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EdWorkingPaper No. 21-470

A Classroom Observer Like Me: The Effects of Race-congruence and Gender-congruence Between Teachers and Raters on Observation Scores

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State and local education agencies across the country are prioritizing the goal of diversifying the teacher workforce. To further understand the challenges of diversifying the teacher pipeline, I investigate race and gender dynamics between teachers and school-based administrators, who are key decision-makers in hiring, evaluating, and retaining teachers. I use longitudinal data from a large school district in the southeastern United States to examine the effects of race-congruence and gender-congruence between teachers and observers/administrators on teachers' observation scores. Using models with two-way fixed effects, I find that teachers, on average, experience small positive increases in their scores from sharing race or gender with their observers, raising fairness concerns for teachers whose race or gender identities are not reflected by any of their raters.

VERSION: October 2021

Suggested citation: Chi, Olivia L.. (2021). A Classroom Observer Like Me: The Effects of Race-congruence and Gender-congruence Between Teachers and Raters on Observation Scores. (EdWorkingPaper: 21-470). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/g8bz-zs40

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Abstract

State and local education agencies across the country are prioritizing the goal of diversifying the teacher workforce. To further understand the challenges of diversifying the teacher pipeline, I investigate race and gender dynamics between teachers and school-based administrators, who are key decision-makers in hiring, evaluating, and retaining teachers. I use longitudinal data from a large school district in the southeastern United States to examine the effects of race-congruence and gender-congruence between teachers and observers/administrators on teachers' observation scores. Using models with two-way fixed effects, I find that teachers, on average, experience small positive increases in their scores from sharing race or gender with their observers, raising fairness concerns for teachers whose race or gender identities are not reflected by any of their raters.

Correspondence regarding the paper can be sent to Olivia Chi at ochi@bu.edu. I thank Martin West, Eric Taylor, David Deming, Matthew Kraft, seminar participants at Harvard and Boston University, and session participants at AEFP and APPAM for their valuable comments and feedback. I am grateful for the support from the data providers. The research reported here was supported, 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 author and do not represent the views of the Institute or the U.S. Department of Education. Additional support came from the Multidisciplinary Program in Inequality and Social Policy at the Harvard Kennedy School. All errors are my own.

I. Introduction

State education agencies and school districts across the country are prioritizing the goal of diversifying the teacher workforce to better reflect the diversity of the student population. Policymakers' interest in efforts to recruit, hire, develop, and retain underrepresented teachers are growing alongside the accumulation of rigorous empirical evidence that documents both short- and long-term benefits to students who are assigned to same-race teachers (Dee, 2004; Egalite et al., 2015; Gershenson et al., 2018; Lindsay & Hart, 2017; see Goldhaber et al., 2019 for an overview). However, states and districts face many significant challenges in their efforts to close the diversity gap (Goe & Roth, 2019; Putman et al., 2016; Redding & Baker, 2019).

To further understand the challenges of diversifying the teacher pipeline, the roles and characteristics of school-based administrators should receive particular attention, as school-based administrators commonly act as key decision-makers in the processes of hiring, developing, evaluating, and retaining teachers. Moreover, a growing body of research suggests that administrators' race and gender – and the race- or gender-congruence between principals and teachers – may play an important role in teacher outcomes, such as teacher hiring, turnover, and job satisfaction (Bartanen & Grissom, 2019; Grissom & Keiser, 2011; Husain et al., 2018).

In this study, I investigate the roles of race and gender dynamics between school-based administrators and teachers in the context of teachers' classroom observations. Over the past decade, U.S. states and districts have come to rely on teacher evaluations – and in particular, classroom observations conducted by administrators – as a key lever for teacher accountability. Across states and districts implementing post-No Child Left Behind (NCLB) teacher evaluation systems, classroom observations are the most frequently used measure of teachers' on-the-job

performance, and they typically represent the highest weighted component of a teacher's summative evaluation rating (Steinberg & Donaldson, 2016).

As ratings from teacher evaluation systems have become more widely available, a growing body of research has documented substantial gaps in teachers' scores by race and gender, and gaps appear to persist even after accounting for other measures of teacher quality, such as value-added to test scores (Drake et al., 2019; Grissom & Bartanen, 2020; Jacob & Walsh, 2011; Jiang & Sporte, 2016). Taken together with recent work on the importance of administrators' race and gender identities, this raises concerns about whether and to what extent administrators' and teachers' race and gender identities influence classroom observation scores.

In this study, I use longitudinal data from a large school district in North Carolina to examine the relationship between teacher race/gender, the race/gender of the classroom observer (typically a school administrator), and observation scores. I ask:

(1) Do teachers receive higher (or lower) classroom observation scores as a result of sharing race or gender identities with their observers?

(2) Are the effects of race-congruence or gender-congruence mediated by the sharing of other attributes, such as education history or teaching assignment history?

An important contribution of this study is the added rigor with which the effects of race-congruence and gender-congruence are identified, stemming from the availability of detailed data generated by the district's classroom observation scheme. In this district, teachers receive multiple rounds of classroom observations each school year, and they may be observed by different raters across observation rounds. To identify race or gender interactions, I estimate models that include both teacher-by-year fixed effects and observer-by-round-by-year fixed effects. The inclusion of teacher-by-year fixed effects implies that the identifying variation

comes from teacher-years in which the teacher is observed, in the same school year, by at least one rater who shares the racial or gender characteristic of interest and at least one rater who does not. By including observer-by-round-by-year fixed effects, I account for observed and unobserved differences in rater characteristics across raters, observation rounds, and time. The availability and inclusion of these particular sets of fixed effects address threats to internal validity that remain in prior research. For example, these fixed effects alleviate lingering concerns about estimates that may be biased by certain patterns of teacher sorting to administrators/raters on unobservable characteristics.

I find that teachers, on average, experience small positive increases in their scores from sharing race (0.03 SD) or gender (0.02 SD) with their observer. These dynamics imply that the estimated sizes of the Black-White and male-female observation score gaps could fluctuate as a function of the proportion of raters from underrepresented groups and how they are assigned to teachers. I also find that the race and gender congruence effects are not mediated by the sharing of other available attributes, such as whether the teacher and observer ever taught the same teaching assignment, whether they have attended the same university, or the number of years they have worked in the same school. These race and gender dynamics between teachers and their raters appear to exist separately from the attributes I examine. Though the underlying mechanisms for the effects of race-congruence and gender-congruence between teachers and raters are unknown, the results raise fairness concerns for teachers whose race or gender identities are not reflected by any of their administrators.

II. Background

A. Classroom Observation Scores

Classroom observations using standards-based observation protocols (e.g., Charlotte Danielson's Framework for Teaching, 1996) have become the cornerstone of post-NCLB teacher evaluation systems (Steinberg & Donaldson, 2016). Using scores from formal classroom observations as a measure of teacher performance poses many advantages. Prior work provides evidence on the predictive validity of classroom observation instruments (e.g., Kane, McCaffrey, Miller, & Staiger, 2013). Unlike test score value-added measures which can only be calculated for teachers in tested grades and subjects, classroom observation scores can be made available for all teachers. Furthermore, prior evidence indicates that evaluation systems with observations and individualized performance feedback can improve teacher performance (Taylor & Tyler, 2012). And so, in theory, classroom observations serve not only the purpose of gathering evidence for teacher evaluation, but also the purpose of developing teachers' instructional skills via a cycle of observation and feedback.

However, as standards-based classroom observations for teacher accountability have become more widespread, a growing body of research has documented gaps in scores by race and gender, raising questions about the sources of the gaps and whether specific subgroups are disadvantaged in the implementation of the classroom observation process (Cohen & Goldhaber, 2016). Recent studies using data from Chicago, Michigan, and Tennessee find that teachers of color and male teachers receive lower observation/evaluation ratings than their White and female counterparts (Drake et al., 2019, Grissom & Bartanen, 2020; Jacob & Walsh, 2011; Jiang & Sporte, 2016), and these differences persist even after accounting for observable differences between teachers, such as their subject/grade assignments and value-added to test scores.

These evaluation and observation score gaps, which are unexplained by observable teacher characteristics or measures of teachers' contributions to test scores, raise concerns that

classroom observation ratings are influenced by aspects of teachers' context that are outside of their control. Two recent studies using experimental evidence from the Measures of Effective Teaching (MET) project focus on the role of classroom composition. Steinberg and Garrett (2016) find that students' incoming academic performance is positively related to observation ratings, and Campbell and Ronfeldt (2018) find that teachers with higher proportions of Black, Hispanic, male, and low-performing students receive lower observation ratings even after controlling for classroom-specific value-added measures. While the results of these studies cannot rule out the possibility that the differences in ratings are driven by actual differences in instructional quality across classrooms, they provide evidence consistent with the explanation that classroom observers may be biased by the classroom context in their ratings.

It is important to note that the evidence from the MET project is based on ratings from a low-stakes research study. The influence of classroom characteristics may be different in the high-stakes context of a teacher evaluation system. Recent work has documented differences in administrators' scoring behavior in high- vs. low-stakes contexts, demonstrating that observation ratings can be influenced by the complex, social environments in which administrators work (Grissom & Loeb, 2017; Kraft & Gilmour, 2017; Qi et al., 2018).

B. Race-congruence and Gender-congruence

A growing body of research suggests that administrators' race and gender identities, as well as the race- or gender-congruence between teachers and administrators, play an important role in teacher outcomes and the demographic composition of the teachers in the school. Using nationally representative data from the Schools and Staffing Survey (SASS) and the Teacher Follow-up Survey (TFS), Grissom and Keiser (2011) investigate the effect of race-congruence between teachers and principals on teacher satisfaction and teacher turnover using propensity

score matching models and school fixed effects models. They find that teachers with same-race principals are more likely to stay in their schools and report higher job satisfaction.

Recent studies using state administrative data also corroborate the potential importance of administrators' race and gender. Husain, Matsa, and Miller (2018), using school and teacher fixed effects models with data from New York State, find that male teachers are more likely to exit their schools under female principals than under male principals. Bartanen & Grissom (2019), find that principals in Missouri and Tennessee are more likely to hire same-race teachers, a result that is partially explained by principals hiring from within their networks. The authors also find that teachers with race-congruent principals are less likely to exit their schools.

While these studies highlight the role of race/gender characteristics in hiring, retention, and job satisfaction, three recent studies raise the importance of teachers' and raters' racial identities within the context of the observation and feedback cycle. Kraft and Christian (2019), using teacher survey data from Boston, find that teachers of color who are evaluated by same-race administrators report receiving higher-quality feedback. The positive relationship between race-congruence and perceived feedback quality is partially explained by teachers' perceptions of their sense of mutual respect, trust, and enjoyment in working with their evaluators.

Campbell (2020), using data from North Carolina, examines gaps in summative observation ratings between Black and White women teachers in middle schools. Using a school fixed effects identification strategy, Campbell finds that principals rate White women teachers higher than they rate Black women teachers, even after accounting for value-added measures, teacher and classroom characteristics, and indicators for race-, gender-, and race-and-gender-congruency. However, in this study, the gap in ratings between Black and White women was not explained by race-, gender-, and race-and-gender-congruence between the teacher and principal.

In a study that is closely related in topic to this one, Grissom and Bartanen (2020) examine potential sources of race and gender biases in high-stakes teacher evaluations using data from Tennessee. Using models that include controls for teacher characteristics and teacher work assignment, indicators for observation round, rater fixed effects, and school-by-year fixed effects, they find that teachers benefit, in terms of receiving higher observation ratings, when they share race with their observers (0.03 SD). However, they do not find effects of gender matching on observation ratings.

Taken all together, these studies put forth the importance of race and gender dynamics and teacher-administrator relationships for the teacher observation and evaluation process. This study builds upon and contributes to the prior research in this area by (1) providing an exploration of how the sharing of other attributes and/or the degree of professional familiarity between teachers and raters could mediate the effects of race- and gender-congruence, and (2) employing estimation models that address threats to internal validity that remain in prior work. In prior studies with fixed effects strategies where the identifying variation comes from *across* individual teachers in the same race or gender subgroup (perhaps in the same school-year and/or the same school), one may be concerned that estimates of the effects of race- or gender-congruence are biased by the sorting of individual teachers to administrators/raters on unobservable characteristics.[1] In prior fixed-effects studies where the identifying variation comes from *within* individuals *across* multiple school-years, one may be concerned about bias stemming from how individuals sort to administrators/raters on unobservable characteristics over time across school-years.[2] In contrast, these patterns of sorting on unobservable characteristics

[1] For example, the teachers within a school with relatively higher motivation may specifically seek out and lobby for race-congruent or gender-congruent raters.
[2] For example, teachers may systematically seek out race-congruent or gender-congruent raters during school years in which they are struggling.

do not pose threats to internal validity here. The models in this study estimate the effects of race and gender congruence between teachers and their raters/administrators using *within* teacher-by-year variation, while also accounting for rater differences across raters, observation rounds, and time. Further details on the empirical strategy are presented in Section IV.

