

Dressed for Success? The Effect of School Uniforms on Student Achievement and Behavior

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Abstract: Concerns about safety in urban schools have led many school districts to require uniforms for their students. However, we know very little about what impact school uniforms have had on the educational environment. In this paper we use a unique dataset to assess how uniform adoption affects student behavior and achievement in a large urban school district in the southwest. Since each school in the district could decide independently about whether or not to adopt uniforms, we are able to use variation across schools and over time to identify the effects of uniforms. Using models that include student and school fixed-effects along with school-specific linear time trends we find that uniforms generate improvements in attendance and test scores. These results are particularly strong for girls in middle and high school. We also find evidence that suggests behavioral problems shift towards less severe infractions for both genders in middle and high school. Finally, uniforms reduce the likelihood that girls leave the district for alternative education options, potentially providing a tool for retaining students in the face of increased school choice options.

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1 Introduction

In 1996, the US Department of Education found that only 3% of public schools required uniforms. As a result of this and in the belief that uniforms make “schoolrooms more orderly [and] more disciplined,” President Clinton and the Department of Education encouraged schools to adopt uniforms (Mitchell, 1996). This led to substantial growth in the use of uniforms in public schools. By 2005 uniform adoption had more than quadrupled as it spread to 14% of public schools.² Today, many large school districts have some schools that require students to wear uniforms. Most notably Philadelphia public schools require all students to wear uniforms while New York City, Long Beach, and Dallas require uniforms in pre-secondary grades. Other large school districts, including Miami-Dade, Houston, Chicago, and Boston, permit individual schools to adopt uniforms.

Despite their widespread use and even though politicians and administrators specifically cite improvements in discipline and achievement as justifications for uniform adoption (Archibold, 1998; Los Angeles Daily News, 2009; Steinberg, 1998), the effects of uniforms on students remains unclear. In addition, proponents of uniforms suggest that the largest impacts may be on non-cognitive skills such as self esteem and discipline. Recently researchers have established that non-cognitive skill formation is an important part of education and may be just as important a determinant of students’ future social and employment success as academic ability (Heckman and Rubinstein, 2001; Heckman, Stixrud and Urzua, 2006; Imberman, forthcoming; Jacob, 2002; Segal, 2009).

In this paper, we identify the impact of uniforms on student achievement, attendance and behavior using data student-level panel data from a large urban school district in the southwest (LUSD-SW). Since schools in LUSD are free to set their own uniform policies and most schools adopt uniforms during the time period for which we have data, we are able to produce causal estimates of uniform impacts on student outcomes through the use of school and student fixed effects along with school-specific time trends.

²US Department of Education, National Center for Education Statistics

Theoretically it is unclear how uniforms might affect students' achievement and behavior. Uniforms could improve student outcomes through a few mechanisms. First, they potentially provide direct improvements in safety by making it easy to identify unauthorized visitors to a school, preventing the use of gang colors and insignia, and reducing theft since students no longer bring expensive clothing items to school (Stanley, 1996). For example, the Los Angeles Times argues that "in gang-plagued areas where wearing a certain color is enough to set off a fight, [uniforms] create a more neutral atmosphere on campus" (Los Angeles Times, 2009). Second, uniforms may instill respect for authority in students which, in turn, could improve behavior and reduce classroom disruptions. Third, a concern for adolescents, particularly girls, is that there may be substantial peer pressure to dress well which could, in turn, lead to low self esteem if a child is unable to dress "properly" due to low income or parental preferences. Uniforms negate much of this peer pressure by requiring students to wear the same clothing.

Uniforms also make the process of dressing for school faster, particularly for adolescent girls, potentially providing extra time for sleeping or studying. For example, at a school near Boston a high school senior remarks that "for some people it takes hours to get dressed. If we had a uniform it would take three minutes (Alspach, 2007)." Finally, uniforms provide an additional tool that administrators and teachers can use for discipline by providing students with rewards of "uniform-free" days for good behavior.

Nonetheless, uniforms could negatively affect student outcomes. One possibility is that the restrictiveness of uniforms induces students to become disruptive as a way to rebel against authority or increased conformity could make school boring. Another possibility is that improvements generated by uniforms could induce students with behavioral problems who would otherwise have attended alternative education environments such as charter schools or dropped out of school to remain in the public school. This could ultimately reverse improvements from uniforms via negative peer effects (Carell and Hoekstra, forthcoming; Gaviria and Raphael, 2001; Figlio, 2005; Imberman, Kugler and Sacerdote, 2009). On the

other hand, such an impetus to remain in the public schools could also occur for high quality students, and thus uniforms could generate a positive peer-effect in the long-run. Finally, some research has suggested that uniforms may actually reduce self-esteem as it restricts the ability of students to express themselves (Wade and Stafford, 2003).

There are also considerations beyond student behavior and achievement when schools decide whether to adopt uniforms. In particular, opponents argue that uniforms restrict students' rights and impose financial hardships (Brunsma and Rockquemore, 1998). For example, a recent report in Britain found that uniform costs varied by a factor of 10 and climbed as high as £200 (BBC, 2003). While most schools with uniform policies in the US provide subsidies to low-income families, the remaining share of costs may still be substantial.

Despite the large growth in the use of uniforms in public schools over the past decade, there is very little empirical research that assesses their impacts on behavior and achievement. Brunsma and Rockquemore (1998) compare students who attend schools with and without uniforms in a nationally representative sample of high-school students. They find little difference in absenteeism, behavior problems, and substance abuse while uniforms correlate negatively with test scores.³ Brunsma (2004) and Yeung (2009) conduct further analyses using similar data and find no significant impact on behavior or achievement. Stanley (1996) finds, on the other hand, that after Long Beach instituted uniforms behavior improved.⁴

A potential drawback with these studies is that they rely on cross sectional variation in uniform status.⁵ The exception is Stanley (1996) who compares results before and after adoption, but in this case she is limited to a district-wide change which could be contempo-

³Bodine (2003) notes that their sample of schools that require uniforms are almost all private schools and hence the results may not apply to public schools.

⁴A related paper is Evans, Kremer, and Ngatia (2008) who evaluate a random lottery that gave uniforms to students in Kenya. They find improvements in attendance and, preliminarily, test scores for students who receive uniforms. However, while this suggests that uniforms can be effective tools at improving student outcomes, the context is very different from the United States. In this case the authors do not evaluate a policy change of imposing uniforms, rather they measure the impact of providing uniforms for free to students in schools where they are already required. This reduces the cost of education for those students, who would have had to purchase the uniforms otherwise. Thus, they are not able to evaluate the effect of a change in uniform policy.

⁵Yeung improves on the regression models by focusing on value-added scores rather than test-score levels.

raneous with general trends in behavior. Hence, the estimates are subject to bias as schools and districts that choose to adopt uniforms may be inherently different from those that do not. Of particular concern is schools and districts that adopt uniforms are likely to have lower achievement and more behavior problems than schools that choose not to adopt uniforms. In addition, students and parents themselves may choose schools in part based on whether or not they have uniforms. Alternatively, if uniforms have an impact on student outcomes parents may respond to this by changing schools. For example, if parents believe that uniforms improve discipline and achievement then higher ability students may be inclined to switch to schools with uniforms. This will bias estimates upwards. While controlling for school characteristics helps address this bias it is very likely to be insufficient as there are many aspects of the decision to adopt uniforms, such as principals' preferences for discipline and the quality of teachers, that are inherently unobservable and would also affect student outcomes.

The sparseness and identification difficulties of the prior literature thus provide a very unclear picture of how uniforms affect student outcomes. In contrast to the research discussed above, we explicitly address the selection problem by exploiting the panel nature of our data. As such, we include student and school fixed-effects. These account for unobservable characteristics of students who attend uniform schools and of the schools themselves that are fixed over time. In addition, since uniform adoption by schools may be a response to trends in discipline or achievement over time, we add school-specific linear time trends to our models. Using this strategy we are able to provide, to our knowledge, the first causal estimates of the impact of uniforms on student achievement and behavior.

In contrast to most of the prior literature, we find that uniforms generate improvements in student outcomes, particularly for girls. Attendance rates for females in middle or high school significantly increase after schools adopt uniforms, while both elementary and middle/high girls show modest improvements in language test scores. In addition, we find that girls at both grade levels are significantly less likely to leave LUSD after their school adopts

uniforms, suggesting that parents respond to uniform adoption by choosing to forgo alternative education options such as charter or private schools, both of which are prevalent in LUSD. For boys the results for these measures are mixed. Nonetheless, all of the estimates we find for boys that suggest uniforms reduce performance dissipate a few years after schools adopt uniforms while the estimates that show improvement are sustained. This suggests that after an initial adjustment period uniforms are helpful for boys as well.

We also find some evidence of improvement in behavior for both males and females in middle and high school. While overall there is an increase in disciplinary infractions for these students, they are mostly from an increase in in-school suspensions, which are likely in-part due to uniform violations, while out-of-school suspensions drop significantly. These results suggest the student behavior shifts towards less severe infractions. In addition, these results combined with the robustness of our estimates to the inclusion of principal fixed-effects and the finding that our estimates do not statistically significantly differ if uniforms are adopted under new or established principals make it unlikely that our estimates reflect concurrent changes in discipline enforcement policies.

