

DISCUSSION PAPER SERIES

IZA DP No. 17351

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Child Care Workforce**

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## ABSTRACT

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# The Declining Relative Quality of the Child Care Workforce

Although it is widely acknowledged that high-skilled teachers are integral to service quality and young children's well-being in child care settings, little is known about the qualifications and skills of the child care workforce. This paper combines data from multiple sources to provide a comprehensive assessment of the quality of individuals employed in the child care sector. I find that today's workforce is relatively low-skilled: child care workers have less schooling than those in other occupations, they score substantially lower on tests of cognitive ability, and they are among the lowest-paid individuals in the economy. I also show that the relative quality of the child care workforce is declining, in part because higher-skilled individuals increasingly find the child care sector less attractive than other occupations. Furthermore, I provide evidence that at least three other factors may be associated with the decline in worker quality. First, the recent proliferation of community college programs offering child care-related certificates and degrees may divert students away from attending four-year schools. Second, those majoring in child care-related fields are negatively selected for their cognitive skills, thereby decreasing the quality of the child care labor pool. Third, I show that the increased availability of outside employment options for high-skilled women had a detrimental effect on the quality of the child care workforce.

**JEL Classification:** I21, J13

**Keywords:** child care, child care quality, early childhood education, teacher quality

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# 1 Introduction

There is a growing consensus that teachers matter to the production of quality and child outcomes in child care and early education settings. High-skilled teachers are likely to be important for young children’s development because the substitution of parental for non-parental caregivers occurs early in a child’s life, when brain development is particularly rapid and gaps in cognitive and social-emotional skills become apparent (Gilmore et al., 2018; Heckman and Carneiro, 2003; Boyd-Swan and Herbst, 2018). Indeed, the evidence suggests that higher-quality teachers have more meaningful interactions with children (Araujo et al., 2016; Auger et al., 2014), they increase the overall quality of the classroom learning environment (Blau, 2001), and they have beneficial effects on children’s short-run development as well as long-run schooling and labor market outcomes (Chetty et al., 2011; Felfe and Lalive, 2018).

Despite the importance of teachers to the provision of high-quality care, little is known about the qualifications and skills of individuals employed in the child care sector and whether the quality of the workforce has improved over time. The current paper marshals data from a variety of sources to provide such evidence. The analysis proceeds in three steps. Drawing on multiple measures of skill—including schooling attainment, cognitive ability test scores, and wages—I first evaluate the quality of the contemporary child care workforce. Data on schooling and wages come from the most recent waves of the American Community Survey (ACS), while the test scores are drawn from the Program for the International Assessment of Adult Competencies (PIAAC), a unique dataset providing information on the literacy and numeracy skills of adults in 39 countries.<sup>1</sup> Across all three skill measures, I compare the child care workforce with other categories of education-based workers (i.e., K-12 teachers) as well as those employed in a variety of service sector occupations (e.g., personal and health services).

I then examine the trend in child care worker skills. These analyses take a birth cohort approach, as opposed to a time period approach, by documenting the evolution in skills for individuals born between 1930 and 1985. I begin by studying changes over time in the educational composition of the child care workforce, followed by an analysis of the relative trend in child care schooling and wages. Comparisons are made to the same sets of education- and service-based workers referenced above. In addition, I formalize these descriptive analyses by estimating birth cohort-specific models of the effect of schooling attainment on the decision to work in the child care sector (i.e,

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<sup>1</sup>The current study examines only the U.S.-based test score data, which were collected via surveys fielded in 2012, 2014, and 2017.

occupational choices) and wages (i.e., skill prices). Such analyses provide further insight into whether the child care sector has become more or less attractive to higher-skilled workers and whether it rewards those for attaining better skills.

Results from these analyses paint a consistent picture about the child care workforce: today's workers are relatively low-skilled, and the quality of the workforce has declined over time. Indeed, I find that child care workers have comparatively low levels of schooling, their cognitive ability test scores are lower than those of other workers, and they are among the lowest-paid individuals in the economy. For example, employed women as a whole have nearly one more year of schooling than child care workers, while school-based early educators (e.g., kindergarten teachers) and health services workers have two more years of schooling. In addition, data from the PIAAC reveals that child care workers' median literacy score falls at the 36th percentile of the test score distribution for all other female workers, while the median numeracy score falls at the 35th percentile. Child care workers score even lower relative to elementary and secondary school teachers: median literacy and numeracy scores are at the 18th and 17th percentiles, respectively, within the distribution of elementary teacher scores, and are at the 9th and 7th percentiles, respectively, within the secondary teacher distributions. Given these results, it is not surprising that child care workers receive low wages. With a median hourly wage of \$14.60, child care is the 10th lowest-paid occupation out of approximately 750 occupations in the economy.

I also find that the child care workforce has lost ground relative to other employed women on most measures of skill. While older cohorts of child care workers had similar levels of schooling to other groups of employed women, more recent cohorts have significantly less schooling. Indeed, I find that the schooling attainment of child care workers fell by about 0.8 years relative to all other women between the 1930 and 1985 birth cohorts. A similar story holds for compensation, with wages falling by \$2.63. Child care workers experienced even steeper declines in skill compared to school-based early educators, personal services workers, and health services workers. Results from the occupational choice model offer one explanation for the decline in skills: while older cohorts of highly educated women were more likely to seek employment in the child care sector, recent cohorts of such women have become less likely to work in child care. In other words, highly educated women increasingly find child care less attractive than other employment destinations. I also find striking evidence that the returns to schooling in the child care sector are significantly lower among younger cohorts, having decreased nearly 50% between the 1930 and

1985 birth cohorts. In contrast, the returns to schooling increased about 30% for all other workers.

The final set of analyses provides a framework for understanding why child care worker quality has declined—or at least identifies some key factors placing downward pressure on quality. The discussion focuses on four themes, beginning with the potential influence of labor unions and child care regulations on worker quality. Second, I draw on nearly 20 years of data from the Integrated Postsecondary Education Data System (IPEDS) to document how changes in the availability of child care-related training and education opportunities at the sub-baccalaureate (i.e., community college) level may be diverting students away from pursuing four-year degrees. Third, I return to the PIAAC—which collects information about post-secondary degree attainment—to assess whether individuals majoring in a child care-related academic field are negatively selected for cognitive ability, which would decrease the quality of the pool of child care workers.<sup>2</sup> Finally, I examine whether the expansion of outside labor market opportunities for high-skilled women has encouraged such individuals to forego employment in the child care sector, leading to a de-skilling of those who remain employed there.

While evidence on the role of unions and regulations is not compelling, stronger evidence supports the role of other factors in the decline of child care worker quality. First, I show that over the last two decades, there has been an explosion in the availability of community college programs offering (and conferring) certificates and degrees in a range of child care-related fields. This growth has significantly outpaced the increase in the same bachelor's degree offerings at four-year colleges and universities. Such trends confirm the possibility that community colleges are drawing students away from more academically rigorous four-year institutions. In addition, I find that individuals who major in a child care-related field are negatively selected for their literacy and numeracy skills. For example, the PIAAC data show that the typical child care major scores at the 35th percentile of (elementary, secondary, and special) education majors' literacy distribution and at the 15th percentile of education majors' numeracy distribution. I also find additional sorting along occupational lines: those who major in a child care-related field and later work in the child care sector are a lower-skilled subset of all child care majors. Finally, empirical estimates from models of occupational choices and schooling attainment suggest that the growth in labor market opportunities for high-skilled women had negative effects on the child care workforce. As high-skilled occupations became more open to women—and because their wages grew faster than in the child care sector—highly educated women have

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<sup>2</sup>Throughout the paper, I use phrases like “child care-related academic fields” to refer to majors in Early Childhood Education and Teaching, Child Development, and Child Care Provider/Assistant.

increasingly found child care employment less attractive. This, in turn, has led to a decline in schooling attainment within the child care workforce.

The decline in child care workforce quality aligns with a substantial body of evidence documenting reductions in K-12 teacher quality over recent decades (Bacolod, 2007; Corcoran et al., 2004a,b; Lakdawalla, 2006; Stoddard, 2003). Indeed, this work shows that teacher performance on standardized tests has declined, with women near the top of the test score distribution less likely to enter the teaching profession. In addition, new teachers are being drawn from less selective colleges and universities, and teachers overall have experienced relative reductions in schooling attainment and wages. To explain these declines, at least one paper finds that labor unions played an important role (Hoxby and Leigh, 2004), while several other studies suggest that the expansion of labor market opportunities played a crucial role in drawing high-skilled women away from the teaching profession (Bacolod, 2007; Lakdawalla, 2006). Therefore, it appears that the dynamics at play within the larger female labor market are affecting the quality of the child care *and* K-12 teacher workforce.

Findings in this paper may also shed light on why many young children are exposed to low-quality child care services. Indeed, a large-scale study of two- and three-year-olds finds that 41% of child care arrangements are rated as “poor” or “mediocre” quality, while only 17% are of “excellent” quality (NICHD Early Child Care Research Network, 2000). In addition, data collected by the National Center for Education Statistics shows that 67% of the center-based arrangements attended by preschool-age children are no better than medium-quality (U.S. Department of Education, 2014). Child care quality varies widely across providers and sectors, with relatives providing the lowest quality of care, nannies (and other providers in the child’s home) providing the highest quality, and center-based programs falling in the middle (Flood et al., 2022). Given the well-established benefits generated by highly qualified teachers, a renewed focus on staffing quality seems critical to the production of high-quality of child care services (Hanushek, 2011; Hanushek and Rivkin, 2010; Jacob and Lefgren, 2008; Rockoff, 2004).

The remainder of the paper proceeds as follows. Section 2 provides a simple model of occupational choices to highlight a few of the ways in which the composition and skills of the child care workforce may have changed. Section 3 introduces the key data sources used throughout the paper. I present the results Sections 4, 5, and 6, while Section 7 provides concluding remarks.

## 2 Theoretical Framework

This paper presents evidence that child care worker quality is lower than that in many other occupations and that it has declined over time. In an ideal setting, such skills would be measured according to a multidimensional index that might include IQ or achievement test scores, a range of personality traits like patience and communication skills, and a commitment to working with young children. In lieu of many of these characteristics, this paper relies on two indirect measures of skill (schooling attainment and wages) and one direct measure (cognitive ability test scores). While schooling is strongly correlated with measures of general intelligence among teachers—and therefore is assumed to be a determinant of worker quality—it is nevertheless appropriate to think of schooling as an input to the production of teacher and overall service quality, in the sense that the combination of many inputs, including schooling as well as work experience and personality traits, determines quality (Hanushek et al., 2015; Boyd-Swan and Herbst, 2018). Wages are assumed to be a credible measure of skill under the assumption that they reflect skill prices, or the valuation of skill by the labor market. Finally, the rationale for using achievement test scores as a direct measure of teacher skill stems from the empirical evidence that such scores are correlated with student outcomes (Clotfelter et al., 2010; Goldhaber, 2007; Hanushek et al., 2019).

Although a number of supply-side factors may be related to changes in child care employment decisions and workforce quality (e.g., changing complementarities with home production, technological advances in home production, and fertility patterns), this paper focuses primarily on a key demand-side factor—changes in labor market opportunities available to high-skilled women—as an explanation for why quality has declined. In this model, women choose between three mutually exclusive alternatives: employed as a child care worker, employed outside the child care sector, and not employed (Blau, 1992, 1993). If  $i$  denotes a given woman and  $j$  denotes one of the employment destinations (i.e.,  $j=1$  for child care workers and  $j=2$  for non-child care workers), the wage offer,  $W$ , for woman  $i$  in sector  $j$  is specified as:

$$W_{ij} = \pi_{ij} a_{ij}, \quad (1)$$

where  $\pi$  is the skill price and  $a$  is the individual’s skill endowment. One can think of an individual’s wage as determined by the amount of skill related to performing work in the  $j$ th occupation (e.g., cognitive ability and schooling investments) and the price of skill in that sector. For clarity, I rewrite the above as occupation-specific



wage offers:

$$W_{i1} = \pi_{i1} a_{i1} \quad (2)$$

$$W_{i2} = \pi_{i2} a_{i2}, \quad (3)$$

where  $a \sim N(0, \sigma^2)$ , that is, representative of an individual's draw of ability or skill from a distribution. An individual's skill endowment may be correlated across sectors, or it may be uncorrelated across sectors if skills are not easily transferable.

