ANNENBERG
BROWN UNIVERSITY

EdWorkingPaper No. 21-399

The Effects of Teacher-Student Demographic Matching on Social-Emotional Learning

Christopher Cleveland
Boston University

Ethan Scherer
Harvard University

A growing body of research shows that students benefit when they demographically match their teachers. However, little is known about how matching affects social-emotional development. We use student-fixed effects to exploit changes over time in the proportion of teachers within a school grade who demographically match a student to estimate matching's effect on social-emotional measures, test scores, and behavioral outcomes. We find improvements for students in grit and interpersonal self-management when matched to teachers of their race and gender. Black female students drive these effects. We also find that matching reduces absences, especially for Black students. Our findings add to the emerging teacher diversity literature by showing its benefits for Black and female students during a critical stage of development.

VERSION: January 2024

Suggested citation: Cleveland, Christopher, and Ethan Scherer. (2024). The Effects of Teacher-Student Demographic Matching on Social-Emotional Learning. (EdWorkingPaper: 21-399). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/3xq6-4k05

The Effects of Teacher-Student Demographic Matching on Social-Emotional Learning

Christopher Cleveland*
Boston University
Wheelock College of Education and Human Development
2 Silber Way, 3rd Floor
Email: chcleve@bu.edu

Ethan Scherer
Center for Education Policy Research at Harvard University
50 Church Street, 4th Floor
Cambridge, MA 02138
Email: ethan_scherer@gse.harvard.edu

* Indicates correspondence author

Acknowledgements: The authors are thankful for feedback and advice from Martin West, conference participants at AEFP and APPAM, and excellent research assistant work from Rebecca Ivester. We thank the Walton Family Foundation for financial support, the Massachusetts Department of Elementary and Secondary Education, and each of the charter management organizations for providing the administrative data for this work. Any errors of fact or interpretation are our own. The research reported here was supported, in whole or in part, by the Institute of Education Sciences, U.S. Department of Education, through grant R305B150010 to Harvard University. The opinions expressed are those of the authors and do not represent the views of the Institute or the U.S. Department of Education.

Abstract

A growing body of research shows that students benefit when they demographically match their teachers. However, little is known about how matching affects social-emotional development. We use student-fixed effects to exploit changes over time in the proportion of teachers within a school grade who demographically match a student to estimate matching's effect on social-emotional measures, test scores, and behavioral outcomes. We find improvements for students in grit and interpersonal self-management when matched to teachers of their race and gender. Black female students drive these effects. We also find that matching reduces absences, especially for Black students. Our findings add to the emerging teacher diversity literature by showing its benefits for Black and female students during a critical stage of development.

Keywords: Social-emotional; non-cognitive skills; teacher-student assignment; teacher-student gender and race match; minority students; minority teachers; achievement gap

Introduction

Over the last decade, there has been an increased focus on the importance of school-based outcomes other than test scores, especially social-emotional (or non-cognitive) skills that predict both long-run academic performance and earnings (Chetty et al., 2011; Almlund et al., 2011; Heckman and Mosso, 2014). As momentum has gathered to collect these measures at scale, like academic outcomes, researchers have also begun to describe significant differences in social-emotional measures between races and genders (de Brey et al., 2019; Reardon et al., 2019; West et al., 2020).

Given the importance of teachers in improving student outcomes, one proposed strategy to reduce the gaps between groups is to increase the racial and gender diversity of the teaching workforce to reflect the diversity of the student population. The PK-12 student population has grown increasingly diverse over the last two decades (de Brey et al., 2019), yet still, 80 percent of U.S. teachers are white, and 77 percent are female (US DOE, 2017). The policy of increasing teacher workforce diversity has gained traction through a growing body of work that racially similar teachers can benefit students. Teacher-student racial matching is associated with gains in student achievement (Dee, 2004; Goldhaber and Hansen, 2010; Egalite, Kisida, and Winters, 2015; Harbatkin, 2021), reductions in absences and suspensions (Holt and Gershenson, 2015; Lindsay and Hart, 2017; Blazar, 2021; Blazar and Lagos, 2021; Gottfried et al., 2021; Shirrell et al., 2021), and reduction of high school dropout and improvements in college enrollment (Dee and Penner, 2019; Gershenson et al., 2019). However, several papers have also found null effects of racial matching on student achievement (Ehrenberg et al., 1995; Howsen and Trawick, 2007; DuBois and Schanzenbach, 2017). Even when there have been statistically significant effects, the effects on test score outcomes for a single year have been relatively small.

However, most of these small or null findings have focused on test scores. Thus, part of the research momentum for the teacher-student racial match, particularly for Black students, is the number of studies in diverse contexts that have consistently found effects on outcomes that measure both cognitive and social-emotional improvements, like GPA, or outcomes that often proxy for direct measures of social-emotional development like absences, suspensions, high school dropout, and graduation, as well as college enrollment. These findings collectively suggest that social-emotional improvements that strongly correlate with behavioral outcomes (West et al., 2020; Blazar, 2021) could be a key mechanism through which racial matching improves outcomes less likely to translate to large test score effects.

In contrast to the racial matching papers, gender matching papers in K-12 have focused mainly on students' test score outcomes, and the evidence has tended to be more ambiguous. While studies have found minor positive effects (Winters et al., 2013) others have found null and negative results of gender matching (Dee, 2007; Goldhaber and Hansen, 2010; Antecol et al., 2015). To our knowledge, one study in gender matching literature has focused on measures directly or indirectly related to social-emotional development (Egalite and Kisida, 2017). This study focuses on students' academic perceptions and attitudes of how a teacher feels about them rather than the student's development. Deepening our understanding of how racial and gender matching affect social-emotional and behavioral measures they relate to remains an important unexplored area of literature.

We address this gap in the literature by investigating race and gender matching's effects on student social-emotional, academic, and behavioral outcomes in six diverse Boston charter management organizations. We use a unique dataset of student social-emotional surveys in 5th to 8th grade and link these surveys to rich administrative data for students and teachers. We

estimate the effects of increasing the proportion of a student's race and gender-matching teachers on student self-reports of growth mindset (G.M.), grit, interpersonal self-management (ISM), social awareness (S.A.), and student academic and behavioral outcomes.

Our results contribute to the literature on teacher-student demographic matching in three ways. First, we find a significant reduction in absences for students who match their teacher's race or gender. Second, we demonstrate that matching does improve social-emotional self-reported measures, and we are the first study to directly explore demographic matching on interpersonal skills, which are growing increasingly important in the labor market (Deming, 2017). Third, in a charter context that emphasizes teachers holding high expectations for all students, demographic matching still provides additional benefits to students. These results highlight the value of continuing to diversify the teacher workforce.

Previous Literature

Racial Matching Literature

The evidence of teacher-student racial matching on student academic and behavioral outcomes continues to grow (Ehrenberg et al., 1995; Dee, 2004; Howsen and Trawick, 2007; Goldhaber and Hansen, 2010; Egalite, Kisida and Winters, 2015; Holt and Gershenson, 2015; DuBois and Schanzenbach, 2017; Lindsay and Hart, 2017; Gershenson et al., 2019; Harbatkin, 2021). However, particularly for the test score outcome, the estimates have ranged from being quite large, where Dee (2004) found effects of over 0.2 standard deviations, to small (i.e., 0.01 to 0.04 standard deviations), to null when using quasi-experimental methods on large state/national longitudinal datasets (Ehrenberg et al., 1995; Howsen and Trawick, 2007; DuBois and Schanzenbach, 2017). However, the effects have been consistently positive when considering outcomes associated with social-emotional development, like absences and suspensions. For

example, in elementary school, Holt and Gershenson (2015) found modest reductions in absences for being taught by a similar race teacher. These results have been replicated in high school (Gottfried et al., 2021) and elementary school (Blazar and Lagos, 2021).

Holt and Gershenson (2015) also find a nearly 19 percent decrease in the number of suspensions in elementary school, while Lindsay and Hart (2017) and Shirrell et al. (2021) find smaller, but significant reductions. These effects could accumulate over time and be significant for long-term outcomes like high school chronic absenteeism, dropout, and college enrollment (Dee and Penner, 2019; Gershenson et al., 2019; Blazar, 2021). These effects are consistent with social-emotional measures' associations with student outcomes, with a relatively modest association with test scores and stronger relationships with outcomes like GPA (West et al., 2020), suggesting that a critical mechanism that racial matching operates through is improving social-emotional learning.

Gender Matching Literature

Gender matching results have been more mixed in the K-12 context. Dee (2007) found positive effects for males in mathematics but adverse effects for females. However, for ELA test scores, neither group benefited from matching. In contrast, using large state longitudinal datasets Winters et al. (2013) found effects of between 0.01 and 0.02 standard deviations for middle school females and males in both ELA and Math. Still, Goldhaber and Hansen (2010) found null effects for gender. However, experimental evidence in elementary schools has found adverse math score effects for females (Antecol et al., 2015). Egalite and Kisida (2017) found large and significant effects of matching on students' perception of their teachers for Black male and female students. These students reported that their teachers pushed them to work hard but ensured that they understood the class material and provided helpful feedback. These positive

perceptions could translate into students' perceptions that they can persist and improve or express care towards other classmates, but these remain unexplored areas of literature. Furthermore, whether gender matching can improve behaviors or academics across contexts and grade ranges remains ambiguous.