2 Uniforms in LUSD-SW

LUSD is an urban school district with more than 200,000 students and close to 300 schools, making it one of the largest in the country. The district has a substantial amount of poverty - 59% of students qualified for free or reduced-price lunch in 2006-07. Like other urban school districts it is also heavily minority - 59% of students are Hispanic and 29% are African-American. Parents of students in LUSD have a number of choice options which could allow students to move in response to uniform policies. First, LUSD itself has a large magnet program. Second, the LUSD area has a substantial number of charter schools and private schools. In 2004-05 state chartered schools near to and within LUSD's boundaries had a population equal to 9% of LUSD's enrollment. LUSD is also surrounded by many suburban

school districts.⁶ Given these characteristics of the district, we will consider how uniforms affect student movements in addition to test scores and behavior

LUSD has permitted its schools to require students to wear uniforms since at least 1992.⁷ Initially, only a handful of schools required uniforms. However, uniform adoption grew substantially over the following 13 years. Of schools that responded to our survey of uniform policies, which we describe in more detail below, only 10% required uniforms in 1993. By 2006, 82% of these schools required uniforms. In addition, no schools abandoned uniforms after adoption. These characteristics suggest that parents and school administrators in LUSD generally believe that uniforms are helpful.

Schools are given wide latitude by LUSD in designing their uniform policies. Nonetheless, while certain characteristics of school uniforms vary across schools, such as color choices and whether a specific shirt purchased from the school are required, the policies are very similar. As of the 2007-08 school year, all schools that require uniforms mandate specific colors and styles for both shirts and pants. Almost all of these schools specify between 1 and 3 colors for shirts, and casual or denim pants in khaki or navy colors. Some schools specifically limit students to wearing polo style shirts. Only a handful of schools require students to purchase specific shirts with a school logo. Some middle and high schools also require different grades to wear specific colors. The most common uniform includes a polo style shirt in one of the school's colors combined with khaki, denim, or navy pants. Girls are generally given the option of wearing pants or skirts.⁸

⁶Eleven districts directly border LUSD.

⁷We cannot determine when uniforms were first allowed. The earliest any school had required uniforms was in 1968, but this was a school operating under contract with LUSD rather than being directly run by LUSD. Of LUSD's own schools, the earliest date provided in our survey of uniform policies was 1992.

⁸Disobeying a mandatory uniform policy is considered a "level II" disciplinary infraction, which requires intervention by a school administrator. Such a violation can result in a variety of punishments depending on the severity of the infraction and the student's prior behavior. These can range from a call to the student's parent to in-school suspension, although the administrator is given discretion to increase or reduce the punishment beyond this range if necessary. Repeated violations can result in out-of-school suspension or placement in a disciplinary alternative education centers.

3 Empirical Strategy

The primary concern with an analysis of the effects of school uniforms on student outcomes is that schools and districts choose whether or not to adopt uniforms. As a result uniform adoption is likely correlated with unobservable characteristics of the school that could affect student performance, such as neighborhood characteristics or parental involvement in the school. If this is the case, then naïve OLS estimates will be biased. The selection process is further complicated by the possibility that schools adopt uniforms in response to existing achievement and behavior levels or even trends in student outcomes. For example, schools may decide to adopt uniforms in response to increasing discipline problems. In addition, parents and students may respond to uniform policies by changing schools.

We can model this framework as

$$Y_{ijt} = \alpha + \beta Uniform_{ijt} + \mathbf{X}_{ijt}\boldsymbol{\Omega} + \gamma_i + \delta_j + \epsilon_{ijt}. \quad (1)$$

where Y_{ijt} is an outcome for student i in school j and academic year t , $Uniform$ is an indicator for whether or not the student has to wear a uniform, and \mathbf{X} is a set of student characteristics and grade-by-year fixed effects. γ , δ and ϵ are error terms where γ varies over students but not schools or time, δ varies over schools but not students or time, and ϵ varies over schools, students and time. Ideally we would want $Uniform$ to be uncorrelated with γ , δ , and ϵ , but due to the reasons described above this is unlikely and, in fact, $Uniform$ is likely to be correlated with all three error terms.

Thus, a simple regression that compares schools with uniforms to those without uniforms will be biased. The availability of panel data where schools adopt uniforms at different times and students move between schools with and without uniforms allows us to use student and school fixed effects to address this concern. This procedure accounts for any unobserved characteristics of students and schools that may affect the school's decision to adopt uniforms, the parents' decision to move their child to a school with uniforms, and student outcomes,

as long as these characteristics do not vary over time. Thus, the procedure accounts for omitted variables such as parents’ preferences for discipline, students’ innate tendencies to misbehave, student ability, and schools’ long-term problems with discipline and test scores. To incorporate these fixed-effects, we modify equation 1 by demeaning within students and adding school indicators as such:

$$Y_{ijt} - \bar{Y}_{ijt} = \beta(Uniform_{ijt} - \overline{Uniform}_{ijt}) + (\mathbf{X}_{ijt} - \bar{\mathbf{X}}_{ijt})\boldsymbol{\Omega} + (\mathbf{S}_{ijt}^j - \bar{\mathbf{S}}_{ijt}^j)\boldsymbol{\Lambda} - \epsilon_{ijt} - \bar{\epsilon}_{ijt}. \quad (2)$$

where \mathbf{S}^j is a set of school “dummy” variables and a bar over a variable indicates that it is a mean over all the observations for student i . This model removes the correlation between *Uniform* and γ via the demeaning and removes the correlation with δ via the school dummies.

Even with this strategy there may still be residual bias if schools choose to require uniforms in response to trends in discipline or other outcomes. To address this concern, we also include school specific linear time trends in our regressions:

$$Y_{ijt} - \bar{Y}_{ijt} = \beta(Uniform_{ijt} - \overline{Uniform}_{ijt}) + (\mathbf{X}_{ijt} - \bar{\mathbf{X}}_{ijt})\boldsymbol{\Omega} + (S_{ijt}^j - \bar{S}_{ijt}^j)\boldsymbol{\Lambda} + (S_{ijt}^j * Year_t - \overline{S_{ijt}^j * Year_t})\boldsymbol{\Gamma} - \epsilon_{ijt} - \bar{\epsilon}_{ijt}. \quad (3)$$

The addition of the time trends eliminates the correlation between *Uniform* and ϵ as long as the selection leading to that relationship is based off of linear time trends. Hence, in our final model bias would remain only if students select into uniformed schools based on time-varying characteristics or schools choose uniforms due to non-linear changes in unobservables over time. To test the validity of this strategy, we will provide models that track student outcomes prior to uniform adoption by a school, so that we might identify if there is any evidence of additional trending after controlling for the fixed-effects and school-specific time trends.

One potential problem with this specification is that it does not account for a student's prior test scores. Ideally in achievement models we would like to include prior test scores as a covariate to account for student growth. However, lagged test scores are potentially endogenous due to omitted variables that could affect both lagged and current test scores. Hence, we rely on restricted-value added models for our test score analyses whereby the dependent variable is measured as the year-to-year change in test scores rather than levels. We provide results from levels specifications in the online appendix. Estimates from levels models are qualitatively similar to value-added specifications.⁹ In addition, since uniforms may have very different impacts by gender and grade level, we conduct all of our analyses separately for males and females and for elementary (grades 1 - 5) and middle/high school (6 - 12) grades. We also provide variations on the model in equation (3) to look at different effects by race and years since uniform adoption.

A second concern is that uniform adoption by a school may be part of a wider policy change that involves enhanced enforcement policies. To the extent that this is true, then our estimates represent the reduced-form impact of such a policy combined with uniform adoption. Unfortunately there is no way to test for this directly, since enforcement enhancements are unobservable.

Nonetheless we provide some evidence to assess the extent to which such a change in enforcement may be affecting our estimates. First, we conduct regressions that include principal-fixed effects. This addresses the possibility that principals who are strict disciplinarians may be more inclined to adopt uniforms. Principal fixed-effects account for these unobserved differences in principal characteristics. Results using this model are generally similar to our baseline estimates. Our second test is to interact uniform status with whether a school's uniform is adopted during the first two years of a principal's term. This addresses

⁹Imberman(forthcoming) shows that a fixed-effects model in a levels specification and one in a restricted value-added specification bound a lagged-dependent variable model in expectation. Hence, if the true model is a lagged-dependent variable model, one can use the levels and restricted VA models as bounds. In the restricted VA models where we find a significant test score impact, the corresponding levels models also are statistically significant in the same direction and hence satisfy this bounding test.

the possibility that some schools respond to worsening behavior by bringing in a new principal who includes uniforms as part of a package of reforms. In addition, new principals may be more willing to experiment with different strategies, including uniforms. If these phenomena were driving our estimates we would expect to see statistically significantly different impacts for uniforms adopted early in a principal's term relative to later. We find little evidence of this. Finally, and perhaps most importantly, when we break down infractions into those resulting in an in-school suspension and those resulting in an out-of-school suspension, we find that there is a significant reduction in more severe punishments. This is the opposite of what we'd expect to see if administrators increase enforcement concurrent with uniform adoption. Hence, while these tests do not rule out the possibility that enforcement plays a role in our results, they provide compelling evidence that our estimates are not driven by enforcement.

4 Data

In this paper we utilize two sources of data from a large urban school district in the southwest (LUSD-SW). The first is a set of administrative records for students in LUSD from 1993 through 2006. This data includes student demographics, test scores, disciplinary records and attendance records for every student in LUSD. Testing data include students's scaled scores on the Stanford Achievement Test (9th & 10th editions) which we standardize within grade and year.¹⁰ Discipline data includes any infraction that results in an in-school suspension or more severe punishment. Attendance records include the attendance rate for each student. Test score data is only available starting in 1998-99, hence while we use all years for attendance, discipline, and student leaver results, we must restrict our analysis to 1998-99 and later for test score analyses.¹¹

¹⁰In 2005-06 and 2006-07 LUSD received some evacuees from Hurricanes Katrina and Rita. While we keep these students in the data, they do not contribute to the standardization. Results dropping evacuees are nearly identical.