III. Data and Measures

A. Data and Sample

I use administrative data from a large district in North Carolina in school years 2013-2014 to 2017-2018. During these years, the state required all teachers who are licensed by the North Carolina Department of Instruction to be annually evaluated using the North Carolina Teacher Evaluation Process (NCTEP), which includes two to three classroom observations that are typically conducted by school administrators. The data includes information from each classroom observation, as well as an identifier for the observer. The data also contains teacher and administrator personnel records, which include race, gender, job classification, job location, years of teaching experience, and teacher-student links.[3]

The data contain 114,000 classroom observations in 45,792 teacher-years from 13,753 unique teachers. I exclude 3.87% of the classroom observations that are conducted by non-administrators or individuals outside of the teacher's school. I also restrict to the sample of individuals for whom I have two or three observations, further reducing the sample to 108,203 classroom observations. Lastly, as I am attempting to explore the role of race and gender identities, I restrict my analytic sample to the two race subgroups for which I have a substantial sample size: Black and White teachers who are observed by Black and White administrators.

[3] Throughout this paper, I (mis)use the term "gender" to refer to the identities of teachers and administrators who have reported "male" or "female" to their district employer, thereby conflating "gender" and "sex." This usage is incorrect, as these terms are not interchangeable. However, I do so to remain consistent with related prior literature that uses the terms "gender," "gender-match," and "gender-congruence."

This produces an analytic sample of 93,975 classroom observations in 38,262 teacher-years from 12,490 unique teachers. These observations were conducted by 2,319 observer-years from 672 unique observers.

Columns 1-4 of Table 1 provide summary characteristics for my analytic sample. Thirteen percent of my sample identify as Black, and 81% are female. Teachers, on average, have 12.3 years of teaching experience and are observed 2.5 times within a school year. Among the classroom observers, 29% identify as Black and 60% are female. Thirty-five percent are school principals and 65% are assistant principals. On average, an observer conducts 44 classroom observations in a school year.

B. Teacher Evaluation and Classroom Observation Ratings[4]

In NCTEP, each teacher is assigned to one of the three evaluation cycle types and required to be formally or informally observed two or three times per school year. Formal observations are intended to last 45 minutes or an entire class period, while informal observations are intended to last at least 20 minutes. The three evaluation cycle types are:

- Comprehensive – teachers are required to receive three formal observations.
- Standard – teachers are required to have one formal observation and two additional observations that can be formal or informal.
- Abbreviated – teachers are required to have two formal or informal observations.

Teachers with fewer than three years of consecutive employment must be evaluated using the comprehensive cycle, while those with three or more years of consecutive employment can be evaluated using any of the three cycles.

[4] Information on the NCTEP was gathered from the manual *North Carolina Teacher Evaluation Process* (North Carolina State Board of Education, 2015).

During classroom observations, the observer, who is typically a principal or assistant principal, evaluates teachers on the Rubric for Evaluating North Carolina Teachers, which was developed to align with the North Carolina Professional Teaching Standards. The rubric includes five standards: Standard I - Teachers Demonstrate Leadership; Standard II - Teachers Establish a Respectful Environment for a Diverse Population of Students; Standard III - Teachers Know the Content they Teach; Standard IV - Teachers Facilitate Learning for their Students; and Standard V - Teachers Reflect on their Practice. Each standard has between three and eight performance elements, along with descriptors, that are used to evaluate teachers. Figure 1 provides an excerpt of the rubric. The descriptors are classified under four categories (from lowest to highest): Developing, Proficient, Accomplished, and Distinguished. During a classroom observation, the rater checks the descriptors that they observe. If none of the descriptors are observed, then the performance element is considered "Not Demonstrated."

The rubric includes 25 elements across the five standards. However, in practice, observers are not charged with checking off descriptors for each of the 25 elements; many of the elements are not designed to be assessed during a classroom observation. For example, the descriptors under "Element Ib. Teachers demonstrate leadership in the school" are demonstrated by teachers' participation in professional learning communities and school improvement plans, which an observer cannot assess during a classroom lesson. Furthermore, the NCTEP manual states that teachers undergoing the abbreviated evaluation cycle are only evaluated on Standards I and IV during their classroom observations. As a result of this design, many parts of the rubric are not completed, and I present the rates of missingness by element in Appendix Table A1. Only seven of the 25 elements are filled in with checks for descriptors at least 90% of the time, and I

use only the information from these seven elements to construct scores for each classroom observation.[5]

In the NCTEP, individual classroom observations do not receive official ratings or scores. Rather, the information from each classroom observation is compiled to form a teacher's end-of-year summary evaluation. After completing a teacher's set of classroom observations, the principal is directed to compile the checks on the descriptors from each classroom observation to obtain the summary rating on each element for the teacher's end-of-year summary evaluation. The teacher receives a summary rating (Not Demonstrated, Developing, Proficient, Accomplished, or Distinguished) that matches the highest rating under which all the descriptors were observed at least once across all the classroom observation.[6]

Since individual classroom observations do not receive official ratings, I assign element ratings for each of these seven most consistently used elements on the rubric by: (a) examining the descriptors that were checked off as being present during the classroom observation, and (b) assigning the highest rating under which *all* the descriptors are checked, similar to the procedure described above. I provide illustrative examples of how this assignment rule is applied in Appendix Section A. Results are also quite similar under the following alternative rules for assigning element ratings from observed descriptors: (a) assign the highest rating under which any descriptors are checked, or (b) assign the highest rating under which at least half of the descriptors are checked.

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[5] The seven elements with non-missing rates of 90% or more are: Ia - Teachers lead in their classrooms; IVa - Teachers know the ways in which learning takes place, and they know the appropriate levels of intellectual, physical, social, and emotional development of their students; IVb - Teachers plan instruction appropriate for their students; IVc - Teachers use a variety of instructional methods; IVe - Teachers help students develop critical thinking and problem-solving skills; IVg - Teachers communicate effectively; and IVh - Teachers use a variety of methods to assess what each student has learned.

[6] For example, take a teacher who receives checks for all the descriptors under Element IVa, as shown in Figure 1, except the following descriptor in the Distinguished column: "Encourages and guides colleagues to adapt instruction to align with students' developmental levels." This teacher receives a rating of "Accomplished" because it is the highest rating category under which she was observed to have met *all* of the descriptors.

To construct the observation scores, I then fit a Graded Response Model (GRM) on the ratings for the seven elements that are consistently used for observations. GRMs are in the family of Item Response Theory (IRT) models that are commonly used in educational and psychological assessment (Samejima, 1969). They are developed for ordered categorical items, such as the five-category scale on the Rubric for Evaluating North Carolina Teachers. I estimate:

$$\Pr\left(Y_{qi} \geq m \mid a_q, b_{qm}, \theta_i\right) = \frac{\exp(a_q(\theta_i - b_{qm}))}{1+\exp(a_q(\theta_i - b_{qm}))}, \quad (1)$$

where Y_{qi} is the rating that the observer gave teacher i on element q; m refers to the categories of scores (e.g., on a 5-point Likert scale, $m = 1, \ldots, 5$); a_q is the discrimination parameter for element q, θ_i is the latent non-cognitive construct, and b_{qm} is the difficulty parameter for response category m on element q. I fit a GRM separately for abbreviated observations and standard/comprehensive observations, and I obtain scores θ_i for each teacher i for each classroom observation. I then standardize the scores within year and observation type (i.e. abbreviated vs. standard/comprehensive) to have a mean of 0 and unit standard deviation.

Compared to the standard practice of taking the simple mean of the element ratings to compute a score, using a GRM to generate scores provides the advantage of incorporating information about the difficulty of individual elements, as well as the extent to which the elements can differentiate between teachers. However, note that the results are nearly identical if I were to instead use observation scores constructed by taking the simple mean of the seven element ratings and standardizing within year and observation type.[7] Additionally, the results have similar point estimates when I limit the sample to separately analyze classroom observations by evaluation cycle types (abbreviated vs. standard/comprehensive) and formal vs.

[7] This is unsurprising given that the correlation between the GRM scores and standardized mean scores is 0.95. The correlation between the GRM scores and the simple mean score (without standardizing) is 0.94.

informal observations (proxied by observation lengths of above and below 45 minutes, respectively).[8]

C. Scores by Subgroup

Table 2 provides the mean and standard deviations of teachers' observation scores by subgroup. The mean observation score across my analytic sample is 0.013. Consistent with prior research (e.g., Campbell & Ronfeldt, 2018, Drake et al., 2019, Jacob & Walsh, 2011, Jiang & Sporte, 2016), I find large raw gaps in ratings by race and gender, where Black teachers and male teachers receive lower scores than their counterparts. As shown in Column 2, the Black-White gap is about 0.18 SD (Black mean = -0.14 SD; White mean = 0.04 SD), whereas the male-female gap is about 0.20 SD (male mean = -0.15 SD; female mean = 0.05 SD).[9] To further examine the extent of race and gender gaps in classroom observation scores, I estimate the following model:

$$y_{ijkst} = \alpha_0 + \alpha_1 Black_i + \alpha_2 Male_i + Z_{ijkt}\eta + X_{ikt}\omega + \gamma_{kst} + \epsilon_{ijkst} \quad (2)$$

where y_{ijkt} is the observation score belonging to teacher i, rated by observer j, in observation round k in school s in year t. I define an observation round k as the combination of the observation number and whether the observation is part of an abbreviated evaluation cycle, which results in 5 possible observation rounds: abbreviated observation no. 1; abbreviated observation no. 2; standard/comprehensive no. 1; standard/comprehensive no. 2; standard/comprehensive no. 3.

[8] The data include clear indicators of whether an observation is conducted as part of an abbreviated evaluation cycle, but they do not include clear indicators to distinguish between observations that are conducted as part of comprehensive vs. standard evaluation cycles.

[9] As shown in Column 5, the Black-White gap among the teachers who contribute to the identifying variation used to estimate the effect of race congruence also has a magnitude of 0.18. However, these teachers have lower scores (Black rating mean = -0.26 SD, White rating mean = -0.08 SD). Column 8 shows that the male-female gap among the teachers who contribute to the identifying variation used to estimate the effect of gender congruence is also quite similar to that in the analytic sample at 0.19. Here, too, the teachers in this subsample have lower scores (male rating mean = -0.24 SD, female rating mean = -0.05 SD).

Z_{ijkt} is a vector of observation-level covariates: a quartic function for the time length in minutes, indicators for the starting hour, and indicators for the month in which the observation is conducted. X_{ikt} are teacher-level covariates, including a function of years of teacher experience, indicators for teaching assignment (e.g., first grade, middle school science, high school English language arts (ELA), etc.), and characteristics of teacher i's linked students in school year t. The student characteristics include the share of students in each race group, who are male, have an English learner status, have a special education status, have a math gifted status, have an ELA gifted status, and for students in grades 4 and up, mean prior test scores.

γ_{kst} represents fixed effects for the school-by-observation round-by-year. By including these fixed effects, teacher j's score from round k is compared with the round k observation scores belonging to the other teachers in the same school during the same school year.

$Black_i$ and $Male_i$ are indicators for whether teacher i identifies as Black and male, respectively. Here, the coefficient α_1 represents the scores of Black teachers relative to White teachers, and α_2 represents the scores of male teachers relative to female teachers. These coefficients provide the magnitudes of the gaps that are unexplained by the teacher characteristics and school-by-observation round-by-year fixed effects included in the model.

Table 3 presents the results from estimating Equation 2. Column 1 shows that the Black-White gap is -0.12 SD and the female-male gap is -0.16 SD after controlling for observation characteristics, as well as fixed effects for the school-round-year. Even after including additional controls for teacher experience, assignment, and linked student characteristics, the gaps remain similarly sized (Column 2).

Next, I explore whether differences in teachers' contributions to test scores can explain some of the remaining gaps in classroom observation scores. To do so, for math and ELA

teachers in tested grades, I include teacher i's test score value-added measure from time t in the right-hand side of Equation 2.[10] Columns 3-4 and 5-6 limit the sample to include teachers with math and ELA value-added estimates, respectively. Evidence from prior research suggests that the distribution of performance measures for teachers in high-stakes grades/subjects may be different from that in low-stakes grades/subjects, as administrators make strategic staffing decisions in response to accountability pressures (Chingos & West, 2011; Grissom et al., 2017). Columns 3 and 5, which include the same covariates as Column 2, indeed highlight a compositional change. Within these samples, the estimated Black-White gaps are smaller (0.08 SD in math sample and 0.08 SD in ELA sample) and no longer statistically significant. The male-female gaps in these samples, however, are still large and statistically significant: 0.20 SD and 0.21 SD in the math and ELA value-added samples, respectively.

Using the same sample of observations as Columns 3 and 5, Columns 4 and 6 present the coefficients on $Black_i$ and $Male_i$ after accounting for teacher quality as measured by value-added to test scores. The point estimates of the race and gender gaps decrease slightly in the math value-added sample, but generally, the estimates remain fairly stable even after this inclusion of value-added measures. At least in these limited samples, the results provide evidence that differences in teachers' estimated contributions to test scores do not account for the gaps in classroom observation scores.