Teacher Training and Expectations Literature

Given the potential promise of demographic matching and the inherent difficulty of changing the teacher supply chain, some have advocated for training to mimic some of the mechanisms believed to operate through demographic matching that influence students' intrapersonal and interpersonal skills. Egalite and Kisida (2018) advocate educating teachers on tools to engage in culturally responsive teaching to help students feel more engaged with the curriculum. Another dimension that training could enhance is setting high expectations for all students. High-performing charter schools have been able to embed high expectations for students into their culture. A key pillar of many high-performing charters is that all students will attend a post-secondary institution and obtain professional careers. These expectations could help correct misperceptions and beliefs about the effort and skills needed to reach these goals (Egalite and Kisida, 2018; Gershenson et al., 2019). Furthermore, empirical evidence shows that some of these schools changed student post-secondary expectations and increased the number of students enrolling in post-secondary education (Angrist et al., 2016; Coen, Nichols-Barrer, and Gleason, 2019; Davis and Heller, 2019).

Testing if there is an additional benefit to teacher-student demographic matching in this study's context, expands the current literature by providing a case of how the expectations modeled in these charters influence the effects of demographic matching. If teachers are role models for students who match their demographics, we would still expect to observe the positive

effects of matching. For example, prior work on non-elementary absences identified two potential mechanisms of increased attendance: higher expectations or students' connectedness to school (Gottfried et al., 2021). Observed effects in our high-expectation context might provide evidence of the importance of connectedness above and beyond high expectations. In addition, the strength of the effect might vary across outcomes. For example, while G.M. and grit are intrapersonal measures, if matching operates through being a role model, the teacher might influence grit more than G.M. because, at a minimum, leading the class showcases their success and persistence.

Data and Measures

Data Collection and Administrative Data

We combine rich student-level survey data with state administrative records for 5th - 8th-grade students attending Boston's public charter middle schools during the 2015 to 2019 school years. Within these schools, we sampled all students from whom we received parental consent to participate and who attended school on the data collection day. Students completed surveys assessing their social-emotional development in their regular classrooms. We then merged these data with student-level administrative data—enrollment, attendance, suspensions, math and English language arts (ELA) test scores on the Massachusetts Comprehensive Assessment System (MCAS) and typical demographic information—provided by the Massachusetts Department of Elementary and Secondary Education (MADESE). MCAS scaled scores were standardized by grade, subject, and year by all students in Boston Public School to have mean zero and variance one. The administrative data is available for all students, but the student response rates on the survey averaged 80% overall. We compared the students who responded to the survey and the students who did not take the survey. On average, these non-responding

students performed worse academically and were more likely to be absent or suspended. To allows us to directly compare our results to prior studies we utilize the administrative data sample for our behavioral and test score outcomes. However, to assess how this selection affects our estimates, we rerun our models for the administrative data using the survey-only sample and then compare them to the results in the paper. Furthermore, we also explored if survey response varied by year. For the years between 2016-2019, response rates varied between 78% and 81%, but was 73% in 2015 because some schools had trouble administering the survey. However, the demographics of the samples were not statistically different between 2015 and the other years. The baseline characteristics of the student sample are in Table 1. Notably, most students in the sample are Black (47%) and receive free or reduced price lunch (67%).

We also received administrative data for the teachers of students attending Boston's public charter middle schools during the 2015 to 2019 school years. We include all teachers in the participating schools. The characteristics of the teacher sample are in the second panel of Table 1. Most teachers are White (69%) and female (72%). We then link the students to teachers who taught the students. Next, we calculate the proportion of teachers who matched the student's demographics. Note that when calculating the match rate, the median student took about 8 classes in middle school. Many students not only took math, English, science, and social studies, but also classes on art, foreign language, or physical education. For students with more than 8 teachers, these numbers often included special education instructors, co-teachers, etc. The goal of including a wide range of subjects is that social-emotional change is not confined to academic subjects. The anecdotes of the thoughtful physical education or inspirational music teacher do not fit into the traditionally analyzed academic boundaries. Table 2 shows the proportion of teachers who match a student's race or gender. Although white students are the minority in our

sample, they are more likely to have a racial match than students of other racial groups. For example, thirty-four percent of white students have a racial and gender match with a teacher compared to ten percent of Black students.

Social-Emotional Survey Measures

We derive our social-emotional data from online and paper surveys to measure social-emotional skills in multiple areas. These surveys were administered to students within their classrooms near the end of the academic year. The survey consisted of four constructs scales: (1) *grit*, a combination of passion and persistence over an extended period; *growth mindset*, the belief that one's intelligence is malleable and can grow with effort; *interpersonal self-management*, the ability to regulate one's emotions, thoughts and behaviors with others; and (4) *social awareness*, the ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports. To measure student's grit, we used the Short Grit Scale (Farrington, 2013; Duckworth and Quinn, 2009). Students respond to four items (e.g., "I finish whatever I begin") on a five-point scale ranging from "not like me at all" to "very much like me." For the other scales refer to Meyer et al. (2018) for further details. The first two constructs represent our intrapersonal measures, while the second two represent our interpersonal ones. For all the scales, we take the average score for the items. In our data the scales have the following sufficient alphas: 0.76, 0.70, 0.79, 0.86 for grit, GM, ISM, and SA, respectively. A validation study using our survey measures, except grit, found the measures to have high structural validity and reliability Meyer et al. (2018).

Empirical Strategy

We use a student-fixed effects strategy to understand the relationship between teacher-student demographic matching and social-emotional, academic, and behavioral outcomes. Lindsay and Hart (2017) note that using a simple regression approach to estimate matching effects could result in bias estimates due to unobserved factors, such as Black students disproportionately matching to Black teachers. Like their work and others in the race and gender matching literature (e.g., Egalite and Kisida, 2018), we leverage that the proportion of demographically matching (or non-matching) teachers a student experiences varies across years. For example, in year *t* a student might have two of eight teachers share their race while in year t+1 that student might have four of eight teachers share their race. We use student-fixed effects to compare the student's self-reports, observed test scores, and behavior over time. Using these models controls for students' time-invariant qualities like persistent traits or ability. The model specification is the following:

$$Y_{igst} = B_0 + \beta_1 \boldsymbol{Same}_{igst} + \beta_3 StudRaceGend_{igst} + \beta_4 SchoolGradeChar_{igst} + \mu_s + \sigma_g + \omega_t + \tau_i + \epsilon_{igst}$$

Y_{gsit} represents student *i*'s outcome, in grade g in school s in period t. The predictors of interest $Same_{igst}$ is a vector of variables for student *i*'s proportion of teachers who share student i's race and/or gender in grade g at school s at time *t*. Following Egalite and Kisida (2018), the *Same* vector in our main model contains four mutually exclusive categories: *Same Race and Same Gender, Same Race and Other Gender, Other Race and Same Gender, and Other Race and Other Gender*, with the last variable omitted as the reference category. The coefficient on the $Same_{igst}$ vector is from the variation within a given student, over time. The proportion of demographically matching teachers assigned to each student varies by year allowing us to estimate the effect of having more or fewer demographically teachers across time. We also

include $StudRaceGender_{igst}$ representing student *i*'s proportion of students in the school grade who share student i's race or gender at time *t* and $SchoolGradeChar_{igst}$ that consists of characteristics of the student's school grade including the proportion of students receiving free/reduced-price lunch, students with an Individualized Education Program, English language learners, the average prior year test scores in math and ELA and teacher characteristics of the grade, like the proportion of teachers for each race and gender, and average experience and experience squared of the school-grade team. We include student-fixed effects τ_i, grade fixed effects σ_g, and time-fixed effects ω_t. Standard errors cluster at the school-grade level. We model the linear and quadratic versions of the main predictors and present the quadratic results in the Appendix Table A6, A7, and A8. While there is evidence that ELA test scores for some groups could be non-linear, these seem less systematic and as such, present the linear results. Because we present multiple outcomes, we also test our confirmatory results to the sensitivity of false discoveries using the Benjamini-Hochberg procedure with a false discovery rate (FDR) set to 0.10 (Benjamini & Hochberg, 1995).