¹¹Results for discipline and attendance when restricted to the test score sample are qualitatively similar to results from the larger sample.

Unfortunately, LUSD does not keep centralized records of when schools adopted uniforms. Thus, we emailed and mailed a survey to the principal of each school in LUSD with the following questions in the fall of 2007:

- *Does your school currently require students to wear uniforms? Note that we define a uniform as any outfit where a particular style of shirt (i.e. polo) and bottom (i.e. khaki, skirt, etc.) and a specified color are required.*
- *If your school currently requires uniforms, what school year did you first require them? Were there any years since then when the requirement was suspended?*
- *If your school currently does not require uniforms, did you ever require them in the past, and if so, could you please provide the years during which students were required to wear uniforms?*

We then followed up via telephone with any school that did not respond to the initial survey or to clarify their answers. If the principal did not know the date then we requested that he/she ask his/her staff members. Data collection was completed in October, 2008.¹² For the 292 schools that were in operation in the 2007-08 school year 79% were able to provide dates of uniform adoption while the date could not be determined for 14% and 7% of the schools refused to participate in the survey.¹³ Figure 1 shows the number of schools in LUSD that require uniforms, do not require uniforms, or for which the uniform requirements could not be determined. Since our survey was based on schools existing in 2007-08 earlier years have higher rates of unknown uniform status than later years. Nonetheless, it is clear that number of schools requiring uniforms increased substantially over the course of the sample.

¹²In some cases we were provided a range of years or a statement that uniforms had been required since a certain date. In these cases if the dates provided were after the start of our sample period we followed up and requested that the principal ask other staff and faculty to identify specific dates of adoption. If an exact date still could not be determined we dropped that school from our sample.

¹³Some schools responded that the uniform policy was adopted before a certain date. In these cases, unless that date was prior to the start of the data sample in 1993, we considered the uniform adoption date for those schools to be unknown. This occurs for 13 schools. In addition three schools stated that they recommended but did not require uniforms. These schools are considered to not have a uniform for the purposes of this study since there would be no punishment for the student if they choose not to wear the uniform.

Since we use school fixed effects to help identify the uniform impact it is also important to know how many schools switch to requiring uniforms over the course of the sample. From 1993-04 to 2006-07 166 schools adopt uniforms. From 1999-00 through 2006-07, the period after the first year of testing data, 84 schools adopt uniforms. Hence there is substantial variation in policies during the period for which we have data.

Table 1 provides summary statistics for students by their school's uniform status. In general, uniform and non-uniform schools have similar demographics. The most notable differences is that uniformed schools have ten percentage points more Hispanics and are only 28% black compared to 34% for non-uniform schools. Uniform schools also have more students who qualify for free or reduced-price lunch. Schools for which we do not know the uniform status also have demographics that are generally similar to the schools where uniform status is known. The notable exception is that these schools appear to have higher rates of free-lunch eligibility. In terms of outcomes, test scores are higher in non-uniform schools than in uniform schools. On the other hand, attendance rates are lower. Schools with unknown status have lower test scores than both uniform and non-uniform schools.

5 Results

5.1 Impacts on Discipline and Attendance

Since uniform proponents often cite behavioral improvements as the main benefit of uniforms, we start by considering the impact of uniforms on disciplinary infractions and attendance. Figures 2 and 3 outline some suggestive evidence that uniforms have an impact on these outcomes. In Figure 2 we see that for elementary students disciplinary infractions remain relatively flat, although there appears to be a temporary increase after uniform adoption. Attendance rates on the other hand increase substantially after uniform adoption. Nonetheless, schools that adopt uniforms tend to have increasing attendance rates before adoption as well. This highlights the need to account for the pre-existing trends of uniform schools by in-

cluding school-specific time trends in regressions. Figure 3 shows a somewhat different story for middle and high schools. Disciplinary infractions increase steadily up to adoption and then appear to level off suggesting that uniforms arrested the upwards trend. Attendance rates are on an upwards trend prior to adoption but jump up afterwards.

Table 2 provides our primary estimates of the effect of uniforms on discipline and attendance.¹⁴ The first column shows OLS models with no school fixed-effects, student fixed effects, or school-specific time trends. Hence, this is similar to the models used in previous research. In general, we find little relationship between uniforms and attendance or behavior in these models. Only elementary boys show a statistically significant relationship between uniforms and attendance, and this is only at the 10% level.

Column (2) provides our preferred specification for discipline and attendance. The most notable estimates here are for girls in middle/high school grades. Attendance rates for these students increase by 0.48 percentage points after uniform adoption. This is a substantial increase equal to 7% of their mean absence rate amongst these students. Middle/high school boys also show marginally significant improvements of 0.27 percentage points - about 4% of the average absence rate. For elementary students there is little evidence of improvement in attendance. Girls show no significant change while boys show a statistically significant drop. We will show later, however, that this drop-off is temporary. In terms of disciplinary infractions, middle/high males exhibit a statistically significant increase. However, this also turns out to be temporary. All other groups show no statistically significant effect on disciplinary infractions.

Nonetheless, the increase in infractions amongst middle/high boys raises concerns that our results may reflect enforcement changes rather than uniform adoption itself. However, three pieces of evidence suggest that this is unlikely to be the case. First of all, in column (3) we provide models that add principal fixed effects. Hence this accounts for the enforcement

¹⁴The LUSD data also includes 39 charter schools directly authorized by LUSD. However, while large in numbers they make up a small portion of the observations (2.4%) and only 8 changed uniform policies during the data. Hence, due to the school fixed-effects very few charters contribute to the identification. Indeed, results that exclude charter schools are very similar to our main results.

preferences of the principal. That is, we account for whether principals who are strict disciplinarians are more likely to adopt uniforms than others. The results in column (3) show that our baseline estimates are quite robust to the inclusion of these fixed effects. In particular, the attendance estimates and most of the discipline estimates change little. The significant disciplinary infraction estimate for boys in middle/high school grades does become insignificant but the sign remains the same and the new estimate is not significantly different from the baseline.¹⁵

A second test we conduct is to see if the uniform adoption effects vary by whether or not the adoption occurs within 2 years of a school getting a new principal. These results are available in the online appendix. One might suspect that new principals who are brought in to impose order in a school may be more inclined to adopt uniforms as part of their strategy. In addition, new principals may be more inexperienced and hence would try many new strategies at one time to address student outcomes to learn what works best. If this is affecting our estimates then we should expect to see different impacts for schools that adopt uniforms in the first two years of a principal's regime than those that adopt uniforms later. The only significant estimate we find is for attendance rates in middle/high males, where new principals have significantly lower attendance improvements than experienced principals. For all other outcomes and groups there is no statistically significant difference between new and experienced principals.

Finally, in Table 3 we investigate this issue further by splitting infractions into in-school suspensions and out-of-school suspensions.¹⁶ For elementary students, there is essentially no change in either type of infraction. However, for middle/high students there are statistically significant increases in in-school suspensions and reductions in out-of-school infractions. Females experience an increase of 0.10 in-school suspensions per year but a reduction of 0.04 out-of-school suspensions while the values are 0.19 and -0.05, respectively, for males. These

¹⁵We also found that results were similar to baseline if instead of principal fixed effects we used principal-school spell fixed effects in place of school fixed-effects.

¹⁶In-school and out-of-school suspensions account for 96% of recorded infractions. The rest are expulsions and referrals to alternative disciplinary schools.

results show a shift in the nature of disciplinary infractions towards less severe violations that warrant softer punishments. While the increases in in-school suspensions are larger than the reductions in out-of-school suspensions, these could be due to punishments for students who violate the uniform codes rather than a net increase in other behavioral incidents. Unfortunately, we can only speculate on this matter as our data does not indicate whether students received a punishment for a uniform violation. Hence, these results suggest that students substitute away from more severe infractions with the adoption of uniforms which could be an indicator of behavioral improvement. Combined with the principal fixed-effects estimates and the analysis of differential impacts for new and established principals, these results also provide strong evidence that enforcement is not driving our estimates.

Another concern is whether fixed-effects and school-specific time trends are sufficient for addressing selection of schools into uniforms off of pre-existing trends. One way to test this is to look at estimates for being in a school prior to the adoption of uniforms and see if there is any remaining evidence of trending. Table 4 provides these results. We would be concerned that our panel data methods are insufficient at addressing selection if the outcomes for multiple years prior to adoption are different from the outcomes in the year immediately prior to adoption, which is the excluded category. The evidence in Table 4 suggests that this is not a substantial concern with regards to discipline and attendance. Only one estimate - 4 or more years prior to adoption in middle/high males - shows a statistically significant difference from the year immediately prior to adoption.

Table 5 provides models that allow the uniform impact to vary by the number of years since adoption by a school. This identifies if the impacts of uniforms change over time. This could happen, for example, if students take time to adjust to the uniforms or if uniforms generate wider changes in the school culture that take time to develop. For elementary students we see that the negative attendance results for males found in Table 2 drop to statistical insignificance one year after a school adopts uniforms and after two years the impact becomes precisely zero. A similar pattern is seen for discipline for males in middle/high school. In

particular, the positive and significant initial impact of 0.13 infractions drops nearly to zero two or more years after adoption.

On the other hand, the improvements in middle/high attendance appear to remain as time from adoption increases. Girls have a significant impact of 0.5 pp in the first year and this impact does not change after two years. Males show a similar pattern with the attendance impact holding steady at 0.4 pp, although two years after adoption the estimate becomes insignificant. The results also show a statistically significant attendance response for elementary girls two years or more after adoption. The increase in attendance rates of 0.17 pp equals 5% of the mean for this group. Hence it appears that the undesirable effects of uniforms on behavior and attendance found in Table 2 dissipate for boys over time while the benefits found for both girls and boys are maintained.