Value-added measures may be limited in that they capture contributions to test scores, but not necessarily other important aspects of teacher quality. And so, the gaps in observation scores may reflect genuine differences in teacher quality that are not captured by differences in value-added measures. Nevertheless, such results, here and in prior research, raise concerns about possible factors that lead to gaps in observation scores but are not related to teacher quality.

[10] See Appendix Section B for value-added model details.

IV. Empirical Strategy

In this paper, I ask: (1) What are the effects of race-congruence and gender-congruence between teachers and raters on teachers' classroom observation ratings? In other words, I examine whether teachers receive higher or lower scores as a result of sharing race or gender identities with their observers. (2) Are the effects of race- or gender-congruence mediated by the sharing of other attributes, such as education history or teaching assignment history?

A. Race-congruence and Gender-congruence

To examine the impact of sharing racial or gender identities with a classroom observer on observation scores, I estimate a model with two-way fixed effects:

$$y_{ijkt} = \beta_0 + \beta_1 Match\_C_{ijkt} + Z_{ijkt}\tau + \delta_{it} + \pi_{jkt} + u_{ijkt} \quad (3)$$

Here, $Match\_C_{ijkt}$ is an indicator that equals 1 if teacher i and observer j share the same characteristic of interest C. Z_{ijkt} are controls for the characteristics of the classroom observation; these are the same as those in Equation 2.

δ_{it} represents teacher-by-year fixed effects, which control for unobserved teacher quality and other teacher characteristics that are invariant within year t. By including δ_{it}, I control for the possibility that better or worse teachers – or teachers in their better or worse school years – are systematically sorting to classroom observers who share their characteristics. With the inclusion of δ_{it}, I am comparing a teacher's observation score to the other observation scores she received in the same school year t. This implies that the identifying variation comes from teacher-years in which the teacher is observed by at least one rater who shares the characteristic of interest and at least one rater who does not in the same school-year. Columns 5-8 and 9-12 of Table 1 provide descriptive characteristics of teachers and observers who contribute to the

identifying variation used to estimate the effect of race and gender congruence effects, respectively. Columns 4-9 of Table 2 also provide mean scores for these teachers.

π_{jkt} represents observer-by-round-by-year fixed effects. Including π_{jkt} controls for observer characteristics, as well as shocks, that are common across all the classroom observations conducted by observer j in round k in school year t. For example, individual observers may vary in their average difficulty or harshness as raters, and individual raters' difficulty may even vary across school-years and/or observation rounds. By including this set of fixed effects, I account for such unobserved and observed differences in rater characteristics across raters, rounds, and time. Standard errors are two-way clustered at the teacher-level and observer-level.

β_1 represents the average effect of a teacher and the classroom observer sharing the characteristic C. That is, for teacher i and observer j who share the characteristic C, β_1 is the estimated difference in the score that teacher i receives from observer j as a result of sharing that characteristic. Absent the sharing of characteristic C, teacher i is predicted to have received the same score minus β_1 from observer j. It is important to note that the observer-round-year fixed effects absorb the "main effect" of observer race or observer gender (e.g., if female raters on average have higher standards for all the teachers they observe). I prefer to include this set of observer-round-year fixed effects because doing so separates the "main effect" of observers from the race or gender interaction effects of interest. For example, when the characteristic of interest C is race, β_1 is a weighted average of the interaction effect for Black teachers observed by Black raters and the interaction effect for White teachers observed by White raters. Any main effect of having a Black rater or White rater is not included in β_1 when observer-round-year fixed effects are included.

To interpret β_1 as the average effect of race or gender congruence between teachers and their raters, the identifying assumption is that, among the observations that a teacher receives in the same school year, selection into having an observer who shares the characteristic C is uncorrelated with unobserved determinants of observation scores. The coefficient β_1 could be biased if systematic sorting to same-race or same-gendered raters occurs *within* teacher-years. One could imagine tales of how non-random assignment of teachers to raters within school-years could bias the estimate of β_1 in either direction. For example, if race- or gender-matches systematically coincide with teachers having extra motivation during the window for an observation round, the estimate of β_1 would be biased upward. In this example, teachers' extra motivation acts as an omitted variable, allowing teachers to both lobby for a same-race or same-gendered rater and perform better as teachers. However, as an additional example, if teachers are systematically assigned to same-race or same-gendered raters during relative rough patches in the school-year, perhaps because administrators believe it will lessen the stress put on those teachers, the estimate of β_1 would be biased downward. Such systematic sorting poses threats to the validity of my estimates. However, I do not find evidence of problematic sorting of teachers to same-race or same-gendered raters within school-year in the data. In Appendix Section C, I provide evidence against problematic sorting.

B. Exploring Potential Mediators

The second part of my analysis explores additional characteristics of the relationships between teachers and their observers that could mediate the effects of race- or gender-congruence estimated above. The extent to which teachers experience gains in observation scores from race- or gender-congruence with their observers could be mediated by other characteristics of the relationships between teachers and observers. For example, one could imagine there exists

systematic sorting of female and male teachers to different subjects/content areas. If so, the effects of gender congruence could be mediated by having an observer who shares the same subject-specific content knowledge as the teacher.

To investigate potential mediators of the effects of race- or gender-congruence, I use district administrative data with staff assignments going back to 2003 to generate variables that capture commonalities between teachers and their observers.

- To assess the role of sharing content knowledge and experience teaching the same content, I create an indicator that equals 1 if the observer j has ever taught the same teaching assignment as that of teacher i at the time of the observation.
- To assess the role of attending the same university, I create an indicator that equals 1 if teacher i and observer j both have degrees from the same university.
- To assess the role of attending a university in the same state, I create an indicator that equals 1 if teacher i and observer j both have degrees from universities in the same state.

To attempt to measure the impact of having existing relationships with a classroom observer, I also create variables that measure the degree of familiarity that teacher i and observer j have with one another. Specifically, I examine:

- the discrete number of school years in which teacher i and observer j have worked in the same school; and
- the discrete number of school years in which teacher i and observer j have had the same teaching assignment while working in the same school. This measures familiarity from working on the same grade-level or content team.

I then re-estimate Equation 3 with the inclusion of these generated variables in the right-hand side. Changes, or lack thereof, in the coefficients on the indicators for race or gender

congruence provide evidence of the extent to which these measures of commonalities or familiarity act as mediators.

V. Results

A. Race-congruence and Gender-congruence Between Teachers and Raters

Race congruence. Table 4 presents the estimates of the effects of race-matching between teachers and their observers. I first focus on the results for having a same-race classroom observer (Panel A) before turning to results for the effect of having a same-gender classroom observer (Panel B). In Column 1, I present results using a specification that includes teacher-year fixed effects and controls for the characteristics of the observation, as well as school-round-year fixed effects, which account for shocks that are common across all the classroom observations in the same school, same observation round, and same school-year. Note that, unlike my preferred specification as described in Equation 3, observer-round-year fixed effects are not included. That is, I do not control for observer characteristics in Column 1.[11] Using within teacher-year variation, I find that teachers who are observed by race congruent teachers, on average, have 0.08 SD higher scores (Panel A).

Since this estimate is from a specification that does not account for observer characteristics, it could reflect observer characteristics that happen to vary with race and may not be reflective of racial dynamics between teachers and their raters. In Column 2, I re-estimate the specification used in Column 1, now including controls for the observer position (i.e., principal vs. assistant principal) and a quadratic function of years of administrator experience. The results are very similar, which indicates that these particular rater characteristics do not drive the result.

[11] The estimates in Column 1 conflate the raters' "main effects" (i.e., the effects of individual raters that are applicable to all teachers) with the effects of race or gender interactions.

Nevertheless, there may be additional unobserved rater characteristics or experiences that happen to vary with race and explain the apparent effect.

In Column 3, I estimate my preferred specification as shown in Equation 3, which includes observer-round-year fixed effects instead of school-round-year fixed effects. In doing so, I now control for unobserved rater characteristics, in addition to other shocks, that are common across all the classroom observations conducted by the same rater in the same school, round, and school year. Here, the observer-round-year fixed effects absorb any "main effects" of observer race (e.g., if Black raters, for whatever reason, have higher standards for all the teachers they observe), thereby leaving the coefficient of interest to reflect race interaction effects. After including this set of fixed effects, the estimated effect of having a race congruent observer is 0.03 SD. As a point of comparison, this magnitude is about 10% of the estimated average within-teacher returns to experience after 1 year of teaching.[12]

In this pooled specification, this estimated effect is a weighted average of the interaction effect for Black teachers observed by Black raters and the interaction effect for White teachers observed by White raters. To investigate potential differences in the extent to which racial subgroups benefit from sharing characteristics with their observers (i.e., include interactions for race congruence by subgroup), I must modify the preferred specification, as I cannot simultaneously include: a) teacher-year fixed effects, b) observer-round-year fixed effects, and c) interactions for race congruence by subgroup.[13] In this modification, I once again exclude

[12] The average within-teacher returns to experience after 1 year of teaching (relative to the novice year) is 0.316. To obtain this estimate, I model observation scores as a function of experience, teacher fixed effects, and teaching assignment-by-year fixed effects. The function of experience includes individual indicator variables for years 1-10, and indicators for 11-15, 16-20, 21-25, and 26+ years of experience.

[13] Equation 3 includes both teacher-year fixed effects, which absorb the interaction for one of the teacher subgroup (e.g., White teachers), and observer-round-year fixed effects, which absorb the interaction for one of the observer groups (e.g., White observers). Including both sets of fixed effects would imply that only one of four possible interactions (i.e., White teacher/White observer; Black teacher/White observer; Black teacher/White observer; Black teacher/Black observer) could be identified. Therefore, in order to estimate interactions for race-congruence by

observer-round-year fixed effects, and I re-include observer position and experience controls, as well as school-round-year fixed effects (as in the specification in Column 2). However, I now also attempt to control directly for individual rater difficulty (as opposed to controlling for rater difficulty using fixed effects), by creating a measure of "prior difficulty" as a rater. The prior difficulty measure is a leave-teacher-out (jackknife) mean, such that for each observer j assigned to rate teacher i, I calculate the mean observation score that observer j gave to all other teachers, except teacher i, in the prior year $t-1$. I use this prior-year jackknife mean score as a proxy for how harsh or difficult observer j is as a rater, and I include a quadratic function of this rater difficulty measure in the right-hand side of the equation.

Since 2013-2014 is my first year of observation score data, I am unable to calculate a prior difficulty measure for observers in that year, so I exclude observations from 2013-2014 in this investigation. In Column 4, I first fit the same preferred model as Column 3 using observations from 2014-2015 to 2017-2018 to show that the estimates of the effect of race congruence is similar in this subsample.

In Column 5, I modify the model as described above, removing observer-round-year fixed effects, and instead include: the function of the rater's prior difficulty, rater characteristics, and school-round-year fixed effects. The estimated effect of race matching remains stable at 0.04 SD, providing some reassurance that the included control variables are fairly reasonable substitutes for the removed set of fixed effects in this model. In Column 6, I then disaggregate the estimated effect of race congruence for Black and White teachers. The point estimates for Black and White teachers are quite similar (0.039 SD and 0.038 SD, respectively). This provides

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subgroup (while still including teacher-year fixed effects in the model), I must remove observer-round-year fixed effects. In doing so, I make the added assumption that conditional on the observable characteristics included in the model, there are no additional unobservable differences between Black and White raters that act as determinants of observation ratings.

some suggestive evidence that, conditional on the included observer characteristics, each subset of teachers benefits from being rated by a same-race classroom observer, and the magnitude of the benefit is comparable. However, I note that the estimate for Black teachers is not statistically significant given the smaller share of Black teachers, and the estimate for White teachers is only marginally significant.

Gender congruence. Panel B repeats the same exercises shown in Panel A to examine the effects of having a same-gender classroom observer, and the pattern of results is similar to that seen in the Panel A results. As shown in Column 1, using within-teacher-year variation, I find that teachers who are observed by same-gender teachers are rated higher by 0.06 SD. This estimate is consistent after including controls for observer position and experience (Column 2). However, just as above, the apparent effects of having a gender-congruent rater could reflect other unobserved rater characteristics that vary with gender, rather than gender interaction effects between teachers and their raters. To account for unobserved rater characteristics, in addition to common shocks across the observations conducted by the same rater in the same school, round, and school year, I include observer-round-year fixed effects in Column 3. The "main effects" of observer gender are now absorbed by this set of fixed effects, and the average estimated effect of sharing gender with the observer is 0.02 SD. For comparison, this magnitude is about 8% of the average within-teacher returns to experience after one year of teaching.

Using the same procedure as that described above, I now attempt to investigate whether the effect of gender congruence is similar for male and female teachers with the subsample of observations from 2014-2015 to 2017-2018. Column 4 shows that the pooled estimated effect from my preferred specification is similar in this subsample, while Column 5 presents the pooled result after including a function of raters' prior difficulty and other controls in place of observer-

round-year fixed effects. With the specification modification, the estimate remains positive, but it is smaller (i.e., a decrease from 0.022 to 0.015) and no longer statistically significant.