Results

Social-Emotional Outcomes

We first examine how the proportion of teacher-student race and gender matching are associated with social-emotional learning outcomes. Figure 1 reports the outcome and the coefficients of interest, proportion matching on gender and race, matching on race but not gender, matching on gender but not race, and each estimate's confidence intervals. Table A1 provides the coefficients for the overall sample. Table A2 provides the coefficients by student race and gender. For each dot color, the coefficient on the y-axis is from the same regression (i.e., each blue dot is a different coefficient from the same regression). The top blue dot reports

the overall effect. In all cases, the comparison group is when students do not match the race or gender of their teacher. For every social-emotional outcome, when students match both gender and race, the effect is positive. When more teachers match a student's gender and race, students rate themselves higher on grit and interpersonal self-management. These effects are significant at the 0.10 level and remain significant even after applying the multiple hypothesis correction to account for the number of student outcomes compared (Benjamini & Hochberg, 1995). The coefficients in our model represent a 100 percent change in the proportion of matching, which is not practical in our context. In our sample, the mean number of teachers is 8. An increase of one additional teacher is about 10 percent. As such, we divide each of the estimates by 10 to understand a 10-percentage point change in the fraction of demographic matching. A 10-percentage point increase in the proportion of students matching gender and race, increases grit and ISM by 0.017 and .018, respectively. In our sample, across all students and grades, students tend to decline about 0.05 standard deviations each year in grit, for example. Thus, the magnitude of these effects is meaningful, a little less than 40 percent of a year's change during middle school. The effect in ISM is also practically large.

However, these overall effects mask differential benefits for specific groups of students. Our figures show separate regressions for Black female and male students. The red and green dot reports the coefficients for Black female and males, respectively. The positive effects in grit and ISM are driven by large and statistically significant effects for Black female students. The effects for Black male students are also large in magnitude but are not significant at the 0.10 level. In Appendix Table A2 we also report effects for white male and female students. As discussed earlier, while there is a high match rate for white students, the number of white students is relatively small in these schools, and we exclude them for parsimony in our figures due to the

large confidence intervals. However, these results suggest that the marginally significant overall effects are because the coefficients for white students are negative. The way to interpret these negative effects is that diversity benefits white students in these schools, particularly white females, because the comparison group for them is non-White male teachers (i.e., for white female students, their self-reported grit declines as the numbers of non-White male teachers decrease and white female teachers increase). These diversity effects for white females are statistically significant and large for grit and S.A., and significant at the 0.10 level in G.M. Thus, particularly for grit, a more diverse workforce benefits female students. We exclude Latinx students from our main results even though they represent 28% of our student population. Very few teachers, particularly male teachers, are Latinx in our sample. These make our estimates less precise. However, because so few papers report results for these students, we report them in Appendix Table A2 and A3 for policy purposes. Still, any results should be interpreted cautiously because of the wide confidence intervals. These results show that Latinx female students significantly improve their self-reported grit when taught by a Latinx teacher.

In addition, when students experience more gender, not race matching, the coefficients are positive for all the socio-emotional measures besides G.M. The blue dot overall effects show that when a higher proportion of teachers match on gender but not race, students rate themselves higher on grit and ISM. These effects also appear to be mainly driven by Black female students. Black females rate their own grit and ISM higher at the 0.10 level when matching on more teachers who share their gender but not race. While the coefficients are positive for almost all our measures, G.M. has negative coefficients but insignificant effects. However, the confidence intervals on these estimates are quite large and include some large positive effects. Also, G.M. had the lowest levels of internal consistency of all our measures, so the fact that the estimates are

less precise than the others is consistent with more measurement error. Overall, we find significant improvements in grit and ISM, with some of the largest benefits to Black females.

Academic and Behavioral Outcomes

We examine how the proportion of teacher-student race match is associated with academic and behavioral outcomes. These results use the full administrative data sample to compare to the estimates to the prior literature.

The top panel of Figure 2 reports the outcome coefficients for math and ELA standardized test scores. Table A1 provides the coefficients for the overall sample. Table A3 provides the coefficients by student race and gender. These results tend to be small or negative and insignificant at 0.05. While this contrasts with prior empirical work (Dee, 2004; Goldhaber and Hansen, 2010; Egalite, Kisida and Winters, 2015), our confidence intervals include prior effects estimates. In addition, to make a more direct comparison with prior work, Figure 1 provides estimates for matching solely on race (and gender). Figure A1 shows a small positive but insignificant effect for Black students on Math and ELA test scores. Thus, we may have insufficient power to detect the relatively small effects identified in prior work (Dee, 2004; Goldhaber and Hansen, 2010; Egalite, Kisida and Winters, 2015; Blazar, 2021; Blazar and Lagos, 2021). An exception to these patterns is the large and statistically significant effect for Black females taught by Black male teachers. In this case, for these students, an increase in the proportion of Black male teachers by about one teacher increases Math test scores by .034 standard deviation units. This effect aligns with Goldhaber and Hansen and is larger than Egalite et al. This effect remains significant even after applying the multiple hypothesis correction.

However, based on prior work (West et al., 2020), if teacher matching operates more through social-emotional learning, we would expect more significant effects for behavioral

outcomes like absences and suspension, which tend to be more strongly related to social-emotional measures. The bottom two panels of Figure 2 show that, particularly for students who match their teacher's race and gender, there are large and significant effects to matching for absences. These effects are not driven by a particular group of students, with a large and significant impact on Black males and females. In Appendix A3, the result indicates a significant reduction in the percentage of absences for Latinx female students as well. For Black female students, matching on approximately one more Black female teacher reduces their absences for the year by approximately 4.2 percent. These effects are larger than those found by Holt and Gershenson (2019) and Gottfried et al. (2021). However, we do not find significant reductions on ever being suspended. However, like test scores, the suspension reductions found in prior work are within our confidence intervals (Lindsay and Hart, 2017; Shirrell et al., 2021).

Note that we show these results for our survey sample in the Appendix in Table A4 and A5. Broadly, the behavioral effects and test score effects are larger in the full administrative data sample. These results suggest that the students who tend to perform worse on test scores and have more behavioral incidences, as noted in Table 1, tend to benefit more behaviorally and cognitively from teacher matching. Given suspension and absences strong association with social-emotional measures, we believe this provides evidence that our social-emotional results could underestimate the effects if we could survey all students.

Discussion and Conclusion

Using a unique longitudinal dataset, we estimate a student-fixed effects model that identifies the effects of increasing the proportion of teacher-student demographic matching on social-emotional survey measures and administrative data outcomes in high-expectation charter middle schools. We find large effects on inter and intrapersonal measures when students are

exposed to about one additional demographically matching teacher. Furthermore, there is evidence that exposure to one additional teacher matching the student's race and gender reduces the number of absences by approximately 2.3 percent.

Our work continues to build upon findings in the racial matching literature that matching improves behavioral outcomes associated with social-emotional measures. Black female students drive the social-emotional effects, while Black male and female students drive absence effects. Our effects suggest that a one-teacher increase in the proportion of Black teachers matching Black students would reduce the number of absences by about four percent. These are larger in magnitude than Holt and Gershenson (2019) and Gottfried et al. (2021) which focus on elementary and high school students, respectively. These larger effects could be attributable to the fact that middle school is a period of intense self-discovery, including the student's perception of racial and gender identity.

Furthermore, while a gender or racially matching teacher could set high expectations because high expectations are ubiquitous in our schools, our effects suggest that the ability of a teacher to connect with students could lead to these effects. While we need more statistical power to detect a statistically significant effect size from prior work, our results are not incongruent to the prior literature on suspensions and test scores. We find similar size effects for Black female students matched to Black male teachers on math standardized tests, though prior work focused on race match alone and not race and gender (Goldhaber and Hansen, 2010; Egalite et al., 2015). Our more precise and larger effects on absences, which are more in control of students and their families than suspensions, suggest that a first-order effect of gender and racial matching could be connectedness and engagement with school.

In addition, our work expands upon findings in both the gender- and racial-matching literature by moving beyond behavioral and test score outcomes. We find strong and consistent positive effects on grit. We also expand upon more common intrapersonal measures to assess if teacher-student matching improves how students interact with each other. Our ISM measure relates to classroom behavior, whereas social awareness is a broader measure of empathy. Because we more precisely estimate positive effects on ISM, it suggests that teacher-student matching could immediately affect how students rate their respect of fellow students in the classroom by interrupting them less, for example. These significant and positive results on the student self-reports of grit and ISM, in combination with the behavioral results, suggest racial matching improves both self-reports of social-emotional measures and behavioral outcomes.

These results are important for three reasons. First, we find a significant reduction in absences for Black students who match their teacher's race and gender. Prior research shows that increased absenteeism causes lower achievement (Gershenson et al., 2017; Goodman, 2014; Gottfried, 2011; Gottfried and Kirksey 2017). An immediate effect of diversifying the teacher workforce could be creating greater student connectedness to school. Second, and relatedly, our work broadens the understanding of how teacher-student demographic matching affects specific student skills. In our schools, demographic matching improves both personal motivation and how students interact with one another. These types of skills are becoming more important in our economy (Deming, 2017), and if these effects persist, as has been found in Gershenson et al. (2019) and Blazar (2021), they could provide significant long-term benefits. Middle school is a particularly tumultuous, where self-management and S.A. tend to decline for all students (West et al., 2020), so identifying interventions that assist during this time could be helpful.