In Table 6 we provide interactions of uniform adoption with the race of the students.¹⁷ For attendance rates we find differences across races. In elementary grades African-American and Hispanic students have significantly higher impacts than other races, although their total effects are not significantly different from zero. In middle and high school, African-American females have significantly more improvements than other non-Hispanics. Hispanic females and African-American males also show larger impacts than the excluded races although these are not statistically significant. Hence, these results suggest that minorities benefit more in terms of attendance from uniforms than other races. Nonetheless, elementary African-American students exhibit significant increases in disciplinary infractions, although there is no significant differences for middle/high students.

5.2 Impacts on Achievement

It is intriguing to see if the improvements found in attendance rates and the reduction in more severe disciplinary infractions spill over into achievement. Additionally, as mentioned

¹⁷The left-out category includes whites, asians, and Native Americans. Although we would normally consider the latter two categories to be separate minorities, their sample sizes are too small to get precise estimates at 2.9% and 0.1%, respectively. Whites account for 10.2% of the sample.

in the introduction, there are a number of other reasons why uniforms may affect achievement. Hence, in this section we consider the impact of uniform adoption on students' test score outcomes. All test scores are standardized across LUSD within year and grade, hence estimates are provided in standard deviation units. Figures 4 and 5 provide graphical evidence on the relationship between uniform adoption and test scores. All three exams that we consider - Stanford Achievement Test math, reading, and language - show similar patterns. For elementary students, there is a clear drop in test scores prior to adoption but then test scores increase dramatically starting immediately after adoption. This suggests that elementary schools may have adopted uniforms in response to falling test scores. For students in grades 6 or higher the selection appears to be in the opposite direction as test scores increase prior to adoption. One possible explanation for this is that uniforms are adopted after changes in the schools population bring in parents who are more concerned about education and more amenable to uniforms. After adoption test scores continue to rise.

Table 7 provides our main achievement results and is structured as in Table 2. As discussed previously, we focus on test score value-added as our dependent variable rather than test-score levels. Levels estimates are generally similar and are provided in the online appendix. Column (1) provides OLS estimates, column (2) provides our preferred specification, and column (3) adds principal fixed effects. In general OLS models show little impact of uniforms on test scores, although middle/high reading is negative and marginally significant. This is consistent with the findings of Yeung (2009).¹⁸ Our preferred model that includes school fixed-effects, student fixed-effects, and school specific linear time-trends provides results that are similar to OLS for math and reading. However, for language scores we find improvements for females. Both elementary and middle/high girls show improvements of around 0.05 standard deviations, though for elementary the estimate is only significant at the 10% level. Nonetheless, these results are somewhat sensitive to specification. While both

¹⁸With the exception of Yeung (2009), prior research has tended to rely on OLS levels models. Our levels estimates for OLS show no statistically significant differences for middle/high school students, but for elementary students of both genders there is a consistently negative and statistically significant correlation of one-tenth of a standard deviation. This is consistent with findings of Brunsmma and Rockquemore (1998).

estimates remain positive when we add principal fixed effects, both become statistically insignificant while the middle/high estimate drops by 1/2. We also estimated models that look at pre-adoption trends as in Table 4. These results are available in the online appendix. While reading in middle/high school test scores show some evidence of residual trending, none of the other exams show evidence of trending for males or females.¹⁹ Thus, the results provide some weak evidence that uniforms improve language scores for girls.²⁰

Given the improvements in attendance, it is somewhat perplexing that only language scores show improvements for middle/high girls. However, the attendance impact, while substantial, may not be large enough to generate a measurable impact on some test score measures. The estimate of 0.5 percentage points translates into one additional day of school in a 180 day school-year. Given that Marcotte and Hemelt (2008) find that for 8th grade students unscheduled school closings only start to significantly affect test scores after 10 days, it is likely that the level of improvement in attendance we find would not induce measurable achievement improvements.

Another possibility is that impacts on test scores appear only after a school has required uniforms for a while. This could occur if adaptation of the school environment and students to uniforms is a slow process. Hence in Table 8 we provide results from models that allow achievement estimates to vary with time since adoption. While there is little change in the estimates for elementary students from the baseline model, for middle and high school students there is improvement over time for both genders. While math gains do not significantly improve in the year of adoption, afterwards the estimates increase and become statistically significant at the 10% level. Two or more years after adoption math score gains increase by 0.11 and 0.09 standard deviations for females and males, respectively. Language value-added for middle/high girls also show a steady increase over time after a school adopts uniforms.

¹⁹A negative estimate shows up for 3 years prior to adoption in language gains, but the estimates for both 4 years and 2 years prior are close to zero.

²⁰We also conducted analyses that interact uniform adoption with the student's race. We find little systematic differences by race. The only case where there are significant differences across races is reading for middle/high males where African-American and Hispanics show higher impacts than other races. Results are provided in the online appendix.

In the year of adoption these gains increase by 0.05 standard deviations increasing to 0.09 standard deviations by the second year after adoption. Thus, it appears that middle/high schools that adopt uniforms experience significant test score improvements for both boys and girls after some lag. This combined with the findings from Table 5 that the increases in male disciplinary infractions drop nearly to zero over the same time frame suggest that both male and female students in middle and high schools benefit from uniforms after an initial adjustment period.

5.3 Impacts on Student Movements

We have now established that uniforms are, on net, beneficial to students, particularly girls in middle and high school. One intriguing potential explanation for these results is that uniforms induce certain students to remain in a school who would have otherwise left, leading to changes in students' peer groups.²¹ This could result from parents interpreting uniforms as a signal that a school is trying to improve safety or that parents directly observe improvements after uniform adoption and thus respond by not switching schools whereas they otherwise would have. The impact of uniforms on student movements is also interesting on its own. The growth of school choice policies, particularly charter schools, provides a need for public schools to find ways to attract students. If uniforms discourage students from leaving for other schooling options, then public schools could use uniforms as part of a strategy to increase enrollment. Given that LUSD has a large charter school population - in 2005 the total (both state and district authorized) charter population was equal to 13.5% of LUSD's non-charter enrollment - a substantial number of private schools, and many nearby suburban districts, it is an excellent location to see what effect uniforms may have on student enrollment in a competitive educational environment.

Table 9 provides results from linear probability models that regress student movements

²¹Such a phenomenon could also potentially lead to bias as uniform adoption changes attrition rates from the data. However, the inclusion of student fixed-effects in our models helps to address this concern and hence such bias is unlikely to be a concern.

on school uniform status. As in our other models, we include student fixed-effects, school fixed-effects, and school-specific time trends. We look at the likelihood of switching schools within LUSD and the likelihood of leaving LUSD in year $t + 1$ as a function of uniform status in year t . We drop students who are in the highest grades of their school since a school's uniform policy would no longer apply for students who are leaving to attend another school due to normal grade progression. Hence including those students may lead to biased estimates.²² For males we do not see any statistically significant effect of uniforms on student movements. However for females there is a clear drop in the likelihood of leaving LUSD, although no significant effect on the likelihood of moving to another LUSD school. The results in column (2) suggest that girls in elementary grades who are in schools that adopt uniforms are 0.7 percentage points less likely to leave LUSD the following year and middle and high school girls are 1.2 percentage points less likely to leave. These values are modest relative to overall mean female leaving rates of 13.3% in elementary grades and 16.0% in middle/high grades, but are nonetheless highly statistically significant.

Hence these results suggest that uniforms can be an effective tool for keeping female students in the public school system. While we cannot see where the students go after they leave, given the large number of charter schools in LUSD it seems likely that many move there.²³ The second question with regards to these effects on student movements is whether students are exposed to peer effects from the students who now choose to stay. If this is the case, it could help explain the attendance and test score effects. Although we cannot identify the peer effects directly we can get an idea of the extent to which this occurs by looking at the type of students who are influenced into being less likely to leave the district. These results are provided in Table 10 where whether a school requires a uniform is interacted with

²²One might find this to be too restrictive in the analysis of leavers. Hence we also conduct regressions of uniform status on the likelihood of leaving where all grades except 12 are included. These provide very similar results.

²³Some charter schools are authorized directly by LUSD and for these we have data. In our models students moving to these schools would be counted as "switchers" rather than "leavers". Nonetheless, we looked directly at whether uniform adoption induces any movements into these charters and did not find any statistically significant effects.

student characteristics. The estimates show that for elementary students, both males and females who are induced to remain in LUSD are more likely to be minorities, particularly Hispanics. However, in terms of the academic ability of the students the results differ by gender. Females who are induced to stay are more likely to be classified as gifted while males are more likely to be classified as requiring special education. Hence, this is consistent with a peer effects story if the effects are concentrated within gender as the influx of gifted girls could have a positive impact on other girls, contributing to the language results while the influx of special education boys could have a negative impact on other boys, contributing to the temporary negative attendance effects. For middle and high school, on the other hand, where we see the largest improvements as a result of uniforms, there is little difference across student characteristics in those who are induced to stay, providing little evidence that peer effects play a substantial role in our estimates for these groups.²⁴

6 Conclusion

Concerns about school safety and the desire by administrators to try different strategies to improve test scores and behavior has led many schools to adopt student uniforms. However, the current evidence on uniforms is sparse and the existing research relies on cross-sectional variation. Since schools likely adopt uniforms in response to existing behavior and achievement in schools the results from these papers may suffer from substantial bias.

