

DISCUSSION PAPER SERIES

IZA DP No. 11140

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## ABSTRACT

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# Racial and Ethnic Discrimination in the Labor Market for Child Care Teachers<sup>1</sup>

This paper examines racial and ethnic discrimination in the labor market for center-based child care teachers. We assemble a novel dataset that combines a resume audit study of child care centers in several large U.S. cities with a follow-up survey of the providers in the original audit sample. The provider survey was administered to obtain detailed information about the children, teachers, and administrators within the center. Together, these data provide three insights about the influence of applicant race and ethnicity on teacher hiring. First, we uncover robust evidence of discrimination: black and Hispanic applicants receive significantly fewer interview requests than observationally equivalent whites. Nevertheless, we show that program directors exhibit strong own-race preferences: white directors favor white applicants, while minority directors favor those from their own racial and ethnic background. Second, our results suggest that teacher hiring is consistent with a model of customer discrimination. In particular, the racial and ethnic composition of children attending the center is strongly correlated with the characteristics of job-seekers receiving an interview request. Finally, we show that states' child care regulations and quality certification programs mitigate or eliminate entirely the racial and ethnic gap in interview requests. These benefits accrue disproportionately to high-skilled minorities, and to those applying to child care centers located in high-income communities. We posit that these firm-level licensing requirements increase the cost to employers of using race and ethnicity as signals of teacher productivity.

**JEL Classification:** J71

**Keywords:** child care market, racial/ethnic labor market discrimination, customer discrimination, child care regulations

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## I. Introduction

This paper provides a comprehensive analysis of racial and ethnic discrimination in the hiring of center-based child care teachers. Specifically, we implement a unique two-step data collection procedure that combines a resume audit study of child care centers in 14 U.S. cities with a detailed follow-up survey of the providers in the original audit sample. Fictitious resumes were randomly assigned predominately white-, black-, and Hispanic-sounding names that were submitted in response to real teacher job advertisements. The provider survey was then administered to inquire about the characteristics of the children, teachers, and administrators within the center. Together, these data allow us to study three features of discrimination within the child care labor market. We begin by examining whether providers engage in discrimination when hiring teachers, as well as the mediating influence of program directors' race and ethnicity on hiring decisions. Second, given the nature and intensity of interaction between child care staff and parents, we provide an empirical test of the role of customer discrimination in teacher hiring. Our final set of analyses examines the impact of regulations and quality certification programs—key features of the child care market—on racial and ethnic disparities in interview requests.<sup>2</sup>

Although the resume audit methodology has been used extensively to examine racial and ethnic discrimination across a variety of labor markets and countries (e.g., Bartoš et al., 2016; Bertrand & Mullainathan, 2004; Carlsson & Rooth, 2007; Nunley et al., 2014; Oreopoulos, 2011), we believe for several reasons that such an investigation is particularly important in the child care market.<sup>3</sup>

First, the emergence of an achievement gap between minority and non-minority children during the preschool-age years has increased the urgency of adopting early childhood policies that deliver high-quality, culturally competent programming (Fryer & Levitt, 2013). One proposal gaining traction is to

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<sup>2</sup> In the interest of full disclosure, the current paper is part of a larger project that examines hiring practices in the market for center-based child care teachers. A previous paper by the authors uses only the resume audit data to study the causal impact of a broad set of applicant characteristics—including race and ethnicity—on interview requests (Boyd-Swan & Herbst, 2017a). That paper does not utilize the provider survey, nor does it examine center directors' race and ethnicity, customer discrimination, or the impact of regulations. In this paper, we repeat the basic analysis showing racial and ethnic gaps in interviews to provide continuity and to motivate the analyses that follow it.

<sup>3</sup> See Bertrand and Duflo (2016) for comprehensive review of this literature. Incidentally, in their study of ethnic discrimination in Sweden, Carlsson and Rooth (2007) include preschool teachers among the 12 occupations analyzed.

increase the hiring and retention of minority child care teachers. Researchers and administrators posit that doing so will provide developmental benefits for minority children by exposing them to demographically similar “role model” adults who may serve as mentors and advocates. In addition, minority teachers may be less likely to exhibit unconscious forms of bias that can impede productive child-teacher interactions, and they may serve as stabilizing cultural “bridges” between children’s home and child care environments.

Consistent with these hypotheses, there is mounting empirical evidence that minority children particularly benefit when they are matched with teachers from the same racial or ethnic background. Although the literature focuses primarily on the K-12 grades, the evidence suggests that such race-matching generates short-run improvements in test scores (Dee, 2004; Egalite et al., 2015), classroom behavior (Wright et al., 2017), attendance and suspensions (Holt & Gershenson, 2015; Lindsay & Hart, 2017), teacher evaluations of student performance and expectations (Dee, 2005; Gershenson et al., 2016), and academic attitudes (Egalite & Kisida, forthcoming). Furthermore, Gershenson et al. (2017) show that race-matching in primary school may generate long-run benefits by reducing high school drop-out rates, particularly among black males.<sup>4</sup>

The salience of these issues—the early emergence of racial achievement gaps as well as teacher-based policies to ameliorate them—will continue to grow in the coming decades given the increasing racial and ethnic diversity of the preschool-age population.<sup>5</sup> Yet despite this growing diversity, the non-white share of the early education workforce continues to lag behind that of the children enrolled in

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<sup>4</sup> The smaller literature on preschool programs also finds that race-matching is important for young children’s development and early education experiences. Two studies of pre-kindergarten programs show that race-matching is positively associated with teacher reports of children’s initial program readiness (Downer et al., 2016) as well as short-run gains in academic and social-emotional skills (Downer et al., 2016; Graves & Howes, 2011). Another study finds that children matched to same-race teachers are rated to have more positive interactions—and closer overall relationships—with their teachers (Saft & Pianta, 2001). A related stream of work finds that minority teachers hold higher expectations for and are more optimistic about the academic futures of children from their own racial and ethnic group (Gilliam et al., 2016; Murray et al., 2008; Tenenbaum & Ruck, 2007).

<sup>5</sup> Approximately half of children ages 0 to 4 are non-white, and one-quarter are children of immigrants and refugees (U.S. Census Bureau, 2012; Park et al., 2015). These demographic shifts have translated into growing numbers of minority children who participate in center-based child care programs (Magnuson & Waldfogel, 2005). Currently, black preschoolers are slightly more likely to participate in center-based care than their white counterparts (43 percent versus 41 percent), while enrollment rates for Hispanic children (although they have grown steadily) remain comparatively low (30 percent) (Author’s analysis of the 2012 NHES).

these programs.<sup>6</sup> To the extent that hiring discrimination exists in the market for child care teachers, such discrimination may prevent the workforce from attaining the level of diversity needed to serve the developmental needs of an increasingly heterogeneous child population. Thus our first goal in the paper is to document whether there are racial and ethnic disparities in child care teacher hiring. In addition, we examine to what extent the race and ethnicity of the *center director* influences the relative treatment of minority applicants. Given that an overwhelming majority of program directors are white, it is plausible that own-race preferences provide an explanation for the differential treatment of minorities.<sup>7</sup>

The second motivation for studying discrimination in child care hiring is that the production of early education services is highly labor intensive. This trait is appealing for our purposes because, unlike the labor markets examined in some previous resume audit studies, there is a high degree of face-to-face interaction between employees (i.e., child care teachers) and consumers (i.e., parents and children). Furthermore, the communication between teachers and parents likely relates to sensitive topics about children's health and development. Such dynamics create the potential for *consumers'* racial preferences to shape the hiring behavior of child care providers. Indeed, Becker's (1957) seminal work on discrimination posits that some consumers have discriminatory tastes—preferring to receive a given service from members of their own racial and ethnic group—which in turn may lower the demand for workers from other groups, reduce their relative wages, and lower the market price charged by firms who continue to hire minority individuals. If these conditions are present in the child care market, profit-maximizing firms have two options: hire minority teachers at low wages and charge lower rates to non-discriminatory parents, or hire high-wage non-minority teachers and charge higher rates to discriminatory parents.

Aside from the high degree of interaction between consumers and employees, there are other reasons to believe that parents' child care decisions may be shaped by racial preferences. First, although

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<sup>6</sup> Recent estimates suggest that blacks and Hispanics comprise about 18 and 12 percent of the center-based lead teacher workforce, respectively, while immigrants make up approximately 18 percent of the workforce (Boyd-Swan & Herbst, 2017a; Park et al., 2015).

<sup>7</sup> Indeed, analyses based on the National Survey of Early Care and Education (NSECE) show that 63 percent of center directors are white, 17 percent are black, and 12 percent are Hispanic (authors' calculations).

parents claim to value high-quality, education-based child care programs, the evidence suggests that actual consumption decisions are driven by a range of non-quality factors, including parents' own personal biases and cultural beliefs (Caldera & Hart, 2004; Chaudry et al., 2011; Pungello & Kurtz-Costes, 1999; Mamedova et al., 2015).<sup>8</sup> In addition, parents generally allocate little time to the child care search, considering just one or two providers before making a decision (NSECE, 2014). Together, these dynamics suggest that parents' consumption decisions may be influenced by such easy-to-observe (and less cognitively demanding) features of the child care environment as the staff racial and ethnic composition. If parents' discriminatory tastes lead to differential sorting based on teachers' observable characteristics, then providers have a strong incentive to adjust hiring behavior in a way that accords with consumer preferences. Therefore, another goal of the current paper is to understand whether customer discrimination plays a role in hiring decisions. In particular, we examine to what extent the racial and ethnic composition of *children* attending the center is correlated with the gap in interview requests between minority and non-minority applicants.

The final motivation for studying this topic is that the child care market is characterized by high levels of regulation and quality certification. All states set minimum standards for child-staff ratios, maximum group sizes, and the experience/education of center directors and teachers. In addition, some states and non-profit organizations administer certifications in the form of quality ratings and accreditations that are awarded to child care centers (and their staff) for meeting a given level of quality and human capital investment. Such forms of occupational licensing are aimed at mitigating the well-known information asymmetries in the child care market, in which parents are ill-informed about the negative external benefits generated by low-quality care as well as how to identify the attributes of high-quality providers (Bassok et al., 2017; Mocan, 2007). In markets with imperfect information, sellers have an incentive to produce lower-quality services in part by hiring less productive workers and

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<sup>8</sup> Studies of the K-12 grades show that parents' school choice preferences are driven in part by the demographic characteristics of schools, including their racial and ethnic composition as well as the likelihood of a demographic match between the prospective student and her peer group (Glazerman & Dotter, 2017; Harris & Larsen, 2015; Hastings et al., 2006; Schneider & Buckley, 2002).

underinvesting in their skill acquisition (Blau, 2001; Shapiro, 1986). As a result, sellers may be more inclined to indulge their distaste for hiring minority applicants than would be the case if consumers were perfectly informed. However, by reducing consumer search frictions, occupational licensing and quality-credentialing increases the cost of discriminating against well-qualified members of minority groups. This discussion suggests that various forms of licensing requirements may have the unintended consequence of reducing racial and ethnic disparities in child care labor market outcomes, a proposition which finds empirical support in other labor markets (e.g., Blair & Chung, 2017). Therefore, the final goal of this paper is to test whether child care regulations and quality credentialing programs influence the hiring behavior of center-based child care providers.

As noted above, our paper makes a methodological contribution to the discrimination literature. After completing data collection for the resume audit study, we administered a nominally independent follow-up survey to all of the child care providers in the original audit study sample. To our knowledge, this is the first paper to implement such a two-step data collection procedure for the purpose of studying labor market discrimination.<sup>9</sup> The web-based survey inquired about the demographic characteristics of the children utilizing the centers, characteristics of the teachers and directors employed there, and a variety of attributes of the centers themselves. Such information enables us to examine how the race and ethnicity of the director as well as the racial composition of actual consumers (i.e., children) influences teacher hiring decisions. In addition, the survey included a number of questions related to the job advertisements to which our fictitious resumes were submitted. We inquired about whether an individual was ultimately hired for the position, the number of job offers made before the hire was completed, the demographic characteristics of the successful applicant, and the starting wage rate. These data allow us to shed light on whether racial differences in interview requests translate into disparities in actual hires.

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<sup>9</sup> We located only two labor market studies that made *any* ex post attempt to contact employers. Carlsson & Rooth (2007) surveyed a sub-set of Swedish employers (i.e., only those inviting at least one resume for an interview) on a small number of characteristics. Oreopoulos (2011) emailed a randomly selected sub-set of firms to elicit their perspective on his finding of ethnic discrimination in Canada's labor market. A third paper, by Zussman (2013), which analyzes the Israeli used car market, represents to our knowledge the most comprehensive attempt to contact participants in the original correspondence study. This paper utilized a telephone survey to contact the sellers listed in the on-line car advertisements about their attitudes toward Arabs in Israel.

Our main findings can be summarized as follows. First, we find evidence consistent with racial and ethnic discrimination in child care teacher hiring decisions. Our estimates imply that resumes containing black-sounding names receive 29 percent fewer interview requests than otherwise identical resumes with white-sounding names, while those with Hispanic-sounding names receive 12 percent fewer interviews. Furthermore, these interview gaps are experienced by minorities applying to both low- and high-skilled teacher positions. However, despite the apparent favoritism shown to white job-seekers in the aggregate, we uncover striking evidence of program directors' own-race preferences in the hiring process: white directors favor white applicants, while minority directors favor those from their own racial and ethnic background. Second, we show that teacher hiring behavior is consistent with a model of customer discrimination. In particular, as the share of children of a given race or ethnicity increases within a child care center, job-seekers from the same background are increasingly favored in the hiring process. We also find that customer discrimination is substantially stronger in the market for high-skilled teachers: the reward to applicants whose background matches that of the children enrolled in the program is larger in positions requiring more experience and education. Finally, our results suggest that states' child care regulations and quality certification programs mitigate or eliminate entirely the racial and ethnic gap in interviews. Providers exposed to more stringent forms of occupational licensing are considerably more likely to interview minority applicants than their counterparts operating in relatively lenient policy environments. In addition, we find that these labor market advantages accrue disproportionately to the most qualified minority applicants, as well as to those applying to child care providers located in high-income communities.

The remainder of the paper proceeds as follows. Section II describes the resume audit study design as well as our follow-up survey of child care providers. Discussion of our empirical results is organized into three sections. Section III documents the racial and ethnic disparities in interview requests, and it reports on the role of director race and ethnicity in influencing the treatment of job-seekers. In Section IV, we turn our attention to examining whether customer discrimination has

implications for child care hiring decisions. The final empirical section, Section V, studies the impact of states' regulatory policies as well as center-specific quality certifications on the racial and ethnic difference in interview requests. We conclude in Section VI with an exploration of the characteristics of individuals who were ultimately hired by the child care providers to which our fictitious resumes were sent.

## **II. Data Sources**

### **Resume Audit Study**

The current paper is part of larger project that administered a resume audit study to understand teacher hiring practices in the market for center-based child care.<sup>10</sup> The setting for our audit study is a large on-line job board in the U.S. We used this website to search for child care teacher job advertisements in 14 large cities: Atlanta, Boston, Chicago, Dallas, District of Columbia, Houston, Los Angeles, Minneapolis, New York City, Philadelphia, Phoenix, San Diego, San Francisco, and Seattle. Fieldwork for the audit study began in May 2016 and ended in January 2017. Our goal was to submit four resumes in response to each job advertisement. Altogether we submitted 10,986 resumes in response to 2,772 job advertisements, of which 2,720 (98.1 percent) received all four resumes.