Third, we build on prior evidence (Gershenson et al., 2019) that there are benefits to matching beyond skills that can be trained, like setting high expectations for students. While our results align with other papers exploring behavioral outcomes, the context of our results is in schools with prior evidence of increasing college enrollment through high expectations of students. In addition, our model focuses on the proportion of similar demographic teachers for all full-time teachers, including non-core subjects. These two results reaffirm the value of continuing to diversify the teacher workforce and that these benefits might not only need to be from traditional ELA and math teachers that have been explored more thoroughly in the past. This result provides some interesting future testable assumptions. For example, could community group members or tutors also play an essential mentorship role? Emerging evidence suggests that exposure to a more diverse professional staff could benefit student outcomes (Blazar and Lagos, 2021). While we do not argue that these individuals should substitute for the continued effort to diversify the teaching workforce, the labor market has been slow to change, and these individuals could provide short-run policy solutions to move the work forward.

A few limitations apply to this work. First, compared to prior evidence, we have a relatively smaller sample size and focus on a specific set of charter schools that are historically effective at increasing academic achievement and college enrollment. These differences limit the generalizability of our findings to lower-performing charter schools, and it could be helpful for others to replicate our work in other locations and among other charter schools. Second, it could be that the positive effects we observe are not the effect of race/gender matching but could indicate differences in teacher quality. For reasons discussed earlier, estimating social-emotional value-added for a particular teacher could incorrectly attribute social-emotional growth to that teacher.

Furthermore, social-emotional value-added is still in its infancy, and preliminary work has found the estimates to be less stable than test scores (Loeb et al., 2019) and often need to be more highly correlated with test score value-added (Jackson, 2018). Third, while the demographic matching literature has grown over the last couple of decades, it often relies on quasi-experimental methods using large secondary datasets, with the notable exception of Dee (2004), Antecol et al. (2015), and Blazar (2021) who used experimental data. Future research should confirm our findings using experimental data in multiple locations and with varied agency types.

References

Adapted from AIR and CASEL (2013) Student self-report of social and emotional competencies

Almlund, M., Duckworth, A. L., Heckman, J., & Kautz, T. (2011). Personality psychology and economics. In *Handbook of the Economics of Education* (Vol. 4, pp. 1-181). Elsevier. doi: 10.1016/B978-0-444-53444-6.00001-8

Angrist, J., Hull, P., Pathak, P., & Walters, C. (2016). Interpreting tests of school VAM validity. *American Economic Review*, *106*(5), 388-92.

Antecol, H., Eren, O., & Ozbeklik, S. (2015). The effect of teacher gender on student achievement in primary school. *Journal of Labor Economics*, *33*(1), 63-89.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. *Journal of the Royal statistical society: series B (Methodological)*, *57*(1), 289-300.

Blazar, D. (2021). Teachers of Color, Culturally Responsive Teaching, and Student Outcomes: Experimental Evidence from the Random Assignment of Teachers to Classes. (EdWorkingPaper: 21-501). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/jym0-wz02

Blazar, David, and Francisco Lagos. (2021). Professional Staff Diversity and Student Outcomes: Extending our Understanding of Race/Ethnicity-Matching Effects in Education. (EdWorkingPaper: 21-500). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/bz9t-7640

Chetty, R, Friedman, J. N, Hilger, N, Saez, E, Schanzenbach, D. W, and Yagan, D. (2011). How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project Star. *The Quarterly Journal of Economics*, 126(4), 1593-1660.

Coen, T., Nichols-Barrer, I., & Gleason, P. (2019). Long-Term Impacts of KIPP Middle Schools on College Enrollment and Early College Persistence. *Mathematica*.

Davis, M., & Heller, B. (2019). No Excuses charter schools and college enrollment: New evidence from a high school network in Chicago. *Education Finance and Policy*, *14*(3), 414-440.

de Brey, C., Musu, L., McFarland, J., Wilkinson-Flicker, S., Diliberti, M., Zhang, A., ... & Wang, X. (2019). Status and Trends in the Education of Racial and Ethnic Groups 2018. NCES 2019-038. *National Center for Education Statistics*. Retrieved April 27, 2021 from https://nces.ed.gov/ pubsearch/.

Dee, T. S. (2004). Teachers, race, and student achievement in a randomized experiment. *Review of economics and statistics*, *86*(1), 195-210.

Deming, D. J. (2017). The Growing Importance of Social Skills in the Labor Market. *The Quarterly Journal of Economics*, 132(4), 1593-1640.

DuBois, C. C., & Schanzenbach, D. W. (2017). *The effect of court-ordered hiring guidelines on teacher composition and student achievement* (No. w24111). National Bureau of Economic Research.

Egalite, A.J., Kisida, B. and Winters, M.A. (2015). Representation in the classroom: The effect of own-race teachers on student achievement. *Economics of Education Review*, 45(1), 44-52.

Egalite, A. J., & Kisida, B. (2018). The effects of teacher match on students' academic perceptions and attitudes. *Educational Evaluation and Policy Analysis*, *40*(1), 59-81.

Ehrenberg, R. G., Goldhaber, D. D., & Brewer, D. J. (1995). Do teachers' race, gender, and ethnicity matter? Evidence from the National Educational Longitudinal Study of 1988. *ILR Review*, *48*(3), 547-561.

Gershenson, S., Hart, C., Hyman, J., Lindsay, C., & Papageorge, N. W. The Long-Run Impacts of Same-Race Teachers. (EdWorkingPaper: 19-43). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/9419-nw68

Gershenson, S., Jacknowitz, A., & Brannagan, A. (2017). Are student absences worth the worry in U.S. primary schools? *Education Finance and Policy*, 12, 137–165.

Gershenson, S., Lindsay, C., and Hansen, M. (2021). Teacher Diversity and Student Success: Why Racial Representation Matters in The Classroom. Harvard Education Press.

Goldhaber, D., & Hansen, M. (2010). Race, gender, and teacher testing: How informative a tool is teacher licensure testing? *American Educational Research Journal*, *47*(1), 218-251.

Goodman, J. (2014, June). Flaking out: Student absences and snow days as disruptions of instructional time (NBER Working Paper No. 20221). National Bureau of Economic Research.

Gottfried, M. A. (2011). The detrimental effects of missing school: Evidence from urban siblings. *American Journal of Education*, 117, 147–182.

Gottfried, M. A., & Kirksey, J. J. (2017). When students miss school: The role of timing of absenteeism on students' test performance. *Educational Researcher*, 46, 119–130

Gottfried, M., Kirksey, J. J., & Fletcher, T. L. (2021). Do High School Students With a Same-Race Teacher Attend Class More Often?. *Educational Evaluation and Policy Analysis*, 01623737211032241.

Harbatkin, E. (2021). Does student-teacher race match affect course grades? *Economics of Education Review*, *81*, 102081.

Heckman, J. J., & Mosso, S. (2014). The economics of human development and social mobility. *Annu. Rev. Econ.*, *6*(1), 689-733.

Holt, S. B., and Gershenson, S. (2019). The impact of teacher demographic representation on student attendance and suspensions. *Policy Studies Journal*. DOI: 10.1111/psj.12229.

Howsen, R. M., & Trawick, M. W. (2007). Teachers, race and student achievement revisited. *Applied Economics Letters*, *14*(14), 1023-1027.

Jackson, C. K. (2018). What Do Test Scores Miss? The Importance of Teacher Effects on Non–Test Score Outcomes. *The Journal of Political Economy*, 126(5), 2072-2107.

Lindsay, C. A., & Hart, C. M. (2017). Exposure to same-race teachers and student disciplinary outcomes for Black students in North Carolina. *Educational Evaluation and Policy Analysis*, *39*(3), 485-510.

Loeb, S., Christian, M. S., Hough, H., Meyer, R. H., Rice, A. B., and West, M. R. (2019). School differences in social–emotional learning gains: Findings from the first large-scale panel survey of students. *Journal of Educational and Behavioral Statistics*, *44*(5), 507-542.

Reardon, S. F., Fahle, E. M., Kalogrides, D., Podolsky, A., & Zárate, R. C. (2019). Gender achievement gaps in U.S. school districts. *American Educational Research Journal*, *56*(6), 2474-2508.