In this paper we assess whether requiring uniforms in schools affects student outcomes using administrative data from a large urban school district in the southwest. Since schools in this district independently decide whether or not to adopt uniforms over the time period for which we have data, we are able to incorporate school fixed-effects, student fixed-effects, and school specific linear time trends into our regressions. This allows us to account for

²⁴We also conducted similar models interacting uniform status with math and reading score quartiles and whether the students incurs any disciplinary infractions. With the exception of middle/high boys in the third quartile of math scores we do not find any statistically significant difference in the uniform impacts on leaving. These are provided in the online appendix

schools endogenously deciding to adopt uniforms off of their fixed characteristics and linear trends as well as students' selection into uniform schools provided that such selection is based on students' fixed characteristics. These corrections are very important as evidenced by the fact that while most prior work has found uniforms to have insignificant to negative impacts, we find that uniforms generally have a positive influence on student attendance and achievement, particularly for girls in middle and high school.

Our results show that attendance rates for girls in grades 6 through 12 increase by 0.5 percentage points after a school adopts uniforms while language exam gains increase by 0.05 standard deviations. Two or more years after uniform adoption the attendance impact increases to 0.7 pp while language gains increase to 0.09 sd and math gains show improvement of 0.11 sd. Girls in grades 1 to 5 also show improvements in language gains of 0.05 sd. For boys the evidence is more mixed. Attendance rates for elementary boys drop and disciplinary infractions for middle/high boys increase, but these impacts attenuate towards zero and become statistical insignificant two years after adoption. In addition, middle/high boys show marginally significant improvements in attendance and, after two years, math gains as well.

In terms of discipline, the story is more complex as we have to wrestle with the fact that our discipline measure - the number of infractions resulting in suspensions or more severe punishments - reflects both behavior and enforcement. We find that overall disciplinary infractions seem to increase temporarily in middle and high school. Nonetheless, we provide evidence that this is likely to be due to neither increased enforcement nor worsening behavior. Rather, it appears that these estimates likely result from violations of the uniform codes combined with a shift towards less severe behavioral problems, as evidenced by significant reductions in out-of-school suspensions.

To further address the potential that our estimates reflect changes in enforcement, we provide models that include principal fixed effects to account for the disciplinary philosophy and quality of school leadership. These results are generally similar to baseline. In addition,

we conduct analyses that consider whether uniform impacts vary by whether uniforms are adopted by a principal who is new to a school. New principals are likely to be more inclined to adopt changes in many parts of a school besides uniform adoption and sometimes may be brought in to “shake-up” a school. We find little evidence that the impacts for new principals differ substantially from those for established principals. Given that these procedures and the discipline regressions disaggregated by type of suspension provide results counter to what we would expect to see if our estimates are driven by changes in enforcement, we believe that our results isolate the impacts of uniforms.

Finally, we find that uniforms reduce the likelihood that girls leave the district for other schools. After a school adopts uniforms, leaving rates fall by 0.7 percentage points for elementary girls and by 1.3 percentage points for middle/high school girls. It is unclear, however, whether this is a direct response to uniforms, a reaction to improvements uniforms generate for girls in attendance and language scores, or reflect changing perceptions about school safety and responsiveness of a school to parental preferences. Nonetheless, given that there are many charter schools within LUSD’s boundaries, these results suggest that schools may be able to use uniforms as a strategy to prevent the loss of students to charters and other alternative education options.

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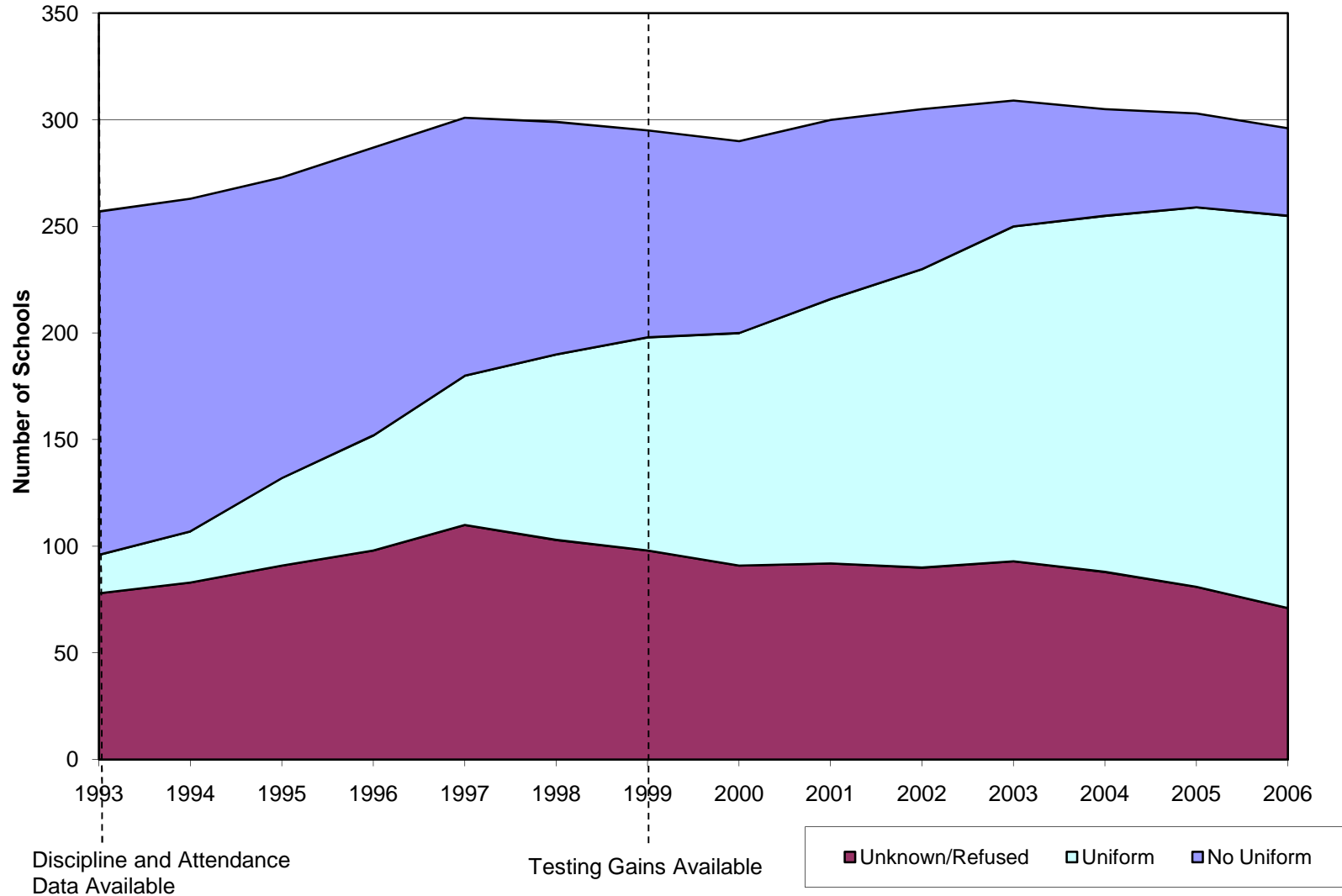
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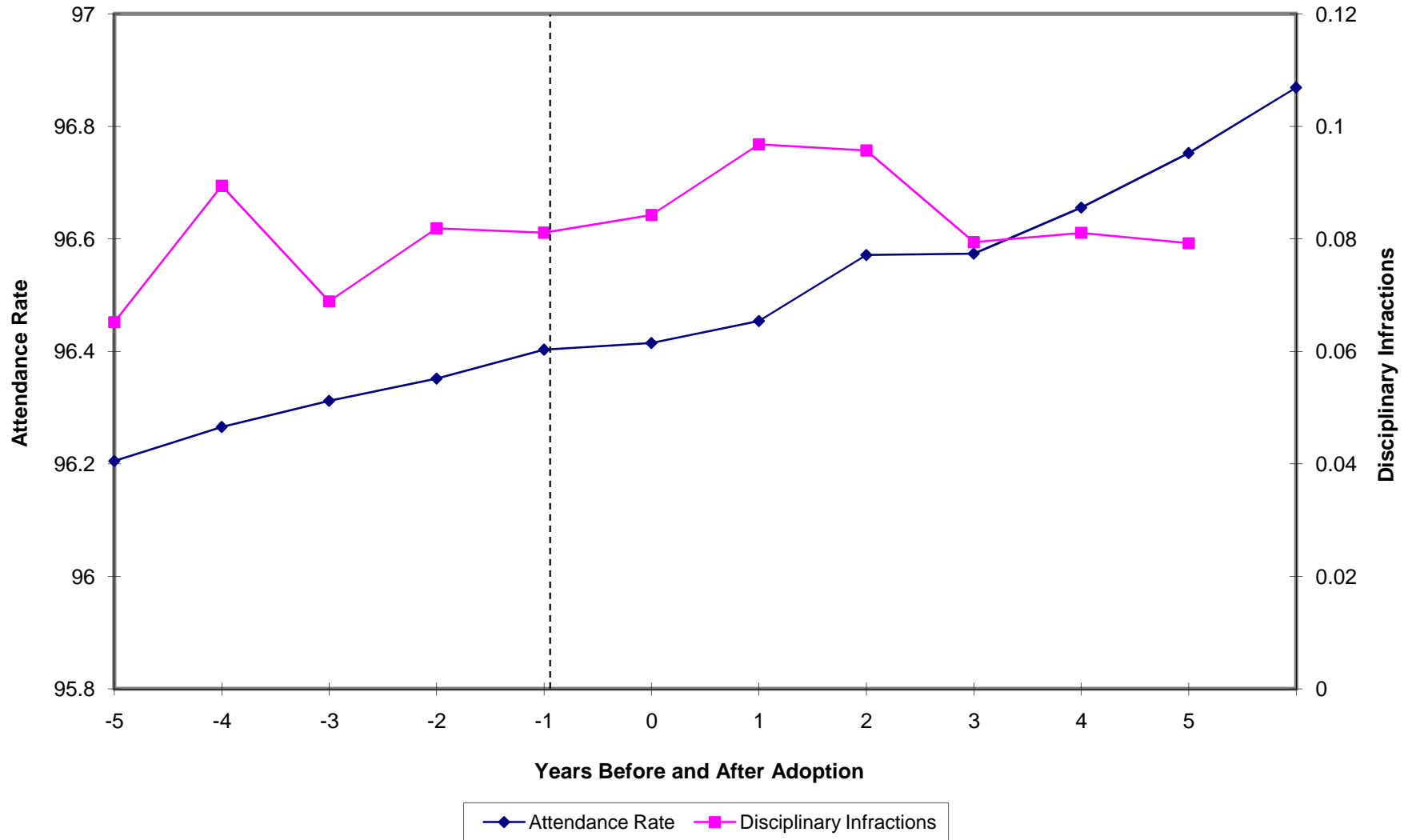
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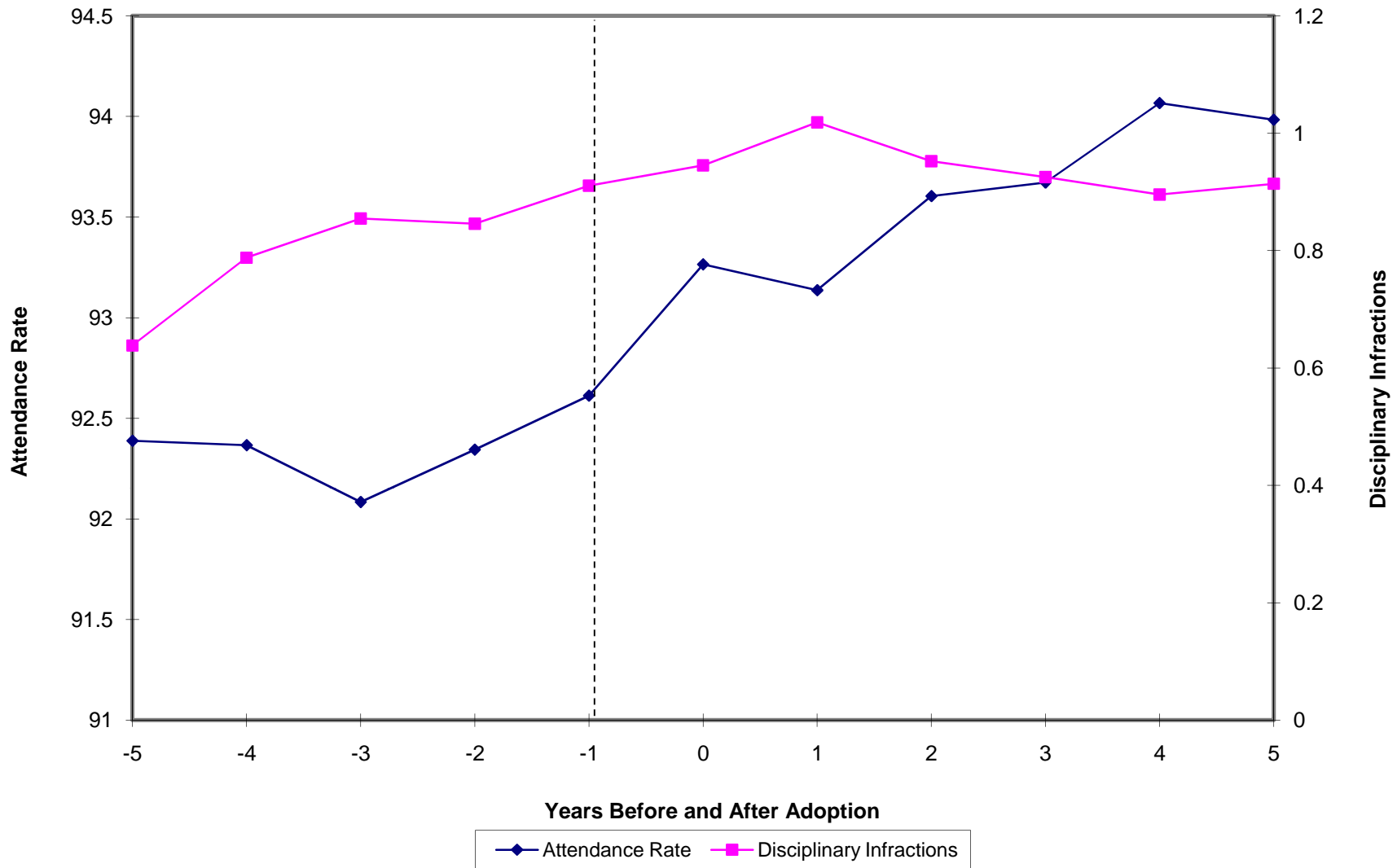
Figure 1: Uniform Adoption in LUSD-SW



