The Structural Attributes of Low and High Performing High Schools: Success Rates in High Stakes Testing in Washington State.

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ABSTRACT

The end of the 20th Century and the beginning of the 21st saw a major refocusing on the productivity of US public education. One of the most highly visible changes has been the spread of "high stakes testing" across the country and a search for the causes of the wide variations in the rates of success in test taking across schools. In this study we use data from the state of Washington to explore the wide between-school variation in success rates in passing the state's WASL exam (Washington Assessment of Student Learning) among 10th grade students. Although several school characteristics, including size, student teacher ratios, and teacher qualifications are correlated with the rate of WASL success, most of the between school variation in WASL success is explained by a simple index of poverty of students. High stakes testing is likely to reinforce and probably exacerbate the very high correlation between socioeconomic status and high school completion.

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INTRODUCTION

Schooling is considered the great equalizer in American society—the one institution that creates opportunities for social mobility. The meritocratic structure of most public schools means that students with ability and motivation are able to climb the academic ladder. Further, as students receive more educational credentials they are more likely to have successful careers and greater earnings (Day and Newburger, 2002). Yet, many children begin schooling at a disadvantage. Students from poorer families, broken homes, and with less educated parents are much less likely to succeed in school than students from more advantaged backgrounds, even among those with comparable abilities (Fischer et al. 1996; Lareau, 2000; Freeman and Fox, 2005; Astone and McLanahan, 1991, 1994). Although schools are a channel for social mobility for many, they can also serve to maintain and reinforce inequality from generation to generation.

Schools are not equal in their ability to sponsor student success. A good share of the observed differences between schools is due to the composition of their students (Lee and Bryk, 1989; Rumberger, 1995). It is much easier for well endowed suburban schools, which draw students from upper middle class home environments, to have high rates of student achievement than it is for schools in remote rural areas or in inner cites, which enroll students from low income families (Rumberger and Thomas 2000). Controlling for the composition of students, are there significant differences between schools in their ability to promote the success of all students? This has been one of the most important questions in the field. There is a substantial literature which emphasizes "meso level" factors that contribute to effective teaching practices and student learning, such as small learning communities, frequent feedback and testing, and a positive school climate (National Research Council 2004). There has been only modest success, however, in identifying the structural attributes of schools that produce successful schools, net of the characteristics of entering students (e.g. Lee and Burkahm, 2003; Goldhaber and Brewer, 1997; Rumberger, 1995) .

One structural attribute of schools that may potentially help to explain differences in the level of success between schools is school size. Smaller schools (schools with 300 to 900 students) are thought to foster closer bonds between teachers and students because of the repeated opportunities for interaction. In smaller schools norms of high expectations can be more easily created and reinforced as teachers have knowledge of individual students. Also, school reform efforts may be easier to implement in smaller schools because there are fewer layers of bureaucratic inertia. The curriculum in smaller schools is often constrained to only academic classes, so ability tracking is less prevalent (Lee and Smith, 2001; Lee and Smith, 1997).

This study examines the school size and other school attributes and student achievement in the context of high stakes testing in Washington State. Specifically, we are interested in whether structural attributes, such as school size, are related to the level of student success in schools, as measured by the rate of passing the 10th grade WASL (Washington Assessment of Student Learning) exam. Using school level data, we explore variations in passing rates of the 10th grade Math, Reading, Writing, and Science WASL exams across 268 comprehensive high schools in Washington State. We do not find a distinct advantage related to attending smaller high schools, however, we find tentative evidence that the WASL passage rates are lower in very large high schools (schools with 2,000 plus students). The structural attribute of schools that is most strongly correlated with WASL passing rates is a simple index of the level of poverty in the school. African American students disproportionately attend high poverty schools, which negatively effects their WASL passing rates.

LITERATURE REVIEW: WHAT MAKES FOR SUCCESSFUL HIGH SCHOOLS?

Given the importance educational attainment in the process of status attainment, explaining inequality in the determinants of educational attainment has been a longstanding focus of social research. One of the most influential analyses of educational inequality was the Coleman Report. It concluded that school context is related to inequalities in educational attainment, but that inequality in educational attainment was predominantly a function of individual level student attributes, such as the student's family of origin (Coleman et. al. 1966). Given these findings, attempts to explain educational inequality have largely focused on individual level predictors of educational success, such as such as family of origin SES, family structure, and parenting styles (Astone and McLanahan, 1994; Jencks, 1972; Sewell, Haller, and Portes 1969). Nevertheless, examining the effects of school context is still an important area of research, as it explains a modest, yet important, proportion of the variation in student success (e.g. Raudenbush and Bryk, 1986). Research on school context usually focuses on three main components of the context: structure, resources, and demographic composition. Although these components are conceptually distinct they often operate in unison to alter student's chances educational success.

School Structure

School size shapes the social and academic organization of the school, which in turn, affects student learning and success. Research on school size often draws upon two contradictory strands. The first, which is economic in nature, notes the increased efficiency and savings that occur in larger schools, while the second, which is sociologically orientated, emphasizes how size affects organizational properties of schools (Lee et al. 2000).

The 'economic' argument notes that in larger schools the student body can be subdivided into groups so that the curriculum can be presented in the most efficient manner. A larger student body also creates economies of scale that allow schools to offer more specialized and elective courses. Also, as schools increase in size they can spread their core operating costs across a larger student body which decreases the per pupil expenditures and enables the savings to be directed towards increased academic support and a stronger and more diverse curriculum (Lee 2000). This perspective argues that larger schools are advantageous, as they allow for increased efficiency in teaching, course offerings, and additional student support.

However, larger schools may not allow for a more advantageous learning environment. The financial savings associated with increased school size may not occur, as larger schools use additional funds on administrative staff (Chambers 1981). Also, ability grouping and curricular diversification do not have an equitable and uniform positive effect on all students. Students from wealthier families are more likely to be placed in a higher ability group than similar students from less wealthy families (Gamoran, 1992; Lareau, 1987, 2000). Further, students in lower level tracks are exposed to lower quality instruction, a less challenging curriculum, and a weaker and less motivated educational environment than their peers in high ability tracks, which results in lower levels of achievement, net of background factors and prior achievement (Gamoran and Mare, 1989; Gamoran et. al. 1995; Oakes 2005).

Also, there is some evidence that schools offering a diversified curriculum, rather than a constrained curriculum, have lower average levels of achievement. As public schools increase in size they diversify by adding non-academic classes, while Catholic high schools, for example, increase the number of academic classes with increasing enrollment (Bryk et al. 1993). The constrained curriculum in Catholic and smaller high schools, usually consists of academic courses, so all students are exposed to an academic curriculum. Students in schools with a constrained curriculum have higher levels of achievement than students in schools with comprehensive curriculum. Further, the amount of learning that occurs in schools with constrained curriculum is more equitable across ability and social groupings (Lee and Bryk, 1989, Lee et. al. 1997).

