	89.9	6.7	57	100
% Advanced	11.9	9.1	0	52
Earth Science				
% Passing	85.4	7.6	51	100
% Advanced	17.9	8.9	0	47
World History				
% Passing	88.8	7.7	62	100
% Advanced	28.5	13.4	3	75
Biology				
% Passing	88.1	6.2	62	100
% Advanced	12.9	7.7	0	44
Geometry				
% Passing	85.5	9.5	28	100
% Advanced	19.2	11.4	0	63
School Population				
School Enrollment	1242.7	707.7	171	4080
% Minority	34	25.7	0	100
% Free/Reduced Price Meal	30.4	15.8	1.1	82.7
Bully Victimization	1.32	0.50	0.32	3.13
Prevalence of Teasing and Bullying				
Teacher Reports	10.25	0.74	7.44	12.33
Student Reports	10.05	0.99	7.29	14.67

Note. Test results were not available for all schools. For Algebra 1, scores were available for 281 schools, for Earth Science, 280; World History 1, 223; Biology, 281; Geometry, 280.

Table 2

Correlations among Study Variables

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Algebra 1 % Passing	.57**	.43**	.31**	.43**	.35**	.41**	.32**	.59**	.47**	.07	-.15**	-.17**	-.08	-.31**	-.22**
2. Algebra 1 % Advanced	--	.32**	.34**	.40**	.45**	.30**	.36**	.44**	.56**	.09	-.19**	-.09	-.09	-.27**	-.23**
3. Earth Science % Passing		--	.68**	.61**	.46**	.59**	.45**	.49**	.45**	.03	-.45**	-.37**	-.05	-.23**	-.21**
4. Earth Science %			--	.51**	.48**	.49**	.59**	.47**	.53**	.12*	-.38**	-.48**	-.05	-.10	-.20**
5. World History %				--	.70**	.56**	.51**	.46**	.48**	.23**	-.28**	-.45**	-.05	-.22**	-.26**
6. World History %					--	.49**	.65**	.42**	.56**	.30**	-.21**	-.50**	-.13*	-.20**	-.21**
7. Biology % Passing						--	.58**	.44**	.45**	-.03	-.43**	-.40**	-.15**	-.21**	-.31**
8. Biology % Advanced							--	.45**	.64**	.30**	-.25**	-.60**	-.09	-.17**	-.22**
9. Geometry % Passing								--	.70**	.07	-.31**	-.31**	-.06	-.30**	-.20**
10. Geometry % Advanced									--	.16**	-.28**	-.35**	-.08	-.27**	-.23**
11. School Enrollment										--	.36**	-.42**	-.11	.09	.18**
12. Student: % Minority											--	.31**	-.10	.15*	.05
13. % Free/Reduced Price												--	.04	.06	.02
14. Bully Victimization													--	.03	.36**
15. Teacher: PTB														--	.31**
16. Student: PTB															--

Note. *p < .05. **p < .01. PBT = Prevalence of Bullying and Teasing

Table 3

Multiple Regression Analyses of Passing Rates

	Algebra 1	Earth Science	World History	Biology	Geometry
	β or R^2	β or R^2	β or R^2	β or R^2	β or R^2
Step 1					
Student: % Minority	-.164*	-.434**	-.288**	-.301**	-.299**
% Free/Reduced Price Meal	- .082	-.203**	-.291**	-.347**	-.180*
School Enrollment	.106	.109	.231**	-.061	.111
Total R^2	.048**	.277**	.266**	.273**	.160**
Δ R^2	.048**	.277**	.266**	.273**	.160**
Step 2					
Student: % Minority	-.173*	-.441**	-.292**	-.321**	-.308**
% Free/Reduced Price Meal	-.078	-.200**	-.289**	-.338**	-.175*
School Enrollment	.101	.104	.228**	-.070	.108
Bully Victimization	-.090	-.082	-.037	-.194**	-.081
Total R^2	.056**	.283**	.267**	.310**	.167**
Δ R^2	.008	.007	.001	.037**	.006
Step 3					
Student: % Minority	-.157*	-.431**	-.264**	-.328**	-.293**
% Free/Reduced Price Meal	-.038	-.170**	-.243**	-.297**	-.142*
School Enrollment	.171*	.158*	.293**	.008	.167*
Bully Victimization	-.021	-.014	.049	-.105*	-.021
PTB (Student)	-.155*	-.172**	-.242**	-.228**	-.134*
PTB (Teacher)	-.251**	-.110*	-.085	-.076	-.215**
Total R^2	.158**	.329**	.331**	.367**	.241**
Δ R^2	.102**	.046**	.064**	.057**	.075**

Note. *$p < .05$. **$p < .01$.

Table 4

Multiple Regression Analyses of Advanced Passing Rates

	Algebra 1	Earth Science	World History	Biology	Geometry
	β or R^2	β or R^2	β or R^2	β or R^2	β or R^2
Step 1					
Student: % Minority	-.321**	-.317**	-.200**	-.171**	-.285**
% Free/Reduced Price Meal	.106	-.347**	-.367**	-.474**	-.199**
School Enrollment	.250**	.099	.238**	.171**	.181*
Total R^2	.076**	.302**	.302**	.379**	.182**
Δ R^2	.076**	.302**	.302**	.379**	.182**
Step 2					
Student: % Minority	-.332**	-.321**	-.214**	-.179**	-.297**
% Free/Reduced Price Meal	.110	-.345**	-.361**	-.471**	-.194**
School Enrollment	.245**	.095	.229**	.167**	.177*
Bully Victimization	-.105	-.056	-.114*	-.076	-.099
Total R^2	.087**	.305**	.314**	.385**	.192**
Δ R^2	.011	.003	.013*	.006	.010
Step 3					
Student: % Minority	-.326**	-.333**	-.191**	-.187**	-.290**
% Free/Reduced Price Meal	.157*	-.315**	-.326**	-.430**	-.152*
School Enrollment	.329**	.155*	.275**	.245**	.254**
Bully Victimization	-.016	.021	-.054	.013	-.016
PTB (Student)	-.215**	-.210**	-.166**	-.227**	-.198**
PTB (Teacher)	-.193**	.024	-.085	-.070	-.180**
Total R^2	.183**	.339**	.350**	.440**	.274**
Δ R^2	.096**	.034**	.035**	.055**	.082**

Note. *$p < .05$. **$p < .01$.

Footnotes

[1] Additional regression analyses were conducted for Chemistry, World History 2, English Reading, Virginia and US History, and Algebra 2 SOL exams. Although fewer than 25% of the examinees for these exams were in the ninth grade, the results were similar to the other findings. PBT made a statistically significant contribution to passing rates for all exams except Chemistry. Additional information is available from the author.

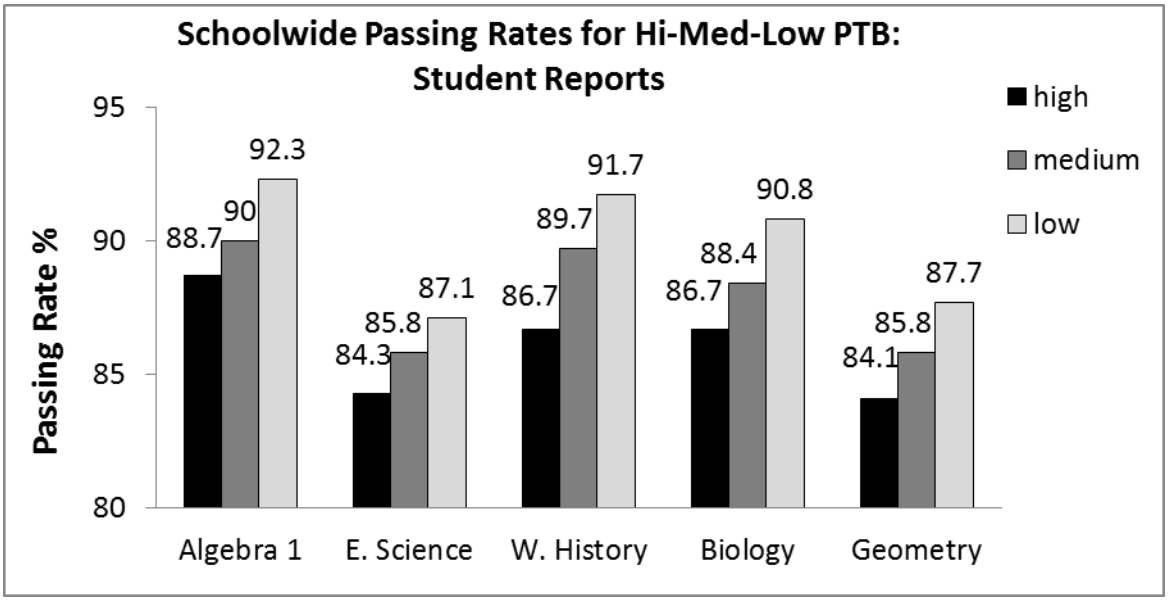


Figure 1. Schoolwide Passing Rates for Hi-Med-Low PTB: Student Reports. Schools were grouped into high, medium, and low PTB terciles based on student perceptions of the prevalence of bullying and teasing.

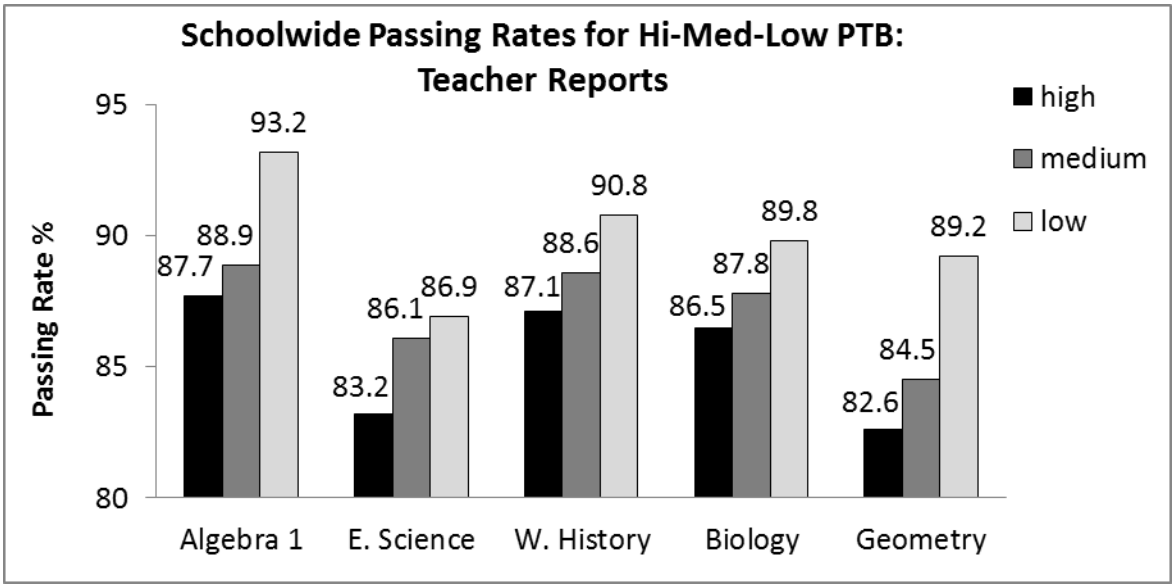


Figure 2. Schoolwide Passing Rates for Hi-Med-Low PTB: Teacher Reports. Schools were grouped into high, medium, and low PTB terciles based on teacher perceptions of the prevalence of bullying and teasing.

Manuscript Two

School Administrator Assessments of Bullying and State-Mandated Testing

Anna Lacey and Dewey Cornell

Curry School of Education

University of Virginia

Author Notes

Anna Lacey, M.Ed. is with the Programs in Clinical and School Psychology, Curry School of Education, University of Virginia. Dewey Cornell, Ph.D. is with the Curry School of Education and Youth Nex: The Center for Effective Youth Development, University of Virginia.

We thank Donna Michaelis of the Virginia Department of Criminal Justice Services and Peter Lovegrove, Ph.D. of Youth Nex: The Center for Effective Youth Development, for their assistance in this study.

Correspondence concerning this article should be addressed to Anna Lacey at apl4gu@virginia.edu, P.O. Box 400270, Charlottesville, VA 22904-4270.

Abstract

Bully victimization is associated with lower academic performance for individual students; however, less is known about the impact of bullying on the academic performance of the school as a whole. This study examined how schoolwide performance on state-mandated testing might be associated with both the prevalence of teasing and bullying (PTB) and the use of evidence-based bullying prevention efforts. Hierarchical regression analyses conducted at the school level with 301 Virginia high schools found that principal reports of both PTB and evidence-based efforts to prevent bullying were associated with the proportion of students that passed achievement testing. Findings could not be attributed to the proportion of Caucasian students in the school, student poverty, school size, or urban location, which were statistically controlled.

Keywords: bullying, bullying prevention, school climate, academic achievement testing

School Administrator Assessments of Bullying and State-Mandated Testing

School administrators in the U.S. are under increasing pressure to meet government standards for student achievement through performance on standardized tests. In many states, schools must achieve high passing rates on state-mandated achievement tests. Under these conditions, school administrators focus their attention on improving student test scores, largely through more intensive academic instruction, and leave relatively little time available to address matters such as bullying and teasing (Spillane & Kenney, 2012). However, recent research has indicated that school climate, particularly peer victimization and bullying, has an impact on student achievement (e.g. Ripski & Gregory, 2009; Konishi, Hymel, Zumbo, & Li, 2010; Lacey & Cornell, 2013).

The definition of bullying varies across studies, but generally includes repeated acts of verbal or physical aggression that are intended to inflict harm on the victim, particularly when there is a power imbalance between the aggressor and the victim (Olweus, 1993). However, most measures of bullying do not sharply distinguish bullying from more general forms of peer aggression such as teasing and taunting (Felix, Sharkey, Green, Furlong, & Tanigawa, 2011; Kert, Codding, Tryon, & Shiyko, 2010; Sawyer, Bradshaw, & O'Brennan, 2008). For purposes of our study, we used an inclusive definition of teasing and bullying that included bullying as well as several common forms of teasing (such as teasing peers about their clothing).

According to a 2005 U.S. national survey of students in grades 6-10, about 38% of males and 41% of females were estimated to have been victims of bullying (Wang, Iannotti, Luk, & Nansel, 2010). Studies involving secondary students found that self-reported victims of bullying had lower academic achievement than non-victims (Juvonen,

Wang, & Espinoza, 2011). Further, bully victimization has been linked with several factors related to academic achievement such as low school enjoyment, perceptions of school as unsafe, and school avoidance (Varjas, Henrich, & Meyers, 2009).