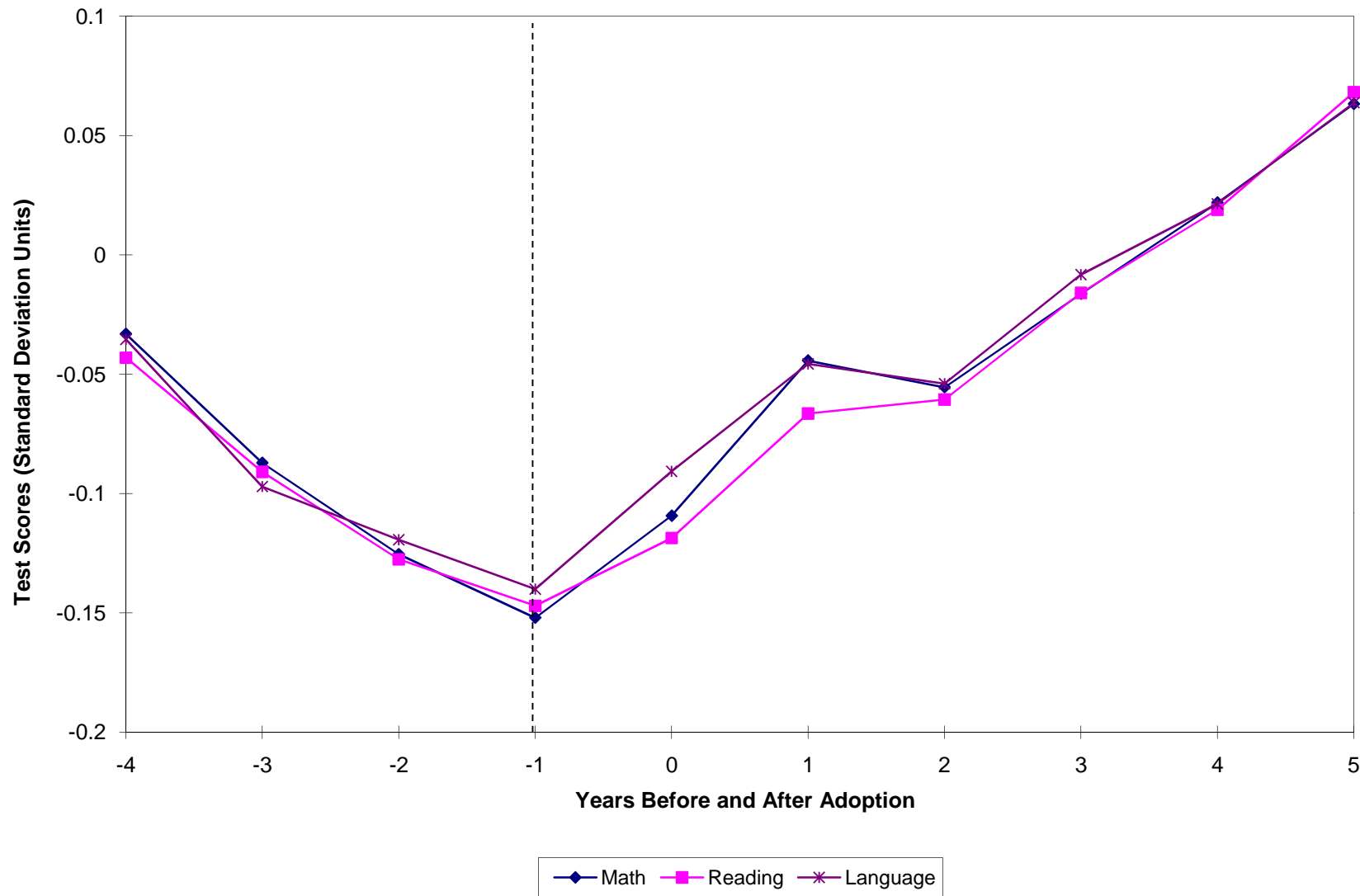
**Figure 2 - Discipline and Attendance Before and After Uniform Adoption
Grades 1 - 5**