The 'organizational' perspective notes that as schools increase in size the bureaucratic structure within the school becomes more complex and formal. Interactions between individuals and the interpersonal relationships become increasingly formal, which dissuades personal relationships and the formation of a community (Lee 2000). In larger schools teachers and student report lower levels of perceived support and commitment from the school, causing some students to feel alienated from the school and at odds with the goals of the school (Lee and Smith 1993; Lee et. al. 2000). In larger schools, the decreased opportunity to develop personal relationships are problematic in that teachers are less likely to notice if students are feeling alienated, making it easier for these students to 'fall through the cracks' (Lee et. al. 2000).

The complex organizational structure in large schools also impacts teachers. As schools increase in size the division of labor and the location of individuals within the bureaucracy are made more explicit. The role of the teacher is defined within the context of their department, the organizational subunit in which they are located. As teachers operate and interact within their respective department their loyalties are swayed from that of the school to that of their specific department. If teachers' loyalties are to their department, they may feel less accountable and responsible for issues and events occurring in the school, but outside of their department. Also, as the school staff increases in numbers and becomes more specialized the likelihood of divergent ideas and goals emerging also increases, which can reduce the cohesion amongst the staff and, potentially, distract them their primary objective of educating students (Lee 2000). In larger schools the opportunity for a wide group of teachers to informally share information about their courses and students is reduced as the transmission of information is more complex and formalized (Lee 2000).

The 'economic' perspective advocates for larger schools while the organizational perspective notes the benefits of smaller schools. Lee and colleagues have conducted numerous analyses in an attempt to determine 'what is the ideal school size?' They conclude that schools that are smaller to medium in size, enrolling roughly 300 to 900 students, are optimal. Students in smaller schools have higher math and reading standardized test scores and are less likely to drop out of high school than their peers in very small and large high schools (Lee and Smith 1997; Lee et. al. 1997; Lee and Burkham 2003). Small and medium sized high schools were found to particularly benefit the educational achievement of minority and low SES students (Lee and Smith, 1997).

One of the explanations for increased levels of achievement in smaller to medium sized schools is the structure of the curriculum. These schools are large enough to offer a challenging and relatively diverse academic curriculum, yet they are not large enough for curriculum diversification, in which numerous non-academic courses are added. Further, larger schools with high curriculum specialization often have differential academic expectations for groups of students, which disproportionately affects minority and low SES students' opportunities to learn (Lee and Bryk 1988). Also, medium sized schools may increase opportunities to develop personal relationships amongst the faculty and students. Students in smaller schools are more likely than their peers in small and large schools, to have positive relationships with their teachers (Lee and Burkham 2003).

Other important elements of school structure are the control (public, private) and location (urban, suburban, rural) of schools. Generally, the net levels of educational achievement are higher in private schools, Catholic school in particular, than in public schools (Coleman et al. 1982a, 1982b; Bryk et al. 1993; Rumberger and Thomas, 2000). Achievement levels, net of other covariates, are lower in urban schools than they are in suburban or rural schools (Heck and Mahoe, 2006; Rumberger and Thomas, 2000; Elliot, 1998).

School Resources

School size operates in concert with access to resources to influence levels of student learning. Schools with access to additional funding can hire more qualified teachers and place students in smaller classes, which should increase levels of student achievement. Although some analyses have not found a relationship between resources and level of achievement (e.g. Hanushek, 1986, 1994, 1997), it appears that more global resources, such as per-pupil expenditures, are strongly associated with student success (e.g. Greenwald et al. 1996; Hedges et. al., 1994).

School funding positively influences student achievement by increasing school quality, which is often indicated by teacher quality and class size. Elliot, using the NELS:88 data linked to U.S census data on school finance, found that per-pupil expenditures positively operates through increased teacher quality to effect student success. Goldhaber and Brewer have also found a positive relationship between teacher quality, as measured by teacher certification and education, and student math and science scores (Goldhaber and Brewer, 1997, 2000). Reduced class size is also related to student success, as measured by lower levels of high school dropout and turnover (McNeal 1997; Rumberger and Thomas, 2000).

Additionally, research on class size, at the primary school level, notes that enrollment in classes with lower teacher-student ratios offers an additional and lasting benefit to minority and disadvantage students (Nye et. al., 2004).

School Demographic Composition

The third element of school context, demographic composition, operates in unison with school resources and school structure to influence student success. Given the potential correlation between individual student and school characteristics, it is important to note that the composition of schools exerts a net effect, independent of individual characteristics, on students' educational success. Students attending low SES schools, especially low SES-urban schools, are disadvantaged in relation to their peers in high SES schools, as these schools often have lower quality teachers, fewer academic resources, more restricted curriculum, lower teacher expectations, higher student and teacher turnover, and a school culture in which college plans may not be normative (Heck and Mahoe, 2006; Portes and Hao, 2004). Students in high SES schools are more likely to have greater educational expectations and attainment (Frost, 2007; Goldschmidt and Wang, 1999; Hill, 2008; Rumberger, 1995). The benefits of attending a high SES school are particularly exacerbated for students from high SES families, as high SES students have higher average GPAs, in these schools, while the returns to attending a high SES school for low income students is negligible (Portes and Hao, 2004).

Levels of racial segregation, another measure of demographic composition, have increased over the last two decades, and they may accelerate given the Supreme Court's recent ruling on the use of race as a factor in assigning students to schools (Orfield and Lee, 2007). Despite the growing importance of examining the effects of racial segregation on student success, it is difficult to isolate the independent effect of it given the high inter-correlation between minority status and socio-economic status, which is particularly high at the school level. For example, during the 2005-06 school year, more than three-fifths of all African American (63%) and Hispanic (62%) students in the US attended a high school in which the majority of students were eligible for subsidized school lunches, while only 21% of all white students attended such a school (Orfield and Lee, 2007).

Racial segregation works in concert with school resources and structure, as racially segregated schools often have fewer college orientated courses, increased ability tracking, lower quality teachers, higher turnover in the student body, and more poor and homeless students (Rumberger and Thomas, 2000; Southworth and Mickelson, 2007). Students in racially segregated schools, on average, experience fewer the opportunities to learn and have lower levels of achievement (Borman et al 2004; Harris, 2006; Heck and Mahoe, 2006). Despite the substantial drawbacks associated with attending a racially segregated school, second generation Mexican youth are less likely to dropout of high school when attending low SES schools, which presumably have a higher proportion of minority students (2004). Also, Goldsmith concluded that African American and Latino student's educational ambitions were higher in segregated schools that employed a large number of minority teachers (2004).

High School Exit Exams: The Washington State Assessment of Student Learning (WASL)

Presently about half of all states require that students pass a high school exit examination, such as the WASL, as well as fulfill specific course requirements to receive a high school degree. The movement to include high school exit exams as a graduation requirement is based in the public's concern that a weak curriculum and low academic and promotion standards left high school students without the basic skills necessary to successfully transition into the workforce (Warren and Kulick, 2007). Although high school exit exams may provide some measure of accountability, there is concern that the lowered rates of high school completion will fall disproportionately on minority and low income students.