We submitted resumes largely in response to postings for early childhood education (ECE), child care or daycare lead teachers, assistant teachers and aides, co-teachers, and floating-classroom teachers. These positions were located in infant, toddler, or preschool-aged classrooms as well as before- and after-school settings. In addition, we limited the job search to child care taking place in for- and non-profit centers, places of worship, community-based organizations, and school-based before- and after-school programs. Our audit study excluded teacher positions in pre-kindergarten classrooms as well as elementary and secondary schools; non-pedagogical or administrative positions (e.g., center directors, accountants, cooks, and bus drivers); child care taking place in the child's home or that of a friend or relative; and home-based child care businesses.

Using software created by Lahey and Beasley (2009), we created a large number of fictitious

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<sup>10</sup> A detailed discussion of the audit study design can be found in Boyd-Swan and Herbst (2017a; b).

resumes, each one containing a variety of randomly assigned characteristics. For the purposes of this study, the key resume attribute is the assignment of a predominately white-, black-, or Hispanic-sounding name. Given that about 95 percent of child care teachers are women, we examine only female-sounding names (Boyd-Swan & Herbst, 2017a). Data on the most common surnames by race and ethnicity were collected from the 2000 U.S. Decennial Census for the following categories: non-Hispanic White only, non-Hispanic Black or African-American only, and Hispanic or Latino origin.<sup>11</sup> Given that the most common forenames by race and ethnicity are not reported by the U.S. Census Bureau, we relied on the New York City Health Department’s Bureau of Vital Statistics birth records from 2014, Babycenter.com’s 2016 list of popular names from Virginia, Colorado, Arkansas, Texas, and New York City, and the list used by Bertrand and Mullainathan (2004).<sup>12</sup> Names within each racial and ethnic category were randomly assigned with equal probability (1/3), and the individual names were drawn without replacement, thereby ensuring that no duplicates appear in a set of four resumes.<sup>13</sup>

Each resume included up to five additional sections whose individual characteristics were also randomly assigned. First, resumes contained a one-sentence personal statement, with each statement including two trait adjectives representing four of the five Big Five personality domains (openness to experience, conscientiousness, extraversion, and agreeableness). Second, all resumes were assigned a work history profile that included no previous child care work experience, six months of experience, or two years of experience. Third, we summarized applicants’ educational attainment by assigning a high school diploma, an associate’s degree, or a bachelor’s degree as the highest level of education. Resumes with an associate’s or a bachelor’s degree were assigned one of three majors: early childhood education (ECE), nursing, or business administration. Fourth, we assigned one of four bundles of professional credentials or job-performance accolades: fingerprint clearance card as well as CPR and First Aid

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<sup>11</sup> U.S. Census Bureau, 2000 Census of Population and Housing, <https://www.census.gov/main/www/cen2000.html>.

<sup>12</sup> Our bank of predominately white-sounding names includes Allison Lutz, Emily Carlson, Jill O’Connell, Meredith Larson, and Sarah Walsh. Our bank of African American-sounding names includes Aisha Booker, Ebony Jackson, Aaliyah Jefferson, Lakisha Robinson, and Tanisha Washington. Finally, our list of Hispanic-sounding names includes Amelia Velazquez, Francesca Ramirez, Josefina Hernandez, Maria Gonzalez, and Gabriella Espinoza.

<sup>13</sup> Appendix Tables 1 and 2 examine the distribution of resume and job advertisement characteristics across the resumes assigned white-, black-, and Hispanic-sounding names. As expected, the covariates are well-balanced across the resume names.

certifications, CDA credential, fluency in English and Spanish (speaking, reading, and writing) along with a six-hour course in Cultural Diversity in Early Childhood Programs, or receipt of an award for Employee of the Month (EoM) as well as a bonus for outstanding job performance in the most recent job. Finally, we assigned to some resumes a one-sentence statement signaling that the applicant has access to a reliable form of transportation.

To allow child care providers to contact our fictitious job-seekers, we established an email account for each name used in the study. Research assistants monitored these accounts and recorded whether resumes received an email message from a provider. Specifically, the research assistants were trained to code interview requests, which for our purposes were defined as having received an explicit interview request or an invitation to discuss the resume or position in more detail. A research assistant was assigned to double-check the coding accuracy of the email messages, and disputes were reviewed and adjudicated by one or both of the authors. In addition to coding employer responses, the research assistants recorded a variety of information about the job advertisements, including the minimum experience and education requirements for the position. This information is deployed in Section V to examine the impact of states' child care regulations on hiring decisions.

As is common in resume audit studies, we took a number of steps to increase authenticity of the resumes so as to avoid detection and to ensure that the job search experience of our fictitious job-seekers mimicked that of real labor market participants. First, we constructed the fictitious resumes based on those of actual child care job-seekers residing in or near states in which our study cities are located. To do so, we used a web scraper to create a dataset of actual teacher resumes posted on a large, on-line job board in the U.S. These publicly available resumes provided the foundation for much of the work history and education content in our fictitious resumes. Second, we manually downloaded resumes from a number of websites to gain insight into the formatting decisions of real child care teachers. Although our fictitious resumes were constructed with these aesthetic features in mind, we altered some aspects of the formatting in order to generate batches of four sufficiently distinct-looking resumes. In

particular, each resume in a batch of four was randomly assigned to a different visual scheme, which included variation in fonts, location of applicant names and contact information, location and formatting of section headings, use of horizontal lines separating resume sections, and other visual distinctions. Finally, the research assistants were instructed to submit the resumes between two and four hours apart from one another.

### **Child Care Provider Survey**

Following the completion of the resume field experiment, we administered a detailed web-based survey to the full set of child care providers included in the audit study sample. This survey was nominally independent of the audit study, in that providers were not made aware that they had participated in a different study. Research assistants used multiple on-line sources to search for and record the name of and contact information for the director of each child care center (e.g., mailing address, email address, and phone number). In some cases, only the name of an assistant director (or other program administrator) or general contact information could be located; this information was used for survey distribution purposes. In a small number of cases (132), no contact information for the center or its personnel could be located; such centers were therefore excluded from the survey.<sup>14</sup> Data collection for the survey proceeded in two phases, first between January and March and then between May and June of 2017, and was administered by the Survey Research Lab at Kent State University. Each child care provider received a pre-survey email message, notifying the director (or other administrator) of the program's inclusion in the survey. Approximately two weeks after the initial distribution of the survey, centers that did not fully complete the questionnaire received three reminder emails (over the course of three weeks). Attempts at data collection were then ceased after the third reminder.

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<sup>14</sup> There were instances in which we responded to multiple job advertisements posted by the same child care provider (although we required at least 30 days to pass before submitting resumes to the same provider). For example, this occurred if the provider did not initially fill the position, and therefore reopened the search at a later date. It was also fairly common for the same provider to use the job board to fill multiple, different positions throughout our data collection period. For these cases, we ensured that the provider was administered the survey only once, and that it inquired about the most recent job advertisement in our dataset.

The provider survey contained four primary sections.<sup>15</sup> Three of the sections inquired about the characteristics of the center (e.g., auspice, enrollment, racial and ethnic composition of children, accreditations, and fees), the teaching staff (e.g., staff size, racial and ethnic composition, staff training and education, and compensation), and the center director (e.g., race and ethnicity, experience and education, and salary), respectively. The fourth section asked a series of questions about the job advertisement to which our fictitious resumes responded during the audit study. Specifically, we embedded in the survey a link to the on-line teacher advertisement posted by the provider—in order to minimize recall errors or confusion about the particular position we were inquiring about—followed by a series of questions about the advertisement, including the number of applications received, number of individuals who were interviewed (by phone and in-person), number receiving a formal job offer, and whether a hire was ultimately completed. If the provider indicated that someone was hired, the survey inquired about that individual’s gender, age, race and ethnicity, years of child care work experience, educational attainment, and starting hourly wage.

We received usable survey data from 514 child care providers (out of 2,340). When these provider-level data are matched with the appropriate resume-level data, we have a maximum of 2,047 resumes (out of 10,986) available for analysis. A key question is whether the providers that completed the survey are equivalent to those that did not. Appendix Tables 3 and 4 examine this issue. We first show a comparison of the interview and positive response rates as well as the job advertisement characteristics collected during the resume audit study. Providers completing the survey are similar to their counterparts that did not. It is particularly encouraging that the job advertisement’s minimum work experience and education requirements—rough proxies for program quality—are quite comparable. We then examine the extent to which the randomly assigned resume characteristics have similar effects on interview requests. Again, at least with regard to hiring preferences, both groups of providers seem comparable: coefficients on the resume characteristics are largely consistent in sign and magnitude.

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<sup>15</sup> The survey instrument is available as a web appendix at [www.chrisherbst.net/files/Download/C.\\_Herbst\\_RAS\\_ProvSurvey.pdf](http://www.chrisherbst.net/files/Download/C._Herbst_RAS_ProvSurvey.pdf).

### III. The Impact of Race and Ethnicity on Child Care Hiring Decisions

#### Empirical Results

This section establishes the causal influence of job-seeker race and ethnicity on hiring decisions for center-based child care teachers. We begin in Table 1 by displaying the average interview rate for white, black, and Hispanic applicants as well as the raw black/white and Hispanic/white difference in interview rates. We present these data for the full analysis sample and separately for each city. Differences in interview rates are estimated by an OLS regression of a binary indicator that equals one if a given resume was invited for an interview (and zero otherwise) on binary indicators for black- and Hispanic-sounding names (white is the omitted category). Overall, 27 percent of resumes with white names were invited for an interview, compared to 20.1 percent for blacks and 23.8 percent for Hispanics. This translates into a black-white gap of -6.9 percentage points and a Hispanic-white gap of -3.2 percentage points. Table 1 also reveals substantial cross-city variation in these interview gaps. The black-white difference ranges from zero in Boston to -14.7 percentage points in Chicago and San Francisco. The Hispanic-white difference is much tighter, ranging from +0.01 percentage points in Seattle to -6.2 percentage points in Minneapolis and San Diego.

Table 2 formalizes this analysis in the context of a series of regression models that successively add controls and experiment with alternative estimators. The basic model takes the following form:

$$[1] \quad \mathit{interview}_{ijcm} = \beta_0 + \beta_1 \mathit{black}_{ijcm} + \beta_2 \mathit{hispanic}_{ijcm} + \mathbf{X}'\beta + \alpha_c + \delta_m + \lambda_j + \gamma_i + \varepsilon_{ijcm},$$

where  $\mathit{interview}$  is a binary indicator equal to one if resume  $i$  submitted in response to job advertisement  $j$  in city  $c$  and month  $m$  received an explicit interview request and zero otherwise. The variables  $\mathit{black}$  and  $\mathit{hispanic}$  are the binary indicators for resumes with black- and Hispanic-sounding names. The baseline model includes a set of city fixed effects ( $\alpha$ ), month fixed effects ( $\delta$ ), and dummy variables for the order in which the  $i^{\text{th}}$  resume was submitted ( $\lambda$ ). We then add  $\mathbf{X}'$  which represents the other randomly assigned resume characteristics. Next, following Farber et al. (2015), we estimate a random effects model, which should yield consistent estimates of  $\beta_1$  and  $\beta_2$  as long as the provider-specific unobservables are

uncorrelated with the resume characteristics. Given the randomized nature of the data, we expect this assumption to hold.<sup>16</sup> Finally, we include a set of job advertisement fixed effects (FE,  $\gamma$ ), which allows for the possibility that the resume characteristics are correlated with provider characteristics. Thus the fixed effects model uses only within-job-advertisement variation to generate the coefficients. All standard errors are clustered at the job advertisement level.

Applicants with black- or Hispanic-sounding names are substantially less likely to receive an interview than their observationally equivalent counterparts with white-sounding names. Specifically, the full OLS model in column (2) shows that black applicants are 7.7 percentage points less likely to receive an interview, while Hispanic applicants are 3.3 percentage points less likely. The coefficients imply that, relative to the white applicant mean, the interview rate for blacks is approximately 29 percent lower, and the interview rate for Hispanics is 12 percent lower. This study's black-white interview gap is not as large as that reported in Bertrand and Mullainathan (2004) (50 percent), nor is it as large as the Middle Eastern-Swedish gap in Carlsson & Rooth (2007) (50 percent). However, it is substantially larger than the estimated gap in Nunley et al. (2014) (14 percent) and is reasonably close to the gap in Oreopoulos (2011) (39 percent). As expected, the estimates in columns (3) and (4), which come from random effects and fixed effects models, respectively, are similar to those from the full OLS model in column (2).

As previously mentioned, we submitted resumes in response to job advertisements for assistant and lead teacher positions. This is important given the differential skill requirements and wages for individuals in these jobs. For example, 24 percent of assistant teacher positions required (at a minimum) an associate's degree, while six percent required a bachelor's degree. The comparable figures for lead teachers were 35 percent and 21 percent, respectively. Furthermore, Boyd-Swan and Herbst (2017a) report that the average hourly wage for assistant teachers is approximately \$11, while that for lead teachers is \$14. Thus this study provides an opportunity to examine the racial and ethnic gap in interview rates across lower- and higher-skilled positions *within the same occupation*. Indeed, the most common

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<sup>16</sup> Indeed, Hausman tests reveal that that our random effects estimates are efficient and consistent.

practice in the discrimination literature is to examine skill-based differences in the interview gap across different occupations and industries (e.g., Bertrand & Mullainathan, 2004; Carlsson & Rooth, 2007).

Table 3 presents OLS (Panel A) and FE (Panel B) estimates on *black* and *hispanic* for the sub-set of assistant, lead infant/toddler, and lead preschool-age teacher advertisements. The lead teacher positions are further disaggregated by age-group given the clear skill differences required for these jobs.<sup>17</sup> We find that the racial and ethnic interview gaps persist across these lower- and higher-skilled teacher positions. For example, the estimates in Panel A imply a black-white gap of -11.4 percentage points and a Hispanic-white gap of -4.0 percentage points in the market for assistant teachers (the lowest-skilled position), while the comparable gaps for lead preschool teachers (the highest-skilled position) are -8.7 and -4.0 percentage points, respectively. We return to a discussion of these results below.

Our results to this point provide clear evidence of racial and ethnic differences in interview requests for applicants to child care teacher positions. An important extension to this analysis asks whether minority job-seekers experience comparable returns to resume quality as their non-minority counterparts. Such a question is interesting because it may shed light on the set of job-seeker characteristics that are responsible for the racial and ethnic gap in interviews. Table 4 reports OLS estimates on the complete set of resume characteristics for the full sample and separately by race and ethnicity.<sup>18</sup> As shown in column (1), estimates for the full sample reveal that employers have strong preferences for applicants with previous ECE work experience, those with post-secondary degrees in ECE, and those with higher GPAs (up to a point). Employers also value a range of non-academic credentials such as the CDA and professional development coursework in Cultural Diversity—albeit less so than having work experience and a college degree. A comparison of columns (2) through (4) reveals several interesting features of the returns to skill. First, the returns to work experience are very similar across non-minority and minority applicants. Second, the returns to educational attainment and academic

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<sup>17</sup> A bachelor's degree was the minimum education requirements in 12 percent of lead infant/toddler teacher positions, compared to 28 percent for lead preschool teacher positions. This is not surprising given that preschool teachers are increasingly tasked with implementing school readiness curricula.