Shirrell, M., Bristol, T.J. and Britton, T. A. 2021. "The effects of teacher-student ethnoracial matching on exclusionary discipline for Asian American, Black, and Latinx students: Evidence from New York City. (EdWorkingPaper No. 21-475). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/3jqw-5x05

U.S. Department of Education. (2019, February). *Spotlight A: Characteristics of Public School Teachers by Race/Ethnicity*. Retrieved from https://nces.ed.gov/programs/raceindicators/spotlight_a.asp

West, M. R., Pier, L., Fricke, H., Hough, H., Loeb, S., Meyer, R. H., & Rice, A. B. (2020). Trends in Student Social-Emotional Learning: Evidence from the First Large-Scale Panel Student Survey. *Educational Evaluation and Policy Analysis*, 42(2), 279–303. https://doi.org/10.3102/0162373720912236

Tables & Figures

Table 1: Descriptive Statistics of Analytic and Administrative Sample

	Survey Sample	Non-Survey Sample	Difference
Student Characteristics			
Male	0.494	0.545	-0.051***
	(0.500)	(0.498)	(0.010)
White	0.090	0.071	0.019**
	(0.287)	(0.257)	(0.009)
Latinx	0.284	0.264	0.020*
	(0.451)	(0.441)	(0.011)
Black	0.472	0.527	-0.055***
	(0.499)	(0.499)	(0.016)
Other	0.154	0.138	0.016
	(0.361)	(0.345)	(0.009)
Individual Education Plan	0.166	0.235	-0.070***
	(0.372)	(0.424)	(0.012)
English Language Learner	0.184	0.214	-0.030**
	(0.387)	(0.410)	(0.015)
Free/Reduced Price Lunch	0.673	0.697	-0.024*
	(0.469)	(0.460)	(0.013)
Student Administrative Data Outcomes			
Math Test Scores	0.204	-0.034	0.238***
	(0.875)	(0.919)	(0.037)
ELA Test Scores	0.086	-0.130	0.217***
	(0.889)	(0.928)	(0.031)
Ever Suspended	0.161	0.266	-0.105***
	(0.368)	(0.442)	(0.012)
Total Days Absent	7.506	11.892	-4.385***
	(7.506)	(13.429)	(0.409)
Unique Students	4496	933	5429
N	11,776	3,258	15,034
Teacher Characteristics			
Female	0.717	0.689	-0.028
	(0.451)	(0.464)	(0.026)
White	0.691	0.652	0.039
	(0.462)	(0.477)	(0.034)
Latinx	0.066	0.079	-0.013
	(0.248)	(0.270)	(0.014)
Black	0.188	0.193	-0.006
	(0.391)	(0.396)	(0.034)
Other	0.056	0.075	-0.020
	(0.229)	(0.264)	(0.018)

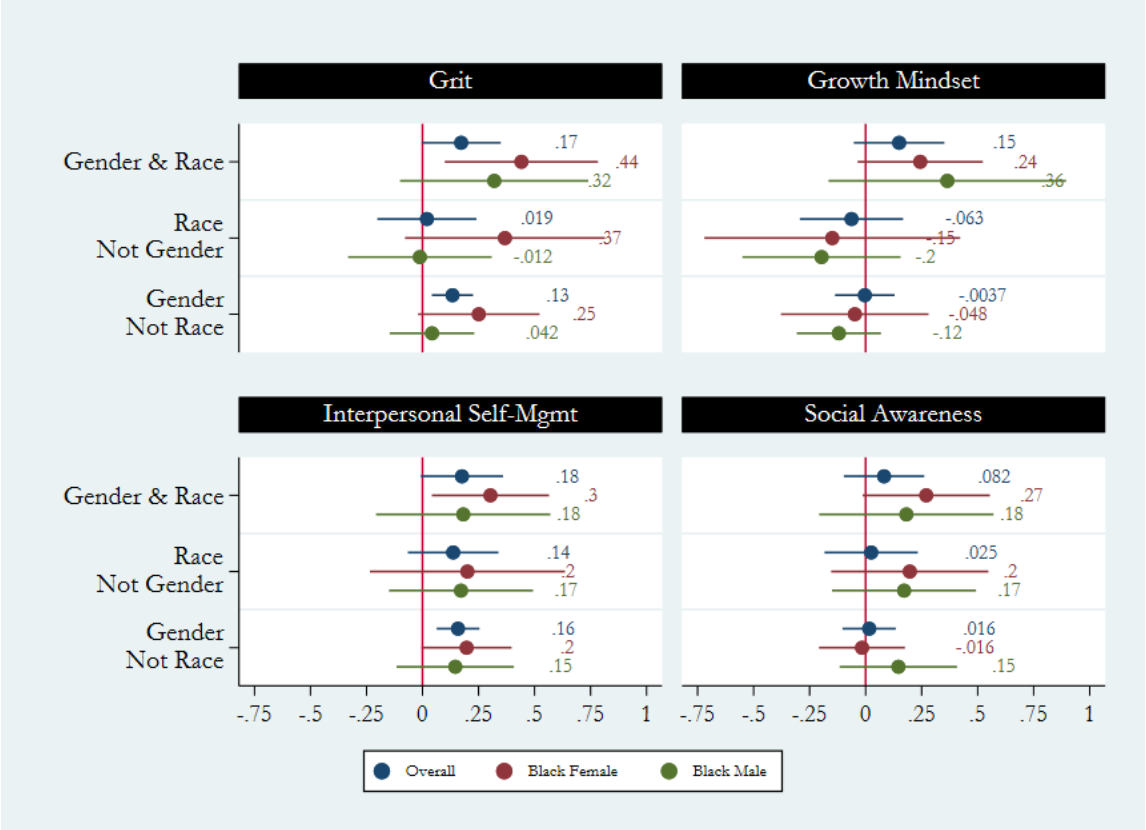
Notes: Students in the Survey Sample answered all survey items and appeared in our data at least twice. The Non-Survey Sample constitute all other students who appeared at least twice, and we have absence/suspension data. The Other demographic category includes Asian, American Indian, Alaskan, Native Hawaiian or Pacific Islander and multiple races. Standard deviations are shown in parentheses for the Survey and Non-Survey column. The difference column refers to mean-difference using school-grade clustered standard errors between surveyed students and non-surveyed students. ELA = English Language Arts. + $p<0.10$,*$p<0.05$,**$p<0.01$

Table 2: Sample Mean of Teacher Matching Variables, by Student Race

Student Race	Proportion matching on gender and race		Proportion matching on race, but not gender		Proportion matching on gender, but not race		Proportion matching on neither gender or race	
All	0.10	(0.15)	0.09	(0.15)	0.41	(0.25)	0.40	(0.25)
White	0.34	(0.27)	0.33	(0.27)	0.17	(0.13)	0.16	(0.13)
Black	0.10	(0.12)	0.11	(0.12)	0.40	(0.23)	0.39	(0.24)
Latinx	0.04	(0.07)	0.04	(0.07)	0.47	(0.25)	0.45	(0.25)

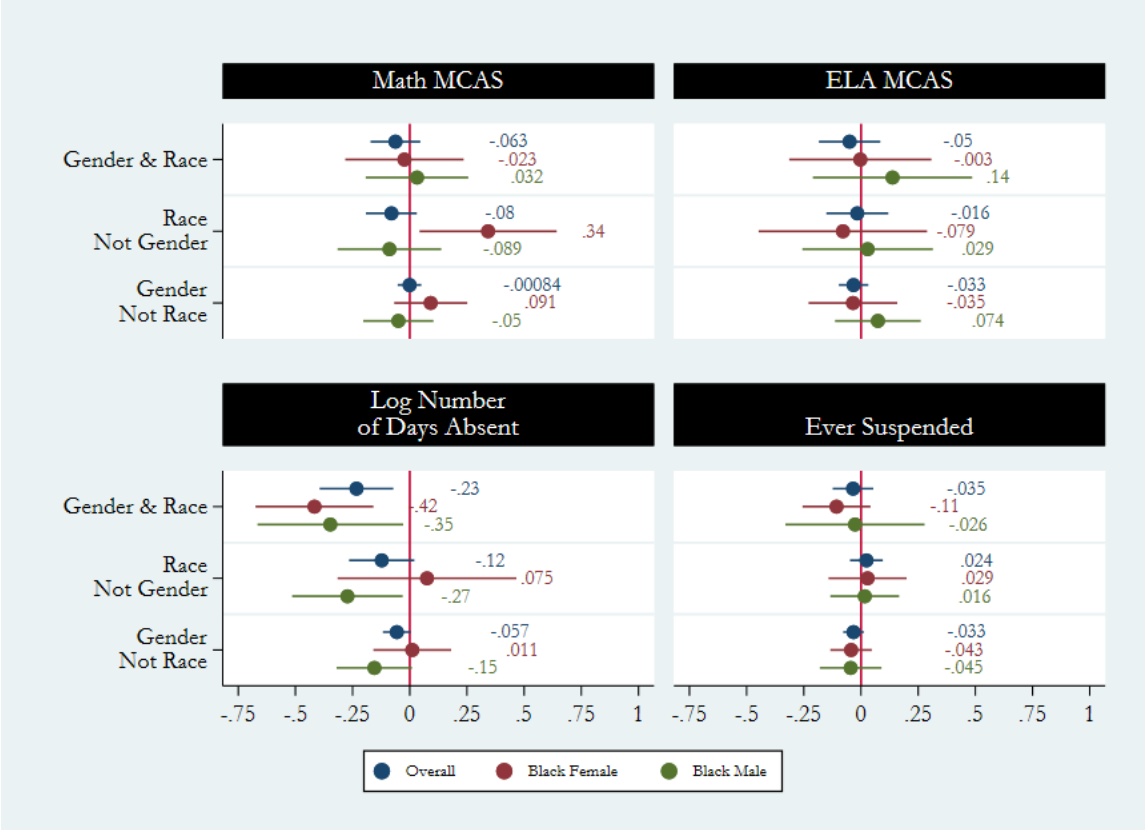
Notes: shows the proportion of teachers who match a student's race or gender.