The impact of bullying extends beyond the direct victims to include bystanders and witnesses (Rivers, Poteat, Noret, & Ashurst, 2009). It is estimated that 63% of students have witnessed some form of peer victimization. Witnessing peer victimization has been related to several mental health symptoms including hostility, anxiety, and somatic complaints (Rivers, et al., 2009). It follows from this research that witnesses to bullying might experience some decline in academic achievement, too.

School Climate

Unnever and Cornell (2003) described a school climate or "culture of bullying" that supports bullying behavior. In these schools, students reported pervasive teasing and bullying, accompanied by perceptions that peer aggression was positively regarded by peers and that teachers were not willing to intervene when it occurred. Under these conditions, bystanders and witnesses to bullying might regard themselves as vulnerable to victimization, too.

The schoolwide prevalence of bullying has been shown to affect student perceptions of safety, student involvement and engagement in school activities, and academic achievement; thus, affecting the school as a whole (e.g. MacNeil, Prater, & Busch, 2009; Ripski and Gregory, 2009; Bandyopadhyay et al, 2009; Konishi et al, 2010; Mehta, Cornell, Fan, & Gregory, 2013; Lacey & Cornell, 2013). More generally, teacher reports of a negative school climate have been linked with poorer performance on standardized tests (MacNeil et al, 2009) and lower mean student achievement (Johnson & Stevens,

2006). Student perceptions of a negative school climate have also been associated with poorer performance on standardized reading and math tests as well as lower student classroom engagement (Ripski & Gregory, 2009) and higher student dropout rates (Cornell, Gregory, Huang, & Fan, 2013). However, as Konishi and colleagues (2010) pointed out, there is little research demonstrating the relationship between bullying and academic performance at the school level. In other words, do effects observed at the individual student level translate into schoolwide effects?

Perceptions of Teasing and Bullying

Bandyopadhyay, Cornell, and Konold (2009) reported development of a scale to measure the schoolwide prevalence of teasing and bullying (PTB). They found that school-level scores for PTB (determined by aggregating student reports of PTB) were predictive of suspension rates, teacher reports of gang-related violence in school, and teacher reports of student willingness to seek help for bullying and threats of violence at school. A subsequent study in an independent sample found that PTB was associated with higher levels of student risk behavior, such as substance use, sadness, and thoughts of suicide (Klein, Cornell, & Konold, 2012).

Cornell and colleagues (2012) examined the relationship between PTB and U.S. high school dropout rates. They found that increases in ninth grade student reports of PTB were related to cumulative student dropout rates four years later when the cohort reached graduation. Specifically, this research found that a one-standard-deviation elevation in the PTB scale during the ninth grade was associated with a 21% increase in the number of students in a school who dropped out by the end of 12th grade. This relationship was significant after controlling for other correlates of dropout rates such as school size,

student body poverty and minority composition, and school performance on standardized testing (Cornell et al, 2013).

Lacey and Cornell (2013) examined the association between PTB and schoolwide academic performance on standardized testing. To build on previous research, this study examined both student and teacher reports of PTB. They showed that both student and teacher perceptions, aggregated at the school level, were predictive of a school's passing rates on state-mandated achievement testing in a sample of 284 high schools. Further, the relationship between reports of PTB and exam passing rates were significant beyond the relationship between personal victimization and exam passing rates. In other words, the relationship between PTB and exam passing rates could not be explained by the personal victimization reports of students, but with the perceptions of both victims and non-victims that bullying and teasing were prevalent in the school. Results from this study supported the need for increased attention to the influence of teasing and bullying on schoolwide academic performance.

Bullying Prevention Efforts

As school authorities increasingly recognize the importance of bullying, they are implementing prevention efforts. However, there is mixed evidence for the impact of bullying prevention efforts and a need to identify the most effective practices across different types of programs (Roberge, 2011; Ttofi & Farrington, 2011). Roberge (2011) conducted a study to evaluate the quality of anti-bullying policies in Canadian schools. She used a list of 39 beneficial practices such as a clear definition of bullying, promotion of positive and collaborative student behaviors, dissemination of policies, and responding

to bullying. She found that school policies averaged approximately 60% of bullying practices identified as beneficial.

One limitation of the previous PTB studies is that they did not take into consideration school efforts to reduce bullying that might mitigate the effect of PTB on academic achievement. In 2011, Ttofi and Farrington reported a meta-analysis of 44 studies on the effectiveness of bullying prevention programming in schools throughout the world. They found thirteen program elements that were most associated with decreased bullying behavior and victimization. These elements included schoolwide conferences or assemblies on bullying and specific disciplinary consequences for bullying. On average, they found that school-based anti-bullying programming decreased bullying behavior and victimization by approximately 20% (Ttofi & Farrington, 2011).

Most evaluations of bullying programs focus on their impact on bullying; there is limited evidence that bullying prevention efforts have a positive impact on academic performance. However, research has shown that bullying programs are related to declines in social factors associated with academic achievement such as classroom participation (Olweus & Limber, 2010).

Current Study

The present study extends the line of research on the prevalence of teasing and bullying by using a new school administrator-report version of the PTB scale that asks school administrators the same questions as the student and teacher versions. An assessment of PTB obtained from school administrators has several advantages. First, the school administrator report scale can be used in schools where surveys of students and teachers are not readily available. Typically, bullying climate is assessed by student

surveys, which can be time consuming and labor intensive. Although school administrator ratings do not provide as comprehensive an assessment of PTB as student and teacher surveys, it may be an efficient source of information that is compelling to school administrators.

A second advantage is that a measure obtained from school administrators may provide especially convincing evidence for the effects of bullying and teasing on school functioning. Over the course of the last decade, school administrators have become highly concerned about school performance on standardized tests that are used to evaluate and accredit their school. The high priority placed on academic performance may lead administrators to focus on academic interventions and devote less effort to seemingly less relevant problems such as student teasing and bullying. In order to further encourage the implementation of anti-bullying practices in the schools, it is important to demonstrate bullying prevention has an academic impact on the school as a whole.

There is evidence that school administrators can provide a good assessment of school functioning. Konishi et al. (2010) investigated the relationship between the extent of bullying in Canadian high schools as reported by principals and individual student achievement. In this study, principals were asked how often students in the school intimidate or bully others. They found that principal reports of the extent of bullying were negatively associated with student math and reading achievement. However, this study relied on a single item to assess principal perceptions of bullying and did not control for school demographic variables.

In the present study, the PTB scale was used to measure school administrator perceptions of the amount of teasing and bullying in a school. This research is intended to

show that school administrator responses to the PTB scale items can be used to predict outcomes similarly to how student and teacher PTB scores have previously predicted outcomes. We hypothesized that school administrator reports of PTB would be associated with schoolwide passing rates on standardized exams.

The effect of PTB on school-level performance may be mitigated by the presence of bullying prevention efforts in the school. Therefore, we also investigated school administrator reports of school efforts to reduce bullying by asking school administrators to identify prevention program elements that the school had in place the previous school year. The program elements were obtained from a list of program elements found to decrease bullying perpetration and victimization in schools (e.g. teacher training on bullying, increased student supervision, and schoolwide anti-bullying policies) (Ttofi & Farrington, 2011). We hypothesized that schools using more bullying prevention practices that have been identified as effective would have higher passing rates on standardized exams.

Prior research has shown that school demographics are related to school disorder in general (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005). A study of 254 secondary schools found that high schools with higher percentage of minority students and in locations with greater community poverty tend to have more reports of school disorder (Gottfredson et al, 2005). In addition, larger schools located in urban areas also had higher amounts of school disorder (Gottfredson et al, 2005). A study focusing on bullying found that schools with larger enrollment sizes, higher percentage of students receiving free and reduced priced meals, and those with higher percentage minority students had higher scores on the PTB scale (Klein & Cornell, 2012). Additionally, the

study reported that urban school students reported less PTB than students in non-urban schools (Klein & Cornell, 2012).

School demographics have also been associated with academic performance (Sutton & Sodderstrom, 1999; Sirin, 2005). First, descriptions of the student population such as socio-economic status and racial composition have been related to achievement. A meta-analysis found that socio-economic status (SES) was strongly associated with school-level academic achievement (Sirin, 2005). Specifically, prior research has established a strong negative relationship between achievement in math and reading and the percentage of students receiving free and reduced priced meals (Sutton & Sodderstrom, 1999). Regarding racial composition, it has been demonstrated that achievement in math and reading is also positively associated with the percentage of Caucasian students in a school (Sutton & Sodderstrom, 1999).

In addition, school structure factors including school size and school location in an urban/non-urban area have also been linked with student achievement. Another line of research has found a relationship between school size and academic achievement (Leithwood & Jantzi, 2009). Finally, a school's location in an urban area has been specifically linked to increases in math achievement. It has been suggested that school location in an urban or non-urban area may affect the relationship between academic achievement and other factors (Werblow & Duesbery, 2009). Given prior research has shown that school demographic variables are associated with both bullying and academic achievement, four school demographic variables were used as control variables: percentage of students eligible for free or reduced price meals (FRPM), percentage of Caucasian students, school size, and urban location.

Method

Sample

The sample consisted of 301 high school administrators who completed a school safety survey in the summer of 2011. Although principals were instructed to complete the survey, in some schools they designated other personnel to complete the survey. About 65% of the participants were principals, 30% of the participants were assistant/associate principals, and 5% were other administration personnel such as a dean of students. Approximately 69% of the administrators were male. Because this survey was administered by the state government for school evaluation rather than research purposes, it did not ask for other demographic information about the survey participants.

The school administrators served 301 high schools representing 100% of the regular public high schools in Virginia. (Alternative schools such as career and technical schools and schools serving specific populations such as juvenile correctional facilities were not included in the sample.) The total school enrollment for grades 9-12 ranged from 136 to 3,062 students (M = 1,212, *SD* = 663). The student body was comprised of between 1% and 100% Caucasian students (M = 64%, SD = 26%). The percentage of students receiving free or reduced priced meals in a school ranged from 1% to 74% (M = 35%, *SD* = 17%). Approximately 42% of the schools were located in a rural area, 33% were located in a suburb, 7% in a town, and 19% in an urban area.

Procedure and Measures

Data were drawn from the Virginia School Safety Audit, a state-mandated annual survey conducted by the Center for School Safety of the Virginia Department of Criminal Justice Services. The survey was designed to collect information regarding school safety

conditions and security practices, such as the use of school security measures, testing of emergency management procedures, and the employment of school resource officers. The survey also included questions about efforts to maintain a safe school climate through bullying prevention programs. Surveys were completed by Virginia school administrators online in the summer of 2011 to describe school conditions during the 2010-2011 school year.

Prevalence of Teasing and Bullying. The Prevalence of Teasing and Bullying (PTB) scale was originally developed as part of the School Climate Bullying Survey completed by students (Cornell, 2011). The purpose of this scale was to obtain an assessment of the prevalence of teasing and bullying that students observe at school, as distinguished from their own experiences of being teased or bullied. Given that observers may have difficulty identifying power imbalances and may have reluctance to use the term "bullying" because of its negative connotations, the PTB scale was designed to ask general questions about teasing and bullying that may occur in a school. This strategy follows recommendations by prior researchers to ask students about specific behaviors such as teasing and threatening rather than just bullying (Felix, et al, 2011; Kert, et al, 2010; Sawyer, et al, 2008).

A study of 2,111 middle school students found that four items about bullying and teasing (from a larger pool of items) clustered together in exploratory and confirmatory factor analyses (Bandyopadhyay et al, 2009). Multi-group confirmatory factor analyses supported the use of this scale across gender and race groups (Bandyopadhyay et al, 2009). The scale was then replicated in a confirmatory factor analysis in a sample of 7,318 ninth-grade students (Bandyopadhyay et al, 2009). A third confirmatory factor

analysis supported use of the scale in an independent sample of 3,687 9th-12th grade students (Klein, et al, 2012). The four items were: (1) Bullying is a problem at this school, (2) Students here often get teased about their clothing or physical appearance, (3) Students here often get put down because of their race or ethnicity, and (4) There is a lot of teasing about sexual topics at this school. Item response options were *strongly disagree, somewhat disagree, somewhat agree, or strongly agree*. Similar questions about peer harassment and teasing are also found in other established measures of bullying (e.g., Juvonen, Nishina, and Graham, 2001; Olweus, 2007). In the current study, the PTB score had an internal consistency (Cronbach's alpha) of .77.

Bullying Prevention Programming. In the prior year survey, 76% of school administrators reported that they were making efforts to reduce bullying in their schools, but there was no information about the nature of these efforts. The state legislature directed the Department of Education to study school bullying prevention efforts. In partial response to this interest, the Virginia School Safety Audit added some questions to assess what kind of bullying prevention efforts were being used in the schools. Seven items included in this survey corresponded to the program elements identified in a meta-analysis by Ttofi and Farrington (2011) as associated with reductions bullying. These seven elements included: (1) schoolwide conference or assembly on bullying, (2) schoolwide rules or policy on bullying communicated to all students, (3) parent education or outreach program regarding bullying, (4) teacher training on bullying, (5) increased supervision of areas where bullying occurs, (6) specific disciplinary consequences for bullying, and (7) videos for students about bullying.

It seemed preferable to assess program elements rather than specific programs (such as the Olweus Bullying Prevention Program) because the majority (73%) of high schools reported not using a recognized program. Of those who utilized a formal bullying program, few schools used the same program. Therefore, the number of program elements was used as the best available measure of the extent of evidence-based bullying prevention efforts in each school. These items are a heterogeneous group of program elements identified empirically as associated with larger effect sizes in the Ttofi and Farrington (2011) meta-analysis of bullying prevention programs. There was no expectation that these items measured the same underlying construct, so they are best described as an index rather than a scale (Streiner, 2003). Consequently, we summed the number of reported prevention program elements into a single index. The index generated an internal consistency (Cronbach's Alpha) of .61, which is an acceptable level for an index of items that are not expected to be homogenous (Streiner, 2003).

Academic achievement. Passing rates for Virginia Standards of Learning (SOL) exams were used as the school-level measure of academic achievement. The SOL exams are state-mandated tests designed to measure student learning and achievement (VDOE, 2007). Students complete the SOL exams at the end of course in core subjects. The SOL exams were first administered in 1998 as a standardization tool for school curriculum and since 2006 have been used for school accreditation and funding purposes. Students can receive a standard score between 200 and 600 with 400 being the standard passing score (VDOE, 2007).

Overall, the SOL exams have been found to have acceptable reliability across race and gender; Cronbach's $\alpha > .70$ (VDOE, 2007). At the high school level, SOL exams

had KR-20 coefficients ranging from .87 to .91 and subject tests correlated with the Stanford 9 achievement tests between .50 and .80 (Hambleton, Crocker, Cruse, Dodd, Plake, & Poggio, 2000).