When I disaggregate the estimated impact by gender (Column 6), the estimates are small and positive for both males (0.021 SD) and females (0.009 SD), but they are not statistically significant. Examining the point estimates, it is possible that male and female teachers may similarly benefit from having a same-gender classroom observer, but these subgroup estimates are imprecise and should be taken with caution.

Implications for gaps. I now turn to the implications of the effect of race and gender congruence for the magnitude of the Black-White and male-female observation gaps. To do so, I use an alternative specification of Equation 3, which simply allows me to re-parameterize the coefficient of interest from Equation 3. In other words, the results here can be backed out of the estimated coefficients displayed in Table 4.[14] The observation score gap between Black and White teachers is smaller by 0.06 SD when teachers are rated by Black observers, as compared to when teachers are rated by White observers. Similarly, the male-female score gap is smaller by 0.05 SD when teachers are rated by male observers, as compared to when teachers are rated by female observers. Put differently, we would expect the performance gap between Black and White (male and female) teachers to be 0.06 SD (0.05 SD) smaller in a version of the world in which all the observers are Black (male), than it would be in a version of the world in which all the observers are White (female), assuming that the estimated effects of race- and gender-congruence remain the same across these versions of the world.

These results imply that the proportion of observers that identify as Black (male), and the proportion of teachers who are rated by race-congruent (gender-congruent) observers, affect the

[14] Specifically, the results can be obtained by doubling the estimate of the coefficient β_1 from Equation 3, displayed in Table 4 Column 3. However, in the interest of providing the exact point estimates and standard errors, I provide the details of the alternative specification in the Appendix D and the results of the estimation in Appendix Table A5.

magnitude of the performance gap. The extents to which the performance gaps could fluctuate as a function of these characteristics of the classroom observation system are non-trivial; 0.06 SD is roughly one-third of the magnitude of the unconditional Black-White gap in observation scores, and 0.05 SD is roughly a quarter of the size of the unconditional male-female gap.[15]

B. Exploring Potential Mediators

Table 5 presents the results of the exploration of additional relationship characteristics that could mediate the effects of race- or gender-congruence. Using my preferred specification as shown in Equation 3, Column 1 presents estimates from separate regressions. I find that the extent of familiarity between teachers and observers from years of working in the same school is positively and significantly related to observation scores. The other teacher-observer relationship characteristics are not significantly related to teachers' observation scores.

Next, each column among Columns 2-6 represents a separate regression. Here, I present the coefficients on the race-match and gender-match indicators after the inclusion of a potential mediator. The estimates of the effects of race-congruence and gender-congruence remain largely the same. Lastly, Column 7 presents estimates from a single regression in which all of the potential mediator variables are included. Even after the inclusion of all of the additional teacher-observer relationship characteristics, the magnitudes of the coefficients on race- and gender-congruence remain statistically significant and stable at 0.03 and 0.02 SD, respectively. These results indicate that the teacher–observer relationship characteristics included in this analysis are not primary mediators of the estimated effects of race- and gender-congruence. The race and

[15] In the existing analytic sample, in which 38 (75) percent of observations of Black (White) teachers are conducted by race-congruent raters, and 49 (63) percent of observations of male (female) are conducted by gender-congruent raters, directly controlling for having a race-congruent or gender-congruent rater decreases the estimates of the conditional Black-White gap by 0.020 SD (16%) and the conditional male-female gap by 0.004 SD (3%). Results are presented in a modified version of Table 3 in Appendix Table A6.

gender dynamics between teachers and their raters appear to exist separately from the relationship characteristics included here.

However, it is important to emphasize that there exist many other relationship-based explanations for the effects of race- and gender-congruence that are worth exploring, and this analysis is limited by the teacher–observer relationship characteristics that could be generated using available administrative data. For example, one could imagine there exists racial homophily among school staff such that staff members are better friends with other staff members of the same race. If so, the effects of race congruence could be mediated by the strength of the friendship between teachers and observers who share the same race. Here, I'm unable to generate a measure of friendship strength, or other in-depth measures of relationships, between teachers and observers. To further investigate explanations for the effects of race- and gender-congruence, future research could use surveys or interviews to capture richer measures of relationship characteristics.

C. Heterogeneity, Robustness, and Limitations

In Appendix Section E, I explore the potential heterogeneity in the effects of having a race- or gender-congruent observer across subgroups of teachers by intersections of race and gender, teaching experience, and prior evaluation scores. As discussed in the Appendix, I do not find any evidence of problematic differential sorting of teachers to race- or gender-congruent observers (Section C), nor do I find any evidence that the results are driven by the inability to control for the characteristics of the specific set of students sitting in a teacher's classroom during each classroom observation (Section F). Appendix Section G also provides a discussion of the potential challenges to the generalizability of this study.

VI. Conclusion and Discussion

In this paper, I examine how race and gender congruence between teachers and their administrators/raters affect the subjective assessments of teachers. Leveraging data from classroom observations, I employ two-way fixed effects models that address threats to internal validity that remain in prior work on the effects of race-matches and gender-matches between teachers and administrators. I find that teachers, on average, experience small positive increases in their observation scores from sharing race or gender with their observer. While the estimated effect sizes for race-congruence (0.03 SD) and gender-congruence (0.02 SD) seem fairly small, these dynamics imply that the estimated sizes of the Black-White and male-female observation score gaps could fluctuate by as much as 0.06 SD and 0.05 SD, respectively, as a function of the proportion of raters from underrepresented groups and how they are assigned to teachers.

To the extent that performance measures – and gaps in performance measures – may influence teachers' self-efficacy and/or teachers' decisions to remain in the teacher workforce, these characteristics of the classroom observation system could potentially enlarge gaps in teacher retention between Black and White (male and female) teachers. In other locations with similar conditions to those in the context of this study – in which Black (male) teachers are both underrepresented and less likely to have race-congruent (gender-congruent) raters – this potential link between performance gaps and workforce retention gaps may dampen efforts to retain underrepresented teachers and diversify the workforce.

I also explore whether other characteristics of the relationships between teachers and their observers mediate the estimated effects of race- and gender-congruence. While I do find that the extent of professional familiarity between teachers and observers (as measured by years of working in the same school) is significantly related to observation scores, I do not find that any of my included relationship measures mediate the race and gender congruence effects. However,

these included measures are limited. Future research could investigate the potential mediating role of relationships using richer measures of the strength and quality of the personal and professional relationships between teachers and observers/administrators.

As with prior research that has documented the effects of race- or gender-congruence, the mechanisms at work are unclear. One possible explanation is that raters' perceptions and assessments of instructional quality are influenced by teachers' race or gender identities – perhaps, consciously or subconsciously, as a result of ingroup favoritism (see, e.g., Tajfel & Turner, 1979; Stauffer & Buckley, 2005). An alternative explanation is that raters may hold implicit or explicit biases against specific subgroups of teachers. Recent work by Chin et al. (2020) examines teachers' implicit Black/White bias (as measured by the implicit association test), documenting that teachers' implicit bias appears, on average, to vary across race and gender identities. For instance, they find that teachers of color appear less biased than White teachers. Therefore, it is possible that variation in anti-Black implicit bias across Black and White raters may serve as a mechanism for the effects of race-congruence between teachers and raters. Yet another alternative explanation is that teachers feel less anxiety teaching in front of raters who belong to their ingroup (see, e.g., Stephan, 2014). As a result, they perform better in these observed lessons, and their improved performance is reflected in their observation ratings.

The underlying mechanisms and how they manifest across Black and White (male and female) teachers may have implications for the diversity of the teacher workforce. For example, the presence of racial bias may not only exacerbate performance gaps, but may also contribute to difficulty in recruiting and retaining teachers of color. Or, the presence of ingroup favoritism among a workforce that is predominantly White and female may also lead to exclusion of underrepresented teachers in the teacher workforce. Unfortunately, the data cannot be used to

determine which, if any, of these mechanisms are at play, and it cannot speak to whether and which observers, if any, are more/less biased or accurate in their ratings. Additional research is needed, perhaps in the form of field experiments designed to test possible mechanisms.

Even though the underlying mechanisms are unclear, the results speak to the extant research that suggests that observation scores can be influenced by factors that are beyond teachers' control. This raises fairness concerns for teachers whose race or gender identities are not reflected by any of their administrators. However, as also pointed out by Campbell and Ronfeldt (2018), such results do not imply that states and districts should discontinue classroom observations. Rather, the results implore those who use observation scores and evaluation scores to carefully consider the circumstances and context under which the scores were generated when making decisions. For example, administrators may consider a teacher's history of observation scores when deliberating over whether to renew her contract. Similarly, administrators, superintendents, or other district officials may consider observation scores when examining the short list of teachers who are being considered for promotion to leadership or specialist positions. The results from this study suggest that these decision makers should perhaps consider the extent to which teachers may have benefitted from race- or gender-congruence or lacked such benefits. Future studies might explore best practices for how leaders can account for factors that are beyond teachers' control in the decision-making process.

Furthermore, the results in this study do not imply that teachers should necessarily be assigned to race- or gender-congruent observers by default, as teachers' instructional practice could benefit from other types of strategic assignment to observers (e.g., Papay, Taylor, Tyler, & Laski, 2020). Rather, the results prompt future research to: (a) investigate what are the elements of these race- and gender-congruent pairings that could help improve the observation and

feedback process, and (b) uncover how best to support and promote the development of teachers who may not have these benefits.

More broadly, this study contributes rigorous evidence to the growing literature on the role of teachers' and administrators' race and gender identities (Bartanen & Grissom, 2019; Grissom & Bartanen, 2020; Grissom & Keiser, 2011; Husain et al., 2018; Kraft & Christian, 2019). The results prompt further investigation into how race and gender dynamics influence the subjective assessments of teachers throughout the teacher pipeline. Administrators frequently rely on their subjective judgments to make human resources decisions, and the dynamics that operate in the context of subjective observation ratings may be relevant in the context of other stages of the pipeline. For example, one could imagine that similar race and gender dynamics could be at play when administrators observe and evaluate teacher applicants' demonstration lessons during the interviewing process. The presence of these dynamics could contribute to performance/assessment gaps by race or gender in the teacher hiring process, perhaps disadvantaging underrepresented teacher applicants, who may be less likely to be assessed by race- or gender-congruent administrators. Larger race- or gender-based performance/assessment gaps within the teacher hiring process could, in turn, contribute to worse hiring outcomes for underrepresented teachers and further dampen efforts to diversify the teacher workforce.

Future research ought to further examine the potential roles of race- and gender-congruence between administrators and teachers on how teachers are rated during the screening and hiring processes, as well the processes involving teachers' contract renewals and recommendations for promotions to leadership positions. Uncovering whether and how these dynamics influence assessments of teachers in these additional contexts may help to highlight focus points for initiatives aiming to diversify the teacher pipeline.

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Tables

Table 1: Descriptive Statistics for Analytic Sample

	Analytic sample				Race-congruence FE sample				Gender-congruence FE sample			
	Teachers		Observers		Teachers		Observers		Teachers		Observers	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
White	0.87	0.34	0.71	0.45	0.84	0.37	0.57	0.50	0.88	0.33	0.72	0.45
Black	0.13	0.34	0.29	0.45	0.16	0.37	0.43	0.50	0.12	0.33	0.28	0.45
Female	0.81	0.40	0.60	0.49	0.80	0.40	0.59	0.49	0.82	0.38	0.51	0.50
Num. of observations	2.51	0.50			2.65	0.48			2.65	0.48		
Has both White & Black observers	0.21	0.41			1.00	0.00			0.38	0.48		
Has both Male & Female observers	0.31	0.46			0.57	0.50			1.00	0.00		
Experience	12.32	8.91			11.17	8.82			11.12	8.84		
Has tenure	0.48	0.50			0.38	0.48			0.40	0.49		
Is principal			0.35	0.48			0.32	0.47			0.33	0.47
Is assistant principal			0.65	0.48			0.68	0.47			0.67	0.47
Num. of observations conducted			44.25	15.55			42.71	14.95			43.96	15.43
N (person-years)	38,262		2,319		7,985		1,136		12,017		1,457	

Note: The sample includes data from 12,490 unique teachers and 672 unique observers in school years 2013-2014 through 2017-2018. The race-(gender-)congruence fixed effects sample refers to the person-years that contribute to the identifying variation for estimating the effect of race-(gender-)congruence on observation scores.