Figure 1. Social-Emotional Outcomes



Notes: Figure 1 reports the social-emotional outcomes and the coefficients of interest, proportion matching on gender and race, matching on race but not gender, matching on gender but not race, and each estimate's confidence intervals.

Figure 2. Academic and Behavioral Outcomes



Notes: Figure 2 reports the academic and behavioral outcomes and the coefficients of interest, proportion matching on gender and race, matching on race but not gender, matching on gender but not race, and each estimate's confidence intervals.

The Effects of Teacher-Student Demographic Matching on Social-Emotional Learning

Appendix

Table A1: Effects of Teacher/Student Race and Gender Matching on Social-Emotional, Academic and Behavioral Outcomes using Fixed Effects Model

	Proportion matching on gender and race		**Proportion matching on race, but not gender**		**Proportion matching on gender, but not race**	
	Comparison group is taught by a teacher other than the student's race and gender					
Social Emotional Outcomes						
Growth Mindset	0.15	(0.101)	-0.06	(0.115)	-0.00	(0.066)
Grit	0.17+	(0.088)	0.02	(0.110)	0.13**	(0.046)
Interpersonal Self-Management	0.18+	(0.092)	0.14	(0.101)	0.16**	(0.048)
Social Awareness	0.08	(0.090)	0.02	(0.104)	0.02	(0.059)
Academic and Behavioral Outcomes						
Math MCAS	-0.06	(0.054)	-0.08	(0.056)	-0.00	(0.026)
ELA MCAS	-0.05	(0.067)	-0.02	(0.068)	-0.03	(0.032)
Ever Suspended	-0.03	(0.044)	0.02	(0.036)	-0.03	(0.022)
Log Total Days Absent	-0.23**	(0.080)	-0.12+	(0.071)	-0.06+	(0.030)
Log Number of Days Suspended	-0.10	(0.062)	-0.03	(0.053)	-0.07*	(0.032)

Notes: Standard errors are reported in parentheses and clustered at the school-grade level. The social-emotional sample is restricted to students with social-emotional survey data. The academic and behavioral samples include those with data in the administrative records. All models also include school, grade, and student fixed effects and time-varying school-grade aggregates of teacher and school-grade characteristics. All survey measures are standardized by grade level within the sample of students who completed the survey. + $p<0.10$, *$p<0.05$,**$p<0.01$

Table A2: Effects of Teacher/Student Race and Gender Matching on Social-Emotional Outcomes for Subgroups of Students using Fixed Effects Model

		GM	Grit	ISM	SA
Black Female Student	Black Female Teacher	0.24+	0.44*	0.30*	0.27+
		(0.139)	(0.171)	(0.130)	(0.141)
	Black Male Teacher	-0.15	0.37	0.20	0.20
		(0.285)	(0.223)	(0.217)	(0.175)
	Non-Black Male Teacher	-0.05	0.25+	0.20+	-0.02
		(0.164)	(0.135)	(0.100)	(0.096)
Black Male Student	Black Male Teacher	0.36	0.32	0.18	-0.00
		(0.264)	(0.210)	(0.194)	(0.270)
	Black Female Teacher	-0.20	-0.01	0.17	0.04
		(0.176)	(0.160)	(0.160)	(0.176)
	Non-Black Female Teacher	-0.12	0.04	0.15	0.05
		(0.094)	(0.094)	(0.131)	(0.158)
Latinx Female Student	Latinx Female Teacher	-0.64+	0.64*	0.37	0.18
		(0.359)	(0.311)	(0.364)	(0.393)
	Latinx Male Teacher	0.69	0.98*	1.02	0.86
		(0.617)	(0.401)	(0.646)	(0.560)
	Non-Latinx Female Teacher	-0.01	0.19	0.17	0.03
		(0.150)	(0.158)	(0.138)	(0.155)
Latinx Male Student	Latinx Male Teacher	0.15	0.94	0.79	1.63*
		(0.646)	(0.623)	(0.772)	(0.615)
	Latinx Female Teacher	-0.20	0.31	0.30	0.55
		(0.597)	(0.569)	(0.608)	(0.476)
	Non-Latinx Male Teacher	-0.16	0.10	0.03	-0.14
		(0.196)	(0.163)	(0.197)	(0.212)
White Female Student	White Female Teacher	-1.02+	-1.01**	-0.35	-0.82*
		(0.524)	(0.326)	(0.340)	(0.312)
	White Male Teacher	-1.29+	-0.39	-1.12*	-0.45
		(0.743)	(0.494)	(0.532)	(0.546)
	Non-White Female Teacher	-0.65	-0.82**	-0.59	-0.84+
		(0.577)	(0.296)	(0.416)	(0.442)
White Male Student	White Male Teacher	0.26	-0.58	-0.81	-0.43
		(0.533)	(0.375)	(0.492)	(0.537)
	White Female Teacher	-0.27	-0.11	-0.47+	-0.19
		(0.420)	(0.350)	(0.277)	(0.272)
	Non-White Male Teacher	0.10	0.52	-0.39	0.19
		(0.598)	(0.523)	(0.386)	(0.391)

Notes: Standard errors are reported in parentheses and clustered at the school-grade level. The social-emotional sample is restricted to students with social-emotional survey data. All models also include school, grade, and student fixed effects and time-varying school-grade aggregates of teacher and student school-grade characteristics. All survey measures are standardized by grade level within the sample of students who completed the survey. + $p<0.10$,*$p<0.05$,**$p<0.01$

Table A3: Effects of Teacher/Student Race and Gender Matching on Behavioral and Academic Outcomes for Subgroups of Students using Fixed Effects Model

		Math	ELA	Ever Susp	Log Abs	Log Susp
Black Female Student	Black Female Teacher	-0.02	-0.00	-0.11	-0.42**	-0.13+
		(0.129)	(0.155)	(0.074)	(0.128)	(0.076)
	Black Male Teacher	0.34*	-0.08	0.03	0.08	-0.09
		(0.150)	(0.184)	(0.085)	(0.195)	(0.117)
	Non-Black Male Teacher	0.09	-0.04	-0.04	0.01	-0.02
		(0.080)	(0.097)	(0.045)	(0.085)	(0.053)
Black Male Student	Black Male Teacher	0.03	0.14	-0.03	-0.35*	-0.26
		(0.112)	(0.174)	(0.152)	(0.159)	(0.246)
	Black Female Teacher	-0.09	0.03	0.02	-0.27*	-0.08
		(0.113)	(0.142)	(0.075)	(0.120)	(0.111)
	Non-Black Female Teacher	-0.05	0.07	-0.05	-0.15+	-0.17
		(0.077)	(0.094)	(0.067)	(0.082)	(0.102)
Latinx Female Student	Latinx Female Teacher	0.11	-0.17	0.07	-0.48*	0.04
		(0.176)	(0.253)	(0.090)	(0.230)	(0.098)
	Latinx Male Teacher	0.24	-0.07	0.22	0.03	0.29
		(0.293)	(0.382)	(0.168)	(0.357)	(0.190)
	Non-Latinx Female Teacher	0.08	-0.14	0.01	-0.01	0.03
		(0.096)	(0.103)	(0.040)	(0.087)	(0.045)
Latinx Male Student	Latinx Male Teacher	-0.46	-0.05	-0.26	-0.50	-0.45
		(0.408)	(0.401)	(0.272)	(0.436)	(0.360)
	Latinx Female Teacher	-0.15	-0.17	0.06	-0.13	0.09
		(0.189)	(0.301)	(0.148)	(0.241)	(0.232)
	Non-Latinx Male Teacher	0.08	0.25*	-0.10	-0.23*	-0.14
		(0.106)	(0.107)	(0.072)	(0.107)	(0.102)
White Female Student	White Female Teacher	0.01	0.00	-0.02	0.47	-0.03
		(0.230)	(0.253)	(0.101)	(0.293)	(0.090)
	White Male Teacher	0.09	0.58+	0.24	0.27	0.22
		(0.272)	(0.303)	(0.178)	(0.367)	(0.135)
	Non-White Female Teacher	0.43	0.18	0.14	-0.02	0.20
		(0.296)	(0.388)	(0.165)	(0.294)	(0.173)
White Male Student	White Male Teacher	-0.39+	0.26	0.04	0.19	0.03
		(0.205)	(0.255)	(0.167)	(0.310)	(0.213)
	White Female Teacher	-0.49**	0.18	-0.04	-0.08	-0.08
		(0.111)	(0.216)	(0.128)	(0.207)	(0.140)
	Non-White Male Teacher	-0.53*	0.50+	-0.02	-0.35	-0.00
		(0.202)	(0.299)	(0.230)	(0.257)	(0.231)