<sup>18</sup> We also estimated these models controlling for job advertisement FEs, as was done in the previous two analyses. Results from the FE models are very similar to those reported in the table. To conserve space, we report only the OLS estimates here.

performance (i.e., GPA) are substantially larger for white applicants. This is particularly true for those with nursing and ECE degrees as well as those listing a moderately high GPA. Conversely, the returns to non-academic credentials appear to be larger for non-white applicants. For example, Hispanics experience greater rewards for a CDA, while both blacks and Hispanics see greater rewards for enrolling in a professional development course. Together, these results provide a tentative explanation for why interview rates for minority applicants lag behind their non-minority counterparts: several of the resume characteristics most predictive of interview requests are relatively less valued by employers when minorities have them, while the characteristics least predictive of interviews are relatively more valued by employers when minorities have them.

The final analysis in this section studies the impact of center directors' race and ethnicity on the treatment of white versus non-white job-seekers. The evidence from nationally representative surveys suggests that directors are overwhelmingly white, a finding that accords with our follow-up survey of the centers in the audit study sample. Approximately three-quarters of the directors are white, nine percent are black, nine percent are Hispanic, and the remaining eight percent are other races/ethnicities. If center directors exhibit own-race biases during the hiring process, it is plausible that the estimated interview gap between white and non-white applicants is explained by the significant presence of white directors within the center-based sector. Such a finding would imply that the dearth of racial and ethnic heterogeneity among teachers in part reflects the lack of heterogeneity among center directors.

To examine this issue, we use information on directors' race and ethnicity from the provider survey, matched to our resume audit data, to estimate versions of the following regression model:

$$\begin{aligned}
 [2] \quad \text{interview}_{ijcm} = & \beta_0 + \beta_1 \text{white\_director} + \beta_2(\text{black} \times \text{white\_director}) + \beta_3(\text{hispanic} \times \text{white\_director}) \\
 & + \beta_4 \text{black\_director} + \beta_5(\text{black} \times \text{black\_director}) + \beta_6(\text{hispanic} \times \text{black\_director}) \\
 & + \beta_7 \text{hispanic\_director} + \beta_8(\text{black} \times \text{hispanic\_director}) + \beta_9(\text{hispanic} \times \text{hispanic\_director}) \\
 & + \beta_{10} \text{other\_director} + \beta_{11}(\text{black} \times \text{other\_director}) + \beta_{12}(\text{hispanic} \times \text{other\_director}) \\
 & + \alpha_c + \delta_m + \lambda_j + \gamma_i + \epsilon_{ijcm},
 \end{aligned}$$

where *interview*, *black*, and *hispanic* are defined in the same manner as before, and the variables *white\_director*, *black\_director*, *hispanic\_director*, and *other\_director* are indicator variables for white, black, Hispanic, and other race/ethnicity center directors, respectively. Omitted from the model are the main effects on the race and ethnicity of job-seekers, so that the coefficients on the interaction terms provide estimates of the impact of black- and Hispanic-sounding resume names (relative to white-sounding names) when the center director is of a given race or ethnicity. Given that the model includes indicator variables for director race/ethnicity, which is not randomly assigned, we present estimates from (OLS and) job advertisement FE models, in which only within-center variation in the interaction terms is used to generate the coefficients.

The OLS and FE estimates from equation [2] are presented in Table 5, and provide consistent evidence of own-race bias in teacher hiring decisions. As shown in the first set of results, white applicants are substantially more likely than their black counterparts to receive an interview when the center director is white (8.0 to 10.2 percentage points). However, white directors appear to be indifferent between white and Hispanic applicants. Similarly, the next set of results show that black directors strongly favor black over white applicants (by 14.8 to 20.4 percentage points), and they too are indifferent between white and Hispanic applicants. Finally, when the center director is Hispanic, Hispanic applicants are much more likely to receive an interview than their white counterparts (by 14.1 to 21.3 percentage points), and they view white and black applicants as being about equally desirable.

## **Discussion**

A few summary statements are in order about the preceding analyses. First, we show that black and Hispanic child care job-seekers are less likely to receive an interview than otherwise identical white applicants. In addition, these interview gaps persist across lower- and higher-skilled positions. Second, we show that the returns to academic traits (i.e., a college degree and a higher GPA) are lower for non-whites, but the returns to non-academic traits (i.e., work experience and professional credentials) are either the same or greater for non-whites.

That the interview gap applies to applicants for lower- and higher-skilled positions may be interpreted as initial evidence of customer discrimination. Indeed, a key responsibility for child care teachers at all levels is to interact with parents about highly sensitive issues. It is therefore possible that center directors are sensitive to the existence of parents' racial preferences when hiring both beginner and advanced teachers. We will examine customer discrimination more directly in the next section. Findings on the differential returns to skill seem consistent with models of statistical discrimination in which the academic traits are noisy or biased measures of skill whose value is discounted by employers, whereas the non-academic traits communicate meaningful signals of underlying productivity. This could occur, for example, if employers believe, on the one hand, that policies such as affirmative action are responsible for minorities' access to higher education, but, on other hand, are not responsible for the attainment of work experience and professional credentials.

To our knowledge, this is the first resume audit study to examine the implications of race-matching recruiters and job-seekers. We find evidence that program directors' own-race preferences influence hiring behavior in the market for child care teachers. Such findings add important nuance to the way in which racial discrimination operates in the child care market: although in the aggregate white applicants are favored over their black and Hispanic counterparts, the race and ethnicity of the program director clearly matters. Indeed, our results provide one explanation for why the child care teacher workforce remains less diverse than the children it serves: an overwhelming fraction of program directors are white. However, our findings imply that one way to increase the diversity of the teacher workforce is to increase the diversity of program directors: minority applicants fare better when they are reviewed by minority directors. Given these pervasive own-race biases, one concern is that the administrative and teaching staff within child care programs may become highly segregated along racial and ethnic lines. Such hiring behavior may therefore warrant additional training on recognizing unconscious bias during the hiring process as well as ways to increase workplace diversity.

## IV. Customer Discrimination

### Empirical Results

We now turn our attention to whether there is evidence of customer discrimination in the labor market for child care teachers. In particular, we examine to what extent the racial and ethnic composition of children attending the center is taken into account when program directors make hiring decisions. This analysis contributes to a relatively small literature on customer discrimination in the labor market. A few papers examine discrimination indirectly by looking at how the racial and ethnic composition of the *potential pool of customers* influences hiring decisions, where the customer pool is measured by local area race/ethnicity shares (e.g., Bertrand & Mullainathan, 2004; Carlsson & Rooth, 2007; Combes et al., 2016; Leonard et al., 2010). A smaller set of studies takes a more direct approach by observing the characteristics of *actual customers* (Bar & Zussman, 2017; Holzer & Ihlanfeldt, 1998), and to our knowledge only one previous study examines actual customers in the context of a field experiment (Neumark, 1996). Thus our paper is one of the first to combine a field experiment with information on actual customers, as measured by the racial and ethnic share of children attending the center.

We once again make use of the provider survey, which included questions about the total enrollment within the center as well as enrollments by race and ethnicity. We use this information to construct variables for the share of white (non-Hispanic), black (non-Hispanic), and Hispanic children within the center. On average, approximately 42 percent of children attending the centers are white, 14 percent are black, and nine percent are Hispanic.<sup>19</sup> Our analysis begins in Panel A of Table 6 with OLS and FE regressions that include interactions of applicant race and ethnicity with program-level child-enrollment shares of whites, blacks, and Hispanics. The estimates in each column are derived from a model of the form:

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<sup>19</sup> Although these percentages may appear to be low, particularly for Hispanics (and far from summing to 100 percent), they represent averages that include centers without any children in a given racial or ethnic group. Fully 22 percent of the centers in our sample do not contain at least one white child, 38 percent do not contain at least one black child, and 39 percent do not contain at least one Hispanic child. When the calculations are conditioned on the center containing at least one child in each category, the race/ethnicity shares are 55 percent, 23 percent, and 15 percent, respectively.

$$\begin{aligned}
[3] \quad \text{interview}_{ijcm} = & \beta_0 + \beta_1 \text{white\_share} + \beta_2(\text{black} \times \text{white\_share}) + \beta_3(\text{hispanic} \times \text{white\_share}) \\
& + \beta_4 \text{black\_share} + \beta_5(\text{black} \times \text{black\_share}) + \beta_6(\text{hispanic} \times \text{black\_share}) \\
& + \beta_7 \text{hispanic\_share} + \beta_8(\text{black} \times \text{hispanic\_share}) + \beta_9(\text{hispanic} \times \text{hispanic\_share}) \\
& + \alpha_c + \delta_m + \lambda_j + \gamma_j + \epsilon_{ijcm},
\end{aligned}$$

where *interview*, *black*, and *hispanic* are defined in the same manner as before, and the variables *white\_share*, *black\_share*, and *hispanic\_share* are variables for the fraction of white, black, and Hispanic children, respectively, attending a given child care center. Again, we omit from equation [3] the main effects on the race and ethnicity of job-seekers, so that the coefficients on the interaction terms provide estimates of the impact of black- and Hispanic-sounding resume names (relative to white-sounding names) as the proportion of children of a given race and ethnicity increases.

The analysis in the previous section showed that directors' race/ethnicity influences hiring decisions. If this is correlated with the racial/ethnic composition of the center, then one would want to control for it. Therefore, we estimate versions of the OLS model with and without controls for directors' race/ethnicity. In addition, given that the model includes the non-randomly assigned variables capturing program-level race/ethnicity shares, we present alongside the OLS estimates those from job advertisement FE models, in which only within-center variation in the interaction terms is used to generate the coefficients.

Column (1) of Panel A provides the baseline OLS estimates; column (2) adds the controls for director race/ethnicity; and column (3) includes the FEs. The first cluster of coefficients, which shows the interactions of *black* and *hispanic* with *white\_share*, provides evidence consistent with white customer discrimination: as the share of white kids enrolled in a center-based program increases from zero to 100 percent, minority applicants—particularly blacks—become less likely than their white counterparts to receive an interview (blacks: 13.0 to 18.5 percentage points less likely). The second set of results, which shows the interactions for *black\_share*, indicates that program directors are largely indifferent between white and black applicants as the black child share increases within the center. However, a comparison of

$\beta_5$  (*black*  $\times$  *black\_share*) and  $\beta_6$  (*hispanic*  $\times$  *black\_share*) suggests that directors favor black over Hispanic applicants as the number of black program enrollees increases. The final set of results in Panel A shows the analogous coefficients for the *hispanic\_share* interactions. Here again we find evidence in favor of customer discrimination: directors strongly favor Hispanic applicants over their white counterparts as the number of Hispanic children increases (by 31.7 to 37.6 percentage points). In addition, a comparison of  $\beta_8$  (*black*  $\times$  *hispanic\_share*) and  $\beta_9$  (*hispanic*  $\times$  *hispanic\_share*) implies that Hispanic applicants are also favored over their black counterparts.

The results presented in Panel B come from a set of models that replace the program-level race and ethnicity shares with census tract-level shares. We geocoded the location of child care centers in the resume audit study, and assigned to each one the appropriate census tract identification number. Using the 2010 U.S. Decennial Census, we calculated the fraction of each tract’s total population that is white (non-Hispanic), black (non-Hispanic), and Hispanic. These variables were then interacted with *black* and *hispanic* in the same manner as above. This analysis is concerned with the racial and ethnic composition of the potential pool of customers and is therefore consistent with the methodology used in many studies of customer discrimination. Thus we provide a useful comparison of results derived from *actual* versus *potential* customers. The first two sets of results, which show the interactions on *white\_share* and *black\_share* within the census tract, are consistent with those in Panel A. However, results based on the *hispanic\_share* interactions do not provide the same evidence in favor of Hispanic customer discrimination. Indeed, the coefficients are small in magnitude, not precisely estimated, and not always positively signed. We address potential reasons for these differences in the forthcoming Discussion section.

The final results in this section are presented in Table 7. We estimate the OLS version of equation [3] on subsets of the sample, as defined by characteristics of the job advertisements to which our resumes responded.<sup>20</sup> Columns (1a) and (1b) show results separately for infant/toddler *and* preschool-age positions; columns (2a) and (2b) show the results for positions requiring no more than

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<sup>20</sup> To conserve space, we present estimates from only the OLS model. Results from the FE model are similar.

one year *and* two or more years of child care work experience; and columns (3a) and (3b) show the results for positions requiring no more than a high school diploma *and* an associate's degree or more. Although each set of characteristics describes a distinct dimension of the job advertisement, they are similar in that each contains a lower- and higher-skilled alternative. Our goal is to examine whether customer discrimination is related to within-occupation vertical segregation (by skill-level) among white and non-white job-seekers (Neumark, 1996). Minorities tend to be overrepresented in lower-skilled child care positions, and there is a meaningful wage gap between minority and non-minority early education teachers. It is plausible, therefore, that customer discrimination operates in a similarly “vertical” manner, in which parents’ racial and ethnic biases are stronger for high-quality, high-cost services. Stated another way, parents may place a higher value on race-matching teachers and children in positions that require more skill, thereby making it difficult for minorities to enter those jobs. As a result, one might expect to see stronger evidence of customer discrimination in the advertisements seeking preschool-age teachers (compared to those seeking infant/toddler teachers) as well as those requiring more work experience and education (compared to those requiring less experience and education).

Table 7 provides consistent evidence that customer discrimination is stronger when the job advertisement seeks a high-skilled worker. For example, a comparison of columns (1a) and (1b) reveal that, in the market for infant/toddler teachers, an increasing white (child) share within the center does not appear to alter hiring decisions. However, in the market for preschool-age teachers, a growing white share disadvantages black and Hispanic applicants relative to their white counterparts. The same pattern holds as the share of black and Hispanic children increases. Furthermore, the pattern is evident when comparing the job advertisement’s minimum work experience [columns (2a) and (2b)] and education [columns (3a) and (3b)] requirements. For jobs requiring less experience and education, growing racial and ethnic homogeneity within the center does not appear to be detrimental to job-seekers from different racial and ethnic groups. However, for positions seeking higher-skilled teachers, center directors strongly prefer applicants whose background is reflected in the children attending the program.

## Discussion

This section was devoted to understanding whether and to what extent customer discrimination is present in the labor market for center-based child care teachers. Such an analysis has been difficult to undertake in traditional resume audit studies because of difficulties collecting high-quality data on the racial composition of firms' actual customers. Our study therefore contributes to this strand of the discrimination literature by providing direct evidence on the demographic characteristics of the customer base—in this case, the children enrolled in the child care centers. In addition, the child care market is an ideal setting in which to study customer discrimination: the staff racial and ethnic composition is relatively straightforward for parents to observe when searching for a provider; parents and teachers likely engage in a lot of face-to-face interaction while the child is enrolled in the program; and the nature of that interaction is expected to cover a range of delicate topics. Thus the potential for customer discrimination to exist and to influence teacher hiring decisions is substantial in this market.