Assuming that workers are income maximizing, an individual will chose the sector yielding the highest utility according to the following indirect utility functions:

$$V_1 = V_1(A, N, \pi_1) \quad (4)$$

$$V_2 = V_2(A, N, \pi_1, \pi_2), \quad (5)$$

where  $A$  denotes demographic and personality characteristics that are correlated with sectoral employment decisions, and  $N$  is exogenous non-wage income. The demographic characteristics include race and ethnicity, level of schooling attainment, and the presence and number of children. The utility functions might also accommodate sector- and geographic-specific characteristics that determine the ease of entering a given sector, such labor regulations, child care subsidies, and gender norms and attitudes related to employment. The probability that a given individual chooses employment in the child care sector is therefore specified as follows:

$$P = Pr(W_1 - W_2 > 0) = Pr(a_1 - a_2 > -(\pi_1 - \pi_2)). \quad (6)$$

In this formulation, the odds of choosing to work in the child care sector is a decreasing function of wages in the non-child care sector,  $W_2$ , and an increasing function of wages within the child care sector,  $W_1$ .

It is less clear, however, what would happen to child care worker skills in the presence of rising non-child care wages,  $W_2$ . As noted by [Bacolod \(2007\)](#), worker quality might increase or decrease depending on the way in which changes in  $W_2$  influence the distribution of skill within each sector and the way in which individuals select into

occupations. On the one hand, while an increase in  $W_2$  is not predicted to change the occupational choices of those who would have chosen to work outside of the child care sector, such an increase might change the choices of certain types of child care workers. In particular, non-child care work is likely to become more attractive to lower-skilled (and thus lower-paid) child care workers. As lower-skilled individuals exit the child care sector, the average quality of the workforce would increase. This prediction is particularly salient if worker skills are weakly correlated across sectors. Conversely, child care workforce quality would decrease if worker skills are highly transferable across sectors and the distribution of skills and wages is more unequal in the non-child care sectors. A less compressed wage distribution outside of child care implies that highly-skilled child care workers could leave the profession in search of higher wages. As better workers exit the child care sector, relatively less-skilled workers are likely to take their place, driving down the average quality of the workforce.

### 3 Data

#### 3.1 Decennial Census and American Community Survey

To examine the level and trend in child care workers' schooling attainment and wages, I rely on the 1980 to 2000 Decennial Census as well as the 2005 to 2022 American Community Survey (ACS) (Ruggles et al., 2024). Most analyses restrict the sample to women ages 30 to 59 who worked more than 26 weeks in the previous year. I also retain only civilian women and those not enrolled in school. The results presented below are not sensitive to changes in the age range of respondents nor to alternative definitions of employment status. The analysis of trends takes a birth cohort approach rather than a time period approach, consistent with some studies in the teacher quality literature (Bacolod, 2007; Lakdawalla, 2006). Therefore, I report years of schooling and wages for groups of five-year birth cohorts between 1930 and 1989.<sup>3</sup>

A child care worker is defined broadly to include all women employed in one of three settings: private households as well as home-based and center-based programs (Brown and Herbst, 2022; Herbst, 2023). Private household child care workers are defined as individuals employed in the private household services industry and whose primary occupation is a child care worker. Home-based workers are self-employed individuals working in the child day care services industry and whose occupation is a child care worker or education administrator. Finally, center-based

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<sup>3</sup>For example, the first five-year cohort includes women born between 1930 and 1934, while the last cohort includes women born between 1985 and 1989. For brevity, when referencing specific cohorts in the text and tables, I refer only to the first birth-year of the five-year cohort.

workers include non-self-employed individuals who work in the child day care services industry and whose occupation is a child care worker, preschool teacher or assistant teacher, education administrator, or special education teacher.

The first measure of human capital analyzed—schooling attainment—is defined as the number of completed years of education. While the 1980 Census and most of the ACS surveys allow for individual years of education (or specific degrees) to be identified, the 1990 and 2000 Censuses combine multiple years of education into one category for those with less than a high school degree. In these cases, I assign all individuals in a given category a single value for years of schooling.<sup>4</sup> For individuals with 12 or more years of schooling, I initiate the following coding procedures: those with 12 years of schooling but no degree or a high school diploma (including a GED) are assigned 12 years of schooling. Individuals with less than one year of college or those with one or more years of college but no degree are assigned 13 years of schooling, while those with two years of college, an associate’s degree, or three years of college are assigned 14 years of schooling. Finally, individuals with four years of college or a bachelor’s degree are assigned 16 years of schooling; individuals with six or seven years of college, a master’s degree, or a professional degree are assigned 18 years of schooling; and those with eight or more or years of college or a doctoral degree are assigned 20 years of schooling.

A second measure of skill—hourly wages—is also examined. While wages are argued to be an indirect measure of human capital, they nevertheless reflect how much the labor market values skill. Indeed, recent evidence suggests that direct measures of human capital such as educational attainment and cognitive ability are strongly associated with wages (Chetty et al., 2011; Hanushek et al., 2015; Lindqvist and Vestman, 2011; Murnane et al., 2000). The measure of hourly wages is constructed by dividing annual earnings by annual hours of work, where hours of work is determined by multiplying the number of weeks of employment by the (usual) number of hours of work per week. While the survey questions on employment and earnings focus on the previous year, it is important to note that the Census’ reference period is the previous calendar year, while for the ACS the reference period is the previous 12 months.

Appendix Table A2 presents summary statistics by birth cohort for child care workers and those employed in all other occupations. The share of married women is similar across both worker-types, with the fraction married initially rising in the early cohorts before starting to decline. It is unclear whether these trends reflect age

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<sup>4</sup>For example, the 1990 Census combines grades one, two, three, and four into a single category, while the 2000 Census combines grades five and six into a single category. In the former case, I impute for all relevant individuals three years of schooling. In the latter case, I impute six years of schooling.

effects (i.e., the more recent cohorts in the data are younger on average) or generational differences in marriage preferences. While the share non-white was initially substantially higher among child care workers, racial/ethnic diversity within the non-child care sectors increased comparatively more than in child care, such that by the end of the observation period both occupational categories had nearly equal shares of non-white workers. The child care sector has traditionally been a key employment destination for immigrants, but the data presented here indicates that immigrant shares within the child care workforce have been falling in recent cohorts (Ali et al., 2024a). Finally, the table shows that, after initially falling over several cohorts, the number of children in all working families has been rising since the 1950 birth cohort. Nevertheless, today’s child care workers are significantly more likely to have children in the family.

### 3.2 Program for the International Assessment of Adult Competencies

I supplement the measures of schooling and wages with information on cognitive skills drawn from the Program for the International Assessment of Adult Competencies (PIAAC) (OECD, 2013a,b). Administered by the Organization for Economic Cooperation and Development (OECD), the PIAAC provides internationally comparable data about the skills, schooling experiences, and employment profiles of large samples of adults in 39 countries. In each country, individuals ages 16 to 65 participated in two study components: an assessment of cognitive skills in three domains (literacy, numeracy, and problem solving) as well as a detailed questionnaire covering respondents’ educational experiences (e.g., highest level of education attained, field of study, and ongoing training), labor market attachment (e.g., employment status, earnings, and occupation/industry classification), and demographic characteristics. The current study pools data from three U.S.-based surveys, each one fielded in a different year: 2012 (N=5,010), 2014 (N=3,660), and 2017 (N=3,660) (Krenzke et al., 2019).<sup>5</sup>

The OECD’s goal was to assess literacy, numeracy and problem solving skills in “technology-rich environments” because such skills are critical for full integration in the labor market, education and training settings, and social and civic life; they are highly transferable across and applicable to multiple work and social contexts; and they are learnable, and thus malleable to the influence of policy interventions (OECD, 2013a,b). The current study examines only literacy and numeracy skills, which are measured on a 500-point scale. The literacy domain measures the

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<sup>5</sup>The second round of U.S. data collection in 2014, known as the National Supplement to the Main Study, was not administered to a nationally representative sample. It was instead designed to enhance and expand the data collected in 2012.

ability to understand, evaluate, and engage with written texts, largely those presented digitally.<sup>6</sup> The assessment does not involve the comprehension or production of spoken language or the production of text. The numeracy domain measures the ability to access, interpret, and communicate mathematical information in order to engage in and manage the numerical demands of a range of situations in adult life.<sup>7</sup>

For example, an item on the literacy test presents respondents with a short newspaper article entitled “Generic Medicines: Not for the Swiss.” Included in the article is a table displaying the market share of generic medicines in 14 European countries and the U.S. The respondent is asked to determine the number of countries in which the generic drug market accounts for 10% or more of total drug sales. However, the phrase “drug sales” does not appear in the text. Therefore, the respondent is required to understand that “market share” is a synonym of “drug sales” in order to answer the question correctly. An item from the numeracy test presents respondents with a photo of a box containing tea light candles. The packaging identifies the product as such, the number of candles included in the box (105 candles), and its weight. While the packaging partially covers the top layer of candles, it can be discerned that the candles are packed in five rows of seven candles each. The instructions inform the respondent that there are 105 candles in a box and asks her to determine the number of layers of tea candles that are packed in the box.

Child care workers in the PIAAC are identified according to their International Standard Classification of Occupations code (ISCO-08: 5311). Among those currently employed, the survey poses a series of questions about respondents’ job title and key responsibilities as well as firms’ industry and products or services offered. This information is then used to assign an ISCO-08 code to respondents. According to the ISCO-08, child care workers provide care and supervision for children in home-based settings as well as in before-school, after-school, and day care centers. Their responsibilities include assisting children with washing, dressing and meals; assisting in the preparation of materials and equipment for children’s education and recreational activities; managing children’s behavior and guiding their social development; and maintaining observational records of children.

The analyses reported below compare the test scores of child care workers to individuals employed in several other occupations. I first examine multiple categories of education-based workers, including school-based early educators (ISCO-08: 2342), elementary (2341) and secondary (2330) school teachers, and special education (2352)

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<sup>6</sup>Indeed, 74% of respondents across all countries received a computer-based assessment, while 21% received a paper-based assessment.

<sup>7</sup>All analyses use the first plausible value of the literacy and numeracy test scores.

teachers. I then examine a broader set of service-based occupations identified by the two-digit ISCO code, including personal services (51), sales (52), protective services (54), health associates (32), health care professionals (22), and customer service clerks (42). The comparisons of child care workers with personal services, sales, and protective services categories might be especially salient, given that all of these workers are classified under the same major occupational code (i.e., service and sales workers).

The PIAAC also inquires about respondents' field of study in the highest post-secondary certificate or degree attained. Specifically, the survey asks individuals to describe their "area of study, emphasis, or major" pertaining to the highest level of education. I use this information along with the literacy and numeracy test scores to compare the cognitive skills of those majoring in child care-related fields with other majors, including those with education degrees. The U.S.-based PIAAC uses the Classification of Instructional Programs (CIP) to categorize respondents' field of study, and I define the relevant child care fields as Early Childhood Education and Teaching (CIP: 13.1210), Education/Teaching of Individuals in Early Childhood Special Education Programs (13.1015), Child Development (19.0706), Child Care and Support Services Management (19.0708), and Child Care Provider/Assistant (19.0709). The education fields include Elementary Education (13.1202), Secondary Education (13.1205), and Special Education (13.1001).

Given the relatively small sample sizes in the PIAAC, most analyses of literacy and numeracy skills are based on a sample containing fewer restrictions. Specifically, I analyze currently employed men and women ages 20 and over. Pooling across all three PIAAC surveys, there are 99 child care workers who meet these requirements, 92% of whom are women. Furthermore, there are 96 child care majors in the data, 97% of whom are women.<sup>8</sup> When reporting summary statistics on the literacy and numeracy test scores, the median is presented, given that it is not susceptible to outliers, which is an important concern when analyzing smaller samples. All analyses are weighted by the PIAAC's final full sample weight.