Table 2: Scores by Teacher Subgroup

	Analytic sample			Race-congruence FE sample			Gender-congruence FE sample		
	N (observations)	Mean	Std. dev.	N (observations)	Mean	Std. dev.	N (observations)	Mean	Std. dev.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
White	81,767	0.04	0.98	16,991	-0.08	0.94	26,714	-0.05	0.92
Black	12,208	-0.14	0.98	3,283	-0.26	0.94	3,740	-0.33	0.93
Female	75,727	0.05	0.97	16,241	-0.07	0.94	24,988	-0.05	0.92
Male	18,248	-0.15	1.01	4,033	-0.27	0.93	5,466	-0.24	0.93

Note: The sample includes data from 38,262 teacher-years from 12,490 unique teachers in school years 2013-2014 through 2017-2018. The race-congruence FE sample includes 7,985 teacher-years from 4,740 unique teachers. The gender-congruence FE sample includes 12,017 teacher-years from 6,601 unique teachers.

Table 3: Gaps in Observation Scores

	Outcome: Observation score					
	Analytic sample		Math VA sample		ELA VA sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Black	-0.121***	-0.127***	-0.076	-0.057	-0.080	-0.080+
	(0.015)	(0.015)	(0.053)	(0.051)	(0.049)	(0.048)
Male	-0.163***	-0.158***	-0.197***	-0.186***	-0.206***	-0.202***
	(0.014)	(0.014)	(0.038)	(0.037)	(0.039)	(0.038)
Observation controls	Y	Y	Y	Y	Y	Y
School-round-year FE	Y	Y	Y	Y	Y	Y
Experience		Y	Y	Y	Y	Y
Assignment		Y	Y	Y	Y	Y
Student characteristics		Y	Y	Y	Y	Y
Math VA				Y		
ELA VA						Y
Observations	93,975	93,975	10,675	10,675	10,726	10,726

Notes: + p<0.10 * p<0.05 ** p<0.01 *** p<0.001. Clustered standard errors (teacher-level) are in parentheses. Observation controls include indicators for observation month, indicators for starting hour, and a quadratic function of the time length. Teacher experience controls include individual indicator variables for 1-10 years of experience, as well as indicators for 11-15, 16-20, 21-26, and 26+ years of experience. Assignment controls include indicator variables for teaching assignment. Student characteristics include the share of students in each race/ethnicity group, the share of students who are male, English-learners, special education, gifted in math, and gifted in ELA; and mean prior test scores for students in Grades 4+.

Table 4: Race- and Gender-congruence

	Outcome: Observation score					
	All			Subsample: 2015-2018		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Race-congruence					
Race match	0.076***	0.077***	0.031*	0.037**	0.038*	
	(0.022)	(0.021)	(0.012)	(0.013)	(0.016)	
Race match x Black						0.039
						(0.034)
Race match x White						0.038+
						(0.020)
	Panel B: Gender-congruence					
Gender match	0.058*	0.061**	0.024*	0.022*	0.015	
	(0.023)	(0.023)	(0.010)	(0.011)	(0.013)	
Gender match x Male						0.021
						(0.026)
Gender match X Female						0.009
						(0.017)
Teacher-year FE	Y	Y	Y	Y	Y	Y
Observation controls	Y	Y	Y	Y	Y	Y
School-round-year FE	Y	Y			Y	Y
Observer controls		Y			Y	Y
Observer-round-year FE			Y	Y		
Rater prior difficulty					Y	Y
Teacher-years	38,262	38,262	38,262	31,235	31,235	31,235
Observer-years	2,319	2,319	2,319	1,881	1,881	1,881
Observations	93,975	93,975	93,975	76,732	76,732	76,732

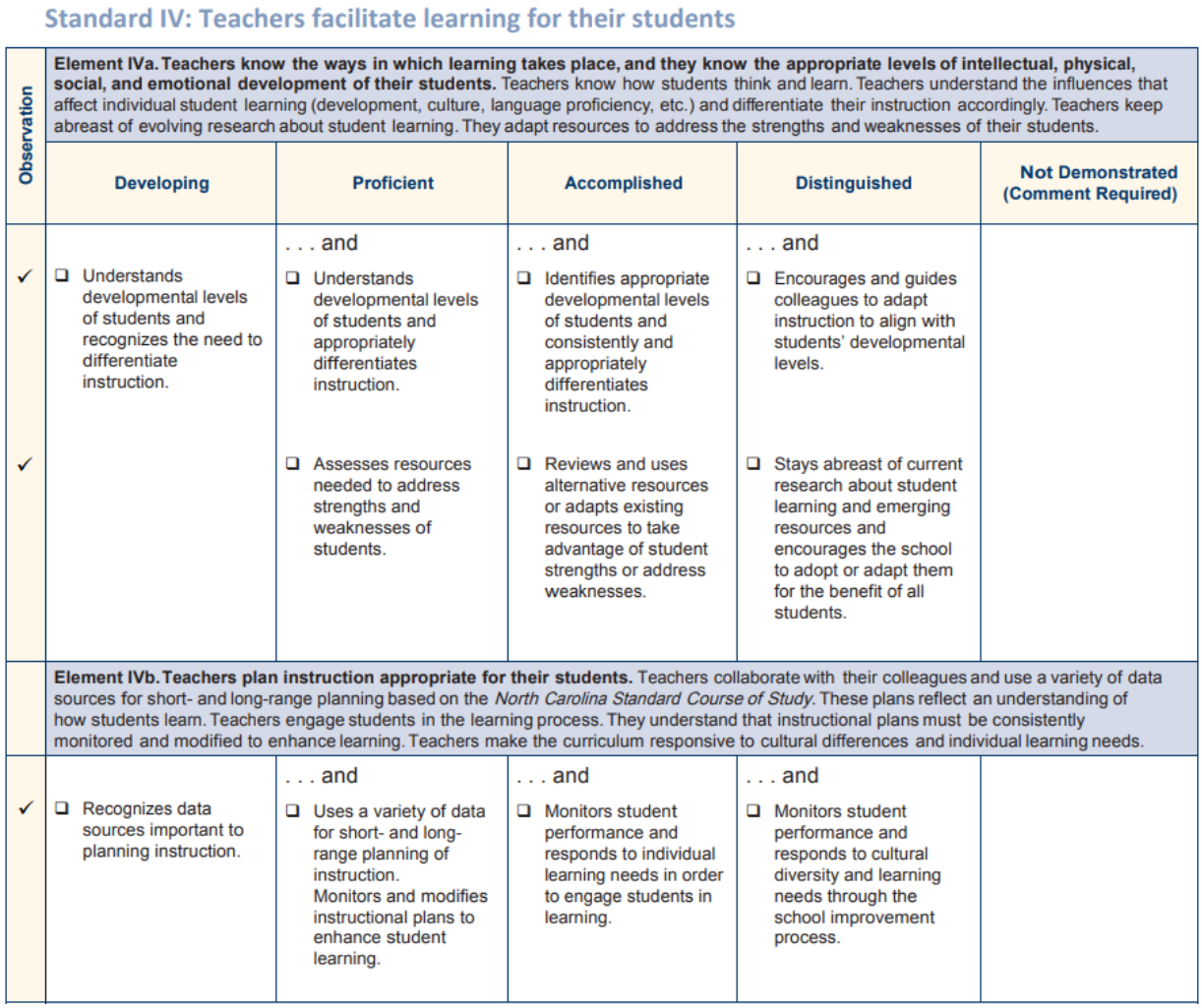
Notes: + p<0.10 * p<0.05 ** p<0.01 *** p<0.001. Two-way clustered standard errors (teacher-level and observer-level) are in parentheses. Observation controls include indicators for observation month, indicators for starting hour, and a quadratic function of the time length. Observer controls include the observer's position (i.e., principal, assistant principal) and a quadratic function of years of administrator experience. The rater prior difficulty measure is a jackknife mean of observation scores that the rater gave to all other teachers in the prior school year.

Table 5: Exploring Mediators

	Outcome: Observation score						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Race match	0.031*	0.030*	0.029*	0.030*	0.030*	0.030*	0.030*
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Gender match	0.024*	0.023*	0.023*	0.023*	0.023*	0.023*	0.023*
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Teaching assignment match	-0.017	-0.018					-0.019
	(0.015)	(0.015)					(0.015)
Attended same university	0.021		0.020				0.023
	(0.017)		(0.017)				(0.017)
Attended university in same state	-0.019			-0.019			-0.024
	(0.017)			(0.017)			(0.017)
Yrs. same school	0.017*				0.017+		0.016+
	(0.009)				(0.009)		(0.009)
Yrs. same school^2	-0.001+				-0.001+		-0.001+
	(0.001)				(0.001)		(0.001)
Yrs. same school-team	0.016					0.015	0.014
	(0.020)					(0.020)	(0.020)
Yrs. same school-team^2	-0.002					-0.002	-0.002
	(0.003)					(0.003)	(0.003)
Observation controls	Y	Y	Y	Y	Y	Y	Y
Teacher-year FE	Y	Y	Y	Y	Y	Y	Y
Observer-round-year FE	Y	Y	Y	Y	Y	Y	Y
Teacher-years	38,262	38,262	38,262	38,262	38,262	38,262	38,262
Observer-years	2,319	2,319	2,319	2,319	2,319	2,319	2,319
Observations	93,975	93,975	93,975	93,975	93,975	93,975	93,975

Notes: + p<0.10 * p<0.05 ** p<0.01 *** p<0.001. Two-way clustered standard errors (teacher-level and observer-level) are in parentheses. Observation controls include indicators for observation month, indicators for starting hour, and a quadratic function of the time length. In Column 1, each group of coefficients separated by a solid line are estimates from a separate regression. Each Column of 2-7 reports results from a single regression.

Figures



Standard IV: Teachers facilitate learning for their students

Observation	Developing	Proficient	Accomplished	Distinguished	Not Demonstrated (Comment Required)
	Element IVa. Teachers know the ways in which learning takes place, and they know the appropriate levels of intellectual, physical, social, and emotional development of their students. Teachers know how students think and learn. Teachers understand the influences that affect individual student learning (development, culture, language proficiency, etc.) and differentiate their instruction accordingly. Teachers keep abreast of evolving research about student learning. They adapt resources to address the strengths and weaknesses of their students.				
✓	❑ Understands developmental levels of students and recognizes the need to differentiate instruction.	. . . and ❑ Understands developmental levels of students and appropriately differentiates instruction.	. . . and ❑ Identifies appropriate developmental levels of students and consistently and appropriately differentiates instruction.	. . . and ❑ Encourages and guides colleagues to adapt instruction to align with students' developmental levels.	
✓		❑ Assesses resources needed to address strengths and weaknesses of students.	❑ Reviews and uses alternative resources or adapts existing resources to take advantage of student strengths or address weaknesses.	❑ Stays abreast of current research about student learning and emerging resources and encourages the school to adopt or adapt them for the benefit of all students.	
	Element IVb. Teachers plan instruction appropriate for their students. Teachers collaborate with their colleagues and use a variety of data sources for short- and long-range planning based on the *North Carolina Standard Course of Study*. These plans reflect an understanding of how students learn. Teachers engage students in the learning process. They understand that instructional plans must be consistently monitored and modified to enhance learning. Teachers make the curriculum responsive to cultural differences and individual learning needs.				
✓	❑ Recognizes data sources important to planning instruction.	. . . and ❑ Uses a variety of data for short- and long-range planning of instruction. Monitors and modifies instructional plans to enhance student learning.	. . . and ❑ Monitors student performance and responds to individual learning needs in order to engage students in learning.	. . . and ❑ Monitors student performance and responds to cultural diversity and learning needs through the school improvement process.	

Figure 1. Excerpt from Rubric for Evaluating North Carolina Teachers from *North Carolina Teacher Evaluation Process*. Source: North Carolina State Board of Education (2015).

Appendix

A. Assigning Element Ratings from Observed Descriptors for Individual Classroom Observations

Since individual classroom observations do not receive official ratings, I assign element ratings for individual classroom observations using the data on which descriptors were checked off by the rater during individual classroom observations. To do so, I use an assignment rule that mimics the procedure used to obtain the summary rating on each element for a teacher's end-of-year summary evaluation. However, results are similar if I adopt alternative assignment rules, as I detail below.

To assign ratings for each element on the rubric for individual classroom observations, I: a) examine the descriptors that were checked off as being present during the classroom observation, and b) assign the highest rating under which *all* the descriptors are checked. To clearly illustrate this procedure, I provide examples of assigning a rating to Element IVa based on the descriptors that are checked off by the rater.

Example 1: As shown in Figure A1, take a teacher, who during an individual classroom observation, received checks for all the descriptors under Element IVa, except the following descriptor in the Distinguished column: "Encourages and guides colleagues to adapt instruction to align with students' developmental levels." I would assign this teacher to have a rating of "Accomplished" on Element IVa, as it is the highest rating category under which she was observed to have demonstrated *all* of the descriptors.

Example 2: As shown in Figure A2, take a teacher, who during an individual classroom observation, received checks for: all the descriptors under Developing, all the descriptors under Proficient, one descriptor under Accomplished, and one descriptor under Distinguished. Despite

the single descriptors that are checked off in the Accomplished and Distinguished categories, I would assign this teacher to have a rating of "Proficient" because it is the highest rating category under which she was observed to have demonstrated *all* of the descriptors.