**Figure 3 - Discipline and Attendance Before and After Uniform Adoption
Grades 6 - 12**



**Figure 4: Student Test Scores Before and After Uniform Adoption
Grades 1 - 5**



**Figure 5: Student Test Scores Before and After Uniform Adoption
Grades 6 - 12**

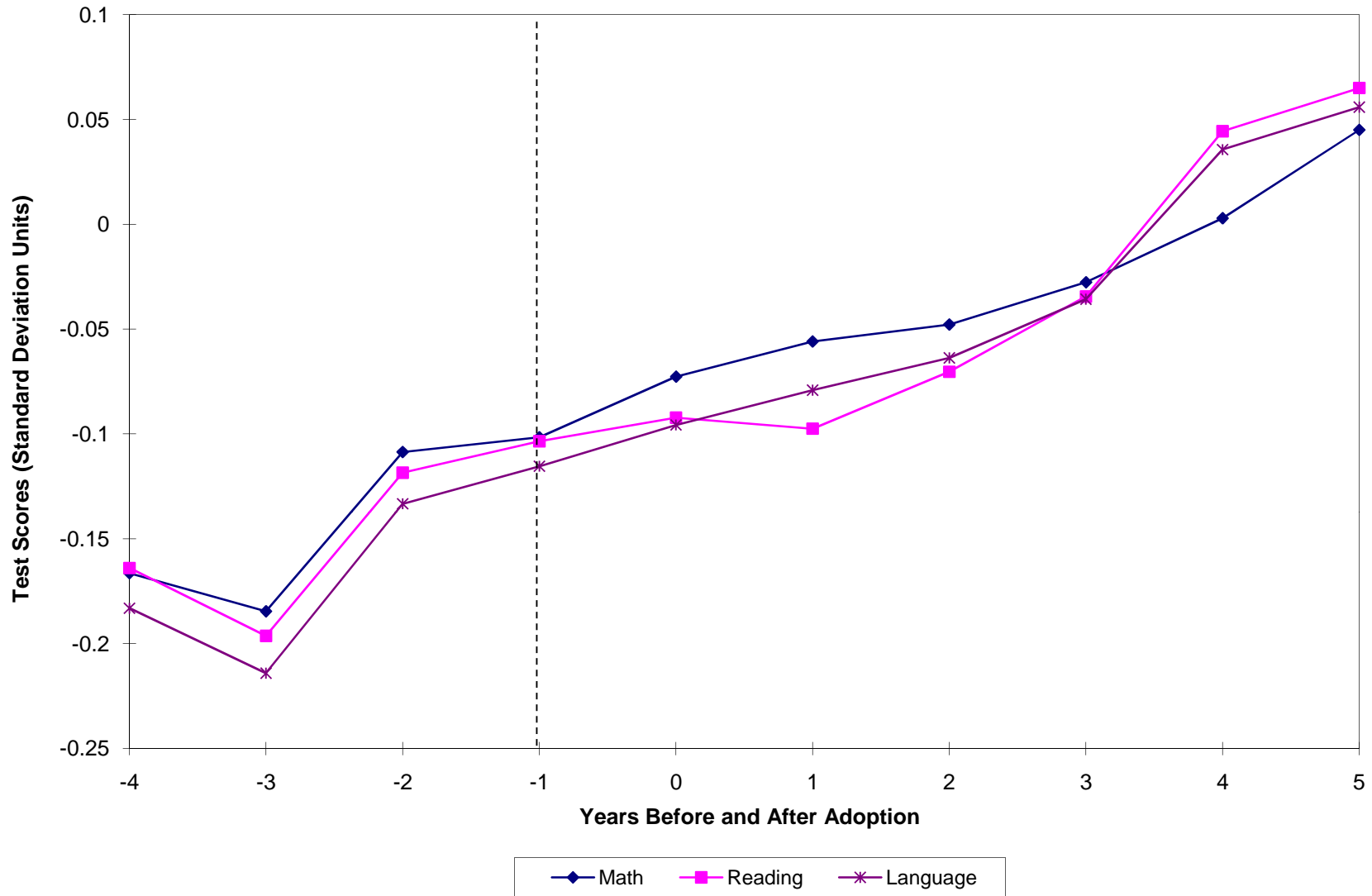


Table 1: Descriptive Statistics

	A. Demographics				B. Outcomes		
	Uniform Not Required	Uniform Required	Uniform Status Unknown		Uniform Not Required	Uniform Required	Uniform Status Unknown
Female	0.49 (0.50)	0.50 (0.50)	0.48 (0.50)	Stanford Math	0.06 (1.05)	0.01 (0.98)	-0.10 (0.96)
Black	0.34 (0.47)	0.28 (0.45)	0.38 (0.48)	Observations	376,590	569,251	246,755
Hispanic	0.49 (0.50)	0.59 (0.49)	0.53 (0.50)	Stanford Reading	0.06 (1.05)	0.01 (0.99)	-0.11 (0.94)
White	0.13 (0.34)	0.10 (0.29)	0.07 (0.25)	Observations	376,033	569,203	247,008
Grade Level	6.91 (3.45)	5.16 (3.04)	4.78 (2.83)	Stanford Language	0.06 (1.05)	0.01 (0.98)	-0.11 (0.95)
Free Lunch	0.51 (0.50)	0.63 (0.68)	0.68 (0.47)	Observations	375,681	569,009	246,671
Reduced Price Lunch	0.05 (0.22)	0.09 (0.29)	0.07 (0.25)	Disciplinary Infractions	0.43 (1.33)	0.45 (1.42)	0.38 (1.28)
Limited English Proficiency	0.22 (0.41)	0.27 (0.44)	0.28 (0.45)	Observations	1,107,333	859,730	528,054
At Risk Status	0.56 (0.50)	0.59 (0.49)	0.58 (0.49)	Attendance Rate	93.62 (9.87)	95.42 (7.10)	94.55 (8.64)
Special Education	0.11 (0.32)	0.11 (0.31)	0.11 (0.31)	Observations	1,077,790	856,069	518,304
Gifted and Talented	0.12 (0.33)	0.11 (0.32)	0.07 (0.26)				
Observations	1,107,333	859,730	528,054				
School-Years	1345	1446	1211				

Standard deviations in parentheses. All test scores are measured in standard deviations from the grade-year mean scale score.

Table 2: Effect of Uniforms on Discipline & Attendance

	(1)	Females (2)	(3)	(4)	Males (5)	(6)
A. Elementary						
i. Attendance Rate						
Uniform Required	0.481 (0.292)	0.039 (0.040)	0.059 (0.044)	0.495* (0.294)	-0.087** (0.043)	-0.122** (0.048)
Observations	429,626	429,626	421,916	448,505	448,505	440,332
ii. Disciplinary Infractions						
Uniform Required	-0.007 (0.005)	-0.001 (0.005)	-0.002 (0.003)	-0.008 (0.015)	0.015 (0.020)	-0.007 (0.011)
Observations	436,940	436,940	429,092	456,590	456,590	448,250
B. Middle/High						
i. Attendance Rate						
Uniform Required	0.869 (0.561)	0.480*** (0.136)	0.475*** (0.170)	0.646 (0.537)	0.271* (0.139)	0.395** (0.154)
Observations	525,447	525,447	511,404	530,281	530,281	515,904
ii. Disciplinary Infractions						
Uniform Required	-0.003 (0.070)	0.062 (0.040)	0.068 (0.047)	0.064 (0.107)	0.130** (0.064)	0.084 (0.075)
Observations	534,135	534,135	519,690	539,398	539,398	524,560
Student Fixed Effects		X	X		X	X
School Fixed Effects		X	X		X	X
School-Specific Linear Time Trends		X	X		X	X
Principal Fixed Effects			X			X

Standard errors clustered by school in parentheses. Elementary covers grades 1 - 5 and middle/high covers grades 6 - 12 limited to students with two consecutive observations. Each regression includes grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3 Effect of Uniforms on In-School and Out-of-School Suspensions

	A. Females		B. Males	
	In-School Suspensions (1)	Out-of-School Suspensions (2)	In-School Suspensions (3)	Out-of-School Suspensions (4)
i. Elementary				
Uniform Required	0.000 (0.002)	0.001 (0.005)	0.002 (0.011)	0.014 (0.019)
Observations	375,500	375,500	392,516	392,516
ii. Middle/High				
Uniform Required	0.097*** (0.035)	-0.038** (0.016)	0.190*** (0.051)	-0.053* (0.028)
Observations	457,541	457,541	461,963	461,963

LUSD did not report disaggregated suspension data in 1995-96 and 1996-97. Standard errors clustered by school in parentheses. Elementary covers grades 1 - 5 and middle/high covers grades 6 - 12 limited to students with two consecutive observations. Each regression includes student fixed-effects, school fixed-effects, school specific linear time-trends, grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Pre-Adoption Trends in Attendance and Discipline

	A. Attendance		B. Discipline	
	Females	Males	Females	Males
	(1)	(2)	(3)	(4)
i. Elementary				
4 or More Years Prior to Adoption	0.126 (0.094)	0.092 (0.094)	0.004 (0.008)	-0.006 (0.026)
3 Years Prior to Adoption	0.013 (0.065)	0.012 (0.061)	0.003 (0.006)	-0.016 (0.021)
2 Years Prior to Adoption	0.043 (0.049)	0.016 (0.046)	0.004 (0.004)	0.004 (0.014)
Uniform Required	0.038 (0.041)	-0.094** (0.042)	0.003 (0.006)	0.015 (0.020)
Observations	429,626	448,505	436,940	456,590
ii. Middle/High				
4 or More Years Prior to Adoption	-0.313 (0.313)	-0.333 (0.338)	-0.079 (0.056)	-0.189** (0.088)
3 Years Prior to Adoption	-0.283 (0.200)	-0.303 (0.221)	-0.014 (0.047)	-0.096 (0.087)
2 Years Prior to Adoption	-0.034 (0.145)	-0.019 (0.159)	-0.027 (0.043)	-0.074 (0.074)
Uniform Required	0.456*** (0.135)	0.250* (0.135)	0.059 (0.038)	0.110* (0.063)
Observations	525,447	530,281	534,135	539,398

Standard errors clustered by school in parentheses. Each regression includes student and school fixed effects along with school-specific time trends, grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. Elementary includes students in grades 1 - 5, while middle/high includes grades 6 - 12. *, **, and *** denote statistical significance at