### 3.3 Integrated Postsecondary Education Data System

The final major data source used in this paper is the Integrated Postsecondary Education Data System (IPEDS). The IPEDS is a set of interrelated surveys conducted annually by the Department of Education's National Center for Education Statistics (NCES). The surveys gather information from every college and university participating

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<sup>8</sup>It should be noted that [Hanushek et al. \(2019\)](#)'s study of teacher quality using the PIAAC relies on a similar number of observations of U.S. school teachers (132).

in federal student financial aid programs under Title IV of the Higher Education Act. The information included in IPEDS encompasses a wide range of topics relevant to post-secondary education. This includes basic institutional data, such as the institution's name, location, and sector (public, private, or for-profit) as well as detailed information on student demographic characteristics, degree program enrollments and completions, and faculty/staff employment. Financial data, including revenues, expenditures, and tuition costs, are also collected, along with data on retention and graduation rates. Finally, the data provide insights into institutional resources, such as library collections and facilities.

This paper makes use of the annual datasets on institutional characteristics and degrees/certificates conferred by field of study between 2004 and 2022 to construct two variables: the share of colleges and universities that offer a certificate or degree in a child care-related field and the number of certificates and degrees awarded in the field. Once again, the CIP is used to categorize the field of study in IPEDS, and I define child care-related fields to include Early Childhood Education and Teaching (13.1210), Child Development (19.0706), and Child Care Provider/Assistant (19.0709). These fields were selected because they are identified in a consistent manner in the IPEDS database, they comprise the bulk of child care-related degrees, and they are consistent with how the equivalent field of study is defined in the PIAAC.<sup>9</sup>

For both variables discussed above, I present two sets of results. I first examine the time series in *one- and two-year certificates* awarded in each field of study by public two-year (i.e., community) colleges.<sup>10</sup> I then present the analogous information on *associate's degrees* awarded by public two-year colleges. For example, I present the time series in the share of public two-year colleges offering certificate programs in Early Childhood Education as well as the number of certificates awarded by these institutions. The same information is presented for associate's degrees in Early Childhood Education.

Since the goal of using the IPEDS data is to examine the differential availability of two-year versus four-year academic programs in child care-related fields, I compare the data described above to the *bachelor's degrees* awarded in the same fields by public four-year colleges and universities. I focus on public (rather than private) two- and four-year schools because they award an overwhelming majority of all child care-related certificates and degrees.

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<sup>9</sup>The only difference is that I exclude Education/Teaching of Individuals in Early Childhood Special Education Programs (13.1015) and Child Care and Support Services Management (19.0708) from the IPEDS analysis, given that these fields produce a very small number of degrees each year.

<sup>10</sup>For brevity, I refer in the text to certificates of one or two years, but the IPEDS data capture three kinds of relevant certificate programs: those lasting less than 12 weeks, those lasting between 12 weeks and one year, and those lasting less than two years.

In addition, I examine only certificates awarded by two-year colleges because comparatively few such awards are made by four-year institutions. Finally, I disregard the small number four-year schools offering associate’s degrees in child care-related fields, and count only the two-year schools with such offerings.<sup>11</sup>

## 4 Schooling, Wages, and Test Scores of Child Care Workers

This section presents a descriptive portrait of the skills of the contemporary child care workforce, where skills are measured by schooling attainment, wages, and cognitive ability test scores. These analyses rely primarily on pooled ACS data from 2021 and 2022 as well as the 2012, 2014, and 2017 waves of the PIAAC. Following this discussion, I pivot in Section 5 to an analysis of trends in relative child care worker quality.

Table 1 provides a comparative analysis of the schooling and wages of the child care workforce. Panel A presents this information for the workforce overall as well as by sector. Child care workers have on average 13.6 years of schooling [column (1)]. Approximately 7% of the workforce has not received a high school diploma [column (2)], while 33% of the workforce has at least a bachelor’s degree [column (3)]. Workers within the center-based sector have more years of schooling (14) than those in the private household (12.7) and home-based (12.7) sectors. Not surprisingly, center-based workers are also significantly less likely to be high school dropouts and are more likely to have a bachelor’s degree.

Panel B provides the analogous information for women in other relevant occupations. Generally speaking, working women regardless of the occupation are more skilled than those in the child care workforce. For example, all other employed women have on average 14.4 years of schooling, exceeding that of child care workers by 0.82 years. While other workers are only slightly less likely to be high school dropouts, they are significantly more likely to have attained a bachelor’s degree. School-based early educators—who work in elementary and secondary schools as a pre-kindergarten, kindergarten, or assistant teacher—have on average two more years of schooling than child care workers, and are 40 percentage points more likely to have a bachelor’s degree. In addition, those in the personal care/service sector—which includes a diverse set of workers like animal caretakers, barbers, baggage porters, and fitness workers—have similar years of schooling to child care workers, while health care workers—who are employed as nutritionists, dental hygienists, physical therapists, physicians, among other things—have about

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<sup>11</sup>While some four-year colleges and universities offer master’s and doctoral degrees in child care-related fields, the individuals receiving these degrees are less relevant to this paper’s study population—the frontline child care workforce—and therefore I have elected to disregard such offerings.



two more years of schooling than child care workers and are substantially more likely to have a four-year college degree.

Turning to wages, column (4) of Table 1 reveals that the median hourly wage of child care workers overall is \$13.87. However, there is substantial heterogeneity by sector, with those employed in private household (\$14.71) and center-based (\$14.37) settings earning more than their counterparts in the home-based (\$11.63) sector. Given the well-established relationship between education and wages, it is not surprising that women in other occupations earn more than child care workers (Hanushek et al., 2015; Heckman et al., 2018; Boyd-Swan and Herbst, 2018).<sup>12</sup> Indeed, the wages of all other working women (\$24.13) are 74% higher, while those of school-based early educators (\$22.12), personal care workers (\$16.66), and health care workers (\$33.37) are 60%, 20%, and 141% higher, respectively.

Figure 1 provides another assessment of child care workers' wages. I examine data from the May 2023 Occupational Employment and Wage Statistics (OEWS) series, a semi-annual survey of employers designed to produce estimates of employment and wages for over 800 occupations. Using the six-digit Standard Occupational Classification (SOC) code, I rank-order median hourly wages for workers in 90 "minor"-level occupations as well as the "detailed" child care occupation. With an hourly wage of \$14.60 (denoted by the red bar), child care is among the lowest-earning occupations, with only entertainment attendants and food/beverage servers earning less.<sup>13</sup> Interestingly, child care wages are lower than most groups of workers within the category of "personal care and service" occupations (denoted by the blue bars), to which child care workers belong. For example, animal care workers, baggage porters, tour guides, and funeral service workers earn more than their child care counterparts; only entertainment attendants earn less.

Table 2 reports on the final measure of skill, that of workers' cognitive ability, as measured in the PIAAC. As shown in Panel A, the median literacy score for child care workers is 263 points [column (1a)], with 14% of such workers scoring in the bottom quintile of the full sample distribution [column (1b)] and 19% scoring in the top quintile [column (1c)]. With a median score of 246 points [column (2a)], child care workers' numeracy skills are weaker. Indeed, 31% of these workers score in the bottom quintile of the distribution [column (2b)], while only 17% score in the top quintile [column (2c)]. Also revealed in Panel A is that child care workers score lower than all

<sup>12</sup>A formal analysis of the relationship between education and wages is presented in the next section.

<sup>13</sup>The SOC includes major-, minor-, broad-, and detailed-level occupational classifications. I elected to present hourly wages for all 90 minor-level occupations because they could be clearly depicted in a single graph. If I instead rank-order child care wages within the group of 757 detailed-level occupations, child care ranks as the 10th lowest-paid occupation.

other workers in the PIAAC, whose median literacy (280 points) and numeracy (268 points) scores are about 20 points higher than those for child care workers. One way to put these differences into perspective is to calculate the percentile position of median child care worker scores within the distribution of all other workers. As shown in columns (1d) and (2d), the median child care worker scores at the 36th percentile of the literacy distribution and at the 35th percentile of the numeracy distribution for all other workers.

Panel B provides evidence on the performance of child care workers compared to other teachers. Generally speaking, I find that the test scores of the median child care worker would place her among the lowest-performing teachers, particularly as it relates to elementary and secondary school teachers. For example, the median literacy score for child care workers is at the 18th percentile of the test score distribution for elementary school teachers, while the median numeracy score is at 17th percentile of the distribution. Such scores are even lower when compared to secondary school teachers, falling at the 9th and 7th percentiles, respectively. While child care workers perform better compared to school-based early educators and special education teachers, their (median) test scores in most cases remain near the bottom 25% of the distribution for these teachers.

Panel C broadens the set of comparisons to workers in other service-based occupations. With one exception (personal service workers), the median child care worker continues to perform in the bottom half of the skill distribution for other service employees. The performance differences are particularly stark when compared to protective service workers and health care workers, but sizable test score gaps are present even among customer service clerks, whose median literacy and numeracy scores are about 20-points higher than those among their child care counterparts. Indeed, the median child care worker scores at the 33rd percentile of the literacy distribution and at the 39th percentile of the numeracy distribution for customer service clerks. In contrast, child care workers score near or above the median relative to personal service and sales workers.

Figure 2 provides the broadest comparison of child care workers' cognitive ability. I rank-order median literacy and numeracy scores for those employed in all 81 occupations in the PIAAC for which there is sufficient data.<sup>14</sup> The median literacy score for child care workers ranks as the 22nd lowest—in between crop growers and bar tenders—while the median numeracy score ranks as the 17th lowest—in between truck/bus drivers and building frame workers.

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<sup>14</sup>These occupational classifications are based on the three-digit International Standard Classification of Occupations 2008 (ISCO-08) codes.

In sum, a consistent picture emerges from the data presented above: today’s child care workforce is low-skilled. Indeed, relative to all other workers, those in the child care sector have fewer years of schooling, score considerably lower on tests of cognitive ability, and earn less per hour. Such differences are more pronounced when child care workers are compared to other teachers—including pre-kindergarten and kindergarten teachers—and they remain large relative to those in other service sector positions, which are themselves often considered to be low-skilled jobs. That child care workers are among the lowest-paid employees in the economy is a particularly striking feature of these results—indeed, even food preparation workers and animal caretakers earn more than child care employees—but such patterns are nonetheless consistent with the data on schooling attainment and test scores, which are argued to be more direct measures of skill acquisition (Lakdawalla, 2006).

## 5 Trends in Child Care Worker Quality

Having established the skill-level of the contemporary child care workforce, this section analyzes how these skills have evolved over time. Relying primarily on Census and ACS data on schooling attainment and wages, I ask whether there has been a change in the composition of child care workers over successive birth cohorts: who decides to work in the child care sector, and has the quality of the workforce changed over time? Recall that the sample for these analyses includes women ages 30 to 59 who worked more than 26 weeks in the previous year. Furthermore, I report years of schooling and wages for five-year birth cohorts between 1930 and 1985.

### 5.1 Schooling Attainment

I begin by examining changes in the schooling attainment of the child care workforce. As shown in Panel (a) of Figure 3, child care is an increasingly attractive employment destination for working-age women. Indeed, 0.7% of women in the 1930 birth cohort were employed in the child care sector, rising to 1.7% for the 1985 birth cohort. This accords with a recent analysis of child care supply, showing large increases in the number of employees and establishments over the last few decades (Herbst, 2023).<sup>15</sup> However, Panel (b) reveals that the relative attractiveness of child care work has been highly uneven across the schooling distribution, with the entry of less-educated women driving the overall growth in employment. The share of women with a bachelor’s degree employed as child care workers increased only slightly from 0.8% (in the 1930 cohort) to 1.1% (in the 1985 cohort). In contrast, the

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<sup>15</sup>The number of private-sector workers (establishments) rose from 391,000 (35,000) in 1990 to 920,000 (73,000) by 2019.

employment share among those with less than 12 years of schooling doubled (from 0.8% to 1.6%), while the share among those with 12 years of schooling grew nearly four-fold (from 0.6% to 2.2%).