The SOL subject exams used in this study were: Algebra 1, Algebra 2, Geometry, English Reading, Writing, Biology, Chemistry, Earth Science, Virginia History, World History 1, and World History 2. School wide passing rates for each school were obtained from the Virginia Department of Education. Results for individual students were not available. SOL exams can be completed at any grade; as a result, the passing rates were not grade specific and could not be disaggregated by grade. However, the exams are typically taken as follows: Algebra 1, Earth Science, and World History 1 in the 9th grade, Biology, Geometry, and World History II in the 10th grade, Algebra II, Chemistry, English Reading, Writing, and Virginia History in the 11th grade.

School demographics. School demographics including racial composition, school enrollment, and the percentage of students receiving free/reduced priced meals (FRPM) were obtained from public records of the Virginia Department of Education. In this study, we used the percentage of Caucasian students. School administrators identified the primary location in which most of their students resided. This variable was dichotomized into urban versus non-urban (suburban, town, or rural) based upon standard census bureau definitions (Office of Management and Budget, 2000).

Results

The data were inspected for outliers, extreme values, and missing data through review of descriptive data, Mahalanobis Distance analyses, and boxplots. Boxplots indicated that there were between 5 and 14 univariate outliers across SOL tests, but none of the values

were outside of the range of possible values and so all cases were retained. (Supplementary analyses excluding univariate outliers did not substantially change the results presented in this paper.)

Mahalanobis Distance analyses indicated between 2 and 5 multivariate outliers were discovered for the different SOL exams using the cutoff of $D^2 = 22.45$. Multivariate outliers were removed from the data as recommended by Tabachnick and Fidell (2007). Tolerance statistics fell above the standard cutoff of .10 and histograms indicated that residuals were randomly distributed for all variables.

Table 1 provides descriptive statistics and Table 2 provides intercorrelations for study variables. In summary, at the .05 level of statistical significance, school administrator reports of PTB were positively correlated with percentage of Caucasian students and negatively correlated with urban location. The number of program elements was positively correlated with the percentage of Caucasian students ($r = .184$, $p < .01$) and negatively correlated with FRPM ($r = -.166$, $p < .01$). School administrator reports of PTB and the number of program elements were not significantly correlated ($r = .037$, $p = .52$).

The percentage of Caucasian students was positively correlated, and FRPM was negatively correlated, with passing rates for all SOL exams. Urban location was associated with lower SOL exam passing rates except for Algebra 1. School size was positively correlated with passing rates with English Reading, Writing, Virginia History, World History 1, and World History 2 passing rates. School administrator reports of PTB were negatively correlated with Earth Science exam passing rates. The sum of program elements was positively correlated with seven of the SOL exam passing rates (Algebra 1, Algebra 2, Biology, Earth Science, English Reading, Geometry, and Writing).

(Correlations between each individual program element and the eleven exams yield no noteworthy findings; results are available upon request.)

A series of preliminary analyses examined potential differences between school principals and other school administrators who completed the survey. Independent t-tests found no differences in reports of PTB and prevention efforts between principal participants and participants with other administrative positions. The inclusion of participant position as a control variable did not alter the pattern of statistically significant findings in any of the regression analyses. Therefore, participant position was not included in the analyses presented here.

In order to determine the potential value of individual program elements, regression analyses were conducted entering school demographic variables (percentage of Caucasian students, school enrollment, and FRPM) entered at step 1, PTB entered at step 2, and each program element individually at step 3. Results indicated that no one program element predicted SOL passing rates to a greater extent than others across SOL exams. Therefore, the prevention program elements were summed into an index to indicate the extent of prevention efforts in a school.

Multiple Regression Analyses of Passing Rates

Separate regression analyses were conducted for passing rates for each of the eleven SOL exams. Each regression was performed in a three-step sequence with school demographic variables (percentage of Caucasian students, school enrollment, and FRPM) entered at step 1, PTB entered at step 2, and the number of bullying program elements reported at step 3.

Given the large number of analyses, only results from step 3 are summarized here. All steps are detailed in Table 3. At step 3, PTB made a statistically significant contribution to the prediction of SOL pass rates for six exams: Algebra 1, Geometry, Biology, Earth Science, English Reading, and Writing. The number of bullying program elements made a statistically significant contribution to the prediction of SOL pass rates for five Exams: Algebra 1, Algebra 2, Geometry, Earth Science, and English Reading. The total variance explained by all independent variables ranged from 19.3% for Chemistry to 51.5% for Biology.

Algebra 1 passing rate. At Step 3, FRPM ($\beta = -.299$, $p < .01$) was the only demographic variable that was statistically significant. In addition, report of PTB ($\beta = -.166$, $p < .01$), and the number of program elements ($\beta = .149$, $p < .01$) significantly contributed to the model. The total variance accounted for by the model was $R^2 = .201$, $p < .01$.

Algebra 2 passing rate. At step 3, proportion Caucasian students ($\beta = .266$, $p < .01$) and FRPM ($\beta = -.232$, $p < .01$) were statistically significant. The number of program elements ($\beta = .109$, $p < .05$) was also a significant predictor. The total variance accounted for was $R^2 = .198$, $p < .01$.

Geometry passing rate. At step 3, proportion of Caucasian students ($\beta = .323$, $p < .01$) and FRPM ($\beta = -.368$, $p < .01$) were significant predictors. Reports of PTB ($\beta = -.138$, $p < .01$) and number of program elements ($\beta = .128$, $p < .01$) also were significant. The total variance explained by the model was $R^2 = .409$, $p < .01$.

English Reading passing rate. At Step 3, FRPM ($\beta = -.484$, $p < .01$) and urban location ($\beta = -.119$, $p < .05$) were statistically significant. Reported PTB ($\beta = -.108$, $p <$

.05) and the number of program elements (β = .116, $p < .05$) also significantly contributed to the model. The total variance accounted for by the model was $R^2 = .409$, $p < .01$.

Writing passing rate. At step 3, FRPM (β = -.549, $p < .01$) significantly contributed to the model. In addition, reports of PTB (β = -.122, $p < .05$) was also significant. The portion of variance explained by the model was $R^2 = .398$, $p < .01$.

Biology passing rate. At step 3, proportion of Caucasian students (β = .192, $p < .01$), FRPM (β = -.573, $p < .01$), and urban location (β = -.117, $p < .05$) were significant predictors. Reports of PTB (β = -.129, $p < .01$) also significantly contributed to the model. The total variance accounted for by the model was $R^2 = .515$, $p < .001$.

Chemistry passing rate. At step 3, only FRPM (β = -.379, $p < .01$) and enrollment size (β = -.174, $p < .01$) significantly contributed to the model. The total variance explained by the model was $R^2 = .193$, $p < .001$.

Earth Science passing rate. At step 3, FRPM (β = -.501, $p < .01$) and urban location (β = -.212, $p < .01$) significantly contributed to the model. Reports of PTB (β = -.152, $p < .01$) and the number of program elements (β = .094, $p < .05$) were also significant. The total variance attributable to the model was $R^2 = .452$, $p < .001$.

Virginia History passing rate. At step 3, FRPM (β = -.538, $p < .01$) and urban location (β = -.184, $p < .01$) significantly contributed to the model. The total variance accounted for by the model was $R^2 = .455$, $p < .001$.

World History 1 passing rate. At step 3, only FRPM (β = -.586, $p < .01$) significantly contributed to the model. The portion of variance attributable to the model was $R^2 = .416$, $p < .001$.

World History 2 passing rate. At step 3, FRPM ($\beta = -.446$, $p < .01$) was the only significant predictor. The portion of variance explained by the model was $R^2 = .296$, $p < .001$.

Discussion

Given the ever increasing pressure for schools to achieve high passing rates on state-mandated testing, school administrators are focusing their attention on improving student test scores (Spillane and Kenney, 2012). At the same time, the governments of 49 out of the 50 states in the U.S. have implemented specific laws directing schools to address bullying in (USDHHS, 2013). A substantial body of literature has indicated that school climate conditions are critically important to school performance and that efforts to improve school climate will enhance student achievement (e.g. MacNeil, Prater, & Busch, 2009; Ripski and Gregory, 2009; Bandyopadhyay et al, 2009; Konishi et al, 2010; Mehta, Cornell, Fan, & Gregory, 2013; Lacey & Cornell, 2013). This study contributes to this literature by showing that the amount of bullying in a school as reported by school administrators is related to schoolwide academic performance. It is notable that PTB was consistently associated with schoolwide performance across six exams. These findings extend results from a previous study (Lacey & Cornell, 2013) which found that ninth grade student and teacher reports of PTB were predictive of passing rates for the Virginia SOL exams.

The use of school administrator report measures has several advantages. First, school administrator reports are more readily accessible than surveys of students or teachers in each school. Although the school administrator's report is not a substitute for a more comprehensive assessment of school climate and data aggregated across students or

teachers, it provides a quick and efficient source of information that is descriptive of the overall school climate. Perhaps even more importantly, school administrators may find it compelling that their own assessment of school bullying is associated with student performance on standardized testing.

Furthermore, this research supports the contention that bullying prevention efforts can have a positive impact on the school as a whole (Merrell, Gueldner, Ross, & Isava, 2008). In the present study, the number of prevention efforts as reported by school administrators significantly predicted schoolwide academic performance on five exams. School administrator reports of the number of prevention efforts in a school are not a substitute for more comprehensive evaluations of prevention efforts, but they may be an efficient and useful source of information regarding prevention efforts in a school.

It should be acknowledged that the magnitude of the associations between school administrator reports and schoolwide exam performance were not large. After removing the effects of Caucasian versus minority composition, school enrollment, FRPM, and urban location, the school administrator's assessment of PTB and the number of prevention efforts in a school accounted for 1.2% to 4.7% of the variance. However, PTB and the number of prevention efforts (correlation r = .037) made independent contributions to the model. These results are consistent with previous research demonstrating the relationship between bullying and academic achievement (Ripski & Gregory, 2009; MacNeil et al, 2009; Johnson and Stevens, 2006).

The four school demographic variables accounted for approximately 33.5% of the variance in test passing rates on average (range 15.4% to 49.6%). FRPM significantly predicted all of the SOL exams. The proportion of Caucasian versus minority students

significantly predicted passing rates on three of the exams (Algebra 1, Geometry, Biology), urban location significantly predicted passing rates on two exams (Earth Science, Virginia History), and enrollment size significantly predicted passing rates on one exam (Chemistry). These results are consistent with previous research showing lower academic achievement among students from less advantaged backgrounds (e.g. Gottfredson et al, 2005; Sirin, 2005; Sutton and Sodderstrom, 1999; Leithwood and Jantzi, 2009; Werblow and Duesbery, 2009; Klein and Cornell, 2012). These findings reflect the challenge for schools associated with socio-economic disparities, but also indicate that bullying and teasing cannot be overlooked in any school. Across a sample of nearly all public high schools in the state of Virginia, the level of bullying and teasing, as well as efforts to address the problem, were consistently associated with academic test performance.

Limitations and Directions for Future Research

This study was correlational and cannot establish a causal relationship or determine the direction of effects. It is possible that the relationship between PTB and prevention efforts and academic performance is bidirectional or the product of other variables. For example, learning and academic performance may also be influenced by a general level of school disorder that also affects the level of bullying and teasing in a school. Collective student perceptions of school safety and hostility are related to student achievement and engagement (Ripski & Gregory, 2009). There may be multiple factors underlying this relationship. For example, pervasive teasing and bullying in a school may lead to decreased student engagement in learning (Mehta et al, 2013; Ripski & Gregory, 2009). Future research could examine whether efforts to prevent bullying and intervene

when bullying occurs have a beneficial impact on school climate and performance on standardized tests.

A second study limitation is that the measure of prevention efforts in the school is based on the number of different types of bullying prevention efforts rather than a more comprehensive assessment of the bullying prevention program. A more comprehensive assessment should include measures of intensity and duration of a program, fidelity to an evidence-based model, and independent evidence of effectiveness. These differences between schools may affect the relationship between prevention efforts and schoolwide academic achievement. The purpose of this study was to investigate the relationship between bullying prevention program efforts and schoolwide academic performance. Although this was not an intervention study, this study found that school efforts to reduce bullying were related to school-level academic performance over and above the extent of bullying and teasing in a school. Controlled studies are needed to show that interventions that reduce bullying and teasing in a school have an impact on student academic performance, as claimed by Olweus and Limber (2010).

Another limitation is that the study did not investigate background or experience of the school administrators, the accuracy of their assessments, and how these factors might affect study findings. Such an analysis might identify administrator characteristics, such as years of experience or length of time in the school, that improve the predictive accuracy of their observations. Finally, this was a retrospective study in which school administrators provided information on conditions in their school the previous school year. It would be useful to conduct a prospective study with a more comprehensive

assessment of school administrator judgments and any individual or contextual factors that might influence their perceptions of school conditions.

Conclusions

In recent years, school administrators have placed increasingly high priority on improving the academic performance of their students on state-mandated tests like the Virginia SOL exams (Spillane & Kenney, 2012). Schools often devote considerable time and resources to academic preparation for standardized exams. However, these efforts should not come at the expense of work to maintain a safe and healthy school climate. A climate of teasing and bullying could undermine school efforts to improve academic performance. In addition to traditional individual services, greater emphasis should be placed on schoolwide anti-bullying programming in order to offset this potential effect.

In addressing bullying, Card and Hodges (2008) recommended use of a comprehensive schoolwide approach to bullying prevention with the purpose of altering the perceptions and behavior of school staff and students. Schools should use evidence-based strategies such as those identified by Ttofi and Farrington's (2011) meta-analysis. In addition, several evidence-based programs have been shown to be effective in increasing bystander interventions in bullying situations (Polanin, Espelage, & Pigott, 2012) and decreasing negative behaviors by bystanders that assist and reinforce bullying behaviors (Kärnä, Voeten, Little, Poskiparta, Kaljonen, & Salmivalli, 2011).

References

Bandyopadhyay, S., Cornell, D., and Konold, T. (2009). Internal and external validity of three school climate scales from the School Climate Bullying Survey. *School Psychology Review***,** *38***,** 338-355.

Card, N.A. and Hodges, E.V.E. (2008). Peer victimization among schoolchildren: Correlations, causes, consequences, and considerations in assessment and intervention. *School Psychology Quarterly*, 23(4), 451-461. doi: 10.1037/a0012769

Cornell, D. (2011). *The School Climate Bullying Survey: Description and research summary*. Charlottesville, Virginia: Curry School of Education, University of Virginia.