In an attempt to examine the effect of high school exits exams on minority and low income students, Warren and colleagues analyze state-level data from 1975 to 2002, differentiating between states with 'minimum competency' exams, which include tests that cover material taught prior to high school, and states with 'more difficult' exit exams, which include tests that cover any material taught in high school. They find that states with difficult exit exams have lower rates of high school graduation and GED passing rates (2006). Further, they find that the negative effect of 'more difficult' exams on high school graduation is greater states with a larger percentage of students that are low income or minority[1].

Despite the impact that high stakes tests have on less advantaged groups, in 1993, the Washington State Legislature passed the Improvement of Student Achievement Act, which required grade specific learning standards and a test to assess student learning of the standards. Thus, the WASL was created as an assessment of student progress, and it was first given to high school students in the spring of 1999. The WASL consists of four sections—Math, Reading, Writing, and Science— each of which is individually scored. The test is a mix of multiple choice, short- and long-answer questions (OSPI A). Additional legislation in 2004 stated that, as of 2008, students must pass the WASL exam to graduate (Houtz, 2004). Initially students were only responsible for passing the Math, Reading, and Writing portions of the exam, with the Science section becoming mandatory for the graduating class of 2013[2]. However, low passage rates on the Math section of the WASL prompted Governor Gregoire to allow students graduating in 2008 to 2012 that failed the math section of the test fulfill their math requirements through taking additional courses or by passing two exams at the end of math courses traditionally taken by 9th and 10th graders, Algebra I and Geometry (Shaw, 2008)[3].

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[1] Most research using individual level data has not found a relationship between high school exit examinations and rates of high school graduation (e.g. Jacob, 2001; Muller and Schiller, 2000; Warren and Jenkins, 2005; Warrens and Edwards, 2005). One explanation for the association at the state level between high school exit exams and high school graduation rates, but not at the individual level, is that many of the individual level analyses used the NELS:88. Thus, these results are only generalizable to the graduating class of 1992. Many of the 'more difficult' exams were implemented after the class of 1992 took their exit exam.

[2] Students were allowed to retake the exam multiple times if they failed. Further, as 2007, if students failed a section of the WASL they could fulfill their requirements by completing one of the three Certificate of Academic Achievement options (http://www.k12.wa.us/assessment/CAAoptions/default.aspx).

[3] It is possible that the current Superintendent of Public Instruction for Washington State, Randy Dorn (elected 11/2008) will substantially revise the WASL. Superintendent Dorn is advocating for the WASL to be replaced by a computer based test that is shorter in length, with less written responses, that is administered at two points during the academic year (http://www.k12.wa.us/Communications/pressreleases2009/ReplacingtheWASL.aspx). However, passing the sections of the revised test will still serve as a graduation requirement. The extent to which the test will change is unclear as the Superintendent supports the current standards for the reading and writing sections of the WASL and he plans to continue using some of the questions from the WASL in the new version of the test (http://www.k12.wa.us/communications/pressreleases2009/ReplacingtheWASLbriefingpaper.pdf). Thus, it is likely

Given the potential impact that the WASL may have on high school graduation, high levels of performance on the test were especially important to students and their families. However, the stakes associated with the WASL test increased in 2002 with the passage of The No Child Left Behind Act (NCLB), as it was decided that the passage rates on the WASL for all students and subgroups of students within a school would be used as an indicator of whether highs schools were making Adequate Yearly Progress (AYP). Thus, high average test scores for the school became a focus of the school staff and administration, as staff in schools that continuously failed to meet AYP could be replaced (US Department of Education, 2002).

Despite the potential ramifications of the WASL and the media attention it has garnered, there has been relatively little research on the relationship between student and school characteristics and success on the WASL. This analysis attempts to fill that gap by examining the school level characteristics that are associated with high WASL passage rates. Specifically, this analysis will examine the extent to which school size is related to higher average levels of passing the WASL in comprehensive high schools. For example, are the WASL passage rates higher in schools that enroll 300 to 900 students?

DATA

Data used in this analysis come from the Washington State Office of Superintendent of Public Instruction (OSPI). Although using both individual and school level data would be optimal, this analysis only relies upon school level data, as OSPI does not make student level data publically available[4]. Thus, the analysis is limited to between school variation—that is, we do not have individual level data. Prior research has shown that there is greater within school variation in student outcomes than between school variation. However, the differences observed between schools are substantial. Schools in which less than ten students or less than ten students in a sub-group took the WASL the scores are not reported for that school or that specific subgroup due to privacy concerns.

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that in the future the WASL will be heavily revised and that it may it take on a new name, however, students in Washington state will still have to pass a high stakes exam as part of their high school completion requirements.

[4] Data can be found at: http://reportcard.ospi.k12.wa.us/summary.aspx?groupLevel=District&year=2006-07

Our search for the structural attributes of successful schools is constrained by the available measures in the data compiled by OSPI. These data do not include within school measures of student achievement, teaching practices or school climate, but they do include a number of frequently mentioned characteristics of schools in the research literature (e.g. school size, student teacher ratio, teacher quality). One important distinction to note is that the WASL data are based upon the 10th graders that took the test, while the school characteristic data is based upon the school as a whole. The attributes of the 10th grade class should be very similar to those of the school as a whole. The one factor that may slightly skew the school population is high school dropout, as high school dropouts are more likely to be minority and low income students (Rumberger 1995; Freeman and Fox 2005).

Overall, missing data were not a problem, as more than 97% of schools had complete data for all variables of interest. In the instances in which data were missing it appeared to be missing at random. In an attempt to account for the missing data in these rare instances we used multiple imputation (Allison, 2002).

THE UNIVERSE OF HIGH SCHOOLS

Table 1 provides a descriptive overview of the universe of schools in Washington State with enrolled high school students. Of the 530 Washington State schools with students enrolled in grades 9 through 12, about half are 'traditional' or comprehensive high schools, roughly one-third are alternative site schools, and the balance are schools which contain both high school and middle or elementary school students (herein mixed schools)[5]. Even though almost half of the schools in the universe are alternative or mixed, almost all high school (grades 9-12) students, 88%, are enrolled in a comprehensive high school. Of the remaining students, 5% are enrolled in a mixed school, and 7% are enrolled in alternative

[5] To classify schools into these three categories the school type and grade taught codes provided by OSPI were used. A few schools had school type and grade taught values that did not fit the school characteristics (e.g. a comprehensive school with an enrollment of two 10th graders), for these schools I also consulted the school and school district websites for information so that I could correctly classify the schools. Note that juvenile detention centers, schools exclusively for students with development disabilities, and home schooled students are excluded from this analysis.

schools. In this table, we compare the characteristics the different type of schools, but our subsequent analysis focuses on comprehensive high schools.