Nearly all of the increase in child care employment occurred in the center-based sector, with little or no change occurring in the private household and home-based sectors. The share of working-age women employed in center-based market increased from 0.5% to 1.3%. Here again, however, these changes were driven by the increased attractiveness of child care employment among women with less than a four-year college degree. Among those with 12 years of schooling, the share employed in the center-based sector grew from 0.4% to 1.6%, while the share among those with no more than two years of college grew from 0.6% to 1.8%. Meanwhile, the employment share increased only slightly, from 0.7% to 0.8%, among those with a bachelor's degree.

Given the uneven education-based selection into child care employment—favoring those with less than a bachelor's degree—one concern is that average levels of schooling may not have increased across cohorts. The data presented Figure 4 probe this question by plotting the time series in schooling attainment for child care workers against all other working women [Panel (a)], school-based early educators [Panel (b)], personal care/service workers [Panel (c)], and health services workers [Panel (d)]. As shown in Panel (a), child care workers in the 1930 birth cohort had virtually the same schooling attainment as all other workers (12.1 versus 12.2 years of schooling). While schooling levels did in fact increase among child care workers, reaching 13.8 years by the 1985 cohort, the increase did not keep pace with other workers, whose schooling attainment reached 14.6 years in the 1985 cohort. Such trends imply that child care workers experienced a relative reduction in schooling attainment of 0.8 years. A similar story emerges when child care workers are compared with individuals in other relevant occupations, as shown in Panels (b) through (d). Indeed, they lost about 1.4 years of schooling compared to school-based early educators, 0.3 years compared to personal care workers, and 1.1 years compared to health services workers.

With regard to specific child care sectors, two developments are noteworthy. First, there has been a dramatic convergence in schooling attainment across birth cohorts. Within the 1930 birth cohort, private household workers had considerably less schooling (10.4 years) than home- (11.9 years) and center-based (12.8 years) workers. By the 1985 cohort, however, workers in all three sectors had approximately the same amount of schooling (13.7, 13.4, and 13.9 years, respectively), with private household workers witnessing the largest increase in schooling attainment and center-based workers witnessing the smallest increase. Second, these developments translate into different trends in

relative worker quality. Those in the private household sector gained over 0.8 years of schooling relative to all other workers, while home-based workers lost one year of schooling and center-based workers lost 1.3 years of schooling.

## 5.2 Wages

As shown in Figure 5, schooling is not the only skill domain in which child care workers have lost ground relative to other workers. Real median hourly wages increased very little over time, rising from \$11.73 in the 1930 birth cohort to \$12.70 for 1985 birth cohort. The flat wages of child care workers has also been documented by papers taking a yearly rather than cohort approach, first by Blau (1992) whose data covered the years 1976 to 1986, and then by Herbst (2018b, 2023) whose data covered the years 1990 to 2019. In contrast, the wages of all other workers grew from \$18.09 to \$21.69, as shown in Panel (a). Such trends indicate that child care workers experienced a relative reduction in wages of \$2.63. Rising wage gaps are also present when child care workers are compared to school-based early educators (\$4.97), personal care workers (\$2.37), and health services workers (\$8.70).

Interesting sectoral patterns also emerge. Given the sizable increase in private household workers' schooling, it is not surprising that they experienced large increases in wages, rising from \$7.93 to \$14.63. Whereas such workers were the lowest-paid child care employees in the 1930 birth cohort, their wages were higher than those in the home- and center-based sectors as of the 1985 birth cohort. In fact, those in the home- and center-based sectors experienced small reductions in their real wages. As a result, private household workers gained \$3.10 compared to all other workers, while home-based workers lost \$4.48 and center-based workers lost \$3.95.

## 5.3 Effect of Schooling Attainment on Occupational Choices and Wages

The analyses in this section formalize the descriptive results discussed above by empirically estimating the effect of schooling attainment on women's occupational choices and wages. I first examine the role of schooling in the decision to work in the child care industry. I do so by estimating separate reduced form binary choice models for each birth cohort, where the dependent variable represents women's employment in child care versus all other occupations. I then examine child care-specific skill prices by estimating log wage equations as a function of schooling attainment, again separately for each birth cohort. Estimating these models for each birth cohort provides insight into whether education-based sorting and skill prices have changed over time.

Relying once again on the Census and ACS sample of women ages 30 to 59 who worked more than 26 weeks in

the previous year, the occupational choice model takes the following form:

$$Y_{ic} = \beta \text{Schooling}_{ic} + \alpha X'_{ic} + \varepsilon_{ic}, \quad (7)$$

where  $Y_{ic}$  is a binary indicator equal to one if woman  $i$  in birth cohort  $c$  is employed in the child care sector and zero if she is employed in any other sector. The term  $\text{Schooling}_{ic}$  denotes the years of schooling attainment for woman  $i$ , and  $X'_{ic}$  captures a set of demographic and locational characteristics, including age (and age-squared), as well as dummy variables for marital status, nonwhite race/ethnicity, immigrant status, urban residence, and southern state residence. As noted above, the model is estimated separately on each birth cohort, resulting in a total of 12 models. All regressions are weighted using the Census/ACS person weight.<sup>16</sup>

Results from the occupational choice model are presented in Figure 6. Each cohort-specific coefficient on years of schooling is plotted along with its 95% confidence interval. A few findings are noteworthy. First, schooling attainment had a small positive effect on the decision to work in the child care sector among women in the earliest birth cohorts (i.e., the 1930 and 1935 cohorts). For all subsequent cohorts, however, higher levels of schooling became negatively associated with the decision to work as a child care provider. In other words, individuals with more schooling increasingly find employment in non-child care sectors (as well as non-work) more attractive than child care employment. That those with more schooling have been shifting away from the child care industry as an employment destination provides one explanation for why average (relative) schooling levels have declined.

In supplementary models, I examine two alternative measures of schooling, first a binary indicator equal to one if a given woman has no more than 11 years of schooling and then a binary indicator equal to one if a given woman has 16 or more years of schooling. Such models are intended to assess where in the schooling distribution the declining attractiveness of child care employment has occurred. I find that high school dropouts across most cohorts are slightly more likely to choose child care employment, with no evident pattern emerging in the estimates. Those with a bachelor's degree, on the other hand, increasingly shift away from child care work and toward other occupations. Therefore, the estimates in Figure 6 are driven by the declining attractiveness of child care employment among highly educated women, rather than the increased attractiveness of such employment among the least educated.

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<sup>16</sup>Several alternative versions of the model were estimated. In particular, I experimented with different sets of control variables, along with the inclusion of state fixed effects. In addition, I altered the age and employment restrictions by, for example, coding the dependent variable as equal to zero for all other workers and non-workers. In all cases, the results are similar to those reported here.

I also estimate a version of the model above that examines (child care) sector-specific choices. Increases in schooling attainment are negatively associated with employment in private household and home-based settings across most cohorts, again with no clear pattern emerging in the estimates. However, schooling had a positive relationship with center-based employment in the earliest cohorts, which became increasingly negative for nearly all subsequent cohorts. Together, these results indicate that higher-skilled women increasingly prefer to work outside of the child care sector. Furthermore, this emerging pattern appears to be driven by those with a bachelor's degree and is especially evident in the center-based sector. Such results provide a tentative explanation for why the center-based workforce experienced the largest reduction in schooling as well as stagnant wages.

I now turn to the estimation of skill prices in the child care labor market, where skill is once again defined as years of schooling attainment. I do so by estimating regressions of log hourly wages on schooling, controlling for the same demographic characteristics. Using the Census and ACS sample of women ages 30 to 59 employed in the child care sector, the wage equation is specified as follows:

$$\ln(w)_{ic} = \beta \text{Schooling}_{ic} + \alpha X'_{ic} + \varepsilon_{ic}, \quad (8)$$

where  $\ln(w)_{ic}$  is the log hourly wage for woman  $i$  in birth cohort  $c$ , and the term  $\text{Schooling}_{ic}$  denotes the years of schooling attained for woman  $i$ . The  $X'_{ic}$  captures the same set of demographic and locational characteristics as defined above. The model is estimated separately on each birth cohort, resulting in a total of 12 models, to allow for temporal differences to emerge in the price of skill.

Estimation of the wage equations must overcome the potential self-selection of women into employment within the child care sector. That is, I observe the wages of women who have chosen to work as child care providers. I do not observe the wages of non-workers, nor do I observe what child care workers would have earned had they chosen a different occupation. To ensure consistent estimates, I implement the Heckman two-step procedure, which begins with estimating a reduced form model of the decision to work in the child care industry. The dependent variable is a binary indicator equal to one if a given woman is employed as a child care worker, and zero if she is not working. Following [Blau \(1992\)](#) and [Herbst \(2018b\)](#), I use the number of children in the household and real non-wage income as the exclusion restrictions, which are used to construct a sample selection term for inclusion in the jointly-estimated wage equation.

Estimates from the selection-corrected wage equation for child care workers are presented in Panel (a) of Figure 7. Each cohort-specific coefficient on years of schooling is plotted along with its 95% confidence interval. Although it is clear that child care workers across all birth cohorts experience positive returns to schooling, there is striking evidence of a persistent decline in those returns. For example, while a one-year increase in schooling attainment for those in the 1930 cohort is associated with a 9% increase in wages, the schooling effect was reduced to 4.6% in the 1985 cohort. For comparison purposes, I estimate the analogous wage equation for all other workers, whose results are shown in Panel (b). The estimates reveal an upward-sloping trend, suggesting that the returns to schooling for all other workers have been growing (i.e., from 7.7% to about 10%). Such patterns suggest that while other labor markets increasingly value education, this is not the case within the child care market.

Figure 8 examines the wage profile for several other occupations, including school-based early educators [Panel (a)], personal care/service workers [Panel (b)], and health services workers [Panel (c)]. Much like the larger group of all other workers discussed above, school-based early educators and health services workers witnessed strong and mostly persistent increases in the returns to schooling across cohorts. Particularly striking are the results for pre-kindergarten and kindergarten teachers, whose returns to schooling for the earliest cohorts were actually lower than those in the child care industry but grew to be more than twice the schooling effect during the most recent cohorts. It is also noteworthy that personal care workers—whose schooling and wage levels are similar to those of child care workers—did not experience decreasing returns to schooling. While the wage effects of schooling are comparatively small for these workers, there was a period during the early cohorts of persistent increases in the returns to schooling, before levelling off for workers starting in the 1960 cohort.

## 6 Why is Worker Quality Declining?

The sections above provide evidence that today's child care workforce is fairly low-skilled, and that the quality of the workforce has declined over time. Indeed, schooling and wage levels have fallen relative to workers in several comparable occupations, with younger cohorts of high-skilled women increasingly finding the child care sector to be a less attractive employment destination than older cohorts. I also find that the returns to schooling in child care are significantly lower among younger cohorts. The goal of this section is to provide an empirical framework for thinking about potential explanations for why workforce quality has declined—or at least identify forces that are placing downward pressure on quality. I organize the discussion around four themes, beginning with the potential impact of



labor unions and child care regulations on worker quality. I then document the dramatic growth in the availability of sub-baccalaureate certificate and degree programs in child care-related fields, positing that community colleges might be diverting students away from pursuing four-year degrees. Third, I shed light on the cognitive ability of individuals who major in child care-related fields, asking whether the (college) major-to-child care employment pipeline selects for low-ability students. Finally, I examine whether the expansion of labor market opportunities for high-skilled women outside of the child care sector has placed downward pressure on worker quality.

## 6.1 Labor Unions and Child Care Regulations

The potential role of unions in the decline of K-12 teacher quality has been investigated in some previous work (Hoxby and Leigh, 2004; Lakdawalla, 2006). The idea is that rent-seeking labor unions might place a relatively high value on small class sizes and other “aesthetic” dimensions of the educational environment, while seeking compression in compensation, benefits, and other ability-related job benefits. As a result, high-quality teachers might be induced to leave the profession in search of employment opportunities that place a higher value on ability. Evidence on union-induced pay compression is mixed, with Hoxby and Leigh (2004) finding that it played a major role in reducing teacher quality and Lakdawalla (2006) taking a more skeptical view.