Example 3: As shown in Figure A3, take a teacher, who receives only a single descriptor checked off in the Proficient category. I would assign a rating of "Not Demonstrated" because there are no rating categories in which she was observed to have demonstrated *all* of the descriptors.

The results are quite similar using the following alternative rules for assigning element ratings from observed descriptors:

a) Assign the highest rating under which *any* descriptors are checked. The teachers described in Examples 1, 2, and 3 (whose descriptors are illustrated in Figures A1, A2, and A3) would receive ratings of Distinguished, Distinguished, and Proficient, respectively.
b) Assign the highest rating under which at least half of the descriptors are checked. The teachers described in Examples 1, 2, and 3 would receive ratings of Distinguished, Distinguished, and Proficient, respectively.

B. Value-added to Math and ELA Test Scores

To estimate teachers' contributions to test scores, I estimate the following value-added model separately for math and ELA teachers of fourth through eighth grade students:

$$A_{ijgt} = f\left(A_{i,t-1}\right) + X_{ijt}\beta + \alpha_{jt} + \gamma_g + \epsilon_{ijt}, \quad \text{(B1)}$$

where A_{ijt} is the outcome of student i assigned to teacher j in grade g in time t. I control for a function of prior math and ELA achievement, which includes the squared and cubed values of

the same-subject prior test score. X_{ijt} is a vector that includes student-, classroom-, and school-level covariates, including gender, race, English learner status, and special education status, as well as these covariates aggregated to the classroom- and school-level, along with mean classroom- and school-level prior test scores. γ_g represent grade fixed effects. α_{jt} are teacher-by-year fixed effects and represent teacher j's value-added to test scores in time t.

C. Sorting of Teachers to Observers

While the preferred specification addresses many potential threats to validity, some concerns remain. The preferred specification includes teacher-year fixed effects, which controls for sorting that arises if the teacher-years in which there are race (gender) matches between teachers and raters are systematically different from the teacher-years without race (gender) matches. However, as mentioned above, there may be unobserved determinants that vary within a teacher-year and lead teachers to seek out race-congruent (gender-congruent) observers for a given classroom observation. To shed light on whether individual teachers appear to systematically sort to race-congruent (gender-congruent) observers over time, I estimate the following model at the teacher-year level:

$$PercentMatch\_C_{it} = \omega_0 + \omega_1 X_{it} + \sigma_i + \tau_t + e_{it} \quad \text{(C1)}$$

Here, $PercentMatch\_C_{it}$ is the percent of teacher i's classroom observations in year t in which teacher i shares characteristic C with her observer. This is a function of teacher i's covariate X_{it}, teacher fixed effects (σ_i), and school fixed effects (τ_t). The coefficient ω_1 provides evidence as to whether within-teacher variation in their time-varying covariates X_{it} predicts the extent to which teachers race or gender match with their observers. I examine the following covariates,

which may be related to classroom observation performance: prior summary evaluation scores, years of experience, and tenure status.

Table A2 presents results from estimating Equation C1. Column 1 (2) presents results where the outcome is the percent of classroom observations with a race (gender) congruent observer, where each estimated coefficient is from a separate regression. None of the estimates are statistically significant at traditional levels, which indicates a lack of evidence for within-teacher sorting to race- or gender-congruent observers on these covariates. While this doesn't rule out the possibility that teachers may be sorting on unobservable characteristics (e.g., motivation) that vary within a teacher-year, some of the concern is alleviated by the lack of evidence of within-teacher sorting on the examined covariates across years.

Next, I examine whether there is evidence of differential sorting of teachers into observer-round-years, such that teachers who match in race or gender with their observer are relatively stronger teachers as compared to other non-matching teachers rated by the same observer in the same round. To do so, I estimate:

$$X_{it} = \varpi_0 + \varpi_1 Match\_C_{ijkt} + \Pi_{jkt} + \Omega_{it} \quad \text{(C2)}$$

Here, teacher i's characteristic X is a function of an indicator that equals 1 if teacher i and observer j share the same characteristic of interest C ($Match\_C_{ijkt}$) and observer-round-year fixed effects (Π_{jkt}). The estimates of ϖ_1 provide evidence as to whether, within observer-round-year, individuals who match in race or gender with their raters, on average, have characteristics that are predictive of stronger performance as teachers: higher prior summary evaluation scores, more years of experience, or tenure status.

Table A3 presents the results from estimating Equation C2. In each of the three columns, each coefficient separated by a solid line is estimated from a separate regression. None of the

estimates are statistically significant at traditional levels. This indicates a lack of evidence for the sorting of teachers to race- or gender-congruent raters on prior summary evaluation scores, years of experience, or tenure status within observer-round-years.

Lastly, I examine whether teachers are more likely to share race or gender identities with their raters in any given round. If teachers are indeed improving over the course of the year and sharing race or gender with their raters are more likely to occur in the later observation rounds, my estimates could be biased upwards. To examine this threat to validity, I estimate:

$$ObservationRound\_R_{ijkt} = \varrho_0 + \varrho_1 Match_{C_{ijkt}} + \Delta_{it} + \Sigma_{ijkt} \quad \text{(C3)}$$

Here, an indicator for whether the classroom observation is a round R observation is a function of an indicator that equals 1 if teacher i and observer j share the same characteristic of interest C ($Match\_C_{ijkt}$) and teacher-year fixed effects (Δ_{it}). ϱ_1 provides evidence as to whether teachers are more likely to share race or gender with their raters in observation round R as compared to themselves in other rounds in the same school year.

Table A4 presents results from estimating Equation C3. In each of the three columns, where the outcomes are indicators for observation rounds 1 through 3, respectively, each coefficient separated by a solid line is estimated from a separate regression. None of the estimates are statistically significant at traditional levels. This provides evidence against sorting of teachers to race- or gender-congruent raters in any given observation round.

D. Estimating Changes in Race and Gender Gaps

To examine how race and gender gaps change when administrators, who belong to the underperforming group, conduct classroom observations, I use an alternative specification of Equation 3. This strategy is similar to that used by Fairlie, Hoffmann, and Oreopoulos (2014)

who examine performance gaps between underrepresented students of color and white community college students when taught by underrepresented instructors of color. Specifically, to examine race gaps, I fit:

$$y_{ijkt} = \lambda_0 + \lambda_1 BlackMatch_{ij} + +Z_{ijkt}\zeta + \delta_{it}^{g} + \pi_{jkt}^{g} + e_{ijkt}, \quad \text{(D1)}$$

where $BlackMatch_{ij}$ is an indicator variable that equals 1 if both teacher i and observer j identify as Black. Just as above, Z_{ijkt} is a vector of classroom observation characteristics. δ_{it}^{g} and π_{jkt}^{g} refer to teacher-by-year and observer-by-round-by-year fixed effects, respectively. The coefficient λ_1 provides an estimate of the change in Black teachers' scores (relative to White teachers' scores) when the observer is also Black, as compared to Black teachers' relative scores when the observer is White. In other words, λ_1 provides an estimate of whether the Black-White gap in observation scores is larger or smaller when observations are conducted by Black observers, as compared to White observers. λ_1 is positive if Black teachers' relative scores are higher when observed by a Black administrator, relative to that when observed by a White administrator. In the context of the existing gap, a positive value of λ_1 would indicate that the gap between Black and White teachers is smaller under Black observers.

To examine whether the male-female gap in observation scores is larger or smaller under male observers, as compared to female observers, I replace the variable $BlackMatch_{ij}$ with $MaleMatch_{ij}$ in Equation D1. Analogously, $MaleMatch_{ij}$ equals 1 if both teacher i and observer j are males, and the coefficient on $MaleMatch_{ij}$ is positive if male teachers' relative scores are higher when observed by male administrators.

Here, λ_1 could be biased if there exists some factor that: (a) coincides with being rated by a Black (male) observer, (b) relates to the conditional outcomes, and (c) exists for Black (male) teachers but not other teachers. One such threat stems from differential sorting, which occurs if,

for example, highly motivated Black (male) teachers sort to Black (male) classroom observers, while highly motivated White (female) teachers do not.

The inputs in the specification shown in Equation D1 are identical to those in my preferred specification Equation 3, except I include $BlackMatch_{ij}$ instead of $Match\_C_{ijkt}$. Estimating the alternative specification shown in Equation D1 essentially allows me to take a difference-in-differences approach to estimate changes in gaps (Fairlie et al., 2014). To clearly illustrate that this is the case, consider the following model:

$$y_{ijkt} = \kappa_0 + \kappa_1 BlackTeacher_i + \kappa_2 BlackObserver_j + \kappa_3\left(BlackTeacher_i \times BlackObserver_j\right) + Z_{ijkt}\zeta + e_{ijkt}, \quad \text{(D2)}$$

where $BlackTeacher_i$ and $BlackObserver_j$ are equal to 1 if teacher i and observer j identify as Black, respectively. κ_3 is essentially a difference-in-differences estimate; it provides the estimate of the change in Black teachers' relative scores from having a Black observer, as compared to Black teachers' relative scores when rated by a White observer. After including teacher-by-year fixed effects and observer-by-round-by-year fixed effects, as well as removing variables that are multicollinear with either set of fixed effects, I arrive at the specification shown in Equation D1. As Equation D1 is simply an alternative specification of Equation 3, the results from estimating Equation D1 can essentially be backed out of the results from estimating Equation 3.

E. Race and Gender Congruence by Subgroup

Intersections of race and gender. To further understand the how race-congruence and gender-congruence influence observations scores across intersections of race and gender, I first examine whether having a race-and-gender congruent rater confers additional benefits with respect to teachers' observation scores. In Appendix Table A7 Column 1, I present results from

estimating Equation 3 with separate indicators for race-congruence, gender-congruence, as well the interaction between the two (i.e., an indicator for race-and-gender congruence). The coefficient on the indicator for race-and-gender congruence provides an estimate of the average effect of sharing *both* race and gender identities with one's observer (beyond the main effects of sharing race or sharing gender with one's observer). The estimated coefficient is -0.009 and is statistically insignificant. The lack of a positive estimate, as well as the imprecision of the estimate, fails to provide any notable indication of additional benefits from having a race-and-gender-congruent rater that exist beyond the main effects.

In the rest of Appendix Table A7, I begin to examine the average effects of having race-congruent and gender-congruent observers across subgroups of teachers by race and gender intersectional identities. To do so, in Columns 2-6, I use the subsample of teachers from school-years 2014-2015 to 2017-2018, just as in the sample included in Table 4 Columns 4-6 for analogous reasons. First, Column 2 repeats the exercise from Column 1 using the 2015-2018 subsample of teachers, illustrating that the patterns in race-and-gender matching effects that are present within the greater analytic sample also hold in this subsample.

In Columns 3 and 4, I examine the effect of having a race-congruent rater, separately for Black males and White males (Column 3) and separately for Black females and White females (Column 4). Though the estimates are generally imprecise with only one of the estimates being statistically significant (for White males), the positive point estimates hint that each of the teacher subgroups may benefit, in terms of higher observation scores, from sharing race with their observers.

In Columns 5 and 6, I examine the effect of having a gender-congruent rater, separately for Black males and Black females (Column 5) and separately for White males and White

females (Column 6). At face value, the estimates would suggest that the effect of having a gender-congruent rater for Black males is large (0.177 SD), while the effect of gender-matching for the other subgroups is far smaller (less than 0.010 SD) and statistically insignificant.[16]

However, it is important to note that the large estimated effect of gender-congruence for Black males is estimated using identifying variation from only 255 teacher-years, from 169 Black male teachers, who are observed by both male and female administrators in the same school-year – a very small, unique subset of teachers relative to the larger analytic sample. Given the small, unique nature of the sample contributing to estimated effect, it is difficult to distinguish whether the estimate pertains only to this small sample or whether the estimated effect is more broadly generalizable to Black male teachers. A deeper understanding of how race and gender dynamics function across intersections of race and gender identities is worthy of further investigation in future research.

Experience and Prior Evaluation Scores. To further understand the role of race- and gender-congruence, I attempt to examine whether the effects vary by additional teacher characteristics, and I present the results in Appendix Table A8. In the odd-numbered columns, I present results from estimating Equation 3 with separate indicators for race-congruence and gender-congruence in the right-hand side of the equation, restricting the sample to teachers with non-missing information on the characteristic of interest. In the even-numbered columns, I adapt the specification so that the each of the indicators for race and gender congruence are interacted with indicators for high and low values of the characteristic of interest.

In Columns 1 and 2, I examine whether the effects of race- and gender-congruence are similar for teachers with at least 12 years (high) and fewer than 12 years (low) of experience.

[16] The positive estimated effect of having a same-gendered observer from my preferred model (0.024 SD from Table 4, Column 3) is not completely driven by Black men teachers. Estimating the same preferred model, while excluding Black men teachers from the sample, results in an estimated effect of 0.015 SD (*std. err* = 0.011, $p = 0.161$).