[TABLE 1 ABOUT HERE]

The major difference between comprehensive high schools and mixed and alternative schools is size. The average comprehensive high school enrolls more than 1,000 students and has a staff of 60 teachers. The mixed and alternative schools have much smaller student enrollments, with a means of 233 and 133 students, respectively. There are small differences in teacher quality, with somewhat longer tenure of teachers in mixed and alternative schools. The percentage of teachers with a Masters degree varies slightly, with comprehensive schools intermediate between mixed and alternative schools.

It seems that the mixed schools are located in remote and rural areas and the alternative schools attract students who experience problems with regular comprehensive high schools. These patterns are evident in the measures of student composition and performance in table 1. The students in mixed schools are relatively more poor and with a higher fraction of white students, but also more American Indians students. In terms of academic performance, however, mixed schools have WASL passing rates only slightly below comprehensive highs schools. The most striking feature of alternative high schools is their very WASL passing rates, typically 20 to 30 percentage points below comprehensive high schools.

Given that comprehensive high school enroll nearly 90% of all students in grades 9 to 12, we focus on our analysis on this sample of schools. The very small size and student composition of mixed and alternative schools make comparisons of school characteristics suspect.

SCHOOL SIZE AND PERFORMANCE: BASIC DESCRIPTION

Because school size has figured so prominently in academic and policy discussions as a major determinant of school climate, table 2 provides an overview of the characteristics and the WASL passing rates schools of the 271 comprehensive high schools in our sample by school size. The overwhelming majority of the 271 comprehensive high schools are of moderate size -- 79 schools in the 300 to 900 student range and 71 have 900 to 1,500 enrolled students (71 schools). There are smaller numbers of mega schools that have over 1,500 or over 2,000 students, while 39 schools enroll less than 300 students.

[TABLE 2 ABOUT HERE]

In general, smaller schools, especially those with less than 300 students, have smaller student teacher ratios. The ratio climbs to 18.9 students per teacher in schools with 900 to 1,500 students and reaches it highest value 20.3 students per teacher in schools with more than 2,000 students. Teacher experience displays a slight negative relationship with school size. On average, smaller schools have teachers with more experience. On the other hand, there is a small positive relationship between school size and the proportion of teachers with a Master's degree, except for the schools with largest enrollments. Overall, the school level differences in teacher experience and qualifications are rather small.

Student composition, however, varies more widely by school size. The percentage of students eligible for free/reduced price lunch is highest in the smaller schools, with estimates of nearly 45% in the smallest schools and 38% in schools with an enrollment of 300 to 900 students. In the medium to larger sized schools the percentage of students receiving free/reduced price lunch hovers around 27%. The proportion of female students is consistent across school size. With one or two exceptions, ethnic composition is only weakly related to school size. The percentage of Native American students is greatest in the smallest schools, but the fractions of other minority groups do not display a consistent pattern The percentage of white students is somewhat higher in the largest schools.

In contrast to the popular image, there are only small differences in WASL test passing rates by school size. The only consistent pattern is that the passage rates are highest in schools that enroll 900 to 1,500 students and 1,500 to 2,000 students. The passage rates are lowest in the schools that enroll less than 300 students. Within ethnic groups, there appears to be a generally positive relationship between school size and the Math WASL passage rates. The passage rates on the math section of the WASL are highest for white and Hispanic students in schools with an enrollment of 1,500 to 2,000, while the passage rates for African American, Native American, and Asian and Pacific Islander students are highest in the largest schools.

MULTIVARIATE MODELS OF SCHOOL STRUCTURE AND MATH WASL PASSING RATES

The relationship between school size and academic performance may be masked because of the confounding effects of other school attributes and student composition. In order to measure the direct effects of school size and other aspects of school structure and student composition, Table 3 presents results from a series of bivariate and multivariate OLS regressions on the percentage of students in each school passing the 10th grade Math WASL[6].

[TABLE 3 ABOUT HERE]

The school characteristic indicators—student-teacher ratio, school size, teacher experience, and percentage of teachers with a Masters degree—do not operate as expected. For example, we expected student-teacher ratio to display a negative relationship with WASL passage rates, and teacher quality to be positively associated (e.g. Goldhaber and Brewer, 1997, 2000; Hedges et. al., 1994). The only expectation to be confirmed was a positive effect between teachers with a master's degrees and the percentage passing the Math WASL. A higher student teacher ratio is associated with lower passing rate (see the bivarate model in table 3), but the relationship is insignificant when any other covariates are added. Similarly, mean years of teacher experience is positively related to success on the math WASL in the bivartite model, but is not significant in model with additional variables. However, the percentage of teachers with an advanced degree is significantly and positively related to the passing rate.

Based on the prior literature we expected schools with 300 to 900 students to have the highest WASL scores, while the smallest and largest schools would have the lowest WASL scores. Lee and

[6] All of the models present in table 3 were estimated with section of the WASL as the outcome. Overall, the results were similar across outcomes, so, in the interest of parsimony, only the math results are displayed.

colleagues note that the optimal school size for student learning was in the range of 300-900 students, as schools of this size provide more equitable learning environments, foster greater teacher responsibility, and allow for collective responsibility of student success by all teachers (Lee and Smith, 1997, 2001). However, the results in model 1b indicate that schools with 300 to 900 students have lower passing rates than schools with 900 to 1,500 students and schools with 1,500 to 2,000 students. In model 2, when all of the school resource and context indicators are included, the positive effect of larger schools is attenuated. The coefficient for schools with 900 to 1,500 students is positive, but no longer significant, while the coefficient for schools with 1,500 to 2,000 students is also positive and on the threshold of statistical significance (*p-value* of .058). The magnitude of the difference in model 2 between schools with 300 to 900 students and schools with 1,500 to 2,000 students is significant with a 5% point difference in Math WASL passing rates.

In the final model, which also includes student composition variables, the positive effect of attending a school with 1,500 to 2,000 students disappears. There does seems to be negative effect, net of student composition, of the largest schools with more than 2,000 students

The differences in passing rates by school size are modest in comparison, however, to differences associated with student composition. The percentage of low income students in a school displays a strongly negative correlation with the percentage of students passing the math section of the exam. The magnitude of this coefficient is huge – a one percent increase in percentage of students in the school that are low income translates into roughly a half of a percentage point decrease in the percentage of students passing the 10^{th} grade Math WASL. The racial and ethnic composition of the school is also correlated with passing the math WASL. The proportion of African American and American Indian students in the school is negatively correlated, while the percentage of Asian and Pacific Islander students is positively correlated with the percentage of students passing the Math WASL.

In model 3 all of the indicators of demographic composition are included, attenuating the effects noted in models 1e to 1g. The percentage of students that are low income is still negatively related to the passing rate, though the coefficient is reduced by roughly one-third from -.55 to -.37. The racial/ethnic effects are present in model 3, save that for Hispanic students, though they were attenuated by the inclusion of the low income measure. The reduction in the race/ethnic coefficients illustrates the correlation between race and poverty. This is particularly the case for Hispanics students, as the coefficient is no longer significant when the percentage of low income students is included in the model. However, the African American coefficient, net of the other school context variables, remains significant. A one percent increase in the African American population is associated with three-fourths of a percentage point decrease in the passing rate for all students. In the final model, which includes the school resource and school context variables, as well as the student composition variables, the racial/ethnic and low income indicators remain highly significant.