Nevertheless, the ability of labor unions to influence the wages and quality of child care workers is more limited, given the substantially lower rates of unionization within the sector. Indeed, the share of unionized child care employees has been low and steady over the past four decades, rising only slightly from 5% in 1983 to 7% in 2023 (Macpherson and Hirsch, 2023). In contrast, over 57% elementary and secondary school teachers overall were members of a union in 1983, falling to 45% and 51%, respectively, by 2023. Among public school teachers, the unionization rate is much higher, at nearly 70%.<sup>17</sup> Thus the comparatively low union membership rate within the child care sector means that it is unlikely that unions have played a major role in the decline in workforce quality.

Another explanation focuses on state-administered minimum quality regulations. Regulations are often justified in the market for child care because they can mitigate the presence of information asymmetries, in which parents are poorly informed about the quality of care received by children (Herbst, 2023). Regulations—which cover an array of health and safety features, staff levels, and staff characteristics—might therefore be necessary to ensure at least a minimally acceptable level of quality exists throughout the market by forcing low-quality providers to

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<sup>17</sup>This figure comes from the U.S. Department of Education, National Center for Education Statistics, 2017-2018 National Teacher and Principal Survey (NTPS), “Public School Teacher Data File”.

improve or shut down. However, while the canonical model of regulations allows for product quality to increase in the regulated sectors, there may be unintended consequences that would reduce service quality. Of particular importance for the current paper is that regulations might encourage child care providers to substitute between inputs. In other words, to comply with a tougher regulation in one domain, providers might increase the quantity of inputs in that domain but reduce their investments elsewhere. For example, faced with a tougher regulation on classroom group sizes, a child care provider might hire more teachers but favor those with lower ability.

The question of input substitution has received only scant attention within the child care literature, but the available evidence suggests that providers do engage in such behavior. For example, in a study of center-based programs in four states, [Blau \(2007\)](#) finds that regulations requiring higher levels of teacher education and experience encourage providers to increase their child-to-staff ratios. A second paper by [Ali et al. \(2024b\)](#), which examines online job advertisements for child care teachers, finds that tougher regulations on group sizes and child-to-staff ratios increase the demand for lead teachers (relative to assistant teachers), but reduces the demand for those with a bachelor's degree (relative to less education). In addition, both papers find that regulations on some inputs increase the likelihood that providers are out-of-compliance with the regulations on other inputs. For example, [Ali et al. \(2024b\)](#) show that tougher regulations on group sizes and ratios increase the share of job advertisements whose teacher education requirements do not meet the corresponding state education regulations. Nevertheless, while this evidence seems intriguing, questions remain as to whether these provider responses can have a large enough impact on *worker quality* to explain the trends documented here.

## 6.2 Sub-Baccalaureate Education in Child Care-Related Fields

In this section, I document the growth in the availability of training and education opportunities in child care-related disciplines at two-year and four-year colleges and universities. The goal is to shed light on whether the supply of and demand for community college programs in child care and early education fields might be diverting students away from pursuing the same degrees at four-year schools. Using IPEDS data between 2004 and 2022, I present the time series in the share of public community colleges that offer a certificate or associate's degree in a child care-related field and the number of certificates and degrees conferred. I then compare these data to the number of bachelor's degrees awarded in the same fields by four-year colleges and universities.

Such an analysis is important because a key component of the recent push to professionalize many low-skilled

occupations is to encourage or mandate the attainment of various field-specific certifications or higher levels of formal education. Two-year community colleges play an important role in providing this training and education. Overall, 5.6 million individuals were enrolled in two-year institutions in 2019, an increase from 2.3 million in 1970 (National Center for Education Statistics, 2023). Today, community college students account for 29% all of college and university enrollees. The rising number of such students has led to an explosion in the volume of degrees and certificates awarded. The number of associate’s degrees conferred rose from 405,000 in 1976 to over one million 2019, an increase of 152%. At the same time, the number of sub-baccalaureate vocational certificates awarded grew from 556,000 in 1998 to approximately one million in 2019, representing a 74% increase.<sup>18</sup>

While the growth in community college enrollments is a promising development, there is concern that access two-year institutions diverts some students away from entering four-year colleges and universities. Indeed, one recent study of community college access in Texas shows that nearly one-third of the estimated impact of access comes from diverting students away from directly enrolling in four-year schools, and as a result these students complete less education in the long-run (Mountjoy, 2022). Other work sheds light on this crowd-out phenomenon, pointing to low rates of community college degree completion and transfers to four-year schools as potential explanations. For example, Jenkins and Fink (2016) show that while 81% of new community college students intend to pursue a bachelor’s degree, only one-third of individuals ultimately transfer to a four-year school within six years, and 14% complete a bachelor’s degree. Concerns about the potential diversionary effects of community college attendance are relevant in light of work showing lower labor market returns to two-year (versus four-year) college degree attainment (Heckman et al., 2018; Kane and Rouse, 1995) as well as the significantly lower returns to sub-baccalaureate certificates (Jepsen et al., 2014; Kim and Tamborini, 2019).

Community colleges provide training and education in child care and early childhood education (ECE) through certificates and associate’s degrees. Although there is substantial variation in how certificate programs are structured, they generally require between 20 and 30 credits of field-specific coursework only (i.e., no general education credits are required), with a completion time of approximately two semesters. The coursework introduces students to theories of child development; appropriate health, nutrition, and safety practices in child care settings; and curriculum design. Some certificate programs require a field or internship experience; others do not. Community

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<sup>18</sup>There is some anecdotal evidence that the recent development of Promise programs, which offer tuition-free experiences at community colleges, is further fueling the rise in two-year degree attainment. Currently, all 50 states have at least one local or statewide Promise program for community college degree-seeking students (Smalley, 2023).

colleges advertise certificates as being a “springboard” to an associate’s degree or a required professional certification for employment within a state’s child care sector. In contrast, the structure of associate’s degrees is more standardized across community colleges. A total of 60 credits are required, to be completed in four semesters, and includes a combination of general education and field-specific coursework. General education courses typically cover writing, math, history, and computer literacy. The child care courses cover the same areas as those in the certificate programs, but do so in more detail, and they introduce students to a variety of topics not covered by the certificates (e.g., behavior modification strategies, special education, and observation/assessment techniques).

Figure 9 presents evidence on the availability of community college opportunities to receive certificates and degrees in child care-related fields as well as the number of such awards being made. Panel (a) presents the time series in the share of two-year schools offering certificate programs in Early Childhood Education (ECE), Child Development, and Child Care Provider/Assistant, while Panel (b) shows the number of certificates awarded in these fields. Panels (c) and (d) present, respectively, the analogous information for associate’s degrees. Generally speaking, there has been substantial growth in the availability and number of child care-related awards at the community college level. For example, the share of such institutions offering a certificate program in ECE increased from 11% in 2004 to 24% in 2022, representing a 131% in the availability of these certificates. In addition, the share of community colleges offering a certificate in Child Development or Child Care Provider grew from 24% to 46%, an increase of 93% over this period. The rise in the availability of certificate programs has led to a corresponding increase in the number of certificates awarded, from 6,555 to 17,571 across all three fields, representing an increase of 168%. Growth in the availability and number of associate’s degrees awarded by community colleges has been similarly robust. For example, across all three fields, the number of child care-related degrees conferred grew from 4,684 to 9,643 over this period, for an increase of 106%.

In contrast, the supply of and demand for bachelor’s degrees at four-year institutions has experienced more tepid growth, as shown in Figure 10. The share of such institutions offering a bachelor’s degree in ECE increased from 21% in 2004 to 35% in 2022, representing an increase of 68%, while growth in the availability of Child Development programs has been stagnant.<sup>19</sup> Furthermore, while the number of bachelor’s degrees awarded in ECE has experienced steady growth—rising from 4,947 to 9,484 (an increase of 92%) over this period—it is substantially

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<sup>19</sup>Degree programs in Child Care Teacher are generally not offered at four-year colleges and universities. Therefore, I consider only ECE and Child Development degrees.

less than the growth in child care-related awards made at the sub-baccalaureate level. Across all three fields, the total number of certificates and associate's degrees conferred by two-year institutions rose from 11,239 to 27,214, for an increase of 142%.

In sum, these data reveal the growing popularity of sub-baccalaureate certificate and associate's degree programs in child care-related fields.<sup>20</sup> Over the past few decades, community colleges aggressively expanded the supply of these programs, and perhaps as a result there has been robust growth in the number of awards conferred in these disciplines. In contrast, growth in the equivalent degree programs at four-year colleges and universities has been substantially slower. Such differential growth provides suggestive—although not definitive—evidence that the proliferation of child care training and education opportunities at community colleges may be discouraging attendance at four-year schools. It is also noteworthy that the growth in community college awards is explained primarily by the rise in certificates, which require far fewer credit hours than an associate's degree in the same field. It is therefore possible that these certificate programs are also diverting students away from obtaining an associate's degree. Both diversionary channels would ultimately decrease the education and skills of the child workforce if they are not fully offset by an increase in education among those who would not have obtained a bachelor's degree in the absence of these community college programs.

### 6.3 Quality of the College to (Child Care) Employment Pipeline

The analyses above established that awards for sub-baccalaureate certificates and degrees in child care-related fields have risen significantly faster than those for four-year degrees. In this section, I examine a number of related education and training issues that might lead to lower workforce quality on their own, but especially when combined with any disincentive effects of community college availability on four-year degree attainment. Given that caregiver training and education programs serve as pipelines into the child care profession, it is important to examine the skills of individuals who choose to major in a child care-related field. Therefore, I begin by using the PIAAC to compare the literacy and numeracy test scores of child care majors with those majoring in education, those majoring in all other fields, and all workers. Second, I examine the test scores of three subsets of individuals who majored in a child care-related field: those currently employed in the child care sector, those employed in a non-child care

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<sup>20</sup>The rising popularity of these programs is particularly striking in light of the demand for bachelor's degrees in Elementary, Secondary, and Special Education. As shown in Figure 11, there has been no change in the availability of these degree programs. In addition, while the number of degrees awarded in Secondary and Special Education has been stagnant, there has been a reduction in the number of degrees awarded in Elementary Education.

sector, and those not employed. The goal here is to understand whether higher-scoring child care majors select into child care employment or leave the profession to work in a different sector. Finally, rather than analyzing child care majors—only some of whom are employed in the child care sector—I examine the post-secondary training received by child care workers. Specifically, I compare their test scores with individuals who have similar majors but are employed in other occupations. Again, the goal is to understand whether higher- or lower-skilled majors in other fields are selecting into the child care profession.

As previously noted, I use the CIP to identify five child care-related majors in the PIAAC: ECE and Teaching, Education/Teaching of Individuals in Early Childhood Special Education Programs, Child Development, Child Care and Support Services Management, and Child Care Provider/Assistant. Panel A of Table 3 shows that the median literacy score for child care majors is 278, while the median numeracy score is 240. By comparison, median test scores for education majors (i.e., those majoring in Elementary, Secondary, or Special Education) and all other majors are substantially higher, as shown in Panel B. For example, the typical child care major scores at the 35th percentile of education majors' literacy distribution and at the 15th percentile of education majors' numeracy distribution. Child care majors score better relative to those in all other majors, but their median scores continue to rank in the bottom half of the test score distributions. When child care majors are instead compared to all workers (Panel C), median scores are higher still, but remain in the bottom half of workers' test score distributions.

As noted above, I also disaggregate child care majors into three groups: those employed as child care workers, those employed in a sector outside of child care, and non-workers. To maintain consistency, I compare median test scores for all three groups against the distribution of all workers in the PIAAC. Among those who majored in child care, 32% are working as a child care provider, 41% are employed outside the child care sector, and 27% are not employed. The median literacy and numeracy scores of those employed in the child care sector are 278 and 236, respectively, which rank at the 48th and 29th percentiles of workers' test score distributions. Those employed outside the child care sector perform better on both tests, placing in the top half of workers' distributions, at the 51st and 54th percentiles, respectively. Finally, consistent with the data on non-workers overall, non-working child care majors score lower than both groups of workers.