Notes: Standard errors are reported in parentheses and clustered at the school-grade level. The social-emotional sample is restricted to students with social-emotional survey data. All models also include school, grade, and student fixed effects and time-varying school-grade aggregates of teacher and student school-grade characteristics. All survey measures are standardized by grade level within the sample of students who completed the survey. Ever Susp = Ever Suspended, Log Abs = Log of number of absences, Log Susp = Log number of suspensions. + p<0.10,*p<0.05,**p<0.01

Table A4: Effects of Teacher/Student Race and Gender Matching on Academic and Behavioral Outcomes using Fixed Effects Model for SEL Survey Sample

	Proportion matching on gender and race		**Proportion matching on race, but not gender**		**Proportion matching on gender, but not race**	
	Comparison group is taught by a teacher other than the student's race and gender					
Academic and Behavioral Outcomes						
Math MCAS	-0.04	(0.057)	-0.01	(0.061)	0.01	(0.025)
ELA MCAS	-0.05	(0.080)	0.02	(0.075)	-0.01	(0.037)
Ever Suspended	0.01	(0.042)	0.06	(0.044)	-0.02	(0.024)
Log Total Days Absent	-0.15+	(0.083)	-0.08	(0.064)	-0.02	(0.032)
Log Number of Days Suspended	-0.04	(0.050)	0.02	(0.056)	-0.06	(0.034)

Notes: Standard errors are reported in parentheses and clustered at the school-grade level. The academic and behavioral sample is restricted to students with social-emotional survey data. All models also include school, grade, and student fixed effects as well as time varying school-grade aggregates of teacher and school-grade characteristics. All survey measures are standardized by grade-level within the sample of students who completed the survey. + $p<0.10$,*$p<0.05$,**$p<0.01$

Table A5: Effects of Teacher/Student Race and Gender Matching on Behavioral and Academic Outcomes for Subgroups of Students using Fixed Effects Model for SEL Survey Sample

		Math	ELA	Ever Susp	Log Abs	Log Susp
Black Female Student	Black Female Teacher	0.02	0.05	-0.01	-0.23	-0.01
		(0.134)	(0.167)	(0.082)	(0.158)	(0.085)
	Black Male Teacher	0.27+	-0.15	0.06	0.20	-0.03
		(0.148)	(0.199)	(0.088)	(0.194)	(0.108)
	Non-Black Male Teacher	0.10	0.03	-0.02	0.02	0.00
		(0.085)	(0.086)	(0.046)	(0.091)	(0.061)
Black Male Student	Black Male Teacher	0.02	0.08	0.05	-0.24	-0.10
		(0.131)	(0.202)	(0.165)	(0.198)	(0.215)
	Black Female Teacher	0.00	0.08	0.04	-0.18	-0.03
		(0.099)	(0.156)	(0.100)	(0.119)	(0.132)
	Non-Black Female Teacher	-0.05	0.10	-0.06	-0.14	-0.17+
		(0.068)	(0.087)	(0.072)	(0.092)	(0.098)
Latinx Female Student	Latinx Female Teacher	0.10	-0.23	0.08	-0.44	0.03
		(0.192)	(0.250)	(0.100)	(0.298)	(0.115)
	Latinx Male Teacher	0.39	-0.05	0.21	0.31	0.23
		(0.284)	(0.408)	(0.158)	(0.331)	(0.164)
	Non-Latinx Female Teacher	0.20*	-0.04	0.03	-0.01	0.04
		(0.093)	(0.100)	(0.045)	(0.104)	(0.047)
Latinx Male Student	Latinx Male Teacher	-0.17	0.02	-0.28	-0.68	-0.66
		(0.465)	(0.442)	(0.333)	(0.496)	(0.442)
	Latinx Female Teacher	-0.16	-0.04	0.23	-0.27	0.24
		(0.229)	(0.358)	(0.196)	(0.287)	(0.286)
	Non-Latinx Male Teacher	-0.11	0.19+	-0.06	-0.09	-0.14
		(0.118)	(0.112)	(0.087)	(0.106)	(0.119)
White Female Student	White Female Teacher	-0.13	0.09	-0.06	0.37	-0.04
		(0.246)	(0.269)	(0.091)	(0.295)	(0.076)
	White Male Teacher	-0.20	0.58	-0.01	-0.00	-0.02
		(0.336)	(0.392)	(0.087)	(0.445)	(0.076)
	Non-White Female Teacher	0.26	0.28	0.03	-0.08	0.03
		(0.274)	(0.393)	(0.106)	(0.307)	(0.095)
White Male Student	White Male Teacher	-0.46+	0.33	-0.02	0.04	-0.07
		(0.247)	(0.284)	(0.186)	(0.288)	(0.220)
	White Female Teacher	-0.38*	0.29	0.05	-0.34	-0.01
		(0.153)	(0.276)	(0.117)	(0.229)	(0.127)
	Non-White Male Teacher	-0.37*	0.73**	0.09	-0.35	0.03
		(0.178)	(0.262)	(0.243)	(0.327)	(0.245)

Notes: Standard errors are reported in parentheses and clustered at the school-grade level. This analysis is restricted to students with social-emotional survey data. All models also include school, grade, and student fixed effects as well as time varying school-grade aggregates of teacher and student school-grade characteristics. All survey measures are standardized by grade-level within the sample of students who completed the survey. Ever Susp = Ever Suspended, Log Abs = Log of number of absences, Log Susp = Log number of suspensions. + p<0.10,*p<0.05,**p<0.01

Table A6: Non-linear Effects of Teacher/Student Race and Gender Matching on Social-Emotional, Academic and Behavioral Outcomes

	Proportion matching on gender and race		Proportion matching on gender and race squared		Proportion matching on race, but not gender		Proportion matching on race, but not gender squared		Proportion matching on gender, but not race		Proportion matching on gender, but not race squared	
	Comparison group is taught by a teacher other than the student's race and gender											
Social Emotional Outcomes												
Growth Mindset	0.30+	(0.156)	-0.31	(0.213)	-0.04	(0.207)	-0.07	(0.289)	-0.18	(0.179)	0.19	(0.172)
Grit	0.32+	(0.164)	-0.34	(0.235)	0.19	(0.183)	-0.34	(0.284)	0.22	(0.139)	-0.10	(0.156)
Interpersonal Self-Management	0.12	(0.136)	0.14	(0.237)	0.25	(0.165)	-0.22	(0.225)	0.05	(0.152)	0.13	(0.160)
Social Awareness	0.10	(0.172)	-0.02	(0.245)	-0.07	(0.146)	0.19	(0.257)	0.16	(0.197)	-0.16	(0.204)
Academic and Behavioral Outcomes												
Math MCAS	-0.04	(0.101)	-0.05	(0.152)	0.03	(0.078)	-0.21+	(0.114)	-0.04	(0.122)	0.04	(0.135)
ELA MCAS	-0.09	(0.115)	0.09	(0.161)	-0.17	(0.122)	0.30	(0.195)	-0.35*	(0.172)	0.35+	(0.195)
Ever Suspended	-0.02	(0.060)	-0.04	(0.078)	0.02	(0.068)	0.02	(0.113)	-0.01	(0.072)	-0.02	(0.072)
Log Total Days Absent	-0.29*	(0.119)	0.13	(0.221)	-0.03	(0.111)	-0.17	(0.164)	-0.27*	(0.125)	0.23+	(0.133)
Log Number of Days Suspended	-0.13	(0.099)	0.07	(0.116)	0.00	(0.093)	-0.05	(0.162)	-0.06	(0.091)	-0.00	(0.090)

Notes: Standard errors are reported in parentheses and clustered at the school-grade level. The social emotional sample is restricted to students with social-emotional survey data. The academic and behavioral sample include those with data in the administrative records. All models also include school, grade, and student fixed effects as well as time varying school-grade aggregates of teacher and school-grade characteristics. All survey measures are standardized by grade-level within the sample of students who completed the survey. + $p<0.10$,*$p<0.05$,**$p<0.01$

Table A7: Non-linear Effects of Teacher/Student Race and Gender Matching on Social-Emotional Outcomes