Despite our initial interest in the association between school size and WASL passage rates, the key finding in table 3 is that the student composition measures explains almost all the between schools variation in WASL passage rates relative to the school context measures. Race/ethnic composition, in model 1g, and percentage of students that are low income, in model 1f, each explain roughly half of the between schools variance in 10^{th} grade math WASL scores. Further when these two measures are both included, along with percent female, in a regression on WASL passing rates, they are able to explain nearly 60% of the total between-school variation. The school context and resource variables together only explain 12% of the total between-school variation. The amount of between school variation explained by school context and resources is noteworthy, as many educational reforms aimed at increasing educational achievement attempt to manipulate elements of the schools structure or resources—though these components of school context explain a small fraction of the between school variance inWASL passing rates.

As it is possible that the school context and student composition variables operate differently across the four sections of the WASL test, table 4 contains results from regressions of reading, writing, math and science WASL passing rates on school context, school resource, and student composition indicators. The results are consistent for every subject measured in the WASL test. The presumed advantage of medium size schools—those with 300 to 900 students—is not evident for of the WASL tests. The major finding that student composition matters, especially the negative impact of the concentration of low income students is also consistent across all divisions of the WASL test. The magnitude of the racial/ethnic composition effect varies across the four outcomes. The disadvantage associated with a higher percentage of African American students and the advantage associated with a higher percentage of Asian students is more pronounced when examining the math and science than reading and writing WASL passage rates.

[TABLE 4 ABOUT HERE]

One systematic difference across the four sections of the test is the importance of the percentage of the teachers having an advanced degree. For the math and science sections of the WASL, an increase in the percentage of teachers with an advanced degree is associated with an increase in the passing rates. The math and science results are consistent with prior research, at the individual level, which has noted a positive relationship between teacher education and certification and students' math and science scores (Goldhaber and Brewer, 1997, 2000). However, on the reading and writing section of the test, no such association exists.

SCHOOL CHARACTERISTICS: CAUSES OR CORRELATES?

The association between schools attributes and WASL test scores observed in tables 3 and 4 may reflect the fact that teachers and students are sorted into low and high performing schools. For example, a wealthy parent may opt to place their high achieving student in a school based upon the history of WASL passage rates in a given school or the school's current student composition and teacher profile (level of experience, etc). Experienced and high qualified teachers may seek to work in schools with high performance standards. If this occurs the cross-sectional relationship between the school attribute indicators and WASL passage rates will be difficult to interpret, as information from prior years may be influencing the relationship. In short, a feed back loop could exist.

[TABLE 5 ABOUT HERE]

In an attempt to minimize this potential bias, we estimated the relationship between the change in school attributes from 2002-03 to 2006-07, the 2002-03 WASL scores and the 2006-07 WASL scores. Essentially, we are examining the relationship between the change in school attributes and the change in WASL scores. As school level indicators are slow to change, additional years of data between the time-points would have been desirable. However, 2002-03 was the first year for which all of the school attributes were systematically available. Table 5 contains the results for the math WASL scores[7]. The only consistent finding in table 5 is that as the percentage of African American and Hispanic students increase the WASL passing rate decreases. Further, the magnitude of the effects is very substantial. A percentage increase in the African American student population is associated with a decline of roughly 1.25% in the schools overall Math WASL passing rate.

THE CUMULATIVE EFFECTS OF POVERTY AND RACIAL COMPOSITION

Our initial expectation, based on the research literature, that school size would be the major predictor of WASL passing rates, there is a negative effect of school size for the very largest schools (over 2,000 students) that is on the borderline of statistical significance (it is significant for the Math WASL) and the proportion of a school's teachers that have a master's degree does have a significant positive effect on the math and science WASL passing levels. But the effects of school structure were modest compared to the major influences of concentrated poverty and racial segregation academic success of a school, as measured by WASL passage rate. Most of the between school-variation in WASL passage rates can be explained by simple measures of poverty and racial concentration (see table 4). In

[7] Appendix table A1 contains the full regression model for changes in school attributes on changes in the Reading and Writing sections of the WASL test. We did not include the Science exam as it was not implemented until 2004.

Table 6, we attempt to further explore on the impact of concentrated poverty on the WASL passing rates of African American students and other students.

[TABLE 6 ABOUT HERE]

The published tabulations show WASL passing rates for all students in each school as well as for passing rates for each race and ethnic group in each school, if there is at least 10 students (in each race/ethnic group) taking the test in that school. In table 6, we present the math WASL passing rates of all students, African American students, and Non-African American students by the percentage of students in the school that are low income.

There is a very dramatic effect of concentrated poverty on academic success of the school. As the percentage of low income students increases, the WASL passing rate steadily declines. For example, in schools in which less than 10% of students are low income, the WASL passage rate for all students is 72.3%, however, this figure drops to 30.5% in schools in which more than 60% of all students are low income.

This overall finding is evident for black and nonblack students, but with some important qualifications. For black students, there is a clear negative impact of poverty concentration, but the pattern is more bimodal than linear. About 30% of African American students enrolled in schools with modest poverty levels (10-20%) pass the WASL (due to small cell sizes we were unable to estimate the poverty rate for African American students in schools with less than 10% low income). But in schools with high poverty concentrations, African American students are about 15 percentage points less likely to pass the math WASL.

For nonblack students, there is almost a straight line relationship between concentrated poverty in a school and the passage rate on the Math section of the WASL. Over 70% of non African American students pass the math WASL in schools with the lowest poverty rate but the passage rates bottoms out at 31.4% in the highest poverty schools. There is a strong racial differential within levels of poverty concentration. Nonblack passing rates are generally double of those of black passing rates. Even at the highest level of concentrated poverty, the nonblack passing rate is higher than that of black students in schools at any level of poverty.

In addition to the direct effect of concentrated poverty on student performance for all students, there is an additional impact on African American students because they disproportionately attend schools in which a higher proportion of low income students. These patterns are shown the second panel of table 6, which shows the distribution of students (actually WASL takers) among schools by poverty concentration. For example, 30% of all African American 10th graders that took the WASL attend a high school in which more than half of the student body is low income, while only 11% of all non-African American students attend these schools. Further we see that African American students are underrepresented in low poverty schools. Of all African American 10th graders that took the WASL, 16% attend a school in which less than 20% of the students are low income, while 37% of all non-African American students are enrolled in lower poverty schools. The disproportionate concentration of the African American student population in highly impoverished schools is one of the reasons that African American students pass the WASL test at lower rates.

In additional analyses not reported here, we show that concentrated poverty affects nonpoor students as well as poor students. Low income students have higher passing rates 41%) in low poverty schools than schools with concentrated poverty (their passage rates drop to 24%). The passage rates for non poor students are also affected, with a passing rate of 74% in low poverty schools declining to only 30% in high poverty schools. As the percentage of low income students in the school increases, the passage rates for both low income and non low income students decrease. Context does matter.