We uncover evidence consistent with customer discrimination. As the fraction of children of a given race or ethnicity increases within a program, job-seekers with the same background are increasingly advantaged in the hiring process. This appears to be particularly true for child care programs whose enrollees are increasingly white and Hispanic. Black applicants, on the other hand, benefit substantially less as the number of black children increases. Our second noteworthy finding is that customer discrimination is stronger in labor markets for high-skilled teachers. That is, the penalty to applicants whose background is different from the predominant racial and ethnic group enrolled in the program is larger in positions requiring more skill.

Finally, we show that neighborhood racial and ethnic shares—the most commonly used proxy for firms' customer base—is able to reproduce our program-level results for some groups (i.e., white and black applicants) but not others (i.e., Hispanic applicants). Given the strong correlations between the program- and census tract-level population shares, the lack of full consistency in our results requires

some discussion.<sup>21</sup> It is possible that, for some demographic groups, the local racial/ethnic share is a noisy measure of a firm's actual customer base. For Hispanics, this seems especially plausible given that such children are less likely to participate in center-based child care than their white and black counterparts. The most recent estimates show that 57 percent of white and 61 percent of black preschoolers regularly attend center-based programs, compared to 49 percent among Hispanics (Mamedova et al., 2015). Instead, Hispanics are more likely to rely on parental care or informal modes of non-parental care. Thus it follows that a neighborhood's Hispanic share will not be a good proxy for the customer base if these families are less likely to patronize local child care centers. Another possibility is that Hispanic families utilize the centers not in their neighborhood of residence, but rather in the neighborhood of their employer. This might occur if Hispanic workers have longer commutes than other workers, or if such families are willing to travel longer distances to consume child care. Admittedly, we do not have empirical evidence to substantiate these possibilities. Finally, note that we rely on the share of the *total* census tract population within each racial and ethnic group. Although it may be preferable to use population shares ages 0 to 4 (or 5), Census data limitations preclude us from doing so.

Given the well-known information asymmetries in the child care market, it is perhaps not surprising that our analysis uncovered evidence of customer discrimination. In the absence of being fully informed about the determinants of child care quality, parents likely rely instead on the easy-to-observe features of the program setting, which includes the staff racial and ethnic composition. This leaves open the possibility that parents use teachers' observable demographic characteristics to make inferences about their unobserved productive capacity. It is also possible that parents rely on these observable characteristics to evaluate other teacher traits such as trustworthiness, empathy, and the ability to communicate about sensitive topics. Our results imply that parents rate teachers of their own race and ethnicity more highly on one or more of these dimensions. Insofar as parents use teachers' race and

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<sup>21</sup> The correlation between the white program share and the white census tract share is 0.54. The corresponding correlations for blacks and Hispanics are 0.79 and 0.55, respectively.

ethnicity to make these judgments, child care directors appear to respond by favoring job-seekers whose own background best matches that of the children attending the center.

Although distinguishing taste-based from statistical discrimination is quite difficult, the discussion above points to the latter as a key driving force behind the customer discrimination. Our claim regarding the importance of statistical discrimination is even more relevant when one considers that we uncover very little evidence of customer discrimination in the market for low-skilled child care teachers, and substantial evidence of such discrimination in the market for high-skilled teachers. If parents use teachers' demographic characteristics to make inferences about unobserved skill, then the preferences that stem from these inferences should manifest more strongly in positions that require more skill. On the other hand, if taste-based discrimination was the primary explanation, then one would expect to find evidence of customer discrimination that persists across low- and high-skilled teacher positions. Our results are consistent with the former observation.

## **V. The Impact of Child Care Regulations and Quality-Credentialing Programs**

### **Introduction**

The final set of analyses explores the impact of various forms of occupational licensing on hiring decisions in the market for center-based child care teachers. In particular, we examine to what extent states' child care regulations and Quality Rating and Improvement Systems (QRIS) influence the racial and ethnic gap in interview requests. Both policies are aimed at mitigating the child care market's information problems by ensuring that at least a minimum level of quality is achieved across the spectrum of center-based programs. Although they utilize different approaches, a key goal in each case is to increase the incentive for providers to improve the quality of their teacher workforce. As a result, it is plausible that such policies increase the cost of discriminating against well-qualified members of minority groups. One hypothesis, therefore, is that center-based providers operating in states with more stringent regulations (or who are participating in QRIS) are more likely to signal interest in minority applicants than their counterparts operating in less stringent policy environments.

To set the stage for the empirical analysis, we begin with a brief description of states' child care regulations and QRIS, as well as a discussion of how we measure these policies in the regression models. The primary goal of regulations is to minimize the risk of harm to young children from exposure to low-quality care. They seek to ensure a minimum level of quality in the market, as opposed to achieving the socially optimal level. In addition, state authorities do not regulate program quality *per se*; instead they set and enforce rules regarding the measurable inputs to the production of quality. Regulations cover virtually all dimensions of the child care environment, including child-to-staff ratios; maximum group sizes; the age, experience and educational attainment of directors and teachers; immunizations; food safety; physical features of the provider; and other items. However, there is substantial cross-state variation in whether and to what extent a given feature is regulated, and the stringency of these rules often varies by the age of children served and across center- and home-based settings. Our goal in this paper is to study the impact of center-based child care regulations.

To do so, we began by coding regulations governing the labor intensiveness of child care provision and staff qualifications. In particular, we examine child-to-staff ratios, maximum group sizes, as well as the experience and education requirements for assistant teachers, lead teachers, and program directors. We selected these domains because they are among the most commonly studied in the regulation literature; they are known to be highly correlated with measures of overall child care quality; and they are likely to be given significant consideration during the teacher hiring process. We obtained information on states' regulations from the National Database of Child Care Licensing Regulations (maintained by the U.S. Department of Health and Human Services) and Lieberman (2017). We focus on coding regulations for the 17 states represented in the resume audit study.<sup>22</sup>

There are two complications involved in coding these regulations. First, as others have pointed out, the individual regulations are highly correlated with one another (Blau, 2003; Hotz & Xiao, 2011). Second, states tend to enact different regulations aimed at children of different ages. For example, states

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<sup>22</sup> Arizona, California, Connecticut, Delaware, District of Columbia, Georgia, Illinois, Maryland, Massachusetts, Minnesota, New Jersey, New York, Pennsylvania, Texas, Virginia, Washington, and Wisconsin.

vary the stringency of child-to-staff ratios by age, with the lowest ratios set for infants and toddlers and higher ratios set for preschool-age children. A similar system is in place for maximum group sizes.<sup>23</sup> Such a large and highly correlated set of variables makes it difficult to empirically identify the impact of individual regulations. Therefore, we handle these complications by first standardizing the values of each regulation to have a mean of zero and a standard deviation of one. We then calculated the average of the domain-specific regulations, so that we have an index of regulatory stringency across five major domains: (i) child-to-staff ratios, (ii) maximum group sizes, (iii) experience and education requirements for assistant teachers, (iv) experience and education requirements for lead teachers, and (v) experience and education requirements for program directors. We also examine an overall index of regulatory stringency by averaging over the five domains noted above. Increasing values for a given standardized index represents increasing regulatory stringency. Summary statistics for the individual regulations in each domain are presented in Appendix Table 5.<sup>24</sup>

Over the past decade, QRIS have become the primary policy tool for measuring and increasing quality across a range of early care and education programs, with the goal of improving children’s developmental outcomes. Currently 42 states administer a QRIS, and another six are in the process of piloting one. Although states have substantial autonomy over the design of a QRIS, the basic features are largely consistent across all states. Child care providers volunteer to be assessed in relation to a large number of quality indicators, including child-to-staff ratios, staff training and education, and the classroom learning environment. A summary rating is then given to participating providers, along with financial resources and technical assistance aimed at improving program quality. The ratings usually take the form of “stars” or a numerical value, which are disseminated to the public, with the intention that

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<sup>23</sup> Specifically, there are six separate ratios and six group size regulations established by each state, one for each age-group from infants to five-year-olds, for a total of 12 regulations. Two domains for assistant teachers, lead teachers, and directors are examined—minimum number of years of child care work experience and educational attainment—which generate another six regulations. In this paper, experience is measured in years, and educational attainment is measured in post-secondary credits (or semester hours). States that do not regulate a certain program feature (years of lead teacher experience, for example) are coded a value of a zero on the variable, which is then standardized to have a mean of zero and a standard deviation of one. Thus our paper is designed to examine the overall impact of the intensive and extensive margins of the regulations.

<sup>24</sup> Although we refer to “child-to-staff” ratios in the text, the summary statistics show “staff-to-child” ratios in which we use staff as the numerator and the number of children as the denominator. Larger values on these variables indicate increasingly strict ratios.

parents use the information to inform their child care choices. The QRIS logic model predicts that as parents become better informed, their willingness to pay for high-quality care will increase, thereby generating competition between providers and improving overall market quality.

Importantly for our purposes, a key determinant of a program's quality rating is the level of education and training obtained by teachers. States establish increasingly ambitious performance standards regarding staff qualifications for programs seeking to improve their rating. Pennsylvania's QRIS, Keystone STARS, which was established in 2002, provides a useful illustration. Keystone STARS includes four quality levels for center-based child care programs, and each level articulates a set of requirements for teachers' level of education and field of study. For example, to earn the highest quality rating (four stars), all lead teachers within the program must have an associate's degree in early childhood education (or related field with 18 early childhood credits), and 50 percent must have a bachelor's degree in the same field. In addition, 50 percent of assistant teachers must have 30 post-secondary early childhood credits. Thus our goal is to examine whether the teacher credentials embedded in the QRIS influence the relative willingness of QRIS participants to interview minority applicants.

To measure centers' participation in QRIS, we rely on a question from the provider survey in which respondents are asked: "Does your program participate in a quality rating and improvement system (QRIS)."<sup>25</sup> We use this question to generate a binary indicator of QRIS participation. We find that approximately 36 percent of the child care centers in our data participate in a QRIS. During the period in which data were collected for the resume audit study, two states (Connecticut and Texas) did not operate a QRIS and another two states (California and Virginia) began to roll-out their program (Herbst, 2016). Removing providers located in these states increases the QRIS participation rate to 42 percent. Given the complexities involved in implementing a QRIS—in which considerable resources are needed to encourage parents and child care providers to engage with the system—we exclude from the

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<sup>25</sup> For those responding in the affirmative, the survey includes a follow-up question inquiring about the specific program rating (i.e., star or quality level). Although we explored ways to incorporate the program rating into the analysis, we ultimately opted against such an approach because of the relatively small number of respondents who provided an answer to this question.

analysis providers located in the four states noted above (Herbst, 2016; Zellman & Perlman, 2008). In doing so, we focus on the subset of providers operating in states with mature, fully operational systems. Nevertheless, we conduct all of the forthcoming analyses on the full set of providers; results from these estimations are similar to those reported in the paper.

## **Empirical Results**

We begin this section by examining the racial and ethnic gap in interviews according to whether an applicant met the minimum experience and education requirements stipulated in the job advertisements. As discussed in Boyd-Swan and Herbst (2017a), 68 percent of the teacher positions required no more than one year of previous child care experience; another 25 percent required two years of experience; and seven percent required three or more years. Regarding education, about half of all positions required no more than a high school degree, while 32 percent required an associate's degree and 17 percent required a bachelor's degree. Their analysis also showed considerable variation in these minimum requirements across the cities. It stands to reason that at least some of this cross-city variation is explained by the varying stringency of the state-level regulatory environment. Indeed, we find considerable overlap between the posted job requirements and the regulations.<sup>26</sup> Thus this analysis should provide an initial indication of the influence of states' regulations on the relative treatment of minority applicants. Specifically, insofar as states' regulatory stringency is reflected in the posted job requirements, and if the regulations increase the cost of engaging in discriminatory hiring behavior, then we would expect to find smaller racial and ethnic gaps in interview requests among those who meet the job requirements (compared to the gaps among those who do *not* meet the requirements).

Regression results from this exercise are presented in Table 8. We estimate a version of equation [1] (without fixed effects) on three subsets of resumes: (i) those submitted in response to job

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<sup>26</sup> For example, among providers located in states with a minimum requirement of one year of experience for lead teachers, less than one percent of their job advertisements stipulated less than one year of experience; approximately 70 percent stipulated exactly one year of experience; and 30 percent stipulated two or more years of experience. However, among providers located in states requiring two years of experience, the corresponding figures are less than one percent, 57 percent, and 42 percent. Turning to education, among providers located in states with a minimum education requirement of a high school diploma, fully three-quarters of their job advertisements stipulated a high school diploma, and 25 percent stipulated an associate's degree or more. However, among providers located in states requiring an associate's degree or more, the corresponding figures are 35 percent and 65 percent.

advertisements that did not include explicit experience and education requirements; (ii) those that did not meet the posted experience and education requirements; and (iii) those that met both requirements. Results from these sub-groups are displayed in columns (1), (2), and (3), respectively. Furthermore, we estimate separate versions of these models for assistant teacher, lead infant/toddler teacher, and lead preschool teacher positions, as shown in Panels A, B, and C, respectively. Columns (4) and (5) provide p-values from tests of the null hypothesis that the racial and ethnic gaps in column (3) equal their counterparts in columns (1) and (2).

In the market for assistant teachers, we find that black and Hispanic job-seekers experience substantial discrimination irrespective of whether they submit resumes to providers that do not post explicit job requirements [column (1)], that do not meet the posted requirements [column (2)], and that meet both requirements [column (3)]. If anything, Hispanics who meet both requirements witness greater disparities, although as shown in columns (4) and (5) the differences are not statistically significant. Such results provide initial evidence that states' child care regulations may not influence minority hiring in the market for assistant teachers. Turning to the results for lead teacher positions, we uncover a very different pattern. Although minority job-seekers experience discrimination when they submit resumes to providers that do not post requirements as well as when they do not meet the requirements, the racial and ethnic gap in interviews is effectively eliminated when they meet the experience and education requirements. For example, the estimates in column (2) of Panel C imply that blacks are 14 percentage points less likely to receive an interview, while Hispanics are 11.1 percentage points less likely to receive an interview, when they do not meet the posted lead preschool teacher requirements. However, those gaps narrow to about 2.1 and 2.9 percentage points, respectively, when they apply for positions for which they meet the requirements. These results suggest that regulations may reduce disparities in the labor market for lead child care teachers.

We now turn our attention to studying the impact of states' child care regulations on the racial and ethnic gap in interview requests. Formally, our regression model is specified as follows:

$$\begin{aligned}
[4] \quad \text{interview}_{ijcm} = & \beta_o + \beta_1 \text{regulation} + \beta_2(\text{black} \times \text{regulation}) + \beta_3(\text{hispanic} \times \text{regulation}) \\
& + \mathbf{X}'\beta + \alpha_c + \delta_m + \lambda_j + \gamma_i + \varepsilon_{ijcm},
\end{aligned}$$

where *regulation* is one of the five domain-specific indices of regulatory stringency (i.e., child-to-staff ratios, maximum group sizes, experience and education requirements for assistant teachers, experience and education requirements for lead teachers, and experience and education requirements for program directors) as well as the overall index of regulatory stringency. The other variable and coefficient vectors are identical to those described in equation [1].<sup>27</sup> As a robustness check, we estimate the model with and without controls for job advertisement FEs ( $\gamma$ ). We also estimate models that replace the city FEs with state FEs in a further attempt to account for state heterogeneity that may be correlated with hiring decisions. Results from these models are similar to those from equation [4]. Consistent with our modelling approach throughout the paper, we omit the main effects on race and ethnicity, so that the coefficients on the interaction terms provide estimates of the impact of black- and Hispanic-sounding resume names (relative to white-sounding names) as a given child care regulation becomes increasingly strict. Given that we observe regulations for all states in which the providers are located, we are able to estimate equation [4] on the full set of resumes (N=10,986).