Cornell, D., Gregory, A., Huang, F., and Fan, X. (2012). Perceived prevalence of bullying and teasing predicts high school dropout rates. *Journal of Educational Psychology*, 105, 138-149.

Felix, E. D., Sharkey, J. D., Green, J. G., Furlong, M. J., and Tanigawa, D. (2011). Getting precise and pragmatic about the assessment of bullying: the development of the California Bullying Victimization Scale. *Aggressive Behavior*, *37*, 234-247.

Gottfredson, G. D., Gottfredson, D. C., Payne, A. A., and Gottfredson, N. C. (2005). School climate predictors of school disorder: Results from a national study of delinquency, *Journal of Research in Crime and Delinquency, 42*, 412-444.

Hambleton, R.K., Crocker, L., Cruse, K., Dodd, B., Plake, B.S., and Poggio, J. (2000). *Review of selected technical characteristics of the Virginia Standard of Learning (SOL) assessments.* Richmond, VA: Commonwealth of Virginia Department of Education.

Johnson, B. and Stevens, J.J. (2006) Student achievement and elementary teachers' perceptions of school climate. *Learning environment Research, 9,* 111-122. DOI:10.1007/s10984-006-9007-7.

Juvonen, J., Nishina, A., and Graham, S. (2001). Self-views versus peer perceptions of victim status among early adolescents, *Peer harassment in school: A plight of the vulnerable and victimized,* edited by J. Juvonen and S. Graham. New York: Guilford Press.

Juvonen, J., Wang, Y., and Espinoza, G. (2011). Bullying Experiences and Compromised Academic Performance Across Middle School Grades, *Journal of early Adolescence*, *31*(1), p 152-173.

Kärnä, A., Voeten, M., Little, T. D., Poskiparta, E., Kaljonen, A., and Salmivalli, C. (2011). A large-scale evaluation of the KiVa antibullying program: Grades 4–6. *Child Development, 82,* 311–330. doi:10.1111/j.1467-8624.2010.01557.x

Kert, A. S., Codding, R. S., Tryon, G. S., and Shiyko, M. (2010). Impact of the word "bully" on the reported rate of bullying behavior. *Psychology in the Schools*, *47*, 193-204. DOI: 10.1002/pits.20464

Klein, J. and Cornell, D. (2011). Is the link between large high schools and student victimization an illusion? *Journal of Educational Psychology,102,* 933-946. doi: 10.1037/a0019896

Klein, J., Cornell, D., and Konold, T. (2012). Relationships between school climate and student risk behaviors. *School Psychology Quarterly*, *27*, 154-169.

Konishi, C., Hymel, S., Zumbo, B.D., and Li, Z. (2010). Do school bullying and student-teacher relationships matter for academic achievement? A multilevel analysis.

Canadian Journal of School Psychology, *25*, 19-39. DOI: 10.1177/0829573509357550 .

Lacey, A. and Cornell, D. (2013). The Impact of teasing and bullying on schoolwide academic performance, *Journal of Applied School Psychology*, 29, 262–283.

Leithwood, K. and Jantzi, D (2009). A review of empirical evidence about school size effects: A policy perspective. *Review of Educational Research, 79*, 464-490.

MacNeil, A.J., Prater, D.L., and Busch, S. (2009) The effects of school culture and climate on student achievement, *International Journal of Leadership in Education*, *12*, 73-84. doi:10.1080/13603120701576241

Mehta, S., Cornell, D., Fan, X., and Gregory, A. (2013). Bullying climate and school engagement in ninth grade students. *Journal of School Health, 83,* 45-52.

Merrell, K.W., Gueldner, B.A., Ross, S.W., and Isava, D.M. (2008). How effective are school bullying intervention programs? A meta-analysis of intervention research. *School Psychology Quarterly*, 23(1), 26-42. doi: 10.1037/1045-3830.23.1.26

Office of Management and Budget's (2000). *Standards for Defining Metropolitan and Micropolitan Statistical Areas,* Federal Register, 65(249), 82228-82238.

Olweus, D. (1993). *Bullying at school: What we know and what we can do*. Oxford, UK: Blackwell.

Olweus, D. (2007). *The Olweus Bullying Questionnaire.* Center City, MN: Hazelden.

Olweus, D. and Limber, S. (2010). Understanding and researching bullying: Some critical issues, *Handbook of bullying in schools: An international perspective*, edited by S.R. Jimerson, S.M. Swearer, and D. L. Espelage. New York: Routledge.

Polanin, J.R., Espelage, D. L., and Pigott, T. D. (2012). A meta-analysis of school-based bullying prevention programs' effects on bystander intervention behavior. *School Psychology Review*, *41*, 47-65.

Ripski, M.B. and Gregory, A. (2009). Unfair, unsafe, and unwelcome: Do high school students' perceptions of unfairness, hostility, and victimization in school predict engagement and achievement. *Journal of School Violence, 8,* 355-375. doi:10.1080/15388220903132755

Rivers, I., Poteat, V.P., Noret, N., and Ashurst, N. (2009). Observing bullying at school: The mental health implications of witness status. *School Psychology Quarterly, 24*, 211-223. doi: 10.1037/a0018164

Roberge, G.D. (2011). Countering school bullying: An analysis of policy content in Ontario and Saskatchewan, *International Journal of Education Policy and Leadership, 6(5),* 1-14.

Sawyer, A. L., Bradshaw, C. P., and O'Brennan, L. M. (2008). Examining ethnic, gender, and developmental differences in the way children report being a victim of "bullying" on self-report measures. *Journal of Adolescent Health, 43,* 106-114.

Sirin, S.R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research,* 75, 417-453.

Spillane, J.P. and Kenney, A.W. (2012). School administration in a changing education sector: The US experience, *Journal of Educational Administration, 50*(5), 541-561. DOI: 10.1108/09578231211249817.

Streiner, D. L., (2003). Being inconsistent about consistency: When coefficient alpha does and doesn't matter. *Journal of Personality Assessment, 80,* 217-222.

Sutton, A. and Soderstrom, I. (1999) Predicting elementary and secondary school achievement with school-related and demographic factors. *The Journal of Educational Research*, 92(6), 330-338.

Tabachnick, B.G., and Fidell, L.S. (2007). Using Multivariate Statistics (5th ed.). Allyn and Bacon.

Ttofi, M.M. and Farrington, D.P. (2011). Effectiveness of school-based programs to reduce bullying: a systematic and meta-analytic review, *Journal of Experimental Criminology, 7*, 27-56. doi: 10.1007/s11292-010-9109-1

Unnever, J. D., and Cornell, D. G. (2003). The culture of bullying in middle school. *Journal of School Violence, 2*, 5-27.

U.S. Department of Health and Human Services (2013). Policies and Laws. Available from http://www.stopbullying.gov/laws.

Varjas, K, Henrich, C.C., and Meyers, J. (2009). Urban Middle School Students' Perceptions of Bullying, Cyberbullying, and School Safety. *Journal of School Violence*, 8, 159-176.

Virginia Department of Education (VDOE (2007). *Virginia SOL Assessments: Technical Report 2006- 2007 Administration Cycle*. Richmond, VA: Author.

Wang, J., Iannotti, R. J., Luk, J. W., and Nansel, T. R. (2010). Co-occurrence of victimization from five subtypes of bullying: Physical, verbal, social exclusion, spreading rumors, and cyber. *Journal of Pediatric Psychology*, *35*, 1103-1112.

Werblow, J., and Duesbery, L. (2009). The impact of high school size on math achievement and dropout rate. *The High School Journal*, *92*, 14-23.

Table 1

Descriptive Statistics for Study Variables

Variable	Mean	SD	Min	Max
Algebra 1	91.69	6.73	50	100
Algebra 2	90.47	7.47	61	100
Biology	90.79	6.31	59	100
Chemistry	93.59	5.79	68	100
Earth Science	89.35	7.00	61	100
English Reading	93.83	3.84	79	100
Geometry	85.39	9.50	52	100
Virginia History	82.48	9.60	45	100
World History 1	80.56	12.38	22	100
World History 2	81.43	10.84	44	100
Writing	92.37	5.20	57	100
School Population				
% Caucasian	.64	.26	.01	1
% Free/Reduced Price Meal	.35	.17	.01	.74
Urban location	.19	.39	0	1
School Enrollment	1212	664	136	3062
Principal Reports: PTB	1.90	.58	1	3.75
Program Elements	3.67	1.71	0	7

Note. Data points were not available for all schools. For Algebra 1, scores were available for 298 schools, for Algebra 2, 299; for Biology, 297; for Chemistry, 295; for Earth Science, 293; for English Reading, 298; for Geometry, 299; for Virginia History, 295; for World History 1, 264; for World History 2, 283; for Writing, 296.

Table 2

Correlations among Study Variables

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Algebra 1	.413*	.514*	.334*	.454*	.435*	.595*	.468*	.429*	.353*	.424*	.211*	-.360**	-.092	.037	-.111	.178**
2. Algebra 2	--	.397*	.279*	.388*	.400*	.555*	.463*	.403*	.387*	.336*	.308*	-.376**	-.125*	.051	.015	.184**
3. Biology		--	.400*	.613*	.691*	.676*	.634*	.564*	.581*	.583*	.467*	-.627**	-.318**	.023	-.054	.160**
4. Chemistry			--	.333*	.283*	.409*	.377*	.336*	.403*	.255*	.296*	-.370**	-.142*	-.044	.030	.107
5. Earth Science				--	.548*	.539*	.565*	.642*	.521*	.534*	.394*	-.568**	-.346**	.066	-.119*	.189**
6. English Reading					--	.631*	.672*	.532*	.488*	.688*	.307*	-.596**	-.233**	.160**	-.065	.202**
7. Geometry						--	.619*	.559*	.571*	.506*	.407*	-.552**	-.211**	.092	-.074	.226**
8. Virginia History							--	.616*	.575*	.572*	.311*	-.612**	-.277**	.187**	-.045	.108
9. World History 1								--	.493*	.481*	.358*	-.606**	-.166**	.150*	-.101	.105
10. World History 2									--	.406*	.257*	-.529**	-.163**	.179**	-.021	.107
11. Writing										--	.200*	-.575**	-.179**	.227**	-.046	.126*
12. Student: %											--	-.371**	-.482**	-.398**	.167**	.184**
13. % Free/Reduced												--	.221**	-.375**	-.024	-.166**
14. Urban location													--	.227**	-.113*	-.036
15. School														--	-.091	-.011
16. Principal PTB															--	.037
17. Program																--

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

Table 3

Multiple Regression Analyses of Passing Rates

	Algebra 1			Algebra 2		
	β	R^2	Δ R^2	β	R^2	Δ R^2
Step 1		.154**	.154**		.186**	.186**
% White	.139			.278**		
FRPM	-.331**			-.249**		
Urban location	.023			.024		
Enrollment	-.048			.079		
Step 2		.180**	.026**		.187**	.001
% White	.168*			.282**		
FRPM	-.321**			-.248**		
Urban location	.014			.023		
Enrollment	-.045			.079		
PTB	-.163**			-.027		
Step 3		.201**	.021**		.198**	.011*
% White	.148			.266**		
FRPM	-.299**			-.232**		
Urban location	.001			.013		
Enrollment	-.040			.083		
PTB	-.166**			-.029		
Program Elements	.149**			.109*		

Note. *p < .05 **p < .01.

Con't Table 3

Geometry			English Reading			Writing		
β	R^2	Δ R^2	β	R^2	Δ R^2	β	R^2	Δ R^2
	.376**	.376**		.385**	.385**		.349**	.349**
.318**			.121			-.031		
-.394**			-.510**			-.569**		
-.027			-.101			-.069		
.102			.062			.041		
	.393**	.018**		.396**	.011*		.363**	.014*
.341**			.140*			-.009		
-.386**			-.501**			-.560**		
-.034			-.109*			-.075		
.105			.066			.042		
-.135**			-.106*			-.121*		
	.409**	.016**		.409**	.013*		.368**	.005
.323**			.123			-.020		
-.368**			-.484**			-.549**		
-.045			-.119*			-.081		
.109			.071			.044		
-.138**			-.108*			-.122*		
.128**			.116*			.074		

Note. *p < .05 **p < .01.

Con't Table 3

Biology			Chemistry			Earth Science		
β	R^2	Δ R^2	β	R^2	Δ R^2	β	R^2	Δ R^2
	.496**	.496**		.191**	.191**		.422**	.422**
.175**			.133			.101		
-.590**			-.388**			-.521**		
-.107*			.053			-.201**		
-.088			-.176*			-.044		
	.512**	.016**		.191**	.000		.444**	.022**
.199**			.137			.128		
-.580**			-.387**			-.514**		
-.112*			.052			-.204**		
-.083			-.175*			-.041		
-.129**			-.016			-.150**		
	.515**	.002		.193**	.002		.452**	.008*
.192**			.130			.115		
-.573**			-.379**			-.501**		
-.117*			.048			-.212**		
-.082			-.174*			-.038		
-.129**			-.017			-.152**		
.050			.049			.094*		

Note. *p < .05 **p < .01.

Con't Table 3

Virginia History			World History 1			World History 2		
β	R^2	Δ R^2	β	R^2	Δ R^2	β	R^2	Δ R^2
	.450**	.450**		.408**	.408**		.293**	.293**
.077			.097			.089		
-.549**			-.596**			-.452**		
-.177**			-.005			-.058		
.068			-.031			.081		
	.454**	.004		.416**	.008		.296**	.003
.090			.116			.099		
-.543**			-.587**			-.449**		
-.181**			-.008			-.061		
.072			-.031			.081		
-.063			-.093			-.055		
	.455**	.001		.416**	.000		.296**	.000
.085			.115			.097		
-.538**			-.586**			-.446**		
-.184**			-.009			-.062		
.073			-.030			.082		
-.063			-.093			-.055		
.032			.010			.016		

Note. *p < .05 **p < .01.

Manuscript Three

The Relations between Teasing and Bullying and Middle School Standardized Exam Performance

Anna Lacey, M.Ed. and Dewey Cornell, Ph.D.

Curry School of Education

University of Virginia

Author Notes

Anna Lacey, M.Ed. is with the Programs in Clinical and School Psychology, Curry School of Education, University of Virginia. Dewey Cornell, Ph.D. is with the Curry School of Education and Youth Nex: The Center for Effective Youth Development, University of Virginia.