DISCUSSION

The WASL test was initially implemented by the Washington State Legislature to assure that students were acquiring the requisite skills to attend college or transition to the workforce. More recently, high school graduation requirements were tied to students' ability to pass the test. Results from the 2006-07 10th grade WASL test indicate that most comprehensive high schools have attained high levels of reading and writing proficiency, as measured by WASL passage rates for these two sections of above 80%. However, the low passage rates in math and science (50% and 36%, respectively) demonstrates that high schools still have a ways to go. Further, the test is keeping students from graduating, as only 91% of the students that made it to the end of their senior year had passed the requisite WASL requirements.

Given the implications of the WASL test it is important to understand the attributes of schools that produce high passage rates. Our initial interests were in the extent to which school size was related to passage rates on the WASL. It was hypothesized that smaller to medium sized schools (school enrolling 300 to 900 students) would have higher passage rates, as they allowed for the 'meso level' factors that contribute to more effective teaching practices, a more equitable curriculum, atmosphere, and student learning. The multivariate analyses did not reveal a positive relationship between the smaller to medium schools and WASL passage rates. There is tentative evidence that the passage rates in smaller to medium schools are higher than those in very large high schools, schools with 2,000 plus students.

The strongest finding of this analysis is that school composition, poverty concentration and racial composition in particular, have a much greater impact on academic success than school structure. School structure and resources together explained about 10 to 12% of the variance in the WASL passage rates, while the demographic composition of the school explained between 53 and 59% of the variance. A simple index of the percentage of students in the school that received free/reduced price lunch explained nearly half of the variance in these outcomes.

The amount of between school variance explained by school resources and structure relative to school composition is worth mentioning as educational reforms and attempts to increase student achievement often attempt to manipulate only elements of the school structure or resources. While educational reforms that focus on school structure or resources—such as smaller classes, smaller learning communities, increased teacher training, to name a few—can have a measurable and moderate effect on student achievement, to reach the levels of achievement outlined and desired in recent legislation such as No Child Left Behind and, in Washington State, the Improvement of Student Achievement Act it will require more intensive changes than attempting to exploit these specific aspects of the school context.

Another important finding is that African American students, given their disproportionate enrollment in high poverty schools, are adversely affected by attending high poverty schools. Nearly one third of all African American 10th graders that took the WASL test are enrolled in a school in which more than half of all students are eligible for free/reduced price lunch (compared to 12% of all non-African American students). Thus, one of the reasons for the low levels of educational success amongst African American students is that they are disproportionately concentrated in an educational environment that does not provide them with an equal opportunity to acquire the skills necessary to succeed on the WASL or on other measure of educational success. This point is particularly poignant for low income African American students, as they have to overcome all of the individual level risk factors associated with poverty and discrimination, as well as a depressed educational environment, to meet their high school requirements.

The desegregation of schools by poverty status or, given their high intercorrelation, race/ethnicity is not an easy task. Over the past half century numerous attempts have been made to desegregate public schools, but none have fully succeeded. In fact, the re-segregation of schools by race/ethnicity has been on the rise since the early 1990's (Orfield and Lee, 2007).

One way to potentially increase desegregation by race/ethnicity or income, in a manner the most recent Supreme Court ruling has deemed legal, is the strategic placement and construction of schools in areas that border high and low income neighborhoods. The strategic placement of schools would allow for a more even proportion of low income and racial/ethnic minority students in all schools within a district or metropolitan area. The intended result of this intervention would be to minimize or eliminate the negative effects on educational attainment that students experience when they attend high poverty schools. Further, levels of racial/ethnic segregation would also decrease. African American students would no longer be disproportionately isolated in high poverty schools that negatively effect their ability to achieve educational success. Although the strategic placement of schools would not mitigate all of the negative effects of the concentration of poverty and racial/ethnic minorities, it would be an important and positive step in the direction of manipulating schools' demographic composition, the element of the school structure that is most highly correlated with educational attainment, such as the WASL.

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Table 1. The Structure and Characteristics of High Schools in Washington, 2006-07[1]				
	Washington State			
	Comprehensive High Schools	High Schools Mixed with Middle/Primary	Alternative High Schools	All Schools with 9-12 students[2]
Number of Schools	271	71	188	530
Number of Enrolled Students	284,045	16,576	23,931	324,552
Percent of all students	88%	5%	7%	100%
School Size				
Average No. Students	1,048	233	133	622
Average No. of Teachers	60	19	7	36
Student/Teacher Ratio	17.4	12.1	20.2	17.2
Teacher Characteristics				
Mean (Years) of Teaching Experience	12.9	13.9	13.2	13.1
Pecent with MA degree	63.3	61.5	66.5	63.7
Compositional Characteristics				
Percent Poor or Near Poor	33.0	43.2	36.4	35.6
Percent Female	48.5	47.9	47.1	47.9
Percent in each Race/Ethnicity Group				
White	70.5	75.7	70.2	71.1
African American	4.8	1.4	6.1	4.8
Hispanic	12.2	10.2	12.4	12.0
Asian & Pacific Islander	6.9	1.7	3.3	4.9
American Indian	4.5	9.9	6.4	5.9
Percent in Special Education	10.1	11.2	13.3	11.4
Percent in Transitional Bilingual	4.2	2.9	2.6	3.5
Percent Passing WASL Exams[3]				
Reading WASL	81.8	80.4	57.9	77.0
Writing WASL	84.7	82.3	62.8	79.9
Math WASL	50.5	46.4	21.3	43.9
Science WASL	35.7	33.1	13.1	31.3

1 The sample of schools is based upon all schools in which at least one 10th grader was enrolled when the WASL test was administered. However the total does not include juvenile detention centers, schools for students with development disabilities, or home schools.

2 Approximately 325 thousand 9th to 12th grade students enrollled in 530 schools in Washington State in 2006-07, but only 522 reported full enrollment, demographic and 10th grade WASL data.

3 WASL scores were only reported for schools in which at least ten students took the exam: 386 schools reported WASL test scores for all four subject areas, 410 schools reported WASL scores for at least one subject area.