The analyses in Table 4 use the PIAAC to examine the post-secondary academic training received by child care workers, and to compare the literacy and numeracy skills of such workers with individuals who have similar college

majors but are employed outside the child care sector. Column (1) reports the number of child care workers in the sample who obtained each listed post-secondary degree, while column (2) reports the weighted percent of child care workers with each degree. Column (3) presents information on the workers whose literacy score is in the bottom quintile of the test score distribution for their relevant two-digit CIP major.<sup>21</sup> For majors obtained by more than one child care worker, the column presents the number of workers scoring in the bottom quintile. For majors obtained by one child care worker, the column notes whether that individual scored in the bottom quintile. Column (4) presents the analogous information for the numeracy test, while columns (5) and (6) report the analogous information for those scoring in the top quintile of the literacy and numeracy distributions, respectively.

Two noteworthy findings emerge from these data. First, there is substantial variation in the post-secondary degrees obtained by child care workers, ranging from ECE and Elementary Education to such fields as Biology, Journalism, Paralegal Studies, National Security, and Accounting. In fact, as shown in column (2), only 11% of child care workers majored in ECE, 6% majored in Elementary Education, and 3% majored in Education. The remaining four-fifths of child care workers have a post-secondary degree outside of the education field. Second, child care workers of all majors are drawn disproportionately from the bottom quintile of the test score distributions for individuals with similar majors, and are underrepresented among those scoring in the top quintile. For example, as shown in the first row, four (of seven) ECE majors scored in the bottom quintile of the literacy and numeracy distributions for all education majors, while no ECE major scored in the top quintile. To take another example, the data show that two child care workers majored in Education (eighth row): both individuals scored in the bottom quintile of the literacy distribution, one scored in the bottom quintile of the numeracy distribution, and neither scored in the top quintile of the distributions.

The bottom row of Table 4 provides summary information for all 58 child care workers with a post-secondary degree. These data confirm the patterns established in the analysis of individual college majors: relative to their counterparts with similar majors in other occupations, child care workers are overrepresented among the lowest-scoring respondents and underrepresented among the highest-scoring respondents. Indeed, I find that 28% of child care workers scored in the bottom quintile of their (two-digit CIP) major's literacy test score distribution, while

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<sup>21</sup>For example, the scores of those majoring in Early Childhood Education (13.1210) are compared to the test score distribution for respondents whose two-digit CIP is 13, indicating some type of education major. To take another example: the test scores of the individual who majored in Paralegal Studies (22.0302) is compared to distribution of all individuals whose two-digit CIP code is 22, which includes majors in legal studies.

26% scored in the bottom quintile of the numeracy distribution. In addition, 17% of child care workers scored in the top quintile of their respective major's literacy distribution, and 13% scored in the top quintile of the numeracy distribution.<sup>22</sup>

In sum, data from the PIAAC indicate that one-third of individuals who majored in a child care care-related field are currently employed as a child care worker. Those selecting into child care majors are less-skilled than individuals majoring in other areas, with the most relevant comparison coming from (elementary, secondary, and special) education majors, whose test scores are significantly higher. I also find that there is further sorting along occupational lines: among those majoring in a child care-related field, individuals who are employed as child care workers are a less-skilled subset of all majors, while those employed outside the child care sector are a higher-skilled subset of all majors. Finally, although there is substantial variation in the degrees attained by child care workers, those choosing employment in the child care sector are consistently less-skilled than their counterparts with similar degrees but employed in other occupations. Together, these findings suggest that post-secondary degrees like ECE and Child Development may be particularly appealing to lower-ability college students, that higher-ability child care majors might be especially susceptible to leaving the child care profession, and that lower-ability non-child care majors are the most likely to take their place.

## 6.4 Changing Labor Market Opportunities for High-Skilled Women

Recall from Section 2 that an expansion of high-skilled labor market opportunities outside of the child care sector could increase or decrease the quality of the child care workforce depending on whether worker skills are transferable across sectors and whether potential child care workers become more negatively selected. In this section, I empirically study the impact of outside employment opportunities on the decision to work in the child care sector and the skills of the child care workforce, where skills are measured by years of schooling attainment. Specifically, I ask whether high-skilled women are increasingly enticed away from child care employment because of improvements in their outside options, and if so, whether those who remain employed as child care workers have lower levels of schooling.

The analysis tests two conceptualizations of the high-skilled labor market hypothesis: (i) the extent to which

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<sup>22</sup>It should be noted that child care workers in the PIAAC, like their counterparts in the ACS/Census samples, have less schooling on average than individuals in other occupations. Insofar as schooling attainment is correlated with higher test scores, it is possible that some of the observed test score differences across fields of study are driven by variation in level of schooling.



high-skilled occupations have become more open (or available) to women and (ii) the wage premium paid to those employed in high-skilled sectors. I test the “labor market openness” hypothesis by constructing a variable for the share of women employed in high-skilled occupations, while the “wage premium” hypothesis is tested through a ratio of the hourly wages for women in high-skilled occupations to the hourly wages of child care workers. To construct the first variable, I used the Decennial Census and ACS samples to calculate for each birth cohort (of men and women ages 30 to 59 who worked more than 26 weeks in the previous year) the average years of schooling in each occupation. Defining occupations in the top quintile of the schooling attainment distribution as “high-skilled,” I then calculated the share of women employed in high-skilled occupations in birth cohort  $\times$  state cells. The high-skilled labor market has indeed become more open to women over time: approximately 46% of working-age women in the 1930 birth cohort were employed in high-skilled sectors, rising to 58% for the 1985 cohort. Meanwhile, the share of women employed in low-skilled occupations (i.e., those in the bottom quintile of the schooling distribution) declined from 43% to 25%.

To construct the variable representing the ratio of high-skilled to child care worker wages, I calculated the median hourly wage of women (ages 30 to 59 who worked more than 26 weeks in the previous year) who were employed in high-skilled occupations as well as those employed in the child care industry. I then constructed a ratio of the high-skilled wage to the child care wage. Once again, this variable is generated in birth cohort  $\times$  state cells, and I express the variable in log form. The median hourly wage for women employed in high-skilled occupations rose from nearly \$28 in the 1930 cohort to \$30 in the 1985 cohort, after peaking at \$33 for several of the middle cohorts. By contrast, the wages of those employed in low-skilled sectors were effectively stagnant at around \$13 for most cohorts. As shown in Figure 5, the wages of child care workers rose very little over time, indicating that the ratio of high-skilled to child care wages increased across most of the birth cohorts.

Using this information, I estimate two regression models. The first is a sectoral choice model in which the outcome is a binary indicator equal to one if a given woman is employed in the child care sector and zero if the woman is employed in a non-child care sector. The analytic sample is comprised of women ages 30 to 59 who worked more than 26 weeks in the previous year. I further restrict the main analysis to those with 14 or more years of schooling (i.e., those with a college degree), given that their employment decisions are likely to be more sensitive to changes occurring within high-skilled occupations. Nevertheless, I estimate the sectoral choice model

along other important schooling margins.<sup>23</sup> In the second model, the outcome is years of schooling attainment. The sample is restricted to women ages 30 to 59 who worked more than 26 weeks in the previous year in the child care sector. Formally, both models are specified as follows:

$$Y_{ics} = \gamma s_{cs}^{hs} + \phi p_{cs}^{hs} + \alpha X'_{ics} + \xi_c + \eta_s + \varepsilon_{ics}, \quad (9)$$

where  $Y_{ics}$  denotes one of the outcomes described above for woman  $i$  in birth cohort  $c$  located in state  $s$ . The variables  $s^{hs}$  and  $p^{hs}$  indicate the share of women employed in high-skilled occupations and the log ratio of high-skilled wages to child care wages, respectively. Both measures vary in birth cohort  $\times$  state cells. The models include a set of demographic controls ( $X'$ ), including age, age-squared, marital status, non-white race/ethnicity, immigrant status, years of schooling (occupational choice model only), number of children, and urban residence. The models also include a set of birth cohort fixed effects,  $\xi$ , and state fixed effects,  $\eta$ , to account for any generational and geographic unobservables that may affect women's occupational and schooling decisions. All analyses are weighted using the Census/ACS person weight, and the standard errors are clustered in birth cohort  $\times$  state cells.

Table 5 presents estimates from the occupational choice model. The main results, which are displayed in columns (1) through (3), imply that the growing availability of high-skilled labor market opportunities have enticed college-educated women away from child care employment and toward other occupations. Indeed, the estimates in column (3) indicate that increases in labor market openness reduce the share of such women employed as child care workers: as the share of women employed in high-skilled occupations increases from 0% to 100%, the likelihood that a college-educated woman chooses child care employment declines by 1.7 percentage points. Furthermore, increases in the high-skilled wage premium lead to additional reductions in child care employment: a 10% increase in the wage differential between high-skilled workers and child care workers reduces the likelihood that a college-educated woman chooses child care employment by 0.05 percentage points.

The next two columns examine the impact of high-skilled labor market opportunities on the occupational choices of less-skilled women, with column (4) focusing on high school drop-outs and column (5) focusing on high school graduates. The coefficients are uniformly positive, suggesting that lower-skilled women replace their higher-

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<sup>23</sup>Several alternative versions of the sectoral choice model were estimated. In particular, I experimented with different sets of control variables, and I altered the age and employment restrictions (e.g., coding the dependent variable equal to zero for all other workers and non-workers. In all cases, the results are similar to those reported here.

skilled counterparts in the child care sector as the latter exit the profession to pursue higher-paid employment opportunities. Finally, columns (6), (7), and (8) examine the decision to work in specific child care settings: private households, home-based programs, and center-based programs, respectively. While improved labor market opportunities generally reduce the attractiveness of working in all child care settings, private household and home-based decisions seem particularly sensitive to changes in high-skilled employment, while center-based decisions are the most sensitive to changes in the high-skilled wage premium.

Table 6 provides the analogous results for the model of schooling attainment. The main results, which are based on the full sample of child care workers, are presented in columns (1) through (3). The estimates imply that improved labor market opportunities for women are associated with reductions in the schooling attainment of child care workers. Such results are consistent with those discussed above, which show that better outside options pull higher-skilled women out of the child care sector, leaving behind workers with less education. The estimates in column (3) suggest that as the share of women employed in high-skilled occupations increases from 0% to 100%, the schooling attainment of the child care workforce falls by about four years. Furthermore, a 10% increase in the wage differential between high-skilled workers and child care workers reduces workers' schooling by 0.1 years.

The next three columns replace years of schooling as the outcome with binary indicators for whether a given woman is a high school drop-out [column (4)], has 14 or more years of schooling [column (5)], and has 16 or more years of schooling [column (5)]. Consistent with the results in Table 5, the estimates suggest that improved labor market opportunities for high-skilled women increase the likelihood that child care workers will not finish high school, while decreasing the likelihood that such workers have college degrees, particularly four-year college degrees. The last three columns in Table 6 once again examine years of schooling, but in subsets of private household child care workers [column (7)], home-based workers [column (8)], and center-based workers [column (9)]. The negative effects of improved labor market opportunities persist across all three sectors, but appear to be particularly strong in the center-based sector. In other words, workers in the center-based sector experience the largest reduction in schooling attainment as high-skilled opportunities become more available.

Finally, Appendix Table A1 provides some additional estimates for the occupational choice [columns (1) and (2)] and schooling attainment [columns (3) and (4)] models. Specifically, in columns (1) and (3), I examine not just the high-skilled wage differential (i.e., the ratio of wages for those in the top quintile of schooling attainment to

child care worker wages), but also the medium-skilled (i.e., the wages for those in the middle schooling quintile) and low-skilled (i.e., the wages for those in the bottom schooling quintile) differentials.<sup>24</sup> The results confirm that the wage “premium” within high-skilled occupations is responsible for reducing the skills of the child care workforce. Columns (2) and (4) replace the wage ratios with a variable for the log hourly child care wage. Both coefficients are positive and statistically significant, indicating that improvements in absolute wage levels—as opposed to increases in relative wages—might encourage higher-skilled women to enter the child care workforce.

In sum, this section explored whether the expansion of high-skilled labor market opportunities outside of the child care sector can explain, at least in part, the declining quality of the child care workforce. I operationalized this expansion through two distinct though related mechanisms—“labor market openness” and “wage premium” channels—and I find evidence that they reduced the attractiveness of child care employment among higher-skilled women while reducing the schooling attainment of those who remain employed in the sector. As women increased their presence within high-skilled occupations and as these occupations were paid more relative to child care workers, a de-skilling of the child care workforce resulted, wherein fewer highly educated women chose to go into the profession. The evidence provided here also suggests that such women were replaced by those with less schooling, further contributing to the workforce’s de-skilling. Finally, I show that the center-based sector, whose workers are better educated and paid than those in other child care sectors, experienced the largest de-skilling effects.