Thank you to Donna Michaelis and Jessica Smith of the Virginia Department of Criminal Justice Services and Cynthia Cave of the Virginia Department of Education for their support of the Virginia Secondary School Climate Study. This research was backed by the Office of Juvenile Justice and Delinquency Prevention, Office of Justice Programs, U.S. Department of Justice; Grant #2012-JF-FX-. The ideas, findings, and conclusions presented in this manuscript are those of the authors and do not necessarily reflect the opinions of the Department of Justice.

Correspondence concerning this article should be addressed to Anna Lacey at apl4gu@virginia.edu, P.O. Box 400270, Charlottesville, VA 22904-4270.

Abstract

This study examined the relations between the prevalence of teasing and bullying (PTB) and schoolwide performance on state-mandated testing in middle schools. Measures of PTB and student engagement were obtained from a statewide survey of 29,203 seventh and eighth grade students and 6,298 teachers. Student and teacher responses were aggregated to the school level for 271 Virginia middle schools. Hierarchical regression analyses conducted at the school level found that PTB as perceived by students and teachers predicted schoolwide performance on achievement testing. Engagement partially mediated the association between PTB and test performance. These findings were not accounted for by the proportion of minority students in the school, student poverty, school size, or personal victimization, which were statistically controlled. These results support notion that PTB is related to student test performance, in part, because PTB decreases student engagement in school which, in turn, decreases student performance on high stakes testing.

Keywords: bullying, school climate, academic achievement testing, middle school

The Relations between Teasing and Bullying and Middle School Standardized Exam Performance

Bullying is of special concern in middle schools. Research has found that students and staff express more concern regarding bullying in middle schools than in other grade levels (Bradshaw, Sawyer, & O'Brennan, 2007). A national survey found that approximately 32-37% of students in grades 6-8 report being bullied while at school (NCES, 2012). Prior studies have estimated that the proportion of students who are victims of bullying is even higher (Wang, Iannotti, Luk, & Nansel, 2010). A longitudinal study of 382 middle school students found that 51% of students reported bully victimization at least once per week during three years of middle school (Baly, Cornell, & Lovegrove, 2014). Another study found that as many as 71% of middle school students experienced occasional bullying and 15% reported frequent experiences with bullying (Guerra, Williams, & Sadek, 2011).

Students who are victims of bullying and other forms of peer aggression tend to have poorer academic achievement at the middle and high school levels (Nakamoto & Schwartz, 2010). A meta-analysis of 33 studies found that victims of bullying, teasing, and peer exclusion have lower academic functioning across measures of academic achievement such as grade point average and standardized testing (Nakamoto & Schwartz, 2010). In a secondary school sample, students who reported personal bully victimization were more likely to have a lower GPA than students who were bystanders (Glew, Fan, Katon, & Rivara, 2008). A study of 6th grade students found that both self-reported bully victimization and peer reports of victimization were significantly related to student GPA (Juvonen, Wang, & Espinoza, 2011).

Bullying has also been found to affect student bystanders not directly involved as victims (Pepler & Craig, 1995; Swearer, Espelage, Vaillancourt, & Hymel, 2010). Research estimates

that about 63% of students have witnessed some form of peer victimization while at school (Rivers, Poteat, Noret, & Ashurst, 2009). Witnessing peer victimization has been linked to mental health risks such as anxiety and hostility (Rivers et al., 2009). Further, bullying and negative school climate have been linked to factors related to academic achievement such as student engagement (e.g. Mehta, Cornell, Fan & Gregory, 2013; Cornell, Gregory, Huang, & Fan, 2013). Based upon these findings, assessment of the impact of bullying on a school should go beyond personal victimization to include schoolwide prevalence of bullying.

Schoolwide Effects of Teasing and Bullying

Bullying has been defined differently across studies, but is generally considered to be repeated acts of verbal or physical aggression that are intended to inflict harm on the victim by an aggressor who is more powerful than the victim (Olweus, 1993). In addition to questions about bullying, measures of bullying frequently include questions about more general forms of peer aggression such as teasing (Felix, Sharkey, Green, Furlong, & Tanigawa, 2011; Kert, Codding, Tryon, & Shiyko, 2010; Sawyer, Bradshaw, & O'Brennan, 2008). In concordance with previous researchers, the measure of teasing and bullying used in this research included bullying as well as several common forms of teasing such as teasing about clothing and appearance.

In schools where teasing and bullying is prevalent there is a culture of bullying that affects student attitudes regarding aggression and victimization (Unnever & Cornell, 2003). In such schools, students may feel at increased threat of bullying victimization regardless of their own past experiences with bullying. Concern regarding potential bullying victimization may in turn negatively affect all students; even those not directly involved in bullying.

Negative school climate and bullying have been linked to poorer academic achievement as well as factors related to academic achievement including lower student engagement, low school

enjoyment, disruption of school work, and higher rates of student dropout (e.g. Konishi et al, 2010; Mehta et al, 2013; Cornell et al, 2013; Lacey and Cornell, 2013a; MacNeil et al, 2009; Ripski & Gregory, 2009; Bandyopadhyay, Cornell, & Konold, 2009; Juvonen et al, 2011). Although the relation between bullying and academic achievement has been demonstrated in several studies, mechanisms behind these associations have yet to be understood.

The Prevalence of Teasing and Bullying

Bandyopadhyay, Cornell, and Konold (2009) studied a measure of the perceived magnitude of teasing and bullying in a school, the Prevalence of Teasing and Bullying scale (PTB). They found that the average level of PTB in a school (aggregated across students) predicted suspension rates, teacher reports of gang violence, and student willingness to seek help for bullying and threats of violence. School-level PTB scores are also predictive of high school drop-out rates (Cornell et al, 2013). At the individual level, PTB scores have been found to be negatively related to student mental health including substance use, sadness, and thoughts of suicide (Klein, Cornell, & Konold, 2012).

Two prior studies have investigated the relation between school-level PTB scores and school wide academic achievement. In a sample of 284 high schools, Lacey and Cornell (2013a) found that, at the school level, both teacher and student reports of PTB predicted school passing rates on state-mandated achievement testing. These results suggested that a school climate of pervasive teasing and bullying might have a general effect on student performance on standardized testing. The study controlled for school demographics and student reports of personal bullying victimization. By controlling for students reports of personal bullying victimization the research demonstrated that the relation between PTB and schoolwide passing rates was not attributable to the number of individual victims of bullying in the school.

A second study examined the relation between PTB as reported by principals and schoolwide academic performance on standardized testing (Lacey & Cornell, 2013b). This study used principal rather than student and teacher reports of PTB to show the value of principal perceptions of school climate as a tool in assessing school functioning. Principal reports are more accessible and less time consuming and labor intensive than assessing students and teachers. In a sample of 301 high schools, schools in which principals reported higher levels of PTB had lower passing rates on standardized tests. Taken together, results from these studies suggest that school administrators should give more attention to the impact of teasing and bullying on schoolwide academic performance.

Student Engagement

Factors that may explain the mechanism behind the relation between bullying and academic achievement have yet to be investigated. One possible mechanism is that a climate of teasing and bullying discourages student engagement in school. Students in schools with more teasing and bullying may feel less connected to school and may view education as less of a priority than students in schools with less teasing and bullying. Poor student engagement in school, in turn, may decrease student academic performance.

Student engagement has been long considered a major factor in academic success (Diperna, 2006; Finn & Rock, 1997). Engagement has been conceptualized as having two aspects: cognitive and affective engagement (Appleton, Christenson, & Furlong, 2008). Cognitive engagement is defined as motivation and investment in the process of learning whereas affective engagement is having feelings of pride and attachment to school (Appleton et al, 2008). Student engagement has been positively associated with higher achievement and negatively associated

with factors related to achievement such as school dropout and truancy (Fredricks, Blumenfeld, and Paris, 2004; Marks, 2000).

Past research has supported the notion that teasing and bullying is also linked to student engagement. In a sample of 7,058 ninth grade students, students who perceived more bullying and teasing in a school also reported lower engagement in school (Mehta et al, 2013). Given that teasing and bullying has been negatively associated with student engagement and student engagement has been positively associated with academic achievement, it follows that student engagement might mediate the established association between teasing and bullying and academic achievement.

School demographics have been found to be important factors in studies of school disorder, engagement, and academic achievement (Klein & Cornell, 2010; Sutton & Sodderstrom, 1999; Sirin, 2005; Leithwood & Jantzi, 2009; Finn & Rock, 1997). Larger schools tend to have more PTB (Klein & Cornell, 20110), lower academic achievement, and lower levels of student engagement (Leithwood & Jantzi, 2009). Schools with more minority students have also been found to have more PTB (Klein & Cornell, 20110) and lower academic achievement (Sutton & Sodderstrom, 1999). Minority status has also been negatively related to student engagement (Finn & Rock, 1997). Finally, schools in more impoverished areas tend to have more PTB (Klein & Cornell, 2010) and lower academic achievement (Sutton & Sodderstrom, 1999; Sirin, 2005).

Current Study

The present study extended prior research by measuring PTB a middle school sample of teachers and students. We hypothesized that both middle school student and teacher perceptions of PTB would predict passing rates on standardized exams completed in middle school as has previously been found in high schools.

Prior research has yet to establish the potential mechanism by which PTB is associated with SOL passing rates. In order to further our understanding of the relation between PTB and SOL passing rates, we intended to show that self-reported student engagement in school mediates the relation between PTB and SOL passing rates at the school level. We hypothesized that increases in PTB will be associated with decreases in student engagement which, in turn, will predict lower SOL passing rates.

School demographics including enrollment size, racial composition of a school, and measures of socio-economic status have been linked to both bullying and academic achievement (Klein & Cornell, 2012; Sutton & Sodderstrom, 1999; Sirin, 2005; Leithwood & Jantzi, 2009). Therefore, three school demographic variables were used as control variables: percentage of students eligible for free or reduced price meals (FRPM), percentage of minority students, and school size. In addition, individual student victimization was included as a control in order to show that PTB represents the overall prevalence of teasing and bullying rather than individual student experiences of victimization.

Methods

School Sample

The sample of schools was drawn from the Virginia Secondary School Climate Survey (VSSCS, 2013), a statewide study designed to assess school climate and safety conditions in Virginia secondary schools. The survey was conducted in 2013 as part of the state's mandatory school safety audit program. Schools that were eligible to participate in the survey offered 7th or 8th grade classes, excluding alternative schools that offered part-time classes or exclusively served a special population such as students with disabilities and juvenile corrections residents.

The sample used in this report consisted of the 271 schools that only taught grades 6-8. The sample represents 62.4% of the 423 eligible schools, excluding schools in which 7th or 8th grade students were grouped with elementary or high school grades. Only schools offering grades 6-8 were included because this was the most common grade configuration found in the participating schools. In addition, by including only schools with grades 6-8, the potential confounding effects of different grade configurations may be limited. The sample did not have enough schools using a different pattern of grade assignment to compare groups using a different grade configuration. Schools in the study have 6th grade students; however, the state survey was limited to 7th and 8th grade students.

The total school enrollment for grades 6-8 varied between 161 and 1,620 students (M = 773, SD =313). The percentage of students in each school who received free or reduced price meals (FRPM) ranged from 3 to 99 (M = 43, SD = 21.1). The percentage of racial minority students in each school ranged from 1 to 99 (M = 43.5, SD = 26.3).

Student and Teacher Samples

Schools were provided with two options to sample students: (1) invite all 7th and 8th grade students to take the survey, with a goal of surveying at least 70% of all eligible students (whole grade option); (2) invite 25 7th grade students and 25 8th grade students to take the survey (random sample option). Schools with fewer than 25 seventh-grade and/or 25 eighth-grade students were instructed to invite all seventh-grade and eighth-grade students to complete the survey.

If a school elected to complete the random sample option, students were randomly selected from school rosters. Principals were asked to identify enough students in both the seventh and eighth grades in order to gain a sample of 25 student surveys from each grade. All

participants and their parents were provided an opportunity to decline participation in the study without penalty. A target sample of 25 students is comparable to the samples obtained in several national studies of student performance, including the National Educational Longitudinal Study, NELS: 88 (Ingels, 1990) and the National Assessment of Educational Progress (NAEP) program (Chromy, 1998). Approximately 86% of the students in each school who were asked to participate completed the survey. Students did not participate because they declined, their parents declined, they were absent on the day the survey was administered, they had a limitation that prevented them from completing the survey such as a language barrier or disability, or for some other reason such as a technical difficulty.

The student sample consisted of 29,203 seventh and eighth grade students. On average, 108 students participated in each school (range = 8-748, SD=125). The students were 51.6% female. Approximately 51% of the students self-identified as White, 20% as African American, 16% as two or more races, 8% as some other race, 3% as Asian American, 2% as American Indian, and less than 1% as Native Hawaiian or Pacific Islander. In addition, 13% of students identified as Hispanic or Latino.

Schools were instructed to ask all seventh and eighth grade teachers to complete the survey. Altogether, 6,298 teachers completed the survey; representing about 84% of the teachers asked to participate. About 25 teachers participated in each school on average (range = 1-72, SD=13). About 75% of the teachers were female. The majority (53%) of teachers had more than 10 years of experience. About 24% had 6-10 years of experience, 13% had 3-5 years, and 10% had less than 3 years of experience. Other teacher demographic information was not collected in order to protect teacher anonymity.

Procedure

Student and teacher surveys were completed online in the spring of 2013. Student surveys were completed anonymously during school hours, supervised by teachers or other school personnel. Teachers completed surveys independently. All participants read standard instructions prior to completing the survey.

Previous research found that the use of validity screening items can identify students who tend to have extreme responses to questions regarding bullying and more negative perceptions of the school environment than other students (Cornell, Klein, Konold, & Huang, 2012; Cornell, Lovegrove & Baly, 2014). Two validity screening items were included on the student survey. First, "I am telling the truth on this survey" with response options *Strongly Disagree, Disagree, Agree,* and *Strongly Agree*. Students who responded *Strongly Disagree* or *Disagree* were omitted from the sample. Second, students were asked "How many of the questions on this survey did you answer truthfully?" with response options *All of them, All but 1 or 2 of them, Most of them, Some of them,* and *Only a few or none of them.* Students who responded *Some of them* or *Only a few or none of them* were omitted from the sample. Of the 32,074 student participants, 2,871 (9%) of the sample were classified as invalid responders. Invalid responders were removed from the data set prior to all analyses.

Measures

Measures of bullying and teasing were included in a survey that measured perceptions of school climate and safety conditions, as well as student engagement in school. More detailed project information is available (VCCS, 2013).