Table 2. The Number and Characteristics of Comprehensive High Schools by Number of Enrolled Students

	School Size (Number of Enrolled Students)					
School Characteristics	**< 300**	**300 - 899**	**900 - 1,499**	**1,500 - 1,999**	**> 2000**	**TOTAL**
Number of Schools	39	79	71	59	15	271
Average School Size (students)	161	569	1,270	1,730	2,347	1,048
Student Teacher Ratio	11.6	16.9	18.9	19.4	20.3	17.4
Teacher Characteristics						
Mean (Years) of Teaching Experience	13.4	13.0	12.8	12.7	12.3	12.9
% with Masters	60.3	62.8	63.6	65.4	63.7	63.3
Compositional Characteristics						
% Female	47.7	48.4	48.8	48.7	48.4	48.5
% Poor or Near Poor	44.9	38.4	26.6	27.0	26.7	33.0
% White	67.6	70.1	70.5	72.2	73.3	70.5
% African American	2.2	4.1	6.7	5.7	3.5	4.8
% Hispanic	11.5	17.3	9.0	10.0	11.6	12.2
% Asian & Pacific Islander	2.7	4.1	10.6	8.7	7.9	6.9
% American Indian	15.1	3.7	2.0	2.1	1.5	4.5
Percent Passing WASL (Std. Dev.)						
Reading	80.4 (14.6)	80.7 (9.6)	82.4 (8.8)	83.8 (7.7)	81.5 (8.0)	81.8 (9.8)
Writing	82.2 (12.2)	83.3 (9.2)	86.2 (8.5)	86.3 (7.5)	84.7 (7.4)	84.7 (9.2)
Math	46.9 (19.2)	47.6 (14.9)	52.4 (15.2)	54.4 (12.7)	51.1 (12.9)	50.5 (15.3)
Science	30.4 (19.2)	32.3 (14.0)	38.6 (15.4)	40.2 (12.3)	36.0 (13.7)	35.7 (15.3)
% Passing Math WASL by Race/Ethnicity[1] (number of schools reporting)						
White (number of schools)	49.7 (33)	53.3 (78)	55.0 (74)	56.8 (59)	55.4 (15)	54.3 (259)
African American	10.0 (1)	16.2 (9)	19.4 (36)	21.9 (42)	24.0 (11)	20.6 (99)
Hispanic	28.8 (4)	24.4 (46)	27.0 (67)	29.0 (57)	25.1 (14)	26.9 (188)
Asian	83.3 (1)	48.3 (14)	52.4 (59)	55.2 (50)	59.8 (15)	54.0 (139)
Native American	13.7 (7)	23.6 (6)	29.6 (10)	26.1 (18)	29.7 (7)	25.2 (48)

[1] Due to confidentiality constraints, OSPI suppressed data for schools in which less than 10 students of each racial/ethnic group took the Math WASL

Table 3. OLS Regression of Percent Passing 10th Grade Math WASL on School and Compositional Characteristics of Comprehensive High Schools (with robust standard errors): Washington State, 2006-07 (N = 268).

	Models 1a to 1g		Model 2		Model 3		Model 4	
Independent Variables	**Bivariate Models**		**School Variables**		**Student Variables**		**School & Student Variables**	
School Variables	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E
1a. Student-Teacher Ratio	.57 †	.30	.28	.43			.05	.29
Constant (model 1a.)	40.58 **	5.42						
R^2 (Model 1a.)	.02							
1b. School Size:								
Less Than 300	-.68	3.48	2.55	3.79			3.67	2.89
300-900	--	--	--	--			--	--
900-1500	4.78 *	2.42	3.89	2.59			-2.30	1.90
1500-2000	6.86 *	2.34	5.02 †	2.64			-.08	1.90
2000 or more	3.56	3.64	2.34	3.99			-4.53 †	2.64
Constant (model 1b.)	47.58 **	1.66						
R^2 (Model 1b.)	.03							
1c. Mean (Years) of Teaching Exp.	.36	.43	.19	.43			.01	.29
Constant (model 1c.)	45.84 **	5.76						
R^2 (Model 1c.)	.00							
1d. % of Teachers with a MA degree	.49 **	.10	.46 **	.11			.17 *	.08
Constant (model 1d.)	19.35 **	6.37						
R^2 (Model 1d.)	.10							
Compositional Characteristics								
1e. Percent Female	.03	.52			-.12	.38	-.10	.36
Constant (model 1e.)	49.28 *	25.09						
R^2 (Model 1e.)	.00							
1f. Percent Poor or Near Poor	-.55 **	.04			-.37 **	.07	-.37 **	.07
Constant (model 1f.)	68.55 **	1.47						
R^2 (Model 1f.)	.49							
1g. Race/Ethnic Composition:								
Percent African American	-1.16 **	.20			-.77 **	.20	-.77 **	.20
Percent Hispanic	-.34 **	.03			-.08	.06	-.06	.06
Percent Asian & Pacific Islander	.72 **	.18			.48 **	.16	.55 **	.16
Percent American Indian	-.44 **	.05			-.24 **	.07	-.25 **	.07
Constant (model 1g.)	57.23 **	1.17						
R^2 (Model 1g.)	.49							
Constant (Models 2, 3, 4)			11.69	10.98	70.67 **	18.18	58.10 **	18.72
R^2 (Models 2, 3,4)			.12		.57		.59	

Table 4. Regression of Percent Passing 10th Grade WASL in Reading, Writing, Math and Science on School and Compositinal Characteristics of Comprehensive High Schools (robust standard errors): Washington State, 2006-07

	Reading WASL		Writing WASL		Math WASL		Science WASL	
Variables	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Student-Teacher Ratio	-.24	.19	-.30 †	.17	.05	.29	.04	.35
School Size:								
Less Than 300	1.18	1.74	-.85	1.88	3.67	2.89	1.36	3.47
300-900								
900-1500	-1.19	1.20	.18	1.16	-2.30	1.90	-.61	1.94
1500-2000	.17	1.26	.29	1.18	-.08	1.90	1.12	2.07
2000 or more	-2.95	1.85	-1.62	1.49	-4.53 †	2.64	-4.20	3.41
Mean (Ye ars) of Teaching Experience	-.12	.20	-.06	.21	.01	.29	-.26	.32
% of Teachers with a MA degree	.08	.06	.01	.05	.17 *	.08	.18 *	.08
Percent Female	-.31	.19	.06	.18	-.10	.36	.00	.39
Percent Poor or Near Poor	-.29 **	.05	-.30 **	.04	-.37 **	.07	-.38 **	.07
Race/Ethnic Composition								
Percent African American	-.39 **	.12	-.22 *	.09	-.77 **	.20	-.75 **	.17
Percent Hispanic	.04	.04	-.03	.05	-.06	.06	-.02	.06
Percent Asian & Pacific Islander	.17 *	.08	-.02	.07	.55 **	.16	.58 **	.17
Percent American Indian	-.21 *	.09	-.10 †	.06	-.25 **	.07	-.10	.06
Constant	108.2 **	10.53	98.77 **	9.61	58.10 **	18.72	39.80 †	20.93
R^2	.56		.57		.59		.53	
N	267		266		268		268	

Table 5. OLS Regression of Percent Passing Math WASL on Change in School and Compositional Characteristics of Comprehensive High Schools from 2002-03 to 2006-07 in Washington State (with robust standard errors). N =240