Results from equation [4] are presented in Table 9. Each column shows the estimates on  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  for each regulatory domain. Panel A provides the OLS estimates, while Panel B provides the FE estimates; both sets of results are quite comparable. Generally speaking, the evidence suggests that increasing the stringency of states' child care regulations reduces the racial and ethnic gap in interview requests. For example, the estimates in column (1) of Panel A imply that black applicants are 3.4 percentage points more likely to receive an interview request for each one-standard deviation (*SD*) increase in the strictness of states' child-to-staff ratios. The comparable estimates for Hispanics are between 1.1 (Panel A; not statistically significant) and 1.8 (Panel B; statistically significant) percentage points. These positive effects apply to regulations for maximum group size and lead teachers' experience

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<sup>27</sup> The model specified in the text includes city fixed effects. In results not reported in the paper, we experiment with state fixed effects instead. Results are from these models are similar to those reported here.

and education, whereas there are null effects of the assistant teacher and program director requirements.<sup>28</sup> As shown in column (6), which presents the coefficients for the full regulation index, black and Hispanic applicants are increasingly favored over their white counterparts as the broad regulatory landscape becomes stricter. A one-*SD* increase in the index increases the likelihood of receiving an interview by 4.3 percentage points among blacks, while increasing Hispanics' likelihood of receiving an interview between 1.6 (Panel A; not statistically significant) and 2.8 (Panel B; statistically significant) percentage points.

The results above indicate that child care regulations reduce the racial and ethnic disparity in interview requests, perhaps because heavily regulated providers face a higher cost of discriminating against well-qualified minority job-seekers. If this is the case, then one would expect highly-qualified black and Hispanic applicants to benefit more from these regulations than their less-qualified counterparts. In other words, if regulations increase the incentive for providers to focus less on applicants' race and ethnicity and more on their credentials, then high-quality minorities should benefit disproportionately from this shift. The estimations in Table 10 test this proposition by estimating equation [4] on subsets of low- and high-quality applicants to lead teacher positions.<sup>29</sup> Looking at Panel A (i.e., the low-quality applicants), we find that child care regulations do not advantage low-quality minorities: the racial and ethnic gap in interviews does not change as states' regulatory environments become stricter. Indeed, coefficients on the interaction terms are small in magnitude, sometimes negatively signed, and none are statistically significant. In contrast, as shown in Panel B (i.e., the high-quality applicants), regulations have sizable positive effects on interview requests for high-quality minorities. Several of the individual interactions are statistically significant, and tests of the equality of the interactions across low- and high-quality applicants often reject the null hypothesis (Panel C).

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<sup>28</sup> It is important to point out that the assistant teacher and lead teacher regulations are estimated on the subset of resumes that were submitted in response to assistant teacher and lead teacher job advertisements, respectively.

<sup>29</sup> Applicant (i.e., resume) quality is determined by the predicted probability that a given resume received an interview request. Predicted probabilities are determined by estimating a probit model of interview requests on the resume characteristics controlling for city/month indicators and resume order indicators, and then using the coefficients on the variables to generate a probability for each resume. Low-quality resumes are those with predicted probabilities at or below the median (predicted) interview rate, and high-quality resumes are those with predicted probabilities above the median interview rate.

Table 11 estimates another version of the analysis above, this time for subsets of child care providers located in different markets. Specifically, we divide the sample by zip code median household income, thereby allowing us to test for differential effects of child care regulations across providers located in low- and high-income markets.<sup>30</sup> This analysis is motivated by the findings in Hotz and Xiao (2011), who show that although the imposition and increased stringency of regulations improves child care quality, these benefits accrue disproportionately to providers located in higher-income markets. One might expect, then, that the reduction in the racial and ethnic interview gap is also pronounced for providers in wealthy markets relative to those located in lower-income areas. In other words, it is plausible that the factors catalyzing a larger impact of regulations on quality in high-income areas are similarly influential in—and a direct result of—providers’ hiring decisions, especially as it relates to hiring well-qualified minority applicants. Our results strongly suggest this is the case. Looking at Panel A (i.e., the low-income zip codes), we find that providers located in low-income markets do not respond to regulations by interviewing (relatively) more blacks and Hispanics. If anything, the estimates imply that providers are less inclined to interview minorities. On the other hand, the estimates in Panel B (i.e., the high-income zip codes) reveal that providers located in wealthy markets increasingly favor minority applicants as the regulatory environment becomes stricter. Several of the individual interactions are statistically significant, particularly for blacks, and tests of the equality of the interactions across low- and high-income zip codes often reject the null hypothesis (Panel C).

We now consider the impact of providers’ QRIS participation on the racial and ethnic gap in interview requests. The regression model in this case is specified as follows:

$$\begin{aligned}
 [5] \quad \text{interview}_{ijcm} = & \beta_0 + \beta_1 \text{qris\_no} + \beta_2(\text{black} \times \text{qris\_no}) + \beta_3(\text{hispanic} \times \text{qris\_no}) \\
 & + \beta_4 \text{qris\_yes} + \beta_5(\text{black} \times \text{qris\_yes}) + \beta_6(\text{hispanic} \times \text{qris\_yes}) \\
 & + \mathbf{X}'\beta + \alpha_c + \delta_m + \epsilon_{ijcm},
 \end{aligned}$$

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<sup>30</sup> Low-income is defined as zip codes in the bottom quartile of the distribution of median household income. High-income is defined as zip codes in the top quartile of the distribution of median household income. The distributions are based on the zip codes located in the 17 states represented in the resume audit study.

where *qris\_yes* and *qris\_no* are binary indicators of QRIS participation and non-participation, respectively.<sup>31</sup> We include interactions of each participation indicator with the race and ethnicity variables (*black* and *hispanic*). This modelling strategy allows us to examine within the same equation the separate effects of race and ethnicity across providers participating and not participating in QRIS. Our approach is tantamount to splitting the sample into QRIS participants and non-participants and generating coefficients on *black* and *hispanic* from separately-run regressions. Another advantage of our approach is that we can test within the same equation the null hypothesis on the equality of *black* and *hispanic* across QRIS participants and non-participants (i.e.,  $H_0: \beta_2 = \beta_5$  and  $H_0: \beta_3 = \beta_6$ ). The coefficients of interest are  $\beta_2$  and  $\beta_3$ , which provide estimates of the racial and ethnic gap in interviews among QRIS non-participants, and  $\beta_5$  and  $\beta_6$ , which provide the analogous estimates for QRIS participants.

The OLS estimates from equation [5] are presented in Panel A of Table 12. Column (1) estimates the model on the full set of advertised teacher positions, while columns (2) through (5) show the results for subsets of assistant, lead, infant/toddler, and preschool teacher positions, respectively. The pattern of results is remarkably similar to that for the child care regulations discussed above. Minority applicants to providers not participating in QRIS are substantially less likely to receive an interview than their white counterparts. Specifically, the estimates in column (1) reveal that blacks are 12.4 percentage points less likely to be interviewed, while Hispanics are 2.6 percentage points less likely. These interview gaps persist across virtually all teacher-types. However, the racial and ethnic gap in interviews is effectively eliminated when minorities apply to providers participating in QRIS. In fact, if anything such individuals—particularly Hispanics—are actually favored over their white counterparts. Column (1) shows that QRIS participants are indifferent between white and black applicants, and they appear to favor Hispanics by 4.3 percentage points. The estimates in Panel B show the extent to which the interview gap closed for resumes in each teacher category, testing the null hypothesis on the equality of *black* and *hispanic* across QRIS participants and non-participants. In several instances the null is

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<sup>31</sup> Of course, one of these variables falls out of the model.

rejected, indicating that quality-credentialing programs may create powerful incentives for providers to behave differently toward minority applicants.

## **Discussion**

The preceding analyses focused on estimating the impact of two forms of occupational licensing on hiring decisions in the market for child care teachers: states' center-based regulations and QRIS. Although these policies operate quite differently and have somewhat different objectives, we find that they have similar effects on hiring decisions. Providers exposed to more stringent forms of occupational licensing—be it in the form of tougher regulations or participation in QRIS—tend to view minority applicants more favorably than their counterparts exposed to lighter forms of these policies. We also find that these labor market advantages accrue disproportionately to high-quality applicants, and to those applying to child care providers located in high-income communities.

A key feature of our results is that, with the exception of assistant teacher positions, the employment benefits apply to a variety of teacher-types (e.g., infant, toddler, and preschool teachers). A potential explanation for the null effects on assistant teachers is that fewer states regulate experience and education levels for these entry-level employees, and among those that do, the regulations tend to be less demanding than the comparable regulations aimed at lead teachers, as shown in Appendix Table 5. Therefore, it is possible child care providers find it feasible to engage in discrimination in the assistant teacher market—where the regulations are lighter—but infeasible to do so in the market for lead teachers—where the regulations are stricter.

Our results contribute to a few distinct though related literatures. First, we add to the sizable literature studying the impact of regulations on the child care market (e.g., Blau 2001; 2003; Hotz & Kilburn, 1994; Hotz & Xiao, 2011). The evidence suggests that the imposition and increased stringency of such regulations as ratios, group sizes, and staff educational requirements has small negative effects on supply and positive effects on prices and quality. Results in Hotz and Xiao's (2011) analysis are especially noteworthy: regulations reduce supply in low-income neighborhoods, where consumers respond by

shifting into lower-quality informal arrangements, while they increase quality particularly in high-income communities. We add to this literature by considering the heretofore unexplored question of whether these regulations influence race-based hiring decisions. Our results shed light on a plausible mechanism through which regulations improve provider quality in high-income communities: by reducing disparities in the treatment of high-skilled minority applicants during the teacher hiring process. Indeed, insofar as teacher credentials are important inputs to the production of quality, heavily regulated providers may improve quality by hiring better teachers, regardless of their race and ethnicity.

Second, this work contributes to the nascent literature examining the impact of QRIS on child care quality. One recent study provides evidence that QRIS increases the odds that women with post-secondary degrees are employed in the center-based sector (Herbst, 2016), and another study shows that providers initially assigned to a low QRIS quality tier subsequently improve overall quality (Bassok & Dee, 2017). Our results once again provide a plausible mechanism through which these labor- and program-driven increases in quality occur: QRIS participation may create strong incentives for providers to hire better teachers, irrespective of their race and ethnicity, who in turn not only assist the provider in meeting its performance targets but also contribute to improving overall program quality.

Finally, our research informs the literature on the influence of asymmetric information on black-white employment disparities. This literature focuses on the effect of occupational licensing on labor market disparities. Given that some workers must pass criminal background checks or obtain field-specific credentials as a condition of employment, such forms of occupational licensing may reduce information gaps between employers and job-seekers, and in turn strengthen the productivity signals sent by minorities. Indeed, recent work finds a licensing premium equivalent to a 43 percent reduction in the wage gap between black and white men (Blair & Chung, 2017). Also relevant is the work on “ban the box” policies, which prevent employers in certain jurisdictions from conducting criminal background checks until the latter stages of the hiring process, a practice that likely intensifies information asymmetry (e.g., Agan & Star, 2016; Doleac & Hansen, 2016). This work finds that such policies tend to worsen

employment outcomes for minority men. However, whereas this research focuses on whether *individual-level* forms of occupational licensing eliminate information gaps between employers and applicants, our work studies the role of *firm-level* licensing in reducing information problems between consumers and producers. In the former case, minority job-seekers benefit directly from the reduction in statistical discrimination, but in our case one may argue that minorities benefit indirectly from firms' increased emphasis on applicants' credentials, as opposed to their race and ethnicity.<sup>32</sup>

## VI. Conclusion

The goal of this paper is to shed light on three dimensions of racial and ethnic discrimination in the labor market for center-based child care teachers: (i) whether and to what extent hiring discrimination exists, (ii) whether customer discrimination plays a role in hiring behavior, and (iii) to understand the way in which states' child care regulations and quality credentialing programs influence the relative treatment of minority job-seekers. Previous sections of the paper summarized the key results from each analysis and provided a discussion of policy implications. Therefore, we will not revisit these topics here. Instead, we end by considering an important but largely neglected question in the discrimination literature: to what extent does the negative treatment of minorities at the interview stage of the hiring process persist to such "downstream" employment outcomes as hiring rates and starting wages? Indeed, a common criticism of correspondence studies is that the methodology is not able to shed light on who is ultimately offered the job and at what wage rate (e.g., Bertrand & Mullainathan, 2004; Bertrand & Duflo, 2016).

We once again exploit the provider survey in which program directors responded to questions about whether an individual was ultimately hired for the advertised position, the number of job offers made before the hire was completed, the demographic and human capital characteristics of the hired individual, and the starting wage. As previously discussed, we embedded in the survey a link to the teacher advertisement posted by the provider so as to mitigate confusion over the particular position we

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<sup>32</sup> An important caveat to these results is that occupational licensing may reduce disparities in the labor market *conditional* on minority and non-minority job-seekers attaining equal levels of experience and education, something that is ensured in our field experiment. It may be the case, however, that occupational licensing aggravates labor market disparities if, because of disparities in educational opportunities, minority applicants are less qualified than their non-minority counterparts.

inquired about. Note that our survey data allow us to examine the characteristics of those who were hired for the positions to which our resumes were submitted; the data obviously do not permit an analysis of whether the (fictitious) resumes receiving an interview request would have been hired. Thus our discussion below provides only indirect evidence on how the racial and ethnic gap in interviews translates into hiring and earnings disparities.

Our results suggest that 66 percent of child care providers successfully hired an individual to fill the advertised teacher position. In most cases (61 percent), a single offer was made before the hire was completed. Characteristics of the hired individuals are summarized in Table 13. Overall 42 percent of those hired are white, 25 percent are black, and 23 percent are Hispanic. It is instructive to also examine the hire rates according to the number of job offers made. In particular, the hire rate among providers making only a single job offer should in principle be equal to the first-round *job offer* rate. Our estimates reveal large racial and ethnic differences in job offers: 45 percent of offers went to white applicants, while 28 percent and 19 percent went to black and Hispanic applicants, respectively. On the other hand, providers making two or more offers achieved much greater racial and ethnic parity in hiring, particularly among black candidates. Together, these results suggest that minority applicants are less likely to be offered a teacher position and less likely overall to be hired, but that their relative attractiveness may increase along with the number of previous job offers.