Prevalence of Teasing and Bullying. Both teachers and students completed the Prevalence of Teasing and Bullying (PTB) as a measure of the pervasiveness of teasing and bullying in the school. The PTB scale consists of five items, with response options of *strongly*

disagree, disagree, agree, or *strongly agree*. The items were: (1) Bullying is a problem at this school, (2) Students here often get teased about their clothing or physical appearance, (3) Students here often get put down because of their race or ethnicity, (4) There is a lot of teasing about sexual topics at this school, and (5) Students here get teased or put down about their sexual orientation. PTB was analyzed at the school level using two scores: the average student score and the average teacher score aggregated for each school.

Although students were provided with the survey definition of bullying, observers may have difficulty identifying power imbalances and may have reluctance to use the term "bullying" because of its negative connotations. Therefore, the PTB scale asks more general questions about teasing and bullying that may occur in a school. This approach is in concordance with prior research which advocated asking students about specific behaviors such as teasing and threatening rather than just bullying (Felix et al, 2011; Kert et al, 2010; Sawyer et al, 2008; Juvonen, Nishina, & Graham, 2001; Olweus, 2007).

A prior four-item version of the PTB scale was supported with exploratory and confirmatory factor analyses (CFA) (Bandyopadhyay, et al, 2009). These results were replicated in a subsequent study using CFA in a sample of 3,687 high school students (Klein et al, 2012).

Konold and colleagues, using the larger student sample from which the sample used in this study was drawn, found that the addition of a fifth item to the PTB scale was warranted. A series of exploratory and confirmatory factor analyses indicated that the five-items in the PTB scale clustered together (Konold, Cornell, Huang, Meyer, Lacey, Nekvasil, Heilbrun, & Shukla, in press). Items on the PTB scale had factor loadings ranging from .70 to .82 in the initial exploratory factor analysis (EFA). Good model fit was found in a confirmatory factor analysis (CFA) with factor loadings ranging from .81 to .97 at the school level. A series of multi-group

confirmatory factor analyses supported the use of the scale across gender groups. The model was reasonably consistent at both the individual and school levels (Konold et.al., in press). Preliminary factor analyses indicated a similar pattern of fit for the five-item PTB scale using teacher data (Huang, Cornell, Konold, Meyer, Lacey, Nekvasil, Heilbrun, & Shukla, 2014). Factor loadings in the initial EFA ranged from .71 to .78. A CFA found moderate model fit with factor loadings ranging from .69 to .96 (Huang et.al., 2014). In the current study, Cronbach's alphas for the student PTB scale and the teacher PTB scales were .87 and .86 respectively.

Student Engagement. Students completed the Engagement scale as a measure of their cognitive and affective engagement in school activities. The scale consists of six items, with response options of *strongly disagree, disagree, agree,* or *strongly agree*. The items were: 1) I like this school, 2) I am proud to be a student at this school, 3) I feel like I belong at this school, 4) I usually finish my homework, 5) Getting good grades is very important to me, 6) I want to learn as much as I can at school. Engagement was analyzed at the school level using the average student score aggregated for each school.

Items for this scale were derived from the Commitment to School scale (Thornberry, Lizotte, Krohn, Farnworth, & Jang, 1991). The factor structure of the Engagement scale was also investigated by Konold and colleagues (in press). Multilevel exploratory and confirmatory factor analyses support a two-factor solution with two correlated factors labeled: cognitive engagement and affective engagement (RMSEA = .05, CFI = .99, TLI = .99) that could be combined to form an overall assessment of student engagement. These six engagement items have been found to be significantly related to student perceptions of bullying at school (Mehta et al, 2013). Therefore, the six-item Engagement scale was used as a general measure of school engagement. The six-

item Engagement Scale yielded factor loadings at the student level that ranged from .54 - .90. In the current study, the Cronbach's alpha for the student Engagement scale was found to be .84.

Bullying Victimization. The Bullying Victimization scale measured personal experiences with bullying victimization. The following definition was presented :

> *"*Bullying is the repeated use of one's strength or popularity to injure, threaten, or embarrass another person on purpose. Bullying can be physical, verbal, or social. It is not bullying when two students who are about the same in strength or popularity have a fight or argument."

The Bully Victimization scale consists of five items, with response options of *never, once or twice, about once per week,* or *more than once per week.* Students first reported whether they had been bullied at school in the past year. Students were then asked if they had been physically, verbally, socially, and cyber bullied at school in the past year. This measure of personal bully victimization is consistent with other measures of bullying (Olweus, 2007).

Prior research has shown that this measure of bullying corresponded with peer and teacher nominations of victims of bullying (Baly, Cornell, & Lovegrove, 2014; Branson & Cornell, 2009; Cornell & Brockenbrough, 2004). Further, a three-year longitudinal study found that bullying victimization scores had good stability over time (Baly, et al, 2014). Additionally, self-reported bullying victimization has been related to poor student outcomes including depression, feelings of sadness, thoughts of suicide, and lower grade point average as well as student perceptions of the safety and supportiveness of school climate (Branson & Cornell, 2009; Baly, et al, 2014).

For this study, an overall bullying victimization score was calculated by summing the five personal bullying victimization questions for each participant and averaging the scores for

participants in each school to find an overall school-level score. The Cronbach's alpha for the overall victimization score was .87.

Academic Achievement. Passing rates for the Virginia Standards of Learning (SOL) exams were used as the measure of school-level academic achievement. School passing rates for SOL exams were obtained from the VDOE; individual results for the students in this study are not available. SOL exams are state-mandated tests intended to measure student learning and achievement (Virginia Department of Education, 2007). Students typically complete the SOL exams at the end of the school year in correspondence with the completion of related courses. First administered in 1998, school performance on the SOL exams has been a criterion for school accreditation and funding since 2006 (Virginia Department of Education, 2010).

The SOL tests were developed using test blueprints, item development specifications, review committees, field testing, and item banking. These procedures were used to limit item bias and ensure appropriate item difficulty and content coverage. As a whole, the SOL exams have been found to have acceptable reliability across race and gender ($\alpha > .70$) (Virginia Department of Education, 2007).

Six SOL subject exams completed in middle school were included in this research: English Reading Grade 7, English Reading Grade 8, English Writing Grade 8, Mathematics Grade 7, Mathematics Grade 8, and Science.

School Demographics. Three school demographic variables were used as control variables: school size, percentage of minority students, and the percentage of students eligible for free or reduced price meals (FRPM). All school demographic variables were acquired from state records.

Results

The data were inspected for outliers, extreme values, missing values, and multicollinearity. Boxplot examination revealed between 18 and 28 univariate outliers across SOL tests, but all cases were within the range of possible values. Further, supplementary analysis excluding univariate outliers did not differ markedly from the results presented in this paper. Between 4 and 7 multivariate outliers were indicated by Mahalanobis Distance analyses across SOL tests (cutoff of $D^2 = 22.45$). As recommended by Tabachnick and Fidell (2007), multivariate outliers were removed from the data. Tolerance statistics were interpreted in order to identify multicollinearity between variables. Tolerance statistics for all variables fell above the standard cutoff of .10 and histograms suggested that residuals were randomly distributed for all variables.

Table 1 provides descriptive statistics and Table 2 provides intercorrelations for study variables. In summary, at the .05 level of statistical significance, FRPM, and percentage of minority students correlated with passing rates for all six exams. School size was correlated with all passing rates for all exams except Science. Student reports of victimization did not correlate with any of the SOL passing rates. Both student and teacher reports of PTB as well as student engagement correlated with passing rates for all six exams. Student and teacher measures of PTB were highly correlated ($r = .55$, $p < .001$). Teacher reports of PTB were modestly correlated with engagement ($r = -.42$, $p < .001$) and student reports of PTB were strongly correlated with student engagement ($r = -.62$, $p < .001$).

Multiple Regression Analyses of Passing Rates

Hierarchical linear regression was used to investigate the predictive relation between PTB and SOL passing rates. In order to account for the potential effect of bullying victimization on reports of PTB, individual bully victimization was a control variable in all analyses. Further,

enrollment size of the school, percentage of minority students, the percentage of students participating in the free/reduced price meal program, and parent/guardian education were also used as control variables.

A three-step multiple regression analysis was conducted with school demographic variables entered at step 1, individual bully victimization entered at step 2, and teacher and student reports of PTB at step 3. Separate regression analyses were conducted for the six SOL exams. Regression was used rather than hierarchical linear modeling because individual student SOL exam scores were not available. Given the large number of analyses, only step 3 of each regression is summarized here. Details are found in Table 3.

Grade 7 English Reading passing rate. At Step 3, FRPM was the only control variable that significantly contributed to the model. PTB, both student perceptions ($\beta = -.091$, $p < .05$) and teacher perceptions ($\beta = -.174$, $p < .01$) were statistically significant. The total variance accounted for by the model was $R^2 = .785$, $p < .01$; the increase associated with PTB was $\Delta R^2 = .034$, $p < .01$.

Grade 7 Mathematics passing rate. At step 3, FRPM was a significant predictor. Neither student nor teacher perceptions of PTB were significant predictors independently. However, taken together, teacher and student PTB significantly increased the total variance accounted for by the model. The total variance accounted for by the model was $R^2 = .611$, $p < .01$; the increase associated with PTB was $\Delta R^2 = .017$, $p < .01$.

Grade 8 English Reading passing rate. At step 3, FRPM significantly contributed to the model. Both student ($\beta = -.143$, $p < .01$) and teacher ($\beta = -.151$, $p < .01$) perceptions of PTB were significant. The total variance in SOL passing rates explained by the model was $R^2 = .702$, $p < .01$. The variance accounted for by PTB was $\Delta R^2 = .038$, $p < .001$.

Grade 8 Writing passing rate. At step 3, FRPM and personal bullying victimization were significant predictors. Student ($\beta = -.197$, $p < .01$) and teacher ($\beta = -.130$, $p < .01$) reports of PTB were significant. The total variance attributable to the model was $R^2 = .698$, $p < .01$. The variance accounted for by PTB was $\Delta R^2 = .044$, $p < .01$.

Grade 8 Mathematics passing rate. At step 3, school enrollment significantly contributed to the model. Teacher reports of PTB ($\beta = -.191$, $p < .05$) was statistically significant whereas student reports of PTB was not a significant predictor. The total variance accounted for by the model was $R^2 = .171$, $p < .01$; the portion of variance attributable to PTB was $\Delta R^2 = .031$, $p < .05$.

Science passing rate. At step 3, percent minority students and FRPM were significant predictors. Personal bullying victimization did not significantly add to the model. For PTB, student ($\beta = -.120$, $p < .05$) and teacher ($\beta = -.141$, $p < .01$) perceptions were statistically significant. The total variance accounted for by the model was $R^2 = .614$, $p < .01$; the portion of the variance accounted for by PTB was $\Delta R^2 = .030$, $p < .01$.

Mediation Analysis

In order to determine the potential mediation of student engagement on the relation between PTB and academic achievement, additional multiple regression analyses were completed in accordance with the procedures suggested by Baron and Kenny (1986). As previously presented, PTB directly predicted SOL passing rates. Next, to show that PTB was related to student engagement, another three-step regression entering school demographics at step 1, individual bully victimization at step 2, and PTB at step 3. Next, four-step regression was completed predicting SOL passing rates by entering school demographics at step 1, individual bully victimization at step 2, PTB as a control variable in step 3, and student engagement in step

4. The mediator-model is demonstrated in Figure 1 using results for Grade 7 English Reading passing rates. Results for all six SOL exams are presented in Table 4.

In Step 2 of the mediation model, it was shown that both student ($\beta = -.466$, $p < .01$) and teacher ($\beta = -.209$, $p < .01$) perceptions of PTB statistically predicted engagement. The portion of the variance in engagement accounted for by PTB was $\Delta R^2 = .188$, $p < .001$. Step 3 demonstrated that engagement significantly predicted passing rates for all six SOL exams. The β of engagement ranged between .134 and .182, $p < .05$. Engagement accounted for between ΔR^2 =.014 and .025, p<.05, of the variance in SOL passing rates. Step 4 analyses demonstrated that engagement and both student and teacher PTB independently contributed to the model. The addition of engagement decreased the contribution of both student and teacher PTB indicating a partial mediation. See Table 3 for detailed results.

In order to determine the significance of the mediation, two post-hoc analyses were conducted as suggested by Preacher and Hayes (2008). First, the Sobel test (1982), which measures the significance of a mediation effect, was completed. To ensure that the Sobel test results were not overly conservative, the bias corrected bootstrapping method; a non-parametric resampling procedure that calculates the significance of a mediation effect; was completed (Preacher & Hayes, 2008).

The Sobel test found that engagement was a significant partial mediator in the model for two of the SOL exam passing rates (English Reading Grade 7 and Science). For English Reading Grade 7, Sobel test analyses showed that engagement partially mediated the model for both student (z= -2.65, p<.05) and teacher PTB (z= -2.34, p<.05). For Science, the Sobel test also found that engagement partially mediated the model for both student (z= -2.30, p<.05) and teacher PTB (z= -2.02, p<.05).

Similar results were found using the bootstrapping method. In these analyses, mediation is significant if the 95% bias-corrected and accelerated confidence intervals for the indirect effect do not include 0 (Preacher and Hayes, 2004). Results were based on 1000 bootstrapped samples. All analyses controlled for total enrollment, percent minority, FRPM, and bully victimization. Indirect effects were considered significant at the p< .05 level when zero was not in the 95% confidence interval.

Controlling for demographic variables and Teacher PTB, Student PTB had a significant total effect on Grade 7 English Reading pass rates [TE= -5.5642, SE= 2.7507, *p*= .044] but the direct effect was not significant [DE= -2.0566, SE= 2.9630, *p*= .49]. A significant indirect effect via engagement was demonstrated (IE lower 95% = -6.6783, IE upper 95% = -1.4362). Therefore, engagement fully mediated the relation between student reports of PTB and Grade 7 English Reading pass rates. With demographics and Student PTB controlled, Teacher PTB had a significant total effect on Grade 7 English Reading pass rates [TE= -9.3263, SE= 2.0025, *p*= .000] and a significant residual direct effect [DE= -8.0831, SE= 2.0172, *p*= .0001]. The significant indirect effect via Engagement demonstrated a partial mediation of the relation between teacher reports of PTB and Grade 7 English Reading pass rates [IE= -1.2431, se= .6066, LL= -2.8171, UL= -.3659].

With demographics and Teacher PTB controlled, Student PTB had a significant total effect on Science pass rates [TE= -8.8012, SE= 4.4037, *p*= .0468] but did not have a significant residual direct effect [DE= -4.0308, SE= 4.7644, *p*= .3984]. An indirect effect via engagement was significant demonstrating a full mediation [IE lower 95%= -10.5448, IE upper 95%= -.4567]. Controlling for demographics and Student PTB, Teacher PTB had a significant total effect on Science pass rates [TE= -9.0033, SE= 3.1927, *p*= .005] and a significant residual direct effect [DE= -7.3221, SE= 3.2313, *p*= .024]. An indirect effect via engagement was found to be significant demonstrating a partial mediation [IE upper 95%= -4.1302, IE lower 95%= -.2786].