		Proportion matching on gender and race		Proportion matching on gender and race squared		Proportion matching on race, but not gender		Proportion matching on race, but not gender squared		Proportion matching on gender, but not race		Proportion matching on gender, but not race squared	
Black female	**GM**	0.38	(0.328)	-0.25	(0.687)	0.24	(0.662)	-1.48	(2.103)	-0.30	(0.416)	0.26	(0.369)
	Grit	0.17	(0.488)	0.52	(0.849)	-0.42	(0.496)	3.04	(1.993)	0.79+	(0.412)	-0.56	(0.399)
	ISM	-0.03	(0.399)	0.79	(0.877	-0.02	(0.566)	0.90	(2.192)	-0.09	(0.346)	0.31	(0.325)
	SA	0.45	(0.445)	-0.42	(0.919)	-0.03	(0.423)	0.84	(1.625)	0.21	(0.314)	-0.24	(0.325)
Black male	**GM**	0.25	(0.491)	0.32	(1.621)	-0.44	(0.471)	0.58	(0.759)	-0.41	(0.267)	0.34	(0.284)
	Grit	0.44	(0.519)	-0.41	(1.911)	0.29	(0.435)	-0.65	(0.889)	0.15	(0.281)	-0.13	(0.333)
	ISM	0.64	(0.424)	-1.72	(1.496)	0.24	(0.323)	-0.20	(0.615)	0.41	(0.284)	-0.32	(0.321)
	SA	0.22	(0.659)	-0.82	(2.562)	0.03	(0.350)	-0.05	(0.719)	0.40	(0.385)	-0.42	(0.401)
Latinx female	**GM**	0.73	(0.936)	-6.42	(3.951)	2.65*	(1.284)	-9.66	(5.873)	-0.21	(0.570)	0.18	(0.504)
	Grit	1.86*	(0.718)	-5.95+	(3.066)	1.66+	(0.976)	-3.50	(3.914)	0.58	(0.490)	-0.33	(0.386)
	ISM	0.98	(0.809)	-2.91	(3.151)	1.88	(1.245)	-4.26	(7.109)	0.19	(0.690)	-0.02	(0.599)
	SA	0.66	(0.885)	-1.86	(3.313)	0.97	(1.172)	-0.39	(5.848)	-0.57	(0.639)	0.53	(0.541)
Latinx male	**GM**	1.47	(1.294)	-6.56	(5.600)	-0.19	(1.291)	0.32	(4.710)	-0.59	(0.478)	0.58	(0.546)
	Grit	1.32	(1.084)	-2.29	(4.502)	2.09*	(1.028)	-7.90	(5.342)	-0.46	(0.452)	0.73	(0.485)
	ISM	2.13*	(1.029)	-6.17	(5.349)	1.55	(1.276)	-5.94	(5.007)	0.20	(0.438)	-0.24	(0.497)
	SA	2.01	(1.247)	-2.21	(5.046)	2.14*	(1.012)	-7.04	(4.428)	-0.61	(0.561)	0.62	(0.628)
White female	**GM**	-2.45**	(0.618)	1.37**	(0.483)	-1.93+	(1.124)	1.50	(1.871)	0.65	(1.064)	-2.15+	(1.133)
	Grit	-0.02	(1.023)	-0.88	(0.849)	0.24	(0.932)	-1.35	(1.837)	-0.99	(0.709)	0.29	(0.997)
	ISM	0.76	(0.863)	-1.00	(0.694)	-0.87	(0.832)	-0.53	(1.445)	-0.78	(0.720)	0.34	(0.753)
	SA	-0.15	(1.030)	-0.53	(0.952)	0.25	(0.969)	-1.43	(1.460)	-0.33	(0.847)	-0.81	(1.028)
White male	**GM**	0.47	(0.631)	-0.40	(1.193)	1.09	(1.288)	-1.24	(0.935)	0.46	(1.155)	-0.71	(1.820)
	Grit	-1.81*	(0.764)	2.36*	(1.056)	1.82	(1.238)	-1.79+	(1.014)	-0.32	(1.130)	2.00	(1.918)
	ISM	-1.47*	(0.728)	1.26	(0.973)	-0.50	(0.902)	-0.01	(0.873)	-0.00	(0.903)	-1.01	(1.931)
	SA	-1.25	(1.049)	1.58	(1.471)	0.18	(1.345)	-0.35	(1.166)	-0.60	(0.818)	1.82	(1.556)

Notes: Standard errors are reported in parentheses and clustered at the school-grade level. The social emotional sample is restricted to students with social-emotional survey data. All models also include school, grade, and student fixed effects as well as time varying school-grade aggregates of teacher and student

school-grade characteristics. All survey measures are standardized by grade-level within the sample of students who completed the survey. GM = Growth Mindset, ISM = Interpersonal Self-Management, and SA = Social Awareness. + $p<0.10$,*$p<0.05$,**$p<0.01$

Table A8: Non-linear Effects of Teacher/Student Race and Gender Matching on Academic and Behavioral Outcomes

		Proportion matching on gender and race		Proportion matching on gender and race squared		Proportion matching on race, but not gender		Proportion matching on race, but not gender squared		Proportion matching on gender, but not race		Proportion matching on gender, but not race squared	
Black female	Math	0.13	(0.192)	-0.29	(0.270)	0.35	(0.293)	0.02	(0.906)	-0.01	(0.217)	0.11	(0.190)
	ELA	0.16	(0.264)	-0.23	(0.370)	-0.21	(0.344)	0.73	(0.900)	-0.88**	(0.252)	0.91**	(0.228)
	Ever Susp	-0.00	(0.123)	-0.24	(0.163)	-0.02	(0.203)	0.17	(0.615)	0.05	(0.117)	-0.11	(0.110)
	Log Abs	-0.33	(0.256)	-0.16	(0.401)	-0.11	(0.305)	0.77	(1.158)	-0.22	(0.250)	0.25	(0.270)
Black male	Math	-0.03	(0.234)	0.22	(0.771)	-0.03	(0.203)	-0.07	(0.365)	-0.29	(0.222)	0.29	(0.286)
	ELA	0.25	(0.308)	-0.60	(0.924)	-0.15	(0.277)	0.41	(0.377)	-0.36	(0.294)	0.54	(0.360)
	Ever Susp	-0.46+	(0.239)	1.80**	(0.590)	0.09	(0.191)	-0.16	(0.318)	0.14	(0.168)	-0.23	(0.174)
	Log Abs	-0.42	(0.365)	0.33	(1.286)	-0.09	(0.217)	-0.31	(0.359)	-0.37	(0.239)	0.27	(0.315)
Latinx female	Math	0.32	(0.413)	-1.08	(1.758)	0.69	(0.484)	-2.14	(1.979)	0.22	(0.232)	-0.12	(0.185)
	ELA	-0.58	(0.499)	2.43	(1.806)	1.01	(0.852)	-5.01	(3.349)	-0.94**	(0.305)	0.69*	(0.268)
	Ever Susp	0.01	(0.200)	0.34	(0.752)	-0.11	(0.314)	1.61	(1.507)	-0.04	(0.157)	0.04	(0.127)
	Log Abs	-0.70	(0.602)	1.10	(2.487)	-0.25	(0.776)	1.38	(2.855)	-0.13	(0.376)	0.10	(0.326)
Latinx male	Math	-0.51	(0.825)	0.20	(2.703)	-0.49	(0.515)	1.56	(2.027)	0.09	(0.191)	-0.01	(0.229)
	ELA	1.12	(0.762)	-5.90*	(2.888)	-0.75	(0.574)	2.92	(2.143)	-0.13	(0.228)	0.53+	(0.272)
	Ever Susp	-0.85	(0.508)	2.58	(2.098)	-0.15	(0.384)	1.13	(1.597)	-0.37	(0.233)	0.35	(0.307)
	Log Abs	-0.67	(0.901)	0.73	(3.678)	-0.81	(0.568)	3.21	(2.090)	-0.35	(0.263)	0.16	(0.371)
White female	Math	0.24	(0.487)	-0.21	(0.495)	-0.46	(0.585)	0.98	(0.783)	0.82	(0.509)	-0.68	(0.586)
	ELA	-0.06	(0.573)	0.01	(0.456)	-0.62	(0.430)	2.01**	(0.499)	0.48	(0.622)	-0.60	(0.559)
	Ever Susp	-0.20	(0.206)	0.09	(0.179)	-0.39*	(0.164)	0.98**	(0.305)	-0.29	(0.219)	0.61*	(0.298)
	Log Abs	0.94+	(0.540)	-0.52	(0.597)	-0.78	(0.798)	1.77*	(0.826)	-0.26	(0.567)	0.28	(0.563)
White male	Math	-0.60	(0.455)	0.38	(0.712)	-0.69+	(0.401)	0.18	(0.355)	-0.53	(0.508)	-0.03	(1.082)
	ELA	-0.43	(0.438)	1.32	(0.865)	0.57	(0.532)	-0.38	(0.478)	0.38	(0.474)	0.23	(0.899)
	Ever Susp	-0.08	(0.260)	0.23	(0.462)	0.03	(0.271)	-0.08	(0.221)	0.14	(0.268)	-0.40	(0.584)
	Log Abs	0.30	(0.460)	-0.21	(0.827)	0.29	(0.645)	-0.34	(0.525)	-0.03	(0.609)	-0.73	(1.167)

Notes: Standard errors are reported in parentheses and clustered at the school-grade level. All models also include school, grade, and student fixed effects as well as time varying school-grade aggregates of teacher and school-grade characteristics. Ever Susp = Ever Suspended, Log Abs = Log of number of absences, Log Susp = Log number of suspensions. + p<0.10,*p<0.05,**p<0.01

Figure Appendix A1. Academic and Behavioral Outcomes