Table 5: Effect of Uniforms on Attendance and Discipline by Time Since Adoption

	A. Attendance		B. Discipline	
	Females (1)	Males (2)	Females (3)	Males (4)
i. Elementary				
Year of Adoption	0.039 (0.039)	-0.102** (0.042)	0.001 (0.005)	0.011 (0.020)
1 Year After Adoption	0.040 (0.052)	-0.062 (0.055)	0.002 (0.006)	0.022 (0.022)
2 or More Years After Adoption	0.168** (0.072)	0.000 (0.071)	0.004 (0.009)	0.010 (0.026)
Observations	429,626	448,505	436,940	456,590
ii. Middle/High				
Year of Adoption	0.549*** (0.124)	0.387*** (0.139)	0.066 (0.044)	0.135** (0.065)
1 Year After Adoption	0.320* (0.192)	0.007 (0.172)	0.062 (0.045)	0.133 (0.086)
2 or More Years After Adoption	0.548* (0.304)	0.376 (0.258)	0.004 (0.062)	0.020 (0.105)
Observations	525,447	530,281	534,135	539,398

Standard errors clustered by school in parentheses. Each regression includes student and school fixed effects along with school specific time-trends, grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. Elementary includes students in grades 1 - 5, while middle/high includes grades 6 - 12. *, **, and *** denote statistical significance at the 10%,

Table 6: Effect of Uniforms Interacted with Race on Attendance and Discipline

	A. Attendance		B. Discipline	
	Females (1)	Males (2)	Females (3)	Males (4)
	i. Elementary			
Uniform Required	-0.298*** (0.085)	-0.289*** (0.096)	-0.006 (0.005)	-0.008 (0.019)
Uniform Required X African-American	0.439*** (0.098)	0.172 (0.106)	0.030** (0.011)	0.084** (0.039)
Uniform Required X Hispanic	0.357*** (0.089)	0.255** (0.100)	-0.003 (0.005)	-0.003 (0.020)
Observations	429,626	448,505	436,940	456,590
	ii. Middle/High			
Uniform Required	0.245 (0.184)	0.276 (0.194)	0.078* (0.045)	0.129** (0.062)
Uniform Required X African-American	0.360** (0.156)	0.205 (0.171)	-0.043 (0.048)	-0.017 (0.065)
Uniform Required X Hispanic	0.206 (0.175)	-0.115 (0.177)	-0.005 (0.040)	0.010 (0.064)
Observations	525,447	530,281	534,135	539,398

Standard errors clustered by school in parentheses. Each regression includes student and school fixed effects along with school specific time-trends, grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. Elementary includes students in grades 1 - 5, while middle/high includes grades 6 - 12. *, **, and *** denote statistical significance at the 10%, 5%,

Table 7 - Effect of Uniforms on Achievement Gains

	Females			Males		
	(1)	(2)	(3)	(1)	(2)	(3)
A. Elementary						
i. Change in Stanford 9/10 Math						
Uniform Required	0.001 (0.011)	-0.036 (0.033)	-0.034 (0.041)	0.012 (0.013)	0.024 (0.031)	0.007 (0.034)
Observations	117,244	117,244	114,581	121,261	121,261	119,012
ii. Change in Stanford 9/10 Reading						
Uniform Required	0.004 (0.010)	-0.015 (0.030)	-0.038 (0.035)	0.009 (0.011)	0.030 (0.032)	0.034 (0.040)
Observations	117,036	117,036	114,682	120,964	120,964	118,730
iii. Change in Stanford 9/10 Language						
Uniform Required	0.016 (0.010)	0.055* (0.031)	0.056 (0.041)	0.013 (0.010)	0.025 (0.033)	0.050 (0.045)
Observations	117,311	117,311	114,943	121,266	121,266	119,031
B. Middle/High						
i. Change in Stanford 9/10 Math						
Uniform Required	-0.021 (0.014)	0.033 (0.036)	0.046 (0.036)	-0.012 (0.012)	0.011 (0.031)	0.024 (0.033)
Observations	177,220	177,220	174,676	173,582	173,582	171,127
ii. Change in Stanford 9/10 Reading						
Uniform Required	-0.018* (0.010)	-0.006 (0.018)	-0.020 (0.029)	-0.017* (0.010)	-0.026 (0.021)	-0.020 (0.026)
Observations	177,252	177,252	174,702	173,323	173,323	170,835
iii. Change in Stanford 9/10 Language						
Uniform Required	-0.002 (0.009)	0.052*** (0.019)	0.025 (0.018)	-0.008 (0.008)	0.038 (0.025)	0.030 (0.031)
Observations	176,858	176,858	174,298	172,972	172,972	170,526
Student Fixed Effects		X	X		X	X
School Fixed Effects		X	X		X	X
School-Specific Linear Time Trends		X	X		X	X
Principal Fixed Effects			X			X

Standard errors clustered by school in parentheses. Sample includes students in grades 1 - 5 limited to students with two consecutive observations. Each regression includes grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. Elementary includes students in grades 1 - 5, while middle/high includes grades 6 - 12. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8: Effect of Uniforms on Test Score Gains by Time Since Adoption

	A. Math		B. Reading		C. Language	
	Female (1)	Male (2)	Female (3)	Male (4)	Female (5)	Male (6)
i. Elementary						
Year of Adoption	-0.047 (0.036)	0.015 (0.033)	-0.015 (0.032)	0.027 (0.035)	0.054* (0.032)	0.015 (0.032)
1 Year After Adoption	0.002 (0.040)	0.016 (0.033)	-0.030 (0.043)	0.027 (0.040)	-0.000 (0.037)	0.007 (0.039)
2 or More Years After Adoption	-0.021 (0.057)	-0.021 (0.048)	-0.037 (0.055)	0.013 (0.058)	-0.027 (0.050)	-0.041 (0.047)
Observations	117,244	121,261	117,036	120,964	117,311	121,266
ii. Middle/High						
Year of Adoption	0.035 (0.034)	0.010 (0.029)	-0.010 (0.019)	-0.032 (0.021)	0.050** (0.020)	0.033 (0.024)
1 Year After Adoption	0.083 (0.060)	0.079 (0.054)	0.035 (0.024)	0.038 (0.035)	0.081*** (0.023)	0.063* (0.033)
2 or More Years After Adoption	0.113* (0.057)	0.094* (0.055)	0.026 (0.025)	0.028 (0.032)	0.086*** (0.025)	0.048 (0.036)
Observations	177,220	173,582	177,252	173,323	176,858	172,972

Standard errors clustered by school in parentheses. Elementary covers grades 1 - 5 and middle/high covers grades 6 - 11 limited to students with two consecutive observations. Each regression includes student and school fixed effects along with school specific time-trends, grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. *, **, and *** denote staistical significance at the 10%, 5%, and 1% levels, respectively.

Table 9: Linear Probability Models of Likelihood of Leaving District or Switching Schools After Uniform Adoption

	A. Female		B. Male	
	Switches Schools in LUSD	Leaves LUSD	Switches Schools in LUSD	Leaves LUSD
	(1)	(2)	(3)	(4)
	i. Elementary			
Uniform Required	-0.0078 (0.0070)	-0.0068** (0.0032)	0.0006 (0.0074)	-0.0049 (0.0031)
Observations	342,332	342,332	358,656	358,656
	ii. Middle/High			
Uniform Required	0.0061 (0.0100)	-0.0123** (0.0050)	0.0137 (0.0109)	-0.0031 (0.0065)
Observations	373,256	373,256	384,381	384,381

Standard errors clustered by school in parentheses. Elementary includes grades 1 - 5, middle/high includes grades 6 - 11. Each regression includes student and school fixed effects along with school-specific linear time trends, grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. All regressions exclude students who are in the highest grade in their school. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 10: Effect of Uniforms on Likelihood of Leaving District
Interactions with Demographics

	A. Elementary		B. Middle/High	
	Females	Males	Females	Males
	(1)	(2)	(3)	(4)
Uniform Required	0.0191* (0.0099)	0.0280*** (0.0088)	-0.0122* (0.0069)	0.0099 (0.0101)
Uniform Required X Black	-0.0094 (0.0103)	-0.0223** (0.0091)	-0.0000 (0.0077)	-0.0034 (0.0096)
Uniform Required X Hispanic	-0.0286*** (0.0101)	-0.0403*** (0.0078)	-0.0047 (0.0089)	-0.0133* (0.0072)
Uniform Required X Disadvantaged	-0.0055 (0.0048)	-0.0010 (0.0046)	0.0016 (0.0040)	-0.0047 (0.0040)
Uniform Required X Gifted	-0.0163*** (0.0056)	-0.0055 (0.0067)	0.0117 (0.0101)	0.0158 (0.0111)
Uniform Required X Special Ed	-0.0067 (0.0065)	-0.0132** (0.0054)	0.0043 (0.0078)	-0.0056 (0.0074)
Disadvantaged	0.0090** (0.0036)	0.0070* (0.0037)	0.0076*** (0.0021)	-0.0061** (0.0025)
Gifted	0.0186*** (0.0045)	0.0113** (0.0046)	-0.0245*** (0.0044)	-0.0186*** (0.0039)
Special Ed	0.0086* (0.0051)	0.0164*** (0.0046)	0.0074 (0.0085)	0.0337*** (0.0074)
Observations	342,332	358,656	373,256	384,381

Standard errors clustered by school in parentheses. Regressions exclude maximum grade in each school. Each regression includes student and school fixed effects along with grade indicators, year indicators, interactions of grade and year indicators, and the student's free-lunch, reduced-price lunch, or other economic disadvantage status. Elementary includes students in grades 1 - 5, while middle/high includes grades 6 - 11. Quartiles are determined based on the average of math and reading scores after standardizing within grade and year. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.