Column 2 shows that less-experienced teachers and highly experienced teachers have similarly positive point estimates for the effect of race congruence (0.03 SD vs. 0.04 SD), as well as similarly positive point estimates for the effect of gender congruence (0.03 SD vs. 0.02 SD).[17]

In Columns 3 and 4, I examine whether the effects of race- and gender-congruence are similar for teachers with above-average and below-average prior evaluation scores. Here, I restrict the sample to teachers with non-missing summative evaluation scores from the prior school year.[18] Column 3 shows that the average estimated effects of race and gender congruence are 0.04 SD and 0.03 SD, respectively, across this sample. These results are fairly similar to those for the full analytic sample. Column 4 provides some suggestive evidence of heterogeneity by prior evaluation scores. The point estimates indicate that the estimated effects of race congruence are larger for teachers with above-average prior evaluation scores (0.06 SD vs. 0.02 SD). The same can be said for the effects of gender congruence; the estimated effects also appear larger for teachers with above-average prior evaluation scores (0.05 SD vs. 0.02 SD). I lack the precision to be able to state that these estimates are statistically different from one another, but the point estimates suggest that there could be meaningful differences by teacher subgroup.[19] One speculative explanation for such a finding is that raters, while checking off performance descriptors, could be more willing to give the benefit of the doubt to race- or gender-congruent teachers whom they know to have prior teaching success.

[17] The p-value on the null hypothesis that the race-(gender-)congruence coefficients for less- and highly experienced teachers are equal is 0.61 (0.70).

[18] In the North Carolina Teacher Evaluation Process, teachers are required to be reviewed annually by their principals (or a similar designated evaluator). To construct each teacher's summative evaluation score, I use the predicted scores from a Graded Response Model (GRM) fit on the ratings that teachers receive on each element of their end-of-year summary rating forms from the North Carolina evaluation regime. I then standardized the estimated scores within-year to have a mean of 0 and a standard deviation of 1.

[19] The p-value on the null hypothesis that the race-(gender-)congruence coefficients for above- and below-average prior scoring teachers are equal is 0.17 (0.20).

F. Classroom Observation Covariates

All the models that were estimated included some controls for the characteristics of the classroom observation, such as the month, the starting hour, and the length of the observation. However, I lack the data and information to create additional control variables for the specific course being taught and the characteristics of the students sitting in the classroom during the observation. Teachers, particularly in middle and high school, often teach multiple courses with different sets of students, and student characteristics may look fairly different across an individual teacher's courses. As discussed above, previous research indicates that the background characteristics and prior test scores of students may influence classroom observation scores (Campbell & Ronfeldt, 2018; Steinberg & Garrett, 2016). My results could be biased if: (a) the characteristics of the students sitting in a classroom indeed influence observation ratings, and (b) race- or gender-congruent raters, for whatever reason, are more likely than non-matching raters to observe teachers with their higher-performing classrooms.

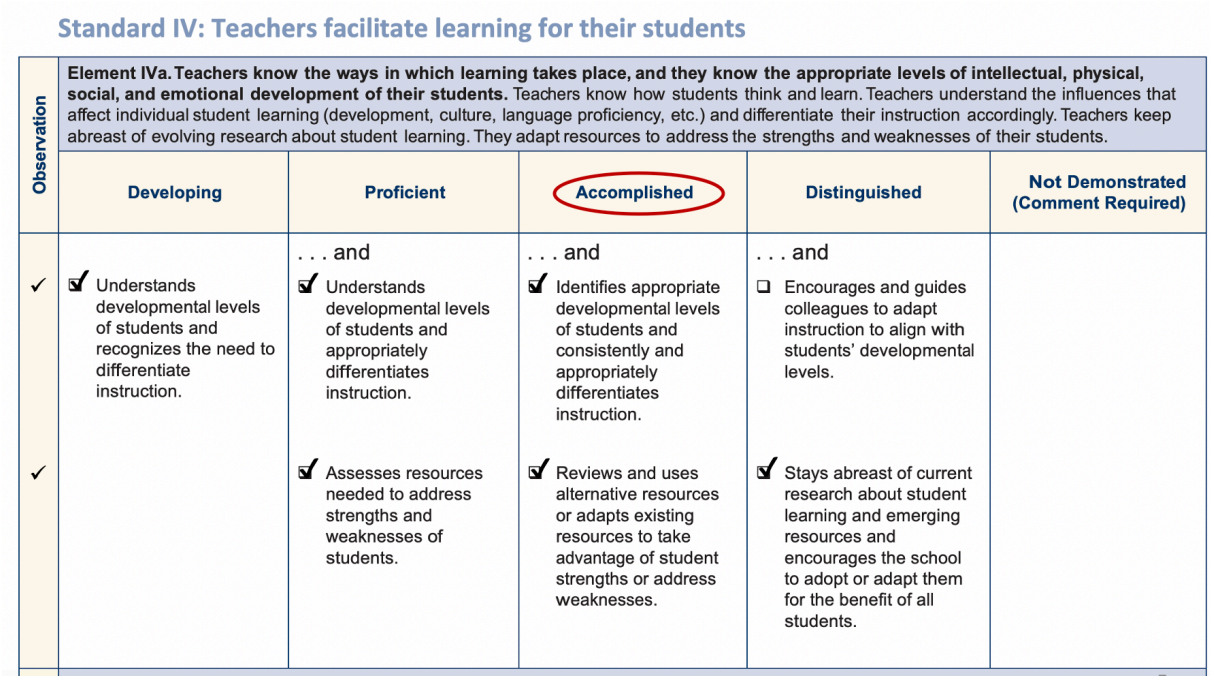
As a robustness check, I attempt to assess whether my results hold in a subsample of the data where teachers are most likely to be observed teaching the same set of students across all the observations they receive in the same school year: elementary school teachers who are assigned to specific grade levels (i.e., teachers who are likely in self-contained classrooms). The main results for the effects of race congruence look qualitatively similar in the elementary subsample, though I lose statistical significance given a smaller sample (results available upon request). This provides some reassurance that the main race-congruence results are not driven by some assignment mechanism where same-race observers are more likely to conduct their observations with teachers' most advantaged students sitting in the classroom. I can speak less to the estimates for gender-congruence, which are very noisy given a relatively small population of

male elementary teachers. Males make up only 6.3% of the elementary subsample of teacher-years.

G. External Validity

The context of this study poses some potential challenges to the generalizability of this study. Importantly, the result for the effect of race-(gender-)congruence is identified using teachers who are observed by both Black and White (male and female) administrators in the same school year. If the teachers and administrators who sort to schools with variation in administrators' race or gender identities are different from those who sort to schools without variation in administrators' race or gender identities, the results here may not generalize.

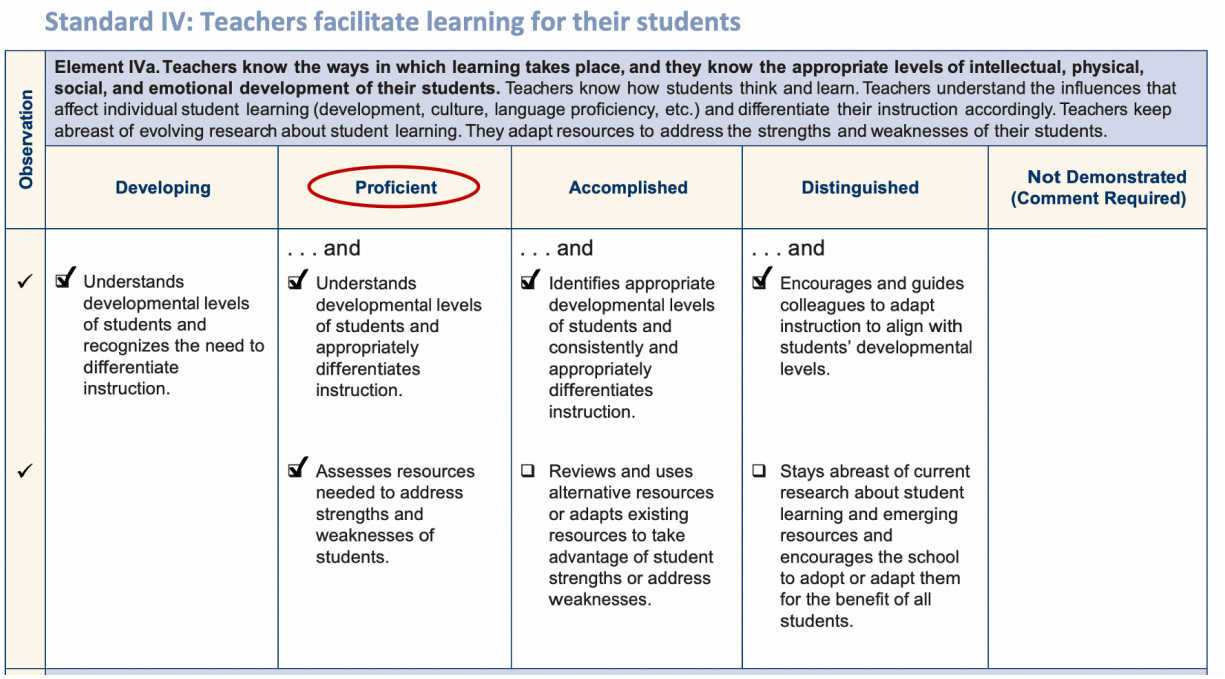
Additionally, in this context, the classroom observers are school administrators who work in the same school as the teachers they observe. It is also unclear whether these results would generalize to evaluation systems in which classroom observations are conducted by individuals who work outside of the teachers' schools. Furthermore, in this study, the race-congruence analysis focuses on Black and White teachers with Black and White classroom observers, as the district has only two adequately sized race groups for analysis. It is unclear the degree to which these results would generalize to other districts with large shares of teachers belonging to other race groups.



Standard IV: Teachers facilitate learning for their students

Observation	Element IVa. Teachers know the ways in which learning takes place, and they know the appropriate levels of intellectual, physical, social, and emotional development of their students. Teachers know how students think and learn. Teachers understand the influences that affect individual student learning (development, culture, language proficiency, etc.) and differentiate their instruction accordingly. Teachers keep abreast of evolving research about student learning. They adapt resources to address the strengths and weaknesses of their students.				
	Developing	**Proficient**	**Accomplished**	**Distinguished**	**Not Demonstrated (Comment Required)**
✓	☑ Understands developmental levels of students and recognizes the need to differentiate instruction.	. . . and ☑ Understands developmental levels of students and appropriately differentiates instruction.	. . . and ☑ Identifies appropriate developmental levels of students and consistently and appropriately differentiates instruction.	. . . and ❑ Encourages and guides colleagues to adapt instruction to align with students' developmental levels.	
✓		☑ Assesses resources needed to address strengths and weaknesses of students.	☑ Reviews and uses alternative resources or adapts existing resources to take advantage of student strengths or address weaknesses.	☑ Stays abreast of current research about student learning and emerging resources and encourages the school to adopt or adapt them for the benefit of all students.	

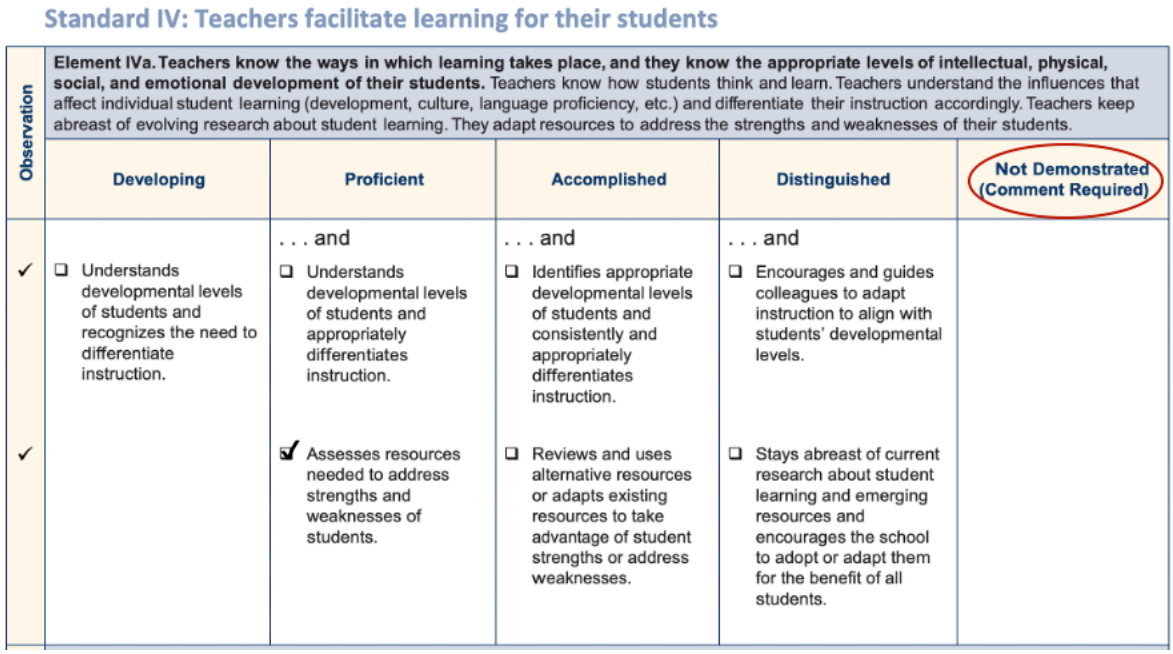
Figure A1. Assigning Ratings for Individual Classroom Observation, Example 1. Note: Rubric excerpt is from Rubric for Evaluating North Carolina Teachers from *North Carolina Teacher Evaluation Process*. Source: North Carolina State Board of Education (2015).