## 7 Conclusion

This paper marshals data from a variety of sources to show that the contemporary child care workforce is relatively low-skilled and that worker quality declined over time. Child care workers have comparatively low levels of schooling, their scores on tests of cognitive ability are below those of other workers, and they are among the lowest-paid individuals in the economy. Furthermore, the child care workforce lost considerable ground on these measures of skill: compared to all other employed women, child care workers experienced a reduction in schooling of 0.8 years and a reduction in wages of \$2.63 between the 1930 and 1985 birth cohorts. Those with more schooling have been steadily moving away from child care as an employment destination, and while the returns to schooling increased in other occupations, they have fallen substantially in the child care sector.

Although labor unions and regulations do not seem like sufficiently potent explanations for the decline in

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<sup>24</sup>I focus on these three quintiles rather than all five quintiles simultaneously because the variables are highly collinear.

workforce quality, I find suggestive evidence that at least three factors are placing downward pressure on quality. First, there has been substantial growth in the availability of community college programs offering certificates and degrees in several child care-related fields. Indeed, this growth has far outstripped the equivalent offerings available at four-year institutions, raising questions about whether community colleges are displacing student attendance at more academically rigorous four-year schools. Second, I show that those with a college major in a child care-related field are negatively selected for their literacy and numeracy skills. As a result, the (relatively low) quality of the child care workforce is to some extent already cemented at the time students begin their academic training. Finally, I provide empirical evidence that the growing number of outside employment options for high-skilled women had a detrimental effect on the child care workforce, further reducing the attractiveness of child care employment for high-ability women and leaving the remaining workers with lower average levels of schooling.

There is a growing recognition among the public and policymakers that teachers matter in child care and early education settings. Indeed, states' quality rating and improvement systems (QRIS) now regularly include staff qualifications for education levels, field-specific degrees, and work experience as explicit components of child care programs' quality rating (Herbst, 2018a). In addition, to meet the rigorous National Association for the Education of Young Children's (NAEYC) accreditation standards, center-based providers must demonstrate that classrooms are staffed by individuals with at least an associate's degree in ECE (Boyd-Swan and Herbst, 2020).<sup>25</sup> Given the evidence that higher-quality teachers produce better student outcomes, staff improvement initiatives within the child care sector—along with efforts to improve wages—are critical if the goal is to reverse the longstanding decline in workforce quality (Hanushek and Rivkin, 2010; Jacob and Lefgren, 2008; Rockoff, 2004).

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<sup>25</sup>Teachers may also have a non-ECE bachelor's degree and either 36 credit hours of ECE coursework or a state teaching certificate.

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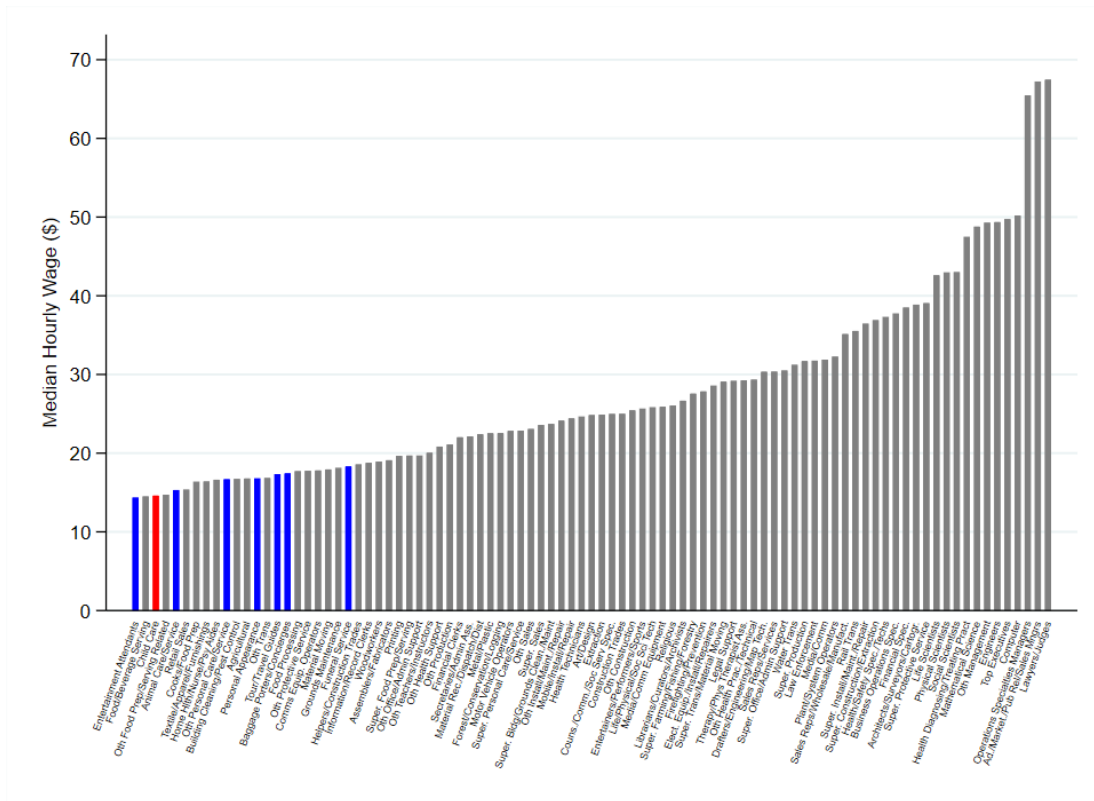
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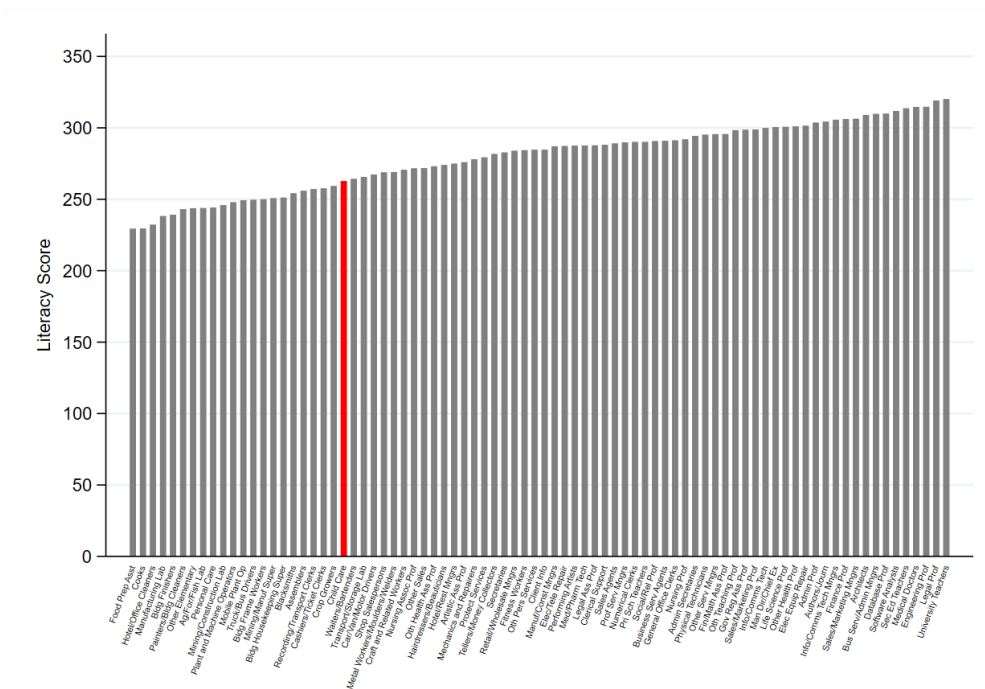
Figure 1: Median Hourly Wages by Occupation



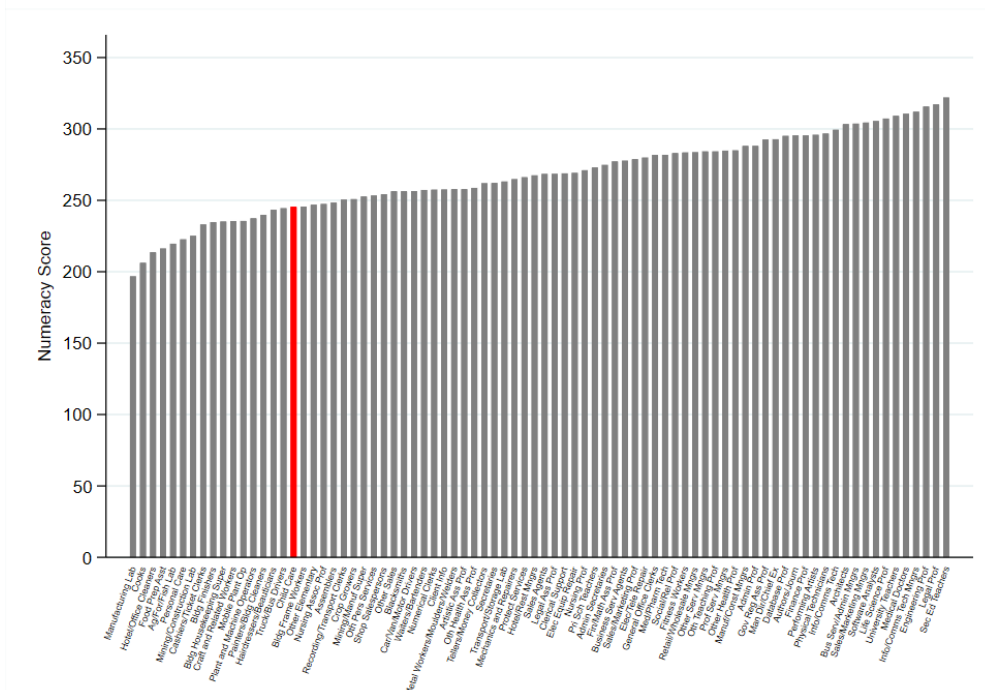
Source.—Occupational Employment and Wage Statistics (OEWS) survey, May 2023.  
 Notes.—This figure reports median hourly wages for 90 “minor”-level occupations as well as the “detailed”-level child care occupation based on the six-digit Standard Occupational Classification (SOC) code.