In results not reported in the table, we also examine to what extent providers that hired an individual of a given race or ethnicity requested interviews with individuals from a different background (as measured by our resume names). Such an analysis is interesting because it allows for a more direct link to be made between provider biases at the interview stage and those at the job offer/hiring stage. We find that among those that hired a white applicant, approximately 18 percent requested at least one interview with a resume containing a black-sounding name. However, among those that hired a black applicant, 32 percent sought interviews with resumes containing black-sounding names. This pattern applies to Hispanics as well: 35 percent of providers requested an interview with Hispanic applicants

when a white individual was hired, rising to 52 percent when a Hispanic individual was hired. Thus it appears that racial and ethnic preferences are stable throughout the hiring process: the demographic mix of applicants favored during the interview stage is predictive of the characteristics of the individuals ultimately hired.

The next set of results in Table 13 examines the experience and education credentials of those hired. Black hires obtained more years of child care work experience than their white counterparts, while Hispanic hires have approximately the same amount of experience. In addition, minority hires are more likely to have some college coursework, an associate's degree, and a CDA credential, while whites are more likely to have a bachelor's degree. White hires are also more likely to have education- and child-related post-secondary degrees, while minorities are more likely to have degrees in other fields. Such results are consistent with our analysis of the returns to skill at the interview stage: minority hires are more likely to have the characteristics that are least predictive of interview requests, while white hires are more likely to have the characteristics that are most predictive of interview requests. Thus the lower returns to resume quality at the interview stage appear to persist to the hiring stage.

Finally, Table 13 examines the wages of newly hired child care teachers. Whites earn approximately \$14 per hour, on average; blacks earn nearly \$13 per hour; and Hispanics earn \$15 per hour. We estimate a simple (log) hourly wage equation as a function of separate race and ethnicity dummies (using white hires as the omitted category), previous work experience, educational attainment, and a variety of other controls.<sup>33</sup> The table reports the coefficient and standard error on the dummies for black and Hispanic hires. Newly hired black teachers earn seven percent less than their white counterparts, while Hispanics earn 15 percent more. One conclusion is that black job-seekers, when hired, continue to experience disparities in the form of lower wages, but Hispanics may actually earn more relative to whites. Although one should interpret these results cautiously, it is noteworthy that they

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<sup>33</sup> See the notes to Table 13 for a complete list of the variables include in the wage equation. Full model results are available upon request.

qualitatively similar to those from a nationally representative sample of center-based teachers (Boyd-Swan & Herbst, 2017a).

The major takeaways from our analysis is that racial and ethnic discrimination exists, with program directors exhibiting own-race bias; that customer discrimination may explain some of the hiring behaviors of program directors; and that public policies such regulations and quality credentialing may be powerful levers to reduce discrimination in the early stages of the hiring process. This study is conducted in the context of growing racial and ethnic diversity within the U.S. preschool-age population as well as growing demand for high-quality child care programs. In addition, previous work finds that demographically matching students and teachers can be particularly beneficial for minority children. These two strands together make a strong argument for diversifying the early education workforce. Indeed, as noted in the Introduction, the minority share of the workforce lags far behind that of the children attending these programs. This paper, on the one hand, paints a rather dire picture about the existence of barriers to diversifying the workforce; but on the other hand, it also provides evidence that some public policies may be effective at combating discrimination.

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**Table 1: Interview Rate—by Race/Ethnicity and City**

|          | Full              | Atl.              | Bos.              | Chi.              | Dallas            | DC                | Hou.              | LA                | Minn.             | NYC               | Phil.             | Phx.              | SD                | SF                | Seattle           |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| White    | 0.270             | 0.236             | 0.217             | 0.291             | 0.267             | 0.163             | 0.247             | 0.202             | 0.452             | 0.112             | 0.253             | 0.330             | 0.379             | 0.371             | 0.347             |
| Black    | 0.201             | 0.219             | 0.217             | 0.144             | 0.218             | 0.121             | 0.133             | 0.138             | 0.323             | 0.077             | 0.199             | 0.235             | 0.247             | 0.224             | 0.331             |
| Hispanic | 0.238             | 0.217             | 0.204             | 0.240             | 0.254             | 0.162             | 0.211             | 0.156             | 0.390             | 0.084             | 0.230             | 0.269             | 0.317             | 0.326             | 0.356             |
| B/W diff | -0.069<br>(0.010) | -0.017<br>(0.034) | 0.000<br>(0.031)  | -0.147<br>(0.033) | -0.049<br>(0.042) | -0.041<br>(0.028) | -0.114<br>(0.040) | -0.064<br>(0.027) | -0.129<br>(0.036) | -0.035<br>(0.021) | -0.054<br>(0.032) | -0.095<br>(0.044) | -0.131<br>(0.066) | -0.147<br>(0.035) | -0.016<br>(0.039) |
| H/W diff | -0.032<br>(0.010) | -0.019<br>(0.026) | -0.013<br>(0.031) | -0.052<br>(0.039) | -0.013<br>(0.043) | -0.001<br>(0.030) | -0.036<br>(0.042) | -0.046<br>(0.031) | -0.062<br>(0.039) | -0.028<br>(0.024) | -0.023<br>(0.035) | -0.061<br>(0.050) | -0.062<br>(0.063) | -0.045<br>(0.036) | 0.008<br>(0.040)  |
| Job Ads  | 2,772             | 226               | 219               | 205               | 169               | 221               | 141               | 237               | 229               | 221               | 226               | 163               | 76                | 238               | 201               |
| Resumes  | 10,986            | 882               | 874               | 815               | 664               | 877               | 549               | 943               | 911               | 879               | 902               | 646               | 301               | 945               | 798               |

*Notes:* Each cell (in the first three rows) reports the fraction of resumes receiving an interview request, by race and ethnicity and by city. The next few rows report the difference in the interview rate between black and white job-seekers and Hispanic and white job-seekers. These differences are generated by estimating an OLS regression of the interview indicator variable on the race indicator variables (white is the omitted category). Standard errors (in parentheses) are clustered at the job advertisement level.

**Table 2: Racial and Ethnic Differences in Interview Requests—  
Full Sample**

|                         | (1)                    | (2)                    | (3)                    | (4)                    |
|-------------------------|------------------------|------------------------|------------------------|------------------------|
| Black name              | -0.0743***<br>(0.0092) | -0.0767***<br>(0.0091) | -0.0750***<br>(0.0081) | -0.0739***<br>(0.0084) |
| Hispanic name           | -0.0328***<br>(0.0095) | -0.0333***<br>(0.0094) | -0.0296***<br>(0.0083) | -0.0273***<br>(0.0085) |
| Observations            | 10,986                 | 10,986                 | 10,986                 | 10,986                 |
| City/month indicators   | Yes                    | Yes                    | Yes                    | Yes                    |
| Resume order indicators | Yes                    | Yes                    | Yes                    | Yes                    |
| Resume characteristics  | No                     | Yes                    | Yes                    | Yes                    |
| Random effects          | No                     | No                     | Yes                    | No                     |
| Job ad fixed effects    | No                     | No                     | No                     | Yes                    |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. The omitted category includes resumes with white-sounding names. Columns (1) and (2) estimate the model using OLS; column (3) estimates the model using a random effects model; and column (4) estimates the model using a (job advertisement) fixed effects model. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 3: Racial and Ethnic Differences in Interview Requests—  
by Teacher-Type**

|  | Assistant<br>Teachers<br>(1) | Lead Inf./Todd.<br>Teachers<br>(2) | Lead Preschool<br>Teachers<br>(3) |
|--|------------------------------|------------------------------------|-----------------------------------|
| <i>Panel A: OLS Estimates</i>                  |                              |                                    |                                   |
| Black name                                     | -0.1139***<br>(0.0184)       | -0.0691***<br>(0.0161)             | -0.0872***<br>(0.0145)            |
| Hispanic name                                  | -0.0401**<br>(0.0193)        | -0.0171<br>(0.0164)                | -0.0400***<br>(0.0149)            |
| <i>Panel B: Job Advertisement FE Estimates</i> |                              |                                    |                                   |
| Black name                                     | -0.0978***<br>(0.0178)       | -0.0672***<br>(0.0150)             | -0.0942***<br>(0.0131)            |
| Hispanic name                                  | -0.0296<br>(0.0184)          | -0.0097<br>(0.0146)                | -0.0347***<br>(0.0133)            |
| Observations                                   | 2,712                        | 3,653                              | 4,324                             |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. The omitted category includes resumes with white-sounding names. Panel A estimates the models using OLS, and includes the other resume characteristics, city/month indicators, resume order indicators. Panel B includes job advertisement fixed effects. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 4: Determinants of Interview Requests—by Race and Ethnicity**

|                              | Full Sample<br>(1)    | White Name<br>(2)     | Black Name<br>(3)     | Hispanic Name<br>(4)  |
|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| “friendly and cooperative”   | 0.0064<br>(0.0085)    | 0.0162<br>(0.0182)    | 0.0062<br>(0.0168)    | -0.0036<br>(0.0183)   |
| “responsible and organized”  | 0.0044<br>(0.0086)    | 0.0216<br>(0.0184)    | 0.0114<br>(0.0174)    | -0.0226<br>(0.0182)   |
| “creative and perceptive”    | 0.0084<br>(0.0086)    | 0.0185<br>(0.0184)    | -0.0255<br>(0.0167)   | 0.0281<br>(0.0184)    |
| 6 months ECE work experience | 0.1391***<br>(0.0100) | 0.1362***<br>(0.0190) | 0.1331***<br>(0.0167) | 0.1456***<br>(0.0181) |
| 2 years ECE work experience  | 0.1138***<br>(0.0089) | 0.1039***<br>(0.0170) | 0.1291***<br>(0.0155) | 0.1081***<br>(0.0160) |
| AA degree in business        | 0.0076<br>(0.0130)    | 0.0199<br>(0.0230)    | 0.0107<br>(0.0213)    | -0.0038<br>(0.0228)   |
| AA degree in nursing         | 0.0321**<br>(0.0137)  | 0.0778***<br>(0.0249) | 0.0212<br>(0.0213)    | 0.0036<br>(0.0240)    |
| AA degree in ECE             | 0.1270***<br>(0.0147) | 0.1659***<br>(0.0259) | 0.1252***<br>(0.0241) | 0.0842***<br>(0.0251) |
| BA degree in business        | 0.0172<br>(0.0129)    | 0.0096<br>(0.0232)    | 0.0486**<br>(0.0221)  | 0.0039<br>(0.0221)    |
| BA degree in nursing         | 0.0159<br>(0.0129)    | 0.0426*<br>(0.0231)   | 0.0211<br>(0.0206)    | -0.0186<br>(0.0226)   |
| BA degree in ECE             | 0.1288***<br>(0.0152) | 0.1430***<br>(0.0261) | 0.1589***<br>(0.0247) | 0.0883***<br>(0.0267) |
| GPA: 3.3                     | 0.0178**<br>(0.0084)  | 0.0377**<br>(0.0164)  | 0.0228<br>(0.0155)    | -0.0084<br>(0.0162)   |
| GPA: 3.8                     | 0.0024<br>(0.0082)    | 0.0069<br>(0.0157)    | 0.0096<br>(0.0153)    | -0.0130<br>(0.0159)   |
| CDA credential               | 0.0226***<br>(0.0086) | 0.0171<br>(0.0187)    | 0.0181<br>(0.0166)    | 0.0307*<br>(0.0178)   |
| Bilingual/diversity course   | 0.0283***<br>(0.0087) | 0.0084<br>(0.0181)    | 0.0452***<br>(0.0173) | 0.0378**<br>(0.0180)  |
| EoM award/bonus pay          | 0.0126<br>(0.0085)    | 0.0161<br>(0.0181)    | 0.0143<br>(0.0168)    | 0.0095<br>(0.0181)    |
| Reliable transportation      | -0.0046<br>(0.0061)   | -0.0137<br>(0.0130)   | -0.0078<br>(0.0120)   | 0.0072<br>(0.0129)    |
| Observations                 | 10,986                | 3,705                 | 3,660                 | 3,621                 |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. All models are estimated using OLS. ECE: early childhood education. EoM: employee of the month. The omitted categories are “enthusiastic and energetic,” no previous ECE work experience, high school diploma, 2.8 GPA, fingerprint clearance card and CPR/First Aid certifications only, and no transportation statement listed on the resume. All models include the city/month indicators and resume order indicators. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 5: Effects of Center Directors' Race and Ethnicity on Interview Requests**

|                              | (1)                    | (2)                   |
|------------------------------|------------------------|-----------------------|
| black × white_director       | -0.1017***<br>(0.0368) | -0.0798**<br>(0.0322) |
| hispanic × white_director    | -0.0022<br>(0.0361)    | -0.0079<br>(0.0308)   |
| black × black_director       | 0.1481<br>(0.1219)     | 0.2037*<br>(0.1106)   |
| hispanic × black_director    | -0.0119<br>(0.0948)    | 0.0647<br>(0.0904)    |
| black × hispanic_director    | -0.0249<br>(0.1249)    | -0.0430<br>(0.1097)   |
| hispanic × hispanic_director | 0.2126**<br>(0.1051)   | 0.1411<br>(0.1027)    |
| black × other_director       | -0.0102<br>(0.0880)    | -0.0625<br>(0.0842)   |
| hispanic × other_director    | -0.0436<br>(0.1173)    | -0.0657<br>(0.1303)   |
| Observations                 | 1,217                  | 1,217                 |
| Estimation method            | OLS                    | FE                    |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. Column (1) estimates the model using OLS, while column (2) includes job advertisement fixed effects. The OLS models include the city/month indicators and resume order indicators. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 6: Tests of Customer Discrimination**

|   | (1)                    | (2)                    | (3)                    |
|---|------------------------|------------------------|------------------------|
| <i>Panel A: Program-Level Interactions</i>      |                        |                        |                        |
| White share of kids                             | 0.2206***<br>(0.0644)  | 0.2278***<br>(0.0673)  | --                     |
| black × white_share                             | -0.1305**<br>(0.0578)  | -0.1298**<br>(0.0573)  | -0.1847***<br>(0.0499) |
| hispanic × white_share                          | -0.0253<br>(0.0559)    | -0.0247<br>(0.0556)    | -0.0693<br>(0.0478)    |
| Black share of kids                             | 0.2011**<br>(0.0824)   | 0.1942**<br>(0.0930)   | --                     |
| black × black_share                             | -0.0767<br>(0.1006)    | -0.0788<br>(0.1037)    | -0.0749<br>(0.1043)    |
| hispanic × black_share                          | -0.1383<br>(0.0956)    | -0.1318<br>(0.0948)    | -0.1582<br>(0.1120)    |
| Hispanic share of kids                          | 0.0115<br>(0.1328)     | -0.0334<br>(0.1222)    | --                     |
| black × hispanic_share                          | 0.0900<br>(0.1443)     | 0.0850<br>(0.1409)     | 0.2615**<br>(0.1315)   |
| hispanic × hispanic_share                       | 0.3176**<br>(0.1496)   | 0.3169**<br>(0.1562)   | 0.3761**<br>(0.1460)   |
| <i>Panel B: Census Tract-Level Interactions</i> |                        |                        |                        |
| White share of kids                             | -0.0504<br>(0.0543)    | -0.0450<br>(0.0536)    | --                     |
| black × white_share                             | -0.1010***<br>(0.0166) | -0.1009***<br>(0.0166) | -0.1010***<br>(0.0152) |
| hispanic × white_share                          | -0.0478***<br>(0.0173) | -0.0468***<br>(0.0173) | -0.0388**<br>(0.0157)  |
| Black share of kids                             | -0.1376**<br>(0.0576)  | -0.1339**<br>(0.0569)  | --                     |
| black × black_share                             | -0.0639*<br>(0.0362)   | -0.0638*<br>(0.0363)   | -0.0170<br>(0.0346)    |
| hispanic × black_share                          | -0.0346<br>(0.0335)    | -0.0333<br>(0.0334)    | -0.0110<br>(0.0326)    |
| Hispanic share of kids                          | -0.0878<br>(0.0662)    | -0.0905<br>(0.0652)    | --                     |
| black × hispanic_share                          | -0.0275<br>(0.0418)    | -0.0263<br>(0.0419)    | -0.0637*<br>(0.0382)   |
| hispanic × hispanic_share                       | 0.0048<br>(0.0503)     | 0.0025<br>(0.0501)     | -0.0225<br>(0.0469)    |
| Observations: Panel A                           | 1,361                  | 1,361                  | 1,361                  |
| Observations: Panel B                           | 10,913                 | 10,913                 | 10,913                 |
| Director race/ethnicity                         | No                     | Yes                    | No                     |
| Estimation method                               | OLS                    | OLS                    | FE                     |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. Columns (1) and (2) estimate the model using OLS, while column (3) includes job advertisement fixed effects. Column (2) adds a control for the race and ethnicity of the child care program director. The OLS models include the city/month indicators and resume order indicators. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 7: Tests of Customer Discrimination—by Characteristics of the Job Advertisement**