Standard IV: Teachers facilitate learning for their students

Observation	Developing	Proficient	Accomplished	Distinguished	Not Demonstrated (Comment Required)
	Element IVa. Teachers know the ways in which learning takes place, and they know the appropriate levels of intellectual, physical, social, and emotional development of their students. Teachers know how students think and learn. Teachers understand the influences that affect individual student learning (development, culture, language proficiency, etc.) and differentiate their instruction accordingly. Teachers keep abreast of evolving research about student learning. They adapt resources to address the strengths and weaknesses of their students.				
✓	☑ Understands developmental levels of students and recognizes the need to differentiate instruction.	. . . and ☑ Understands developmental levels of students and appropriately differentiates instruction.	. . . and ☑ Identifies appropriate developmental levels of students and consistently and appropriately differentiates instruction.	. . . and ☑ Encourages and guides colleagues to adapt instruction to align with students' developmental levels.	
✓		☑ Assesses resources needed to address strengths and weaknesses of students.	☐ Reviews and uses alternative resources or adapts existing resources to take advantage of student strengths or address weaknesses.	☐ Stays abreast of current research about student learning and emerging resources and encourages the school to adopt or adapt them for the benefit of all students.	

Figure A2. Assigning Ratings for Individual Classroom Observation, Example 2. Note: Rubric excerpt is from Rubric for Evaluating North Carolina Teachers from *North Carolina Teacher Evaluation Process*. Source: North Carolina State Board of Education (2015).



Standard IV: Teachers facilitate learning for their students

Observation	Element IVa. Teachers know the ways in which learning takes place, and they know the appropriate levels of intellectual, physical, social, and emotional development of their students. Teachers know how students think and learn. Teachers understand the influences that affect individual student learning (development, culture, language proficiency, etc.) and differentiate their instruction accordingly. Teachers keep abreast of evolving research about student learning. They adapt resources to address the strengths and weaknesses of their students.				
	Developing	**Proficient**	**Accomplished**	**Distinguished**	**Not Demonstrated (Comment Required)**
		. . . and	. . . and	. . . and	
✓	❑ Understands developmental levels of students and recognizes the need to differentiate instruction.	❑ Understands developmental levels of students and appropriately differentiates instruction.	❑ Identifies appropriate developmental levels of students and consistently and appropriately differentiates instruction.	❑ Encourages and guides colleagues to adapt instruction to align with students' developmental levels.	
✓		☑ Assesses resources needed to address strengths and weaknesses of students.	❑ Reviews and uses alternative resources or adapts existing resources to take advantage of student strengths or address weaknesses.	❑ Stays abreast of current research about student learning and emerging resources and encourages the school to adopt or adapt them for the benefit of all students.	

Figure A3. Assigning Ratings for Individual Classroom Observation, Example 3. Note: Rubric excerpt is from Rubric for Evaluating North Carolina Teachers from *North Carolina Teacher Evaluation Process*. Source: North Carolina State Board of Education (2015).

Table A1: Element Rating Missingness Rates by Evaluation Cycle

Element		Comprehensive/ Standard	Abbreviated
1A	Teachers lead in their classrooms.	9.98	8.17
1B	Teachers demonstrate leadership in the school.	74.32	71.29
1C	Teachers lead the teaching profession.	75.19	72.18
1D	Teachers advocate for schools and students.	74.77	71.68
1E	Teachers demonstrate high ethical standards.	72.26	69.02
2A	Teachers provide an environment in which each child has a positive, nurturing relationship with caring adults.	13.63	
2B	Teachers embrace diversity in the school community and in the world.	27.43	
2C	Teachers treat students as individuals.	14.18	
2D	Teachers adapt their teaching for the benefit of students with special needs.	22.86	
2E	Teachers work collaboratively with the families and significant adults in the lives of their students.	73.59	
3A	Teachers align their instruction with the North Carolina Standard Course of Study.	15.19	
3B	Teachers know the content appropriate to their teaching specialty.	14.22	
3C	Teachers recognize the interconnectedness of content areas/disciplines.	19.95	
3D	Teachers make instruction relevant to students.	18.37	
4A	Teachers know the ways in which learning takes place, and they know the appropriate levels of intellectual, physical, social, and emotional development of their students.	4.42	3.26
4B	Teachers plan instruction appropriate for their students.	8.21	7.35
4C	Teachers use a variety of instructional methods.	2.30	1.41
4D	Teachers integrate and utilize technology in their instruction.	13.92	16.93
4E	Teachers help students develop critical thinking and problem-solving skills.	2.89	2.17
4F	Teachers help students work in teams and develop leadership qualities.	14.32	16.28
4G	Teachers communicate effectively.	1.90	1.06
4H	Teachers use a variety of methods to assess what each student has learned.	7.50	6.16
5A	Teachers analyze student learning.	79.14	
5B	Teachers link professional growth to their professional goals.	79.91	
5C	Teachers function effectively in a complex, dynamic environment.	80.10	
	N (teacher-observations)	77,723	36,277

Note: Shaded rows indicate that the element's rating is included in the construction of teacher observation scores. Teachers undergoing the abbreviated evaluation cycle are evaluated on only Standards I and IV during their classroom observations.

Table A2: Sorting Across Time

	% Match race	% Match gender
	(1)	(2)
Prior std. summary evaluation score	-0.260	-0.491
	(0.312)	(0.332)
Yrs. of experience	0.553	-0.288
	(0.765)	(0.611)
Teacher has tenure	-5.808	-2.747
	(3.885)	(3.477)
Teacher FE	Y	Y
N (teacher-years)	35,568	35,568

Notes: Clustered standard errors (at teacher-level) are in parentheses. Estimates are not statistically significant at traditional levels. In Columns 1-2, each coefficient separated by a solid line is estimated from a separate regression.

Table A3: Differential Sorting into Observer-Round-Years

	Prior std. summary evaluation score	Yrs. of experience	Teacher has tenure
	(1)	(2)	(3)
Race match	0.007	-0.005	-0.004
	(0.019)	(0.175)	(0.008)
Gender match	0.017	0.211	0.006
	(0.016)	(0.141)	(0.006)
Observer-round-year FE	Y	Y	Y
N (teacher-years)	63,461	93,778	93,975

Notes: Two-way clustered standard errors (teacher-level and observer-level) are in parentheses. Estimates are not statistically significant at traditional levels. In Columns 1-3, each coefficient separated by a solid line is estimated from a separate regression.

Table A4: Sorting in Matches Across Observation Rounds

	Observation 1	Observation 2	Observation 3
	(1)	(2)	(3)
Race match	0.012	-0.020	0.008
	(0.011)	(0.014)	(0.010)
Gender match	0.014	-0.004	-0.010
	(0.010)	(0.011)	(0.008)
TeacherXyear FE	Y	Y	Y
N (teacher-years)	93,975	93,975	93,975

Notes: Two-way clustered standard errors (teacher-level and observer-level) are in parentheses. Estimates are not statistically significant at traditional levels. In Columns 1-3, each coefficient separated by a solid line is estimated from a separate regression.

Table A5. Changes in Gaps

	Observation score	
	(1)	(2)
Black match	0.061*	
	(0.024)	
Male match		0.047*
		(0.020)
Teacher-year FE	Y	Y
Observation controls	Y	Y
Observer-round-year FE	Y	Y
Teacher-years	38,262	38,262
Observer-years	2,319	2,319
Observations	93,975	93,975

Notes: + $p<0.10$ * $p<0.05$ ** $p<0.01$ *** $p<0.001$. Two-way clustered standard errors (teacher-level and observer-level) are in parentheses. Estimated model is in Equation D1. Observation controls include indicators for observation month, indicators for starting hour, and a quadratic function of the time length.

Table A6: Gaps in Observation Scores

	Outcome: Observation score								
	Analytic sample			Math VA sample			ELA VA sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Black	-0.121***	-0.127***	-0.107***	-0.076	-0.057	-0.047	-0.080	-0.080+	-0.073
	(0.015)	(0.015)	(0.015)	(0.053)	(0.051)	(0.052)	(0.049)	(0.048)	(0.049)
Male	-0.163***	-0.158***	-0.154***	-0.197***	-0.186***	-0.182***	-0.206***	-0.202***	-0.203***
	(0.014)	(0.014)	(0.014)	(0.038)	(0.037)	(0.038)	(0.039)	(0.038)	(0.040)
Race match			0.063***			0.030			0.023
			(0.010)			(0.031)			(0.030)
Gender match			0.041***			0.014			-0.004
			(0.009)			(0.029)			(0.028)
Observation controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
School-round-year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Experience		Y	Y	Y	Y	Y	Y	Y	Y
Assignment		Y	Y	Y	Y	Y	Y	Y	Y
Student characteristics		Y	Y	Y	Y	Y	Y	Y	Y
Math VA					Y	Y			
ELA VA								Y	Y
Observations	93,975	93,975	93,975	10,675	10,675	10,675	10,726	10,726	10,726

Notes: + p<0.10 * p<0.05 ** p<0.01 *** p<0.001. Clustered standard errors (teacher-level) are in parentheses. Observation controls include indicators for observation month, indicators for starting hour, and a quadratic function of the time length. Teacher experience controls include individual indicator variables for 1-10 years of experience, as well as indicators for 11-15, 16-20, 21-26, and 26+ years of experience. Assignment controls include indicator variables for teaching assignment. Student characteristics include the share of students in each race/ethnicity group, the share of students who are male, English-learners, special education, gifted in math, and gifted in ELA; and mean prior test scores for students in Grades 4+.

Table A7: Race- and Gender-congruence Among Subgroups

	Outcome: Observation score					
		Subsample: 2015-2018				
	All	All	Men	Women	Black	White
	(1)	(2)	(3)	(4)	(5)	(6)
Race match	0.035*	0.041*				
	(0.018)	(0.019)				
Gender match	0.029	0.028				
	(0.018)	(0.019)				
Race match x Gender match	-0.009	-0.008				
	(0.021)	(0.022)				
Race match x Black			0.046	0.042		
			(0.061)	(0.038)		
Race match x White			0.067*	0.030		
			(0.033)	(0.022)		
Gender match x Male					0.177**	0.000
					(0.064)	(0.028)
Gender match X Female					0.008	0.008
					(0.045)	(0.017)
Teacher-year FE	Y	Y	Y	Y	Y	Y
Observation controls	Y	Y	Y	Y	Y	Y
School-round-year FE			Y	Y	Y	Y
Observer controls			Y	Y	Y	Y
Observer-round-year FE	Y	Y				
Rater prior difficulty			Y	Y	Y	Y
Teacher-years	38,262	31,235	5,834	25,116	3,874	27,119
Observer-years	2,319	1,881	1,519	1,878	1,425	1,876
Observations	93,975	76,732	14,273	61,721	9,559	66,544

Notes: + p<0.10 * p<0.05 ** p<0.01 *** p<0.001. Two-way clustered standard errors (teacher-level and observer-level) are in parentheses. Observation controls include indicators for observation month, indicators for starting hour, and a quadratic function of the time length. Observer controls include the observer's position (i.e., principal, assistant principal) and a quadratic function of years of administrator experience. The rater prior difficulty measure is a jackknife mean of observation scores that the rater gave to all other teachers in the prior school year.

Table A8: Race- and Gender-congruence for Sub-populations

	Outcome: Observation Score			
	Years of Experience		Prior Evaluation Score	
	(1)	(2)	(3)	(4)
Race Match	0.031*		0.036*	
	(0.012)		(0.014)	
Gender Match	0.023*		0.030*	
	(0.010)		(0.012)	
Race Match X Low		0.026+		0.024
		(0.014)		(0.015)
Race Match X High		0.036*		0.060*
		(0.017)		(0.024)
Gender Match X Low		0.025*		0.020
		(0.012)		(0.014)
Gender Match X High		0.019		0.045*
		(0.014)		(0.018)
Observation controls	Y	Y	Y	Y
Teacher-year FE	Y	Y	Y	Y
Observer-round-year FE	Y	Y	Y	Y
Teacher-years	38,181	38,181	26,313	26,313
Observer-years	2,317	2,317	1,873	1,873
Observations	93,775	93,775	63,408	63,408

Notes: + $p<0.10$ * $p<0.05$ ** $p<0.01$ *** $p<0.001$. Two-way clustered standard errors (teacher-level and observer-level) are in parentheses. Observation controls include indicators for observation month, indicators for starting hour, and a quadratic function of the time length.