**Figure 2:** Literacy and Numeracy Test Scores by Occupation

(a) Literacy



(b) Numeracy

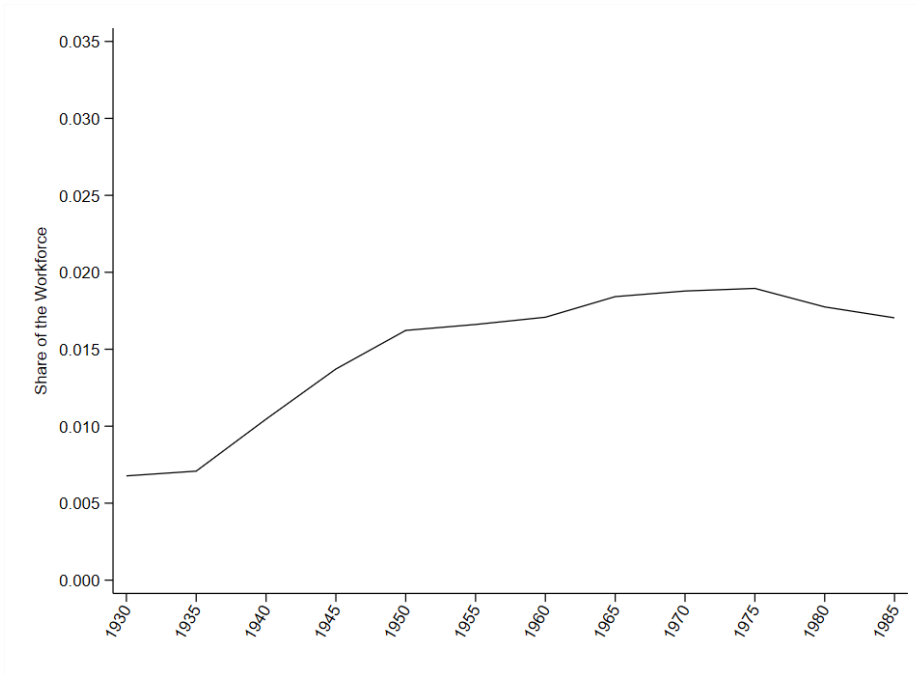


Source.—Program for the International Assessment of Adult Competencies (PIAAC), 2012, 2014, and 2017

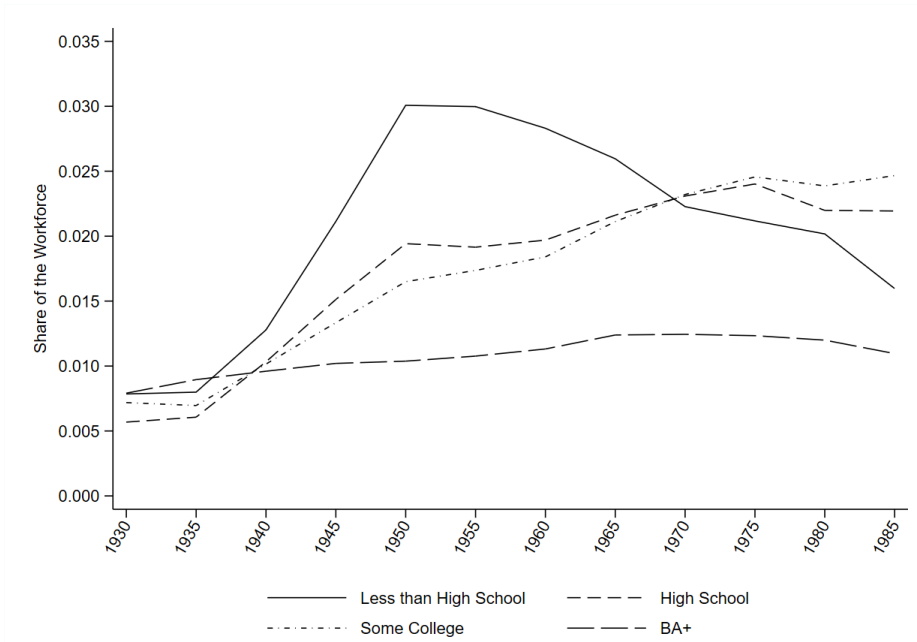
Notes.—The sample includes individuals ages 20 and over who are employed in one of 81 three-digit International Standard Classification of Occupations 2008 (ISCO-08). The figures report median literacy and numeracy test scores by occupation. All figures are weighted using the final full sample weight.

**Figure 3:** Share of Working-Age Women Employed in the Child Care Industry by Birth Cohort

(a) Overall

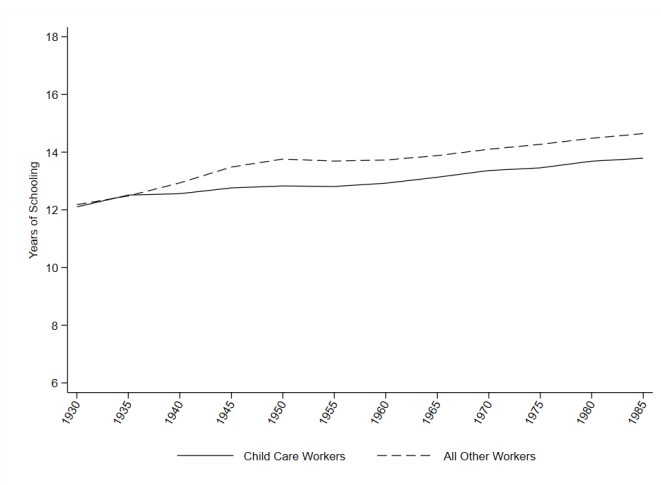
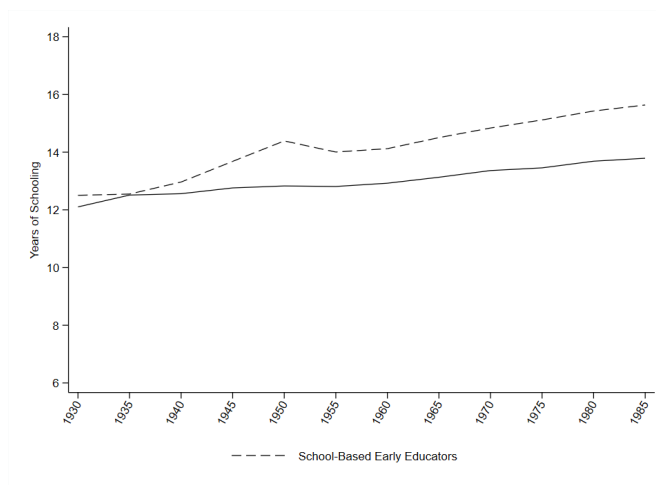
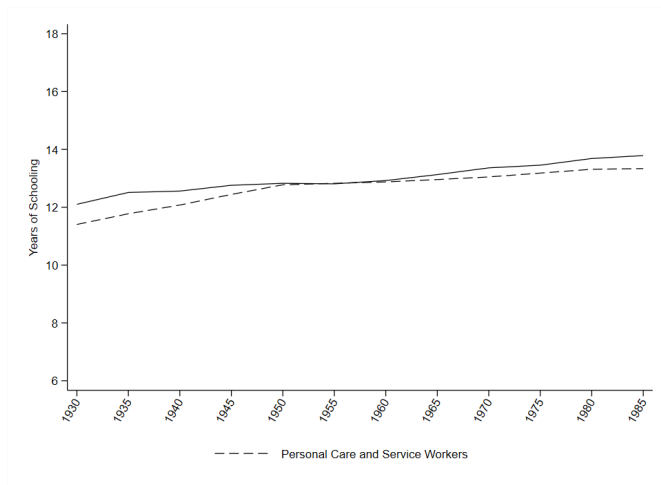
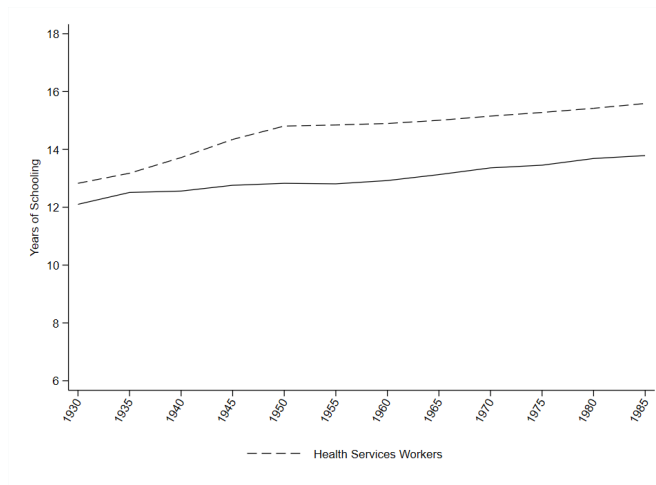


(b) By Education Level



Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

Notes.—The sample includes women ages 30 to 59 who worked more than 26 weeks in the previous year. All analyses are weighted using the Census/ACS person weight.

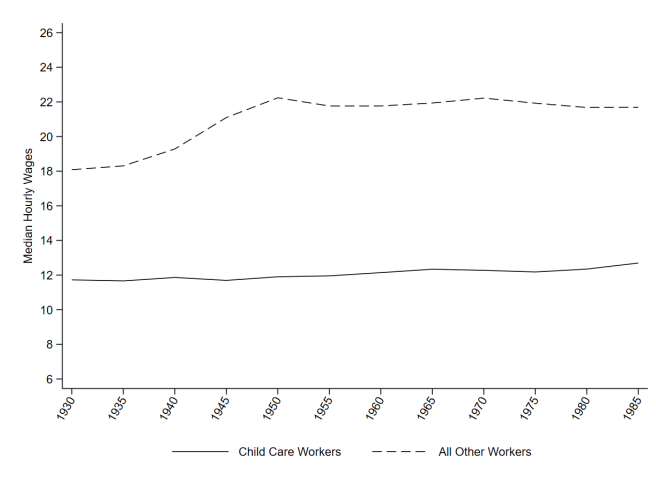
**Figure 4:** Relative Schooling Attainment of Child Care Workers by Birth Cohort**(a) Comparison: All Other Workers****(b) Comparison: School-Based Early Educators****(c) Comparison: Personal Care and Service Workers****(d) Comparison: Health Services Workers**

Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

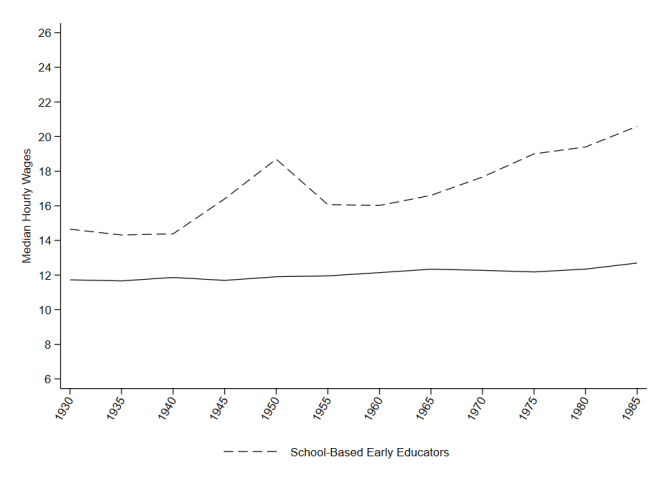
Notes.—The sample includes women ages 30 to 59 who worked more than 26 weeks in the previous year. All analyses are weighted using the Census/ACS person weight.

**Figure 5: Relative Hourly Wages of Child Care Workers by Birth Cohort**

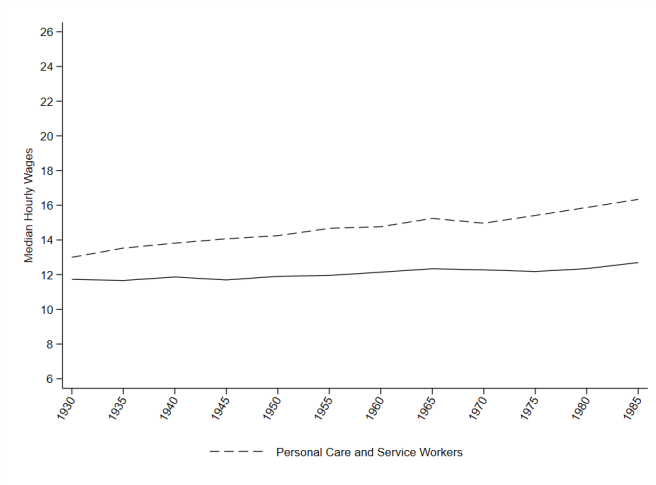
**(a) Comparison: All Other Workers**



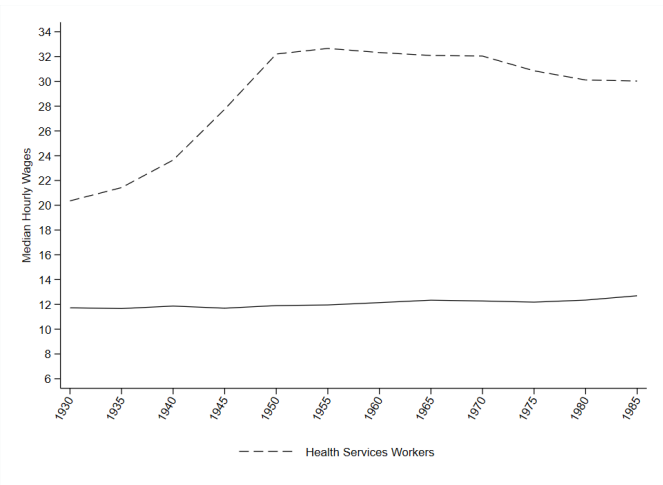
**(b) Comparison: School-Based Early Educators**



**(c) Comparison: Personal Care and Service Workers**