Discussion

In recent decades, there has been increasing focus in schools on student performance on standardized exams (Spillane and Kenney, 2012). The emphasis on test performance has made it more difficult for school administrators to attend to non-academic matters such as school climate or bullying (Spillane and Kenney, 2012). Research suggests that student performance may also benefit from improving school climate (e.g. MacNeil, et al, 2009; Ripski and Gregory, 2009; Bandyopadhyay, et al, 2009; Konishi, et al, 2010; Mehta, et al, 2013; Cornell, et al, 2013; Lacey & Cornell, 2013a).

Findings from this research showed that student and teacher perceptions of PTB were associated with school passing rates on the Virginia SOL exams. These results are consistent with prior studies linking reports of PTB with school performance on the Virginia SOL exams in high schools (Lacey & Cornell, 2013a; Lacey & Cornell, 2013b). Prior research showed this relationship in high schools using student, teacher, and principal reporters. The present findings add to the body of research by demonstrating this association in a middle school sample.

In addition, the study offered new evidence of one mechanism by which PTB was related to SOL passing rates. For two of the SOL exams (Grade 7 English Reading and Science), engagement mediated the relation between student and teacher PTB and SOL passing rates. These results suggest that the link between PTB and academic achievement may be partially attributed to the role of student engagement. It might be that higher PTB leads to lower student engagement in school which, in turn, may decrease student capacity to learn and perform academically. These results are consistent with prior research demonstrating that bullying is negatively related to engagement (Mehta et al, 2013) and positively related to academic achievement (Finn & Rock, 1997).

Teacher and student PTB scores were highly correlated (r= .55), but both contributed significantly to the prediction of passing rates. Teacher perceptions predicted more of the SOL passing rates than student perceptions. Teacher perceptions of PTB predicted five SOL passing rates (Grade 7 English Reading, Grade 8 English Reading, Grade 8 English Writing, Grade 8 Mathematics, and Science) whereas student perceptions of PTB predicted four SOL passing rates (Grade 7 English Reading, Grade 8 English Reading, Grade 8 English Writing, and Science).

The three demographic variables accounted for approximately 56% of the variance on average (range 14% - 75%). Demographic variables explained considerably less of the variance in the passing rates of Grade 8 Mathematics (13.8%) than for the other five SOL exams (range 58.3%-75.1%). The majority of the variance in passing rates was accounted for by FRPM with the exception of Grade 8 Mathematics. These findings indicate that school demographics, which are not easily modified, are related to school performance on measures of academic achievement. However, these findings also indicate that bullying and teasing, a factor that can be improved with appropriate intervention, may be an important component in student success.

These results are consistent with prior research demonstrating that academic achievement is associated with school demographics including the minority composition of the student body, school size, and measures of socio-economic status (Sutton and Sodderstrom, 1999; Sirin, 2005; Leithwood and Jantzi, 2009; Klein and Cornell, 2012). Further, the particular importance of FRPM to academic achievement is consistent with prior research showing that there is a large degree of association between measures of socio-economic status and academic achievement at the school level (Sirin, 2005).

In the current study, personal bullying victimization was used as a covariate to control for the potential effects of personal bullying experiences on student reports of PTB. Personal bullying

victimization did not predict passing rates for five out of the six SOL exams. These results are consistent with prior research on the relation between school-level measures of self-reported bullying victimization and SOL exam pass rates (Lacey & Cornell, 2013a).

Limitations and Directions for Future Research

One limitation of this study is that it was correlational and cannot establish a causal relation or determine the direction of effects. The association between PTB and academic achievement may be bidirectional; PTB may affect academic achievement or academic achievement may affect PTB. However, the findings of this study were consistent with prior research on the relation between student perceptions of teasing and bullying and academic performance (Lacey & Cornell, 2013a; Lacey & Cornell, 2013b). Further, the association between PTB and academic achievement may be explained by other variables not included in these analyses. Although student engagement was found to mediate this association, other variables may also affect the link between PTB and academic achievement. For example, high levels of bullying have been linked with underdeveloped classroom management skills and low staff consensus on rules and instructional practices (Roland & Galloway, 2002; Roland, & Galloway, 2004). Schools with poorer classroom management and institutional policies may fail to support teachers and students in efforts to improve learning. Further, such schools also may not encourage staff to attend to peer conflict such as teasing and bullying. Teachers in such schools may spend a disproportionate amount of time on discipline and less time on instruction leading to lower achievement.

Another limitation is the use of the six-item Engagement scale. Although prior research supported the use of the Engagement scale (Mehta et.al., 2013), a multi-level analysis with the current sample obtained mixed results, with more support for the scale at the individual student

level than the school-level (Konold et.al, in press). These results suggested that it may be difficult to conceptualize student engagement as a school-level construct. However, the mediation analyses are consistent with the view that lowered engagement may be one of the mechanisms through which bullying in a school is related to achievement (Ripski & Gregory, 2009). Future research could examine other potential mediating variables in the relation between the prevalence of teasing and bullying and SOL passing rates.

Finally, the analyses were based on school level passing rates; individual student test scores were unavailable. Analysis including individual student scores on SOL exams and survey questions would provide a more comprehensive assessment. Future research may include hierarchical linear modeling techniques to determine the potential multi-level relations between the prevalence of teasing and bullying and standardized test performance.

Implications for Practice and Conclusions

In recent decades, schools have experienced increasing pressure to improve student academic performance on state-mandated tests (Spillane and Kenney, 2012). Given the increased focus on test performance, many schools divert time and resources to prepare students for standardized exams. To bolster student performance, schools tend to focus on test taking skills and academic instruction (Spillane and Kenney, 2012). The findings of the current research suggest that the prevalence of teasing and bullying in a school may play a larger role in the achievement of students than previously thought. Not only does this research indicate that PTB is negatively related to schoolwide academic achievement but that the association may be attributable, in part, to the negative relation between PTB and schoolwide student engagement.

References

Appleton, J.J., Christenson, S.L., & Furlong, M.J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45,* 369-386. DOI: 10.1002/pits

Baly, M., Cornell, D., & Lovegrove, P., (2014). A longitudinal comparison of peer- and self-reports of bullying victimization across middle school. *Psychology in the Schools,* 51, 217-240.

Bandyopadhyay, S., Cornell, D., & Konold, T. (2009). Internal and external validity of three school climate scales from the School Climate Bullying Survey. *School Psychology Review, 38,* 338-355.

Baron, R. M. & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173-1182.

Boulton, M. (2008) Pupils' perceptions of bullying and disruptions to concentration and attention to school work, *Pastoral Care in Education,* 26 (2), 83-89.

Bradshaw, C.P., Sawyer, A.L., and O'Brennan, L.M. (2007). Bullying and peer victimization at school: Perceptual differences between students and school staff, *School Psychology Review, 36,* 361-382.

Branson, C. E., & Cornell, D. G. (2009). A comparison of self and peer reports in the assessment of middle school bullying. *Journal of Applied School Psychology, 25,* 5–27. doi:10.1080/15377900802484133

Chromy, I.R. (1998). *The effects of finite sampling corrections on state assessment sample requirements.* Paper (Draft No. 3) prepared for the NAEP Validity Studies

Panel. Palo Alto, CA: American Institutes for Research.

Cornell, D. G., & Brockenbrough, K. (2004). Identification of bullies and victims: A comparison of methods. *Journal of School Violence, 3*, 63–87. doi:10.1300/J202v03n02_05

Cornell, D., Gregory, A., Huang, F., & Fan, X. (2013). Perceived prevalence of bullying and teasing predicts high school dropout rates. *Journal of Educational Psychology, 105*, 138-149.

DiPerna, J. C. (2006). Academic enablers and student achievement: Implications for assessment and intervention services in the schools. *Psychology in the Schools, 43*, 7-17.

Felix, E. D., Sharkey, J. D., Green, J. G., Furlong, M. J., & Tanigawa, D. (2011). Getting precise and pragmatic about the assessment of bullying: the development of the California Bullying Victimization Scale. *Aggressive Behavior, 37*, 234-247.

Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of Applied Psychology, 82*, 221-234.

Fredricks, J. A., Blumenfeld, P. C., and Paris, A. (2004). School engagement: potential of the concept: state of the evidence. *Review of Educational Research, 74,* 59–119.

Glew, G.M., Fan, M.Y., Katon, W., & Rivara, F.P. (2008). Bullying and school safety, *Journal of Pediatrics*, 152(1), 123-128.

Gottfredson, G. D., Gottfredson, D. C., Payne, A. A., & Gottfredson, N. C. (2005). School climate predictors of school disorder: Results from a national study of delinquency prevention in schools. *Journal of Research in Crime and Delinquency, 42*, 412-444.

Guerra, N.G., Williams, K.R., & Sadek, S. (2011). Understanding bullying and

victimization during childhood and adolescence: A mixed methods study. *Child Development, 82(1),* 296-310.

Huang, F., Cornell, D., Konold, T., Meyer, P., Lacey, A., Nekvasil, E., Heilbrun, A., & Shukla, K. (2014). Multi-level Factor Structure and Concurrent Validity of the Teacher Version of the Authoritative School Climate Survey. Unpublished manuscript.

Ingels, S.J. (1990). National Education Longitudinal Study of 1988. Base Year: School Component Data File User's Manual.

Juvonen, J., Nishina, A., & Graham, S. (2001). Self-views versus peer perceptions of victim status among early adolescents. In J. Juvonen & S. Graham (Eds.), *Peer harassment in school: A plight of the vulnerable and victimized* (pp. 105-124). New York: Guilford Press.

Juvonen, J., Wang, Y., & Espinoza, G. (2011). Bullying Experiences and Compromised Academic Performance Across Middle School Grades, *Journal of Early Adolescence, 31*(1), p 152-173.

Kert, A. S., Codding, R. S., Tryon, G. S., & Shiyko, M. (2010). Impact of the word "bully" on the reported rate of bullying behavior. *Psychology in the Schools*, *47*, 193-204. DOI: 10.1002/pits.20464

Klein, J., & Cornell, D. (2010). Is the link between large high schools and student victimization an illusion? *Journal of Educational Psychology, 102,* 933-946. doi: 10.1037/a0019896

Klein, J., Cornell, D., & Konold, T. (2012). Relationships between school climate and student risk behaviors. *School Psychology Quarterly, 27,* 154-169.

Konishi, C., Hymel, S., Zumbo, B.D., & Li, Z. (2010). Do school bullying and student-

teacher relationships matter for academic achievement? A multilevel analysis. *Canadian Journal of School Psychology*, *25*, 19-39. doi: 10.1177/0829573509357550

Konold, T., Cornell, D., Huang, F., Meyer, P., Lacey, A., Nekvasil, E., Heilbrun, A., & Shukla, K. (in press). Multi-level multi-informant structure of the Authoritative School Climate Survey. *School Psychology Quarterly*.

Lacey, A. & Cornell, D.G. (2013a). The impact of teasing and bullying on schoolwide academic performance, *Journal of Applied School Psychology*, 29, 262-283.

Lacey, A. & Cornell, D.G. (2013b). School Administrator Assessments of Bullying and State-Mandated Testing. Manuscript submitted for publication.

Leithwood, K. & Jantzi, D (2009). A review of empirical evidence about school size effects: A policy perspective. *Review of Educational Research, 79*, 464-490.

MacNeil, A.J., Prater, D.L., & Busch, S. (2009) The effects of school culture and climate on student achievement, *International Journal of Leadership in Education, 12*, 73-84. doi:10.1080/13603120701576241

Marks, H. M. (2000). Student engagement in instructional activity: patterns in the elementary, middle, and high school years. *American Educational Research Journal, 37*, 153–184.

Mehta, S., Cornell, D., Fan, X., & Gregory, A. (2013). Bullying climate and school engagement in ninth grade students. *Journal of School Health*, 83, 45-52.

Nakamoto, J. & Schwartz, D. (2010). Is peer victimization associated with academic achievement? A meta-analytic review, *Social Development*, 19(2), 221-242.

National Center for Education Statistics (NCES) (2012). Indicators of School Crime and Safety: 2012, Retrieved from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013036

Olweus, D. (1993). *Bullying at school: What we know and what we can do*. Oxford, UK: Blackwell.

Olweus, D. (2007). *The Olweus Bullying Questionnaire.* Center City, MN: Hazelden.

Pepler, D. J., & Craig, W. M. (1995). A peek behind the fence: Naturalistic observations of aggressive children with remote audiovisual recording. Developmental Psychology, 31, 548–553.

Preacher, K. J., & Hayes, A. F. (2008). Contemporary approaches to assessing mediation in communication research. In A. F. Hayes, M. D. Slater, and L. B. Snyder (Eds), *The Sage sourcebook of advanced data analysis methods for communication research* (pp. 13-54). Thousand Oaks, CA: Sage Publications.

Ripski, M.B. & Gregory, A. (2009). Unfair, unsafe, and unwelcome: Do high school students' perceptions of unfairness, hostility, and victimization in school predict engagement and achievement. *Journal of School Violence, 8*, 355-375. doi:10.1080/15388220903132755

Rivers, I., Poteat, V.P., Noret, N., & Ashurst, N. (2009). Observing bullying at school: The mental health implications of witness status. *School Psychology Quarterly, 24*, 211-223. doi: 10.1037/a0018164

Roland R. & Galloway, D. (2002). Classroom influences on bullying. *Educational Research, 44*, 299–312.

Roland, R. & Galloway, D. (2004). Professional cultures in schools with high and low rates of bullying. *School Effectiveness and School Improvement, 15*(3-4), 241-260.

Sawyer, A. L., Bradshaw, C. P., & O'Brennan, L. M. (2008). Examining ethnic, gender, and developmental differences in the way children report being a victim of "bullying" on self-report measures. *Journal of Adolescent Health, 43*, 106-114.

Sirin, S.R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75, 417-453. doi: 10.3102/00346543075003417.

Sobel, M.E., (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological Methodology 1982* (pp. 290- 312). Washington DC: American Sociological Association.

Spillane, J.P. and Kenney, A.W. (2012). School administration in a changing education sector: The US experience, *Journal of Educational Administration, 50*(5), 541-561. DOI: 10.1108/09578231211249817.

Sutton, A. & Soderstrom, I. (1999) Predicting elementary and secondary school achievement with school-related and demographic factors. *The Journal of Educational Research*, 92(6), 330-338.