|                           | (1a)                   | (1b)                   | (2a)                        | (2b)                  | (3a)                       | (3b)                   |
|---------------------------|------------------------|------------------------|-----------------------------|-----------------------|----------------------------|------------------------|
|                           | Teacher-Type/Age Group |                        | Min. Experience Requirement |                       | Min. Education Requirement |                        |
|                           | Inf./Todd.             | Preschool              | <=1 Yr.                     | 2+ Yrs.               | HS                         | AA+                    |
| White share of kids       | 0.1537<br>(0.1040)     | 0.1009<br>(0.1152)     | 0.1249<br>(0.0995)          | 0.2554*<br>(0.1481)   | -0.0027<br>(0.1104)        | 0.3150***<br>(0.0989)  |
| black × white_share       | 0.0270<br>(0.0882)     | -0.2695***<br>(0.0871) | -0.0388<br>(0.1002)         | -0.2184**<br>(0.1068) | 0.1107<br>(0.1042)         | -0.2290***<br>(0.0780) |
| hispanic × white_share    | 0.0601<br>(0.0835)     | -0.1113<br>(0.0914)    | 0.0769<br>(0.0903)          | -0.1081<br>(0.1103)   | 0.1398<br>(0.1078)         | -0.1061<br>(0.0822)    |
| Black share of kids       | 0.1933<br>(0.1230)     | -0.0811<br>(0.1781)    | 0.1506<br>(0.1220)          | 0.2682*<br>(0.1530)   | 0.0776<br>(0.1481)         | 0.1289<br>(0.1238)     |
| black × black_share       | -0.2901**<br>(0.1238)  | 0.0940<br>(0.1831)     | -0.0176<br>(0.1247)         | -0.1572<br>(0.1918)   | 0.0278<br>(0.1708)         | -0.1532<br>(0.1360)    |
| hispanic × black_share    | -0.0990<br>(0.1870)    | -0.1268<br>(0.1497)    | -0.0796<br>(0.1224)         | -0.1690<br>(0.2310)   | -0.0178<br>(0.1238)        | -0.0852<br>(0.1800)    |
| Hispanic share of kids    | 0.0507<br>(0.2633)     | -0.1214<br>(0.1617)    | 0.1314<br>(0.2571)          | -0.0098<br>(0.2474)   | 0.3825<br>(0.2563)         | 0.0014<br>(0.1823)     |
| black × hispanic_share    | 0.2458<br>(0.2430)     | 0.0458<br>(0.1586)     | -0.2443<br>(0.2488)         | 0.6089**<br>(0.2521)  | -0.5006*<br>(0.2927)       | 0.6078***<br>(0.2192)  |
| hispanic × hispanic_share | 0.1749<br>(0.2027)     | 0.5379***<br>(0.1789)  | -0.0001<br>(0.1998)         | 0.3029<br>(0.3241)    | -0.0491<br>(0.2912)        | 0.3902*<br>(0.2238)    |
| Observations              | 531                    | 502                    | 645                         | 316                   | 480                        | 565                    |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. All models are estimated using OLS, and include the city/month indicators and resume order indicators. Columns (1a) and (1b) estimate the model on the subset of resumes submitted in response to infant/toddler and preschool teacher positions, respectively. Columns (2a) and (2b) estimate the model on the subset of resumes submitted in response to job advertisements with a minimum work experience requirement of no more than a year and two or more years, respectively. Columns (3a) and (3b) estimate the model on the subset of resumes submitted in response to job advertisements with a minimum education requirement of a high school degree and an associate's degree or more, respectively. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 8: Racial and Ethnic Differences in Interview Requests—According to Whether Applicants Meet the Job Advertisement Experience and Education Requirements**

|  | (1)<br>No Posted<br>Job Reqs. | (2)<br>Does Not Meet<br>Exp/Edu Reqs. | (3)<br>Meets<br>Exp/Edu Reqs. | (4)<br>Ho:<br>(3)=(1) | (5)<br>Ho:<br>(3)=(2) |
|--|-------------------------------|---------------------------------------|-------------------------------|-----------------------|-----------------------|
| <i>Panel A: Assistant Teachers</i>           |                               |                                       |                               |                       |                       |
| black  | -0.1207***<br>(0.0277)        | -0.1088<br>(0.0748)                   | -0.1058**<br>(0.0422)         | 0.761                 | 0.967                 |
| hispanic                                     | -0.0295<br>(0.0275)           | -0.0503<br>(0.0744)                   | -0.0808*<br>(0.0429)          | 0.300                 | 0.677                 |
| <i>Panel B: Lead Infant/Toddler Teachers</i> |                               |                                       |                               |                       |                       |
| black  | -0.0794***<br>(0.0241)        | -0.1534**<br>(0.0731)                 | -0.0200<br>(0.0370)           | 0.168                 | 0.068                 |
| hispanic                                     | -0.0470**<br>(0.0237)         | -0.0365<br>(0.0816)                   | 0.0215<br>(0.0385)            | 0.121                 | 0.485                 |
| <i>Panel C: Lead Preschool Teachers</i>      |                               |                                       |                               |                       |                       |
| black  | -0.1032***<br>(0.0210)        | -0.1400***<br>(0.0409)                | -0.0205<br>(0.0408)           | 0.064                 | 0.025                 |
| hispanic                                     | -0.0448**<br>(0.0213)         | -0.1112***<br>(0.0392)                | -0.0293<br>(0.0411)           | 0.731                 | 0.125                 |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. All models are estimated using OLS, and include the resume characteristics, city/month indicators, and resume order indicators. Panel A estimates the models on the subset of resumes submitted to assistant teacher positions. Panel B estimates the models on the subset of resumes submitted to lead infant/toddler teacher positions. Panel C estimates the models on the subset of resumes submitted to lead preschool teacher positions. Column (1) estimates the models on the subset of resumes submitted to job advertisements that did not specify a minimum experience and education requirement. Column (2) estimates the models on the subset of resumes submitted to job advertisements that did not meet the minimum experience and education requirements. Column (3) estimates the models on the subset of resumes submitted to job advertisements that met the minimum experience and education requirements. Columns (4) and (5) present the p-values on a test of the null hypothesis of equal race/ethnicity coefficients across columns (1)/(3) and (2)/(3), respectively. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 9: The Impact of States' Child Care Regulations on the Racial and Ethnic Gap in Interviews**

|  | (1)<br>Staff-Child<br>Ratio | (2)<br>Max.<br>Group Size | (3)<br>Assistant<br>Teacher Reqs. | (4)<br>Lead<br>Teacher Reqs. | (5)<br>Program<br>Director Reqs. | (6)<br>Full Regulation<br>Index |
|--|-----------------------------|---------------------------|-----------------------------------|------------------------------|----------------------------------|---------------------------------|
| <i>Panel A: OLS Estimates</i>                  |                             |                           |                                   |                              |                                  |                                 |
| Regulation                                     | -0.0380*<br>(0.0224)        | -0.0229<br>(0.0141)       | 0.0175<br>(0.0471)                | -0.0203<br>(0.0165)          | -0.0026<br>(0.0292)              | -0.0367<br>(0.0247)             |
| black × regulation                             | 0.0338***<br>(0.0108)       | 0.0368***<br>(0.0109)     | -0.0078<br>(0.0246)               | 0.0227*<br>(0.0120)          | -0.0023<br>(0.0158)              | 0.0434***<br>(0.0145)           |
| hispanic × regulation                          | 0.0111<br>(0.0105)          | 0.0151<br>(0.0115)        | -0.0206<br>(0.0246)               | 0.0082<br>(0.0125)           | 0.0058<br>(0.0159)               | 0.0161<br>(0.0146)              |
| <i>Panel B: Job Advertisement FE Estimates</i> |                             |                           |                                   |                              |                                  |                                 |
| Regulation                                     | --                          | --                        | --                                | --                           | --                               | --                              |
| black × regulation                             | 0.0304***<br>(0.0103)       | 0.0355***<br>(0.0099)     | -0.0294<br>(0.0232)               | 0.0240**<br>(0.0111)         | 0.0001<br>(0.0143)               | 0.0415***<br>(0.0134)           |
| hispanic × regulation                          | 0.0175*<br>(0.0096)         | 0.0199*<br>(0.0104)       | -0.0246<br>(0.0230)               | 0.0189*<br>(0.0111)          | 0.0235<br>(0.0143)               | 0.0279**<br>(0.0132)            |
| Observations                                   | 10,986                      | 10,986                    | 2,712                             | 8,591                        | 10,986                           | 10,986                          |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. Panel A estimates the models using OLS, and includes the resume characteristics, city/month indicators, and resume order indicators. Panel B includes job advertisement fixed effects. The regulation estimated in each column is, respectively, the index of staff-child ratios, the index of maximum group size, the index of experience and education requirements for assistant teachers, the index of experience and education requirements for lead teachers, the index of experience and education requirements for program directors, and the overall index of regulatory stringency. The models in columns (1), (2), (5) and (6) are estimated on the full set of resumes, while those in columns (3) and (4) are estimated on the subset of resumes submitted to assistant and lead teacher positions, respectively. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 10: The Impact of States' Child Care Regulations on the Racial and Ethnic Gap in Interviews—  
by Applicants' Resume Quality**

|  | (1)<br>Staff-Child<br>Ratio | (2)<br>Max.<br>Group Size | (3)<br>Lead<br>Teacher Reqs. | (4)<br>Program<br>Director Reqs. | (5)<br>Full Regulation<br>Index |
|--|-----------------------------|---------------------------|------------------------------|----------------------------------|---------------------------------|
| <i>Panel A: Low-Quality Resumes</i>  |                             |                           |                              |                                  |                                 |
| Regulation   | -0.0120<br>(0.0261)         | -0.0006<br>(0.0161)       | -0.0034<br>(0.0173)          | 0.0095<br>(0.0311)               | -0.0071<br>(0.0271)             |
| black × regulation   | 0.0077<br>(0.0146)          | 0.0066<br>(0.0151)        | 0.0191<br>(0.0142)           | 0.0047<br>(0.0219)               | 0.0149<br>(0.0199)              |
| hispanic × regulation  | -0.0200<br>(0.0136)         | -0.0162<br>(0.0154)       | -0.0047<br>(0.0153)          | 0.0058<br>(0.0226)               | -0.0211<br>(0.0192)             |
| <i>Panel B: High-Quality Resumes</i>   |                             |                           |                              |                                  |                                 |
| Regulation   | -0.0723<br>(0.0889)         | -0.0474<br>(0.0323)       | -0.0700<br>(0.0533)          | -0.0641<br>(0.0935)              | -0.0795<br>(0.0577)             |
| black × regulation   | 0.0551**<br>(0.0219)        | 0.0473**<br>(0.0185)      | 0.0346*<br>(0.0205)          | -0.0171<br>(0.0271)              | 0.0534**<br>(0.0261)            |
| hispanic × regulation  | 0.0440**<br>(0.0216)        | 0.0279<br>(0.0196)        | 0.0203<br>(0.0207)           | -0.0047<br>(0.0272)              | 0.0372<br>(0.0269)              |
| <i>Panel C: Hypothesis Tests of Low- versus High-Quality Resumes (p-value)</i> |                             |                           |                              |                                  |                                 |
| Ho: black low = black high   | 0.081                       | 0.091                     | 0.540                        | 0.538                            | 0.251                           |
| Ho: hispanic low = hispanic high   | 0.016                       | 0.073                     | 0.333                        | 0.770                            | 0.084                           |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. All models are estimated on the subset of resumes submitted in response to lead teacher positions. The number of observations in Panel A is 4,295, while the number of observations in Panel B is 4,296. Panel A estimates the OLS model on the subset of low-quality resumes, while Panel B estimates the OLS model on the subset of high-quality resumes. Resume quality is determined by the predicted probability that a given resume received an interview request. Predicted probabilities are determined by estimating a probit model of interview requests on the resume characteristics controlling for city/month indicators and resume order indicators, and then using the coefficients on the variables to generate the probabilities. Low-quality resumes are those with predicted probabilities at or below the median interview rate, and high-quality resumes are those with predicted probabilities above the median interview rate. All models in the table include the resume characteristics, city/month indicators, and resume order indicators. The regulation estimated in each column is, respectively, the index staff-child ratios, the index of maximum group size, the index of experience and education requirements for lead teachers, the index of experience and education requirements for center program directors, and the overall index of regulatory stringency. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 11: Regulations on the Racial and Ethnic Gap in Interviews—  
By Zip Code Median Household Income**