	Models 1a to 1g		Model 2		Model 3		Model 4	
Independent Variables	**Biavriate Models**		**School Variables**		**Student Variables**		**School & Student Variables**	
School Variables	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E
1a.Change in Student-Teacher Ratio	.61 †	.34	.53	.35			.60 †	.36
Average WASL Passing Rate 2002-03	.73 **	.05						
Constant (model 1a.)	22.13 **	2.15						
R^2 (Model 1a.)	.51							
1b. Change in School Size	.00	.00	.00	.00			.00	.00
Average WASL Passing Rate 2002-03	.72 **	.05						
Constant (model 1b.)	22.19 **	2.24						
R^2 (Model 1b.)	.50							
1c. Change in Mean (Years) of Teaching Exp.	.42	.53	.29	.51			.19	.45
Average WASL Passing Rate 2002-03	.73 **	.05						
Constant (model 1c.)	22.22 **	2.25						
R^2 (Model 1c.)	.50							
1d. % of Teachers with a MA degree	.09	.10	.07	.10			.15	.09
Average WASL Passing Rate 2002-03	.73 **	.05						
Constant (model 1d.)	21.56 **	2.20						
R^2 (Model 1d.)	.50							
Compositional Variables								
1e. Percent Female	-.38	.35			-.29	.38	-.05	.06
Average WASL Passing Rate 2002-03	.73 **	.05						
Constant (model 1e.)	21.77 **	2.15						
R^2 (Model 1e.)	.50							
1f. Percent Poor or Near Poor	-.11	.07			-.05	.07	-.24	.32
Average WASL Passing Rate 2002-03	.71 **	.05						
Constant (model 1f.)	22.88 **	2.44						
R^2 (Model 1f.)	.50							
1g. Race/Ethnic Composition:								
Percent African American	-1.35 **	.32			-1.34 **	.32	-1.27 **	.32
Percent Hispanic	-.68 **	.24			-.60 **	.25	-.76 **	.25
Percent Asian & Pacific Islander	.48	.31			.47	.32	.55 †	.32
Percent American Indian	.79	.58			.74	.63	.88	.58
Average WASL Passing Rate 2002-03	.64 **	.06						
Constant (model 1g.)	27.55 **	2.63						
R^2 (Model 1g.)	.55							
Avg WASL Passing Rate 2002-03 (Models 2, 3, 4)			.72 **	.05	.64 **	.06	.63 **	.06
Constant (Models 2, 3, 4)			21.99 **	2.11	27.36 **	2.61	27.60 **	2.50
R^2 (Models 2, 3,4)			.51		.55		.57	

Table 6. Percent of African American and Non-African American Students[1] Passing the Math 10th Grade WASL test by by Percent Poor or Near Poor Enrollment: Washington State High Schools, 2006-07.

Percent Poor/Near Poor	% Passing the 10th Grade Math WASL			Number of 10th Graders That Took WASL			N of	N of Schools w/ GT 10 Af. Am
Students in School:	All Students	Af Am Students	Non-Af Am Stdnts	All Students	Af Am Students	Non-Af Am Stdnts	**Schools**	**Students taking Math WASL**
Less than 10%	**72.3%**	**--**	**71.8%**	11.1%	1.2%	11.6%	23	2
10 to > 20%	**60.0%**	**29.7%**	**60.8%**	25.5%	14.5%	26.0%	54	21
20 to > 30%	**53.4%**	**25.8%**	**54.5%**	27.0%	22.7%	27.2%	68	24
30 to > 40%	**46.3%**	**21.2%**	**47.9%**	15.7%	19.8%	15.5%	43	15
40 to > 50%	**42.6%**	**14.2%**	**44.6%**	8.7%	12.3%	8.5%	32	7
50 to > 60%	**32.8%**	**14.0%**	**36.3%**	5.9%	20.6%	5.2%	20	13
60% + Low Income	**30.5%**	**17.4%**	**31.4%**	6.2%	9.0%	6.1%	28	7
Total: Comprehensive HS	**52.4%**	**20.8%**	**53.9%**	100% / 92.6%	100% / 96.5%	100% / 92.4%	**268**	**89**
Mixed Schools	**46.4%**	**--**	**46.4%**	2.7%	0.0%	2.9%	**54**	**0**
Alternative/Occupational	**23.1%**	**6.8%**	**23.6%**	4.6%	3.5%	4.7%	**84**	**5**
Grand Total[4]	**50.9%**	**20.3%**	**52.3%**	100%	100%	100%	**406[2]**	**94[3]**
OSPI Total[5]	**50.4%**	**22.5%**	**51.9%**	**--**	**--**	**--**	**--**	
N for All Schools				75,579	3,308[6]	72,271		
N for OSPI Estimates:				77,438	4,116	73,322		

Note:

1. WASL scores are only reported for schools and subgroups (e.g. low income students, race/ethnic groups) that have 10 or more students taking the WASL in the school. Thus, the estimates for all students are based upon schools in which at least 10 students took the Math WASL and the African American estimates are based upon schools in which at least 10 African American students took the Math WASL.
2. WASL scores for all students were reported for all students in 406 of the 530 high schools. WASL scores for all students and low income students were reported for 326 high schools. WASL scores for all students were reported in 268 of the 271 comprehensive high schools, while WASL scores for all students and low income students were reported for 252 of 271 schools.
3. WASL scores for all students were reported for all students in 406 of the 530 high schools. WASL scores for all students and African American students were reported for 94 high schools. WASL scores for all students were reported in 268 of the 271 comprehensive high schools, while WASL scores for all students and low income students were reported for 94 of 271 schools.
4. The grand total execludes juvenile detention centers, medical institutions, and students that were home schooled. As noted above, data is not available for schools in which less than 10 students took the Math WASL. This is the reason that th
5. The OSPI totals can be found at www.reportcard.ospi.k12.wa.us
6. 770 African American students are enrolled in schools in which less than 10 students took the Math WASL (496 in a Comprehensive HS, 35 in a Mixed HS, and 239 in an Alternative/Occupational HS) .

Table A1. Regression of Percent Passing 10th Grade WASL in Reading, Writing, and Math on Change in School and Compositional Characteristics of Comprehensive High Schools in Washington State from 2002-003 to 2006-07 (with robust standard errors).

	Reading WASL			Writing WASL			Math WASL		
Variables	Coefficient		S.E.	Coefficient		S.E.	Coefficient		S.E.
Change in Student-Teacher Ratio	.20		.28	-.05		.22	.60		.36
Change in School Size	.00		.00	.00		.00	.00		.00
Mean (Years) of Teaching Experience	.12		.29	.45		.29	.19		.45
Change in % of Teachers with a MA degree	.10		.06	.09		.06	.15		.09
Change in % Female	-.47	**	.16	-.20		.18	-.24		.32
Change in % poor or near poor	-.05		.05	-.07		.06	-.05		.06
Change in Race/Ethnic Composition									
Percent African American	-.61	*	.26	-.69	*	.31	-1.27	**	.32
Percent Hispanic	-.21		.17	-.52	**	.18	-.76	**	.25
Percent Asian & Pacific Islander	.23		.23	.07		.21	.55	†	.32
Percent American Indian	-.28		.53	.41		.42	.88		.58
WASL Score in 2002-03	.40	**	.04	.35	**	.04	.63	**	.06
Constant	58.23		2.61	65.50		2.50	27.60		2.50
R^2	.48			.48			.57		
N	239			239			240		