Swearer, S. M., Espelage, D. L., Vaillancourt, T. & Hymel, S. (2010). What can be done about school bullying? Linking research to educational practice. *Educational Researcher, 39*, 38-47.

Tabachnick, B.G., & Fidell, L.S. (2007). Using Multivariate Statistics (5th ed.). Allyn & Bacon.

Thornberry, T.P., Lizotte A.J., Krohn, M.D., Farnworth, M,, & Jang, S.J. (1991). Testing interactional theory: An examination of reciprocal causal relationships among family, school, and delinquency. *Journal of Criminal Law & Criminology, 82*, 3-35.

Unnever, J.D. & Cornell, D.G. (2003). The culture of bullying in middle schools. *Journal of School Violence*, *2*(2), 5-27. doi:10.1300/J202v02n02_02

U.S. Department of Health and Human Services (2013). Policies and Laws. Available from http://www.stopbullying.gov/laws.

Varjas, K, Henrich, C.C., & Meyers, J. (2009). Urban Middle School Students' Perceptions of Bullying, Cyberbullying, and School Safety. *Journal of School Violence*, 8, 159-176

Virginia Department of Education (2007). *Virginia SOL Assessments: Technical Report 2006-2007 Administration Cycle*. Richmond, VA: Author.

Virginia Department of Education (2010). Virginia Standards of Learning and Common Core Standards.

Retrieved from http://www.doe.virginia.gov/testing/common_core/index.shtml

Virginia School Center for School Safety (2013). *Virginia School Safety Audit Program*.

Retrieved from http://www.dcjs.virginia.gov/vcss/audit/

Wang, J., Iannoti, R.J., & Lux, J.W. (2011). Peer victimization and academic adjustment among early adolescents: Moderation by gender and mediation by perceived classmate support, *Journal of School Health*, 81(7), 386-392.

Table 1

Descriptive Statistics for Study Variables

Variable	Mean	SD	Min	Max
Grade 7 English Reading	73.4	11.5	30.9	100
Grade 7 Mathematics	56.7	20.2	7.3	100
Grade 8 English Reading	69.4	12.2	21.3	100
Grade 8 Mathematics	58.4	18.7	2.8	96.6
Science	75.2	13.7	28.4	95.7
Grade 8 Writing	68.9	12.3	31.9	100
School Population				
School Enrollment	773	313	161	1620
% Minority	43.5	26.3	1	99
FRPM	43.0	21.1	3	99
Bully Victim	1.4	0.1	1.2	1.9
PTB				
Teacher	2.3	0.2	1.7	3.0
Student	2.6	0.2	1.8	3.1
Student Engagement	3.1	0.1	2.7	3.5

Note. Test results were not available for all schools. For Grade 7 English Reading, scores were available for 246 schools, for Grade 7 Mathematics, 232; Grade 8 English Reading, 247; Grade 8 Mathematics, 239; Science, 247; and Grade 8 Writing, 247.

Table 2

Correlations among Study Variables

	2	3	4	5	6	7	8	9	10	11	12	13
1. English Reading: 7	.794**	.878**	.479**	.778**	.820**	.265**	-.849**	-.559**	-.039	-.545**	-.499**	.461**
2. Mathematics: 7	--	.738**	.399**	.649**	.687**	.180**	-.751**	-.487**	-.027	-.466**	-.462**	.398**
3. English Reading: 8		--	.497**	.811**	.886**	.247**	-.812**	-.491**	-.056	-.534**	-.515**	.441**
4. Mathematics: 8			--	.489**	.457**	.148*	-.339**	-.218**	.028	-.289**	-.167**	.223**
5. Science				--	.740**	.080	-.715**	-.588**	.007	-.488**	-.478**	.412**
6. Writing: 8					--	.246**	-.801**	-.432**	-.083	-.523**	-.551**	.448**
7. School Enrollment						--	-.367**	.220**	-.155*	-.036	.009	.147*
8. FRPM							--	.555**	.050	.460**	.471**	-.380**
9. Student: % Minority								--	-.181**	.322**	.264**	-.240**
10. Bully Victimization									--	.196**	.485**	-.310**
11. Teacher: PTB										--	.553**	-.419**
12. Student: PTB											--	-.619**
13. Engagement												--

Note. *p < .05. **p < .01. PBT = Prevalence of Bullying and Teasing

Table 3

Multiple Regression and Mediation Analyses Results

	Grade 7 English Reading			Grade 7 Mathematics			Grade 8 English Reading		
	β	R^2	Δ R^2	β	R^2	Δ R^2	β	R^2	Δ R^2
Step 1		.751**	.751**		.594**	.594**		.663**	.663**
School Enrollment	-.045			-.088			-.057		
% Minority	-.081			-.025			-.016		
% FRPM	-.831**			-.783**			-.824**		
Step 2		.751**	.000		.594**	.000		.664**	.001
School Enrollment	-.044			-.087			-.056		
% Minority	-.089			-.032			-.025		
% FRPM	-.825**			-.777**			-.816**		
Bully Victims	-.020			-.017			-.024		
Step 3		.785**	.034**		.611**	.017**		.702**	.038**
School Enrollment	.006			-.047			.008		
% Minority	-.080			-.026			-.020		
% FRPM	-.692**			-.677**			-.662**		
Bully Victims	.051			.046			.066		
Student PTB	-.091*			-.098			-.143**		
Teacher PTB	-.174**			-.099			-.151**		
Step 4		.793**	.007**		.611**	.000		.705**	.004
School Enrollment	-.013			-.051			-.006		
% Minority	-.060			-.021			-.006		
% FRPM	-.703**			-.679**			-.670**		
Bully Victims	.060			.048			.073		
Student PTB	-.034			-.085			-.101		
Teacher PTB	-.151**			-.093			-.134**		
Engagement	.117**			.027			.086		

Note. *p < .05 **p < .01.

Table 3 Con't

	Grade 8Writing			Grade 8 Mathematics			Grade 8 Science	
	β	R^2	Δ R^2	β	R^2	Δ R^2	β	R^2	Δ R^2
Step 1		.653**	.653**		.138**	.138**		.583**	.583**
School Enrollment	-.103*			.143			-.064		
% Minority	.100			-.115			-.261**		
% FRPM	-.898**			-.237*			-.595**		
Step 2		.653**	.000		.140**	.002		.584**	.001
School Enrollment	-.103*			.144			-.065		
% Minority	.092			-.099			-.272**		
% FRPM	-.893**			-.248**			-.587**		
Bully Victims	-.019			.045			-.030		
Step 3		.698**	.044**		.171**	.031*		.614**	.030**
School Enrollment	-.025			.182*			-.010		
% Minority	.094			-.089			-.265**		
% FRPM	-.716**			-.142			-.453**		
Bully Victims	.092*			.096			.049		
Student PTB	-.197**			-.035			-.120*		
Teacher PTB	-.130**			-.191**			-.141**		
Step 4		.703**	.005*		.182**	.010		.624**	.010*
School Enrollment	-.041			.165*			-.031		
% Minority	.110*			-.069			-.244**		
% FRPM	-.726**			-.149			-.464**		
Bully Victims	.100*			.110			.060		
Student PTB	-.150*			.022			-.055		
Teacher PTB	-.111*			-.163*			-.115*		
Engagement	.095*			.134			.133*		

Note. *p < .05 **p < .01.

Table 4

Sobel and Bootstrapping Results

	Grade 7 English Reading				Grade 7 Mathematics			
Sobel Test								
	Sobel z	Std. Error			Sobel z	Std. Error		
Teacher	-2.34*	0.59			-0.46	1.17		
Student	-2.65**	1.24			-0.46	2.90		
Bootstrap Method			95% Confidence Intervals				95% Confidence Intervals	
	Estimates	Std. Error	Upper	Lower	Estimates	Std. Error	Upper	Lower
Teacher								
PTB Total Effect	-9.33**	2.00			-9.54	5.02		
PTB Residual Effect	-8.08**	2.02			-9.02	5.15		
Engagement Indirect Effect	-1.24*	0.61	-2.82	-0.37	-0.53	1.14	-3.13	1.64
Student								
PTB Total Effect	-5.56*	2.75			-10.67	6.84		
PTB Residual Effect	-2.06	2.96			-9.23	7.52		
Engagement Indirect Effect	-3.51*	1.25	-6.68	-1.44	-1.44	3.13	-8.22	4.43

Note. *p < .05 **p < .01.

Table 4 Con't

	Grade 8 English Reading				Grade 8 Writing			
Sobel Test								
	Sobel z	Std. Error			Sobel z	Std. Error		
Teacher	-1.59	0.64			-1.73	1.64		
Student	-1.73	1.48			-1.90	3.81		
Bootstrap Method			95% Confidence Intervals				95% Confidence Intervals	
	Estimates	Std. Error	Upper	Lower	Estimates	Std. Error	Upper	Lower
Teacher								
PTB Total Effect	-8.62**	2.51			-7.49**	2.55		
PTB Residual Effect	-7.65**	2.56			-6.39*	2.59		
Engagement Indirect Effect	-0.97	0.62	-2.38	0.08	-1.09	0.71	-2.78	0.10
Student								
PTB Total Effect	-9.34**	3.45			-12.92**	3.50		
PTB Residual Effect	-6.61	3.75			-9.86*	3.81		
Engagement Indirect Effect	-2.73	1.54	-5.84	0.39	-3.07	1.65	-6.38	0.14

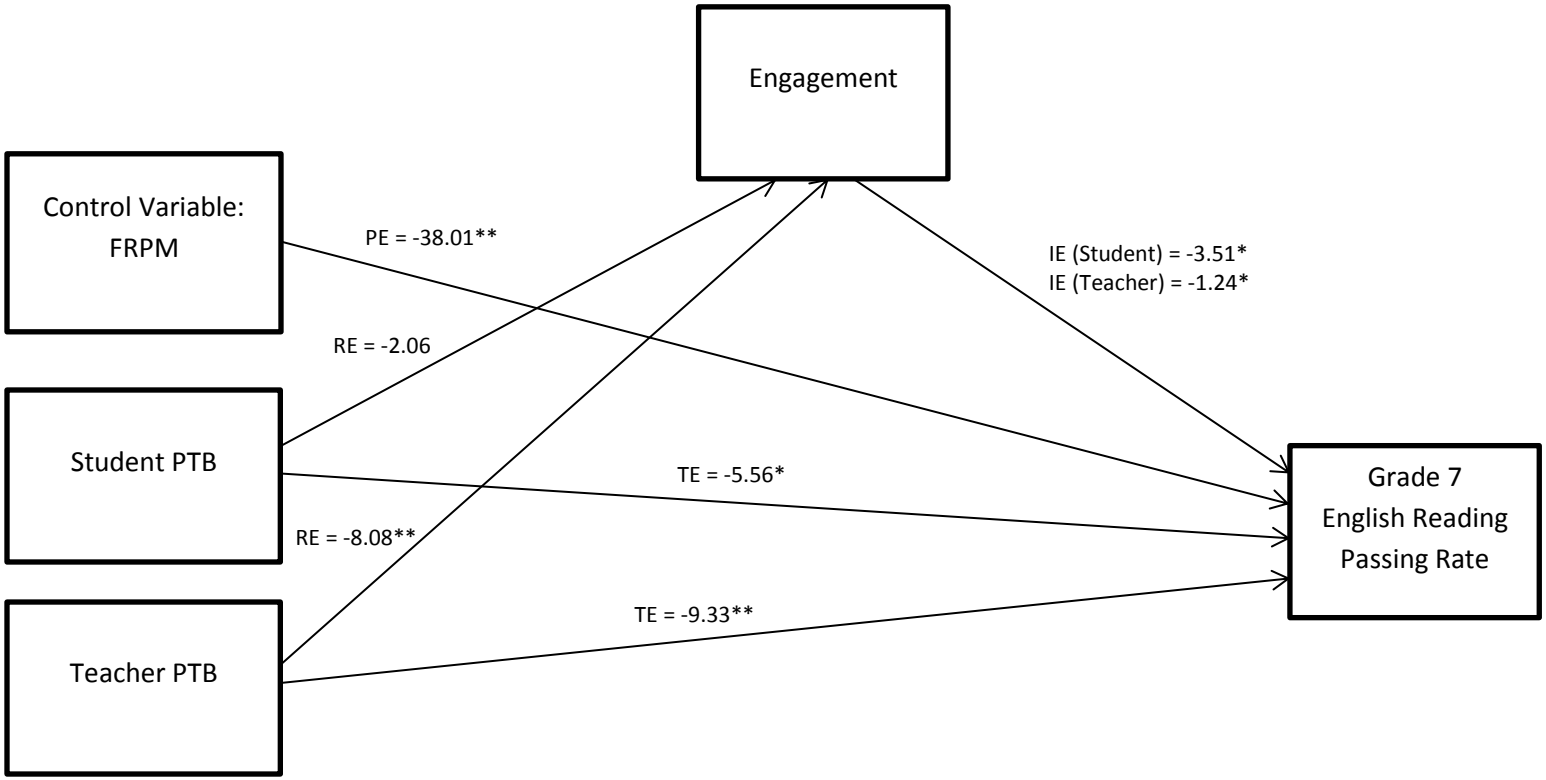
Note. *p < .05 **p < .01.

Table 4 Con't

	Grade 8 Mathematics				Grade 8 Science			
Sobel Test								
	Sobel z	Std. Error			Sobel z	Std. Error		
Teacher	-1.53	1.64			-2.02*	0.88		
Student	-1.65	3.81			-2.30*	1.93		
Bootstrap Method			95% Confidence Intervals				95% Confidence Intervals	
	Estimates	Std. Error	Upper	Lower	Estimates	Std. Error	Upper	Lower
Teacher								
PTB Total Effect	-16.93**	6.49			-9.00**	3.19		
PTB Residual Effect	-14.43*	6.63			-7.32*	3.23		
Engagement Indirect Effect	-2.50	1.74	-6.63	0.22	-1.68*	0.94	-4.13	-0.28
Student								
PTB Total Effect	-3.64	9.33			-8.80*	4.40		
PTB Residual Effect	2.30	9.92			-4.03	4.76		
Engagement Indirect Effect	-5.94	3.72	-13.97	0.69	-4.77*	2.50	-10.54	-0.46

Note. *p < .05 **p < .01

Figure 1. Example Model of Mediation via Engagement.



Note. Results presented in this diagram reflect the results for Grade 7 English Reading passing rates. In addition to FRPM, the percentage of minority students, school size, and student reports of victimization were entered as controls but were not found to be predictive of Grade 7 English Reading passing rates. TE=Total Effect, RE=Residual Effect, IE=Indirect Effect, and PE=Partial Effect. *p < .05 **p < .01