|   | (1)<br>Staff-Child<br>Ratio | (2)<br>Max.<br>Group Size | (3)<br>Assistant<br>Teacher Reqs | (4)<br>Lead<br>Teacher Reqs | (5)<br>Program<br>Director Reqs | (6)<br>Full Regulation<br>Index |
|---|-----------------------------|---------------------------|----------------------------------|-----------------------------|---------------------------------|---------------------------------|
| <i>Panel A: Child Care Providers Located in Low-Income Zip Codes</i>            |                             |                           |                                  |                             |                                 |                                 |
| Regulation  | -0.1035<br>(0.1085)         | -0.3362<br>(0.4795)       | 0.1075<br>(0.3963)               | 0.0894**<br>(0.0375)        | -0.0065<br>(0.2354)             | -0.1622<br>(0.4173)             |
| black × regulation  | -0.0255<br>(0.0290)         | -0.0585<br>(0.0431)       | -0.0359<br>(0.0623)              | -0.0795**<br>(0.0389)       | -0.0172<br>(0.0430)             | -0.0534<br>(0.0427)             |
| hispanic × regulation   | -0.0501*<br>(0.0274)        | -0.0485<br>(0.0485)       | -0.0435<br>(0.0669)              | -0.0368<br>(0.0391)         | -0.0262<br>(0.0421)             | -0.0606<br>(0.0438)             |
| <i>Panel B: Child Care Providers Located in High-Income Zip Codes</i>           |                             |                           |                                  |                             |                                 |                                 |
| Regulation  | -0.0501*<br>(0.0260)        | -0.0199<br>(0.0164)       | 0.0270<br>(0.0540)               | -0.0061<br>(0.0217)         | -0.0087<br>(0.0349)             | -0.0388<br>(0.0302)             |
| black × regulation  | 0.0356**<br>(0.0152)        | 0.0337**<br>(0.0136)      | -0.0332<br>(0.0315)              | 0.0295**<br>(0.0150)        | -0.0102<br>(0.0221)             | 0.0423**<br>(0.0198)            |
| hispanic × regulation   | 0.0202<br>(0.0148)          | 0.0089<br>(0.0142)        | -0.0145<br>(0.0324)              | 0.0089<br>(0.0162)          | 0.0124<br>(0.0232)              | 0.0173<br>(0.0200)              |
| <i>Panel C: Hypothesis Tests of Low- versus High-Income Zip Codes (p-value)</i> |                             |                           |                                  |                             |                                 |                                 |
| Ho: black low = black high  | 0.058                       | 0.038                     | 0.968                            | 0.008                       | 0.884                           | 0.039                           |
| Ho: hispanic low = hispanic high  | 0.022                       | 0.247                     | 0.681                            | 0.269                       | 0.415                           | 0.100                           |
| Observations: Panel A   | 1,126                       | 1,126                     | 336                              | 858                         | 1,126                           | 1,126                           |
| Observations: Panel B   | 6,295                       | 6,295                     | 1,579                            | 4,897                       | 6,295                           | 6,295                           |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. Panel A estimates the OLS model on the subset of resumes submitted to providers located in low-income zip codes, while Panel B estimates the OLS model on the subset of resumes submitted to providers located in high-income zip codes. Low-income is defined as zip codes in the bottom quartile of the distribution of median household income. High-income is defined as zip codes in the top quartile of the distribution of median household income. The distributions are based on the zip codes located in the 17 states represented in the resume audit study. All models include the resume characteristics, city/month indicators, and resume order indicators. The regulation estimated in each column is, respectively, the index of staff-child ratios, the index of maximum group size, the index of experience and education requirements for assistant teachers, the index of experience and education requirements for lead teachers, the index of experience and education requirements for center program directors, and the overall index of regulatory stringency. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 12: The Impact of QRIS Participation on the Racial and Ethnic Gap in Interviews**

|                                  | (1)<br>Full<br>Sample  | (2)<br>Assistant<br>Teachers | (3)<br>Lead<br>Teachers | (4)<br>Infant/Toddler<br>Teachers | (5)<br>Preschool<br>Teachers |
|----------------------------------|------------------------|------------------------------|-------------------------|-----------------------------------|------------------------------|
| <i>Panel A: OLS Estimates</i>    |                        |                              |                         |                                   |                              |
| black × qris_no                  | -0.1237***<br>(0.0420) | -0.1156*<br>(0.0676)         | -0.1421***<br>(0.0500)  | -0.0323<br>(0.0711)               | -0.1584**<br>(0.0640)        |
| hispanic × qris_no               | -0.0255<br>(0.0402)    | -0.0497<br>(0.0658)          | -0.0205<br>(0.0484)     | 0.0416<br>(0.0671)                | -0.0565<br>(0.0633)          |
| black × qris_yes                 | -0.0034<br>(0.0467)    | 0.1492<br>(0.1023)           | -0.0202<br>(0.0497)     | 0.0395<br>(0.0819)                | -0.0223<br>(0.0818)          |
| hispanic × qris_yes              | 0.0433<br>(0.0473)     | 0.1109<br>(0.0913)           | 0.0371<br>(0.0549)      | 0.1002<br>(0.0800)                | 0.0504<br>(0.1163)           |
| <i>Panel B: Hypothesis Tests</i> |                        |                              |                         |                                   |                              |
| Ho: black qris_no = qris_yes     | -0.1203*<br>(0.0619)   | -0.2649**<br>(0.1261)        | -0.1219*<br>(0.0692)    | -0.0719<br>(0.1083)               | -0.1361<br>(0.1029)          |
| Ho: hispanic qris_no = qris_yes  | -0.0688<br>(0.0616)    | -0.1606<br>(0.1138)          | -0.0576<br>(0.0727)     | -0.0585<br>(0.1067)               | -0.1069<br>(0.1319)          |
| Observations                     | 1,070                  | 306                          | 828                     | 429                               | 337                          |

*Notes:* Standard errors (in parentheses) are clustered at the job advertisement level. Panel A estimates the models using OLS, and includes the resume characteristics, city/month indicators, and resume order indicators. Panel B provides tests of the null hypothesis that the “qris\_no” and “qris\_yes” coefficients are the same within each racial and ethnic category. The model in column (1) includes the full set of resumes (for which there is available information on provider QRIS participation), while those in columns (2), (3), (4), and (5) are estimated on the subset of resumes submitted to assistant teacher, lead teacher, infant/toddler teacher, and preschool teacher positions, respectively. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Table 13: Characteristics of Individuals Hired by Child Care Providers**

|                                   | (1)              | (2)              | (3)              |
|-----------------------------------|------------------|------------------|------------------|
|                                   | White            | Black            | Hispanic         |
| Hired; overall (%)                | 0.420<br>(0.494) | 0.250<br>(0.433) | 0.232<br>(0.423) |
| Hired; one offer (%)              | 0.448<br>(0.498) | 0.276<br>(0.448) | 0.190<br>(0.393) |
| Hired; two+ offers (%)            | 0.348<br>(0.479) | 0.304<br>(0.463) | 0.217<br>(0.415) |
| Child care work experience (yrs.) | 4.82<br>(5.50)   | 7.25<br>(7.20)   | 4.13<br>(2.90)   |
| High school diploma (%)           | 0.152<br>(0.360) | 0.160<br>(0.369) | 0.160<br>(0.369) |
| Some college coursework (%)       | 0.261<br>(0.440) | 0.400<br>(0.492) | 0.280<br>(0.451) |
| Associate's degree (%)            | 0.043<br>(0.204) | 0.160<br>(0.369) | 0.120<br>(0.327) |
| Bachelor's degree or more (%)     | 0.543<br>(0.499) | 0.280<br>(0.451) | 0.440<br>(0.499) |
| Degree: Early Childhood Ed. (%)   | 0.500<br>(0.502) | 0.455<br>(0.504) | 0.500<br>(0.505) |
| Degree: Non-ed./-child dev. (%)   | 0.077<br>(0.268) | 0.182<br>(0.390) | 0.214<br>(0.414) |
| CDA credential (%)                | 0.048<br>(0.214) | 0.154<br>(0.363) | 0.182<br>(0.388) |
| Mean hourly wage (\$)             | 13.74<br>(3.97)  | 12.91<br>(2.95)  | 15.21<br>(4.46)  |
| Coefficient: ln(wage) equation    | --               | -0.070           | 0.154            |
| Standard error                    | --               | (0.069)          | (0.120)          |

*Notes:* Standard deviations (or robust standard errors) are shown in parentheses. Each row provides information on a given characteristic, by race and ethnicity, for the individual that was eventually hired by the child care provider. The last two rows display the coefficient and standard error on dummy variables for black and Hispanic hired individuals in a log hourly wage equation (N=106), controlling for gender, age, age-squared, experience, experience-squared, educational attainment, CDA and other credentials, job advertisement characteristics, and city/month dummies. The omitted category includes hired white individuals. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Appendix Table 1: Resume Characteristics—by Race and Ethnicity**

|                                 | White<br>Name | Black<br>Name | Hispanic<br>Name |
|---------------------------------|---------------|---------------|------------------|
| “enthusiastic and energetic”    | 0.253         | 0.254         | 0.242            |
| “friendly and cooperative”      | 0.253         | 0.251         | 0.246            |
| “responsible and organized”     | 0.251         | 0.248         | 0.252            |
| “creative and perceptive”       | 0.243         | 0.247         | 0.259            |
| No ECE work experience          | 0.164         | 0.157         | 0.168            |
| 6 months of ECE work experience | 0.326         | 0.337         | 0.335            |
| 2 years of ECE work experience  | 0.510         | 0.506         | 0.497            |
| High school degree              | 0.342         | 0.326         | 0.331            |
| AA degree in business           | 0.112         | 0.113         | 0.116            |
| AA degree in nursing            | 0.103         | 0.111         | 0.105            |
| AA degree in ECE                | 0.109         | 0.107         | 0.110            |
| BA degree in business           | 0.106         | 0.114         | 0.125            |
| BA degree in nursing            | 0.116         | 0.116         | 0.112            |
| BA degree in ECE                | 0.112         | 0.113         | 0.102            |
| GPA: 2.8                        | 0.348         | 0.330         | 0.336            |
| GPA: 3.3                        | 0.322         | 0.334         | 0.326            |
| GPA: 3.8                        | 0.330         | 0.336         | 0.337            |
| CPR, First Aid, Fingerprint     | 0.251         | 0.241         | 0.258            |
| CDA credential                  | 0.246         | 0.247         | 0.257            |
| Bilingual/diversity course      | 0.251         | 0.258         | 0.242            |
| EoM award/bonus pay             | 0.252         | 0.254         | 0.243            |
| Car statement on resume         | 0.509         | 0.494         | 0.497            |

**Appendix Table 2: Job Advertisement Characteristics—  
by Race and Ethnicity**

|                        | White<br>Name | Black<br>Name | Hispanic<br>Name |
|------------------------|---------------|---------------|------------------|
| Assistant teacher      | 0.200         | 0.196         | 0.188            |
| Lead teacher           | 0.771         | 0.778         | 0.778            |
| Multiple positions     | 0.028         | 0.027         | 0.034            |
| Infant/toddler teacher | 0.421         | 0.401         | 0.415            |
| Preschool teacher      | 0.481         | 0.499         | 0.480            |
| Multiple positions     | 0.098         | 0.101         | 0.106            |
| Full-time              | 0.721         | 0.743         | 0.726            |
| Part-time              | 0.193         | 0.187         | 0.188            |
| Flexible hours         | 0.087         | 0.069         | 0.086            |
| Min ECE exp: ≤ 1 year  | 0.668         | 0.652         | 0.674            |
| Min ECE exp: 2 years   | 0.250         | 0.281         | 0.248            |
| Min ECE exp: 3+ years  | 0.083         | 0.066         | 0.078            |
| Min education: HS      | 0.449         | 0.466         | 0.454            |
| Min education: AA      | 0.368         | 0.334         | 0.355            |
| Min education: BA+     | 0.182         | 0.200         | 0.191            |

**Appendix Table 3: Comparison of Job Advertisement Characteristics for the Sub-Set of Resumes With and Without Provider Survey Data Available**

|                        | No Survey Data Available | Survey Data Available |
|------------------------|--------------------------|-----------------------|
| Interview request      | 0.228                    | 0.276                 |
| Positive response      | 0.067                    | 0.070                 |
| Assistant teacher      | 0.210                    | 0.211                 |
| Lead teacher           | 0.753                    | 0.742                 |
| Multiple positions     | 0.038                    | 0.047                 |
| Infant/toddler teacher | 0.390                    | 0.432                 |
| Preschool teacher      | 0.507                    | 0.451                 |
| Multiple positions     | 0.103                    | 0.117                 |
| Full-time              | 0.664                    | 0.682                 |
| Part-time              | 0.240                    | 0.212                 |
| Flexible hours         | 0.096                    | 0.105                 |
| Min ECE exp: <= 1 year | 0.674                    | 0.701                 |
| Min ECE exp: 2 years   | 0.261                    | 0.222                 |
| Min ECE exp: 3+ years  | 0.064                    | 0.078                 |
| Min education: HS      | 0.522                    | 0.467                 |
| Min education: AA      | 0.314                    | 0.335                 |
| Min education: BA+     | 0.164                    | 0.197                 |

**Appendix Table 4: Comparison of Regression Results for the Sub-Set of Resumes  
With and Without Child Care Provider Survey Data Available**

|                                 | (1)<br>Full<br>Sample  | (2)<br>No Survey<br>Data Available | (3)<br>Survey Data<br>Available |
|---------------------------------|------------------------|------------------------------------|---------------------------------|
| Black name                      | -0.0735***<br>(0.0084) | -0.0727***<br>(0.0092)             | -0.0756***<br>(0.0204)          |
| Hispanic Name                   | -0.0273***<br>(0.0086) | -0.0300***<br>(0.0095)             | -0.0154<br>(0.0200)             |
| 6 months of ECE work experience | 0.1395***<br>(0.0100)  | 0.1377***<br>(0.0110)              | 0.1469***<br>(0.0239)           |
| 2 years of ECE work experience  | 0.1162***<br>(0.0089)  | 0.1173***<br>(0.0098)              | 0.1108***<br>(0.0216)           |
| AA degree                       | 0.0520***<br>(0.0089)  | 0.0475***<br>(0.0097)              | 0.0714***<br>(0.0219)           |
| BA degree                       | 0.0532***<br>(0.0089)  | 0.0522***<br>(0.0099)              | 0.0588***<br>(0.0202)           |
| GPA: 3.3                        | 0.0261***<br>(0.0079)  | 0.0260***<br>(0.0087)              | 0.0263<br>(0.0191)              |
| GPA: 3.8                        | 0.0049<br>(0.0078)     | 0.0047<br>(0.0085)                 | 0.0070<br>(0.0188)              |
| Observations                    | 10,986                 | 8,939                              | 2,047                           |

*Notes:* Standard errors (in parentheses) are clustered at job advertisement level. The omitted category includes resumes assigned a white-sounding name. All models include resume order fixed effects and job advertisement fixed effects. \*, \*\*, and \*\*\* indicate that a given coefficient is statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

**Appendix Table 5: Summary Statistics on the State-Level  
Child Care Regulations**

|                                      | Mean  | SD    |
|--------------------------------------|-------|-------|
| <i>Staff-to-Child Ratios</i>         |       |       |
| Infant                               | 0.249 | 0.038 |
| 1-year-old                           | 0.183 | 0.051 |
| 2-year-old                           | 0.147 | 0.045 |
| 3-year-old                           | 0.091 | 0.018 |
| 4-year-old                           | 0.087 | 0.019 |
| 5-year-old                           | 0.076 | 0.023 |
| <i>Maximum Group Sizes</i>           |       |       |
| Infant                               | 9.76  | 2.07  |
| 1-year-old                           | 12.76 | 3.34  |
| 2-year-old                           | 15.00 | 4.31  |
| 3-year-old                           | 22.45 | 4.64  |
| 4-year-old                           | 24.27 | 6.79  |
| 5-year-old                           | 25.44 | 7.55  |
| <i>Assistant Teacher Regulations</i> |       |       |
| Work experience (yrs.)               | 0.336 | 0.596 |
| CDA/post-secondary credits (%)       | 0.311 | 0.462 |
| <i>Lead Teacher Regulations</i>      |       |       |
| Work experience (yrs.)               | 1.01  | 1.14  |
| Post-secondary credits (no.)         | 15.56 | 23.18 |
| <i>Program Director Regulations</i>  |       |       |
| Work experience (yrs.)               | 2.64  | 1.28  |
| Post-secondary credits (no.)         | 22.09 | 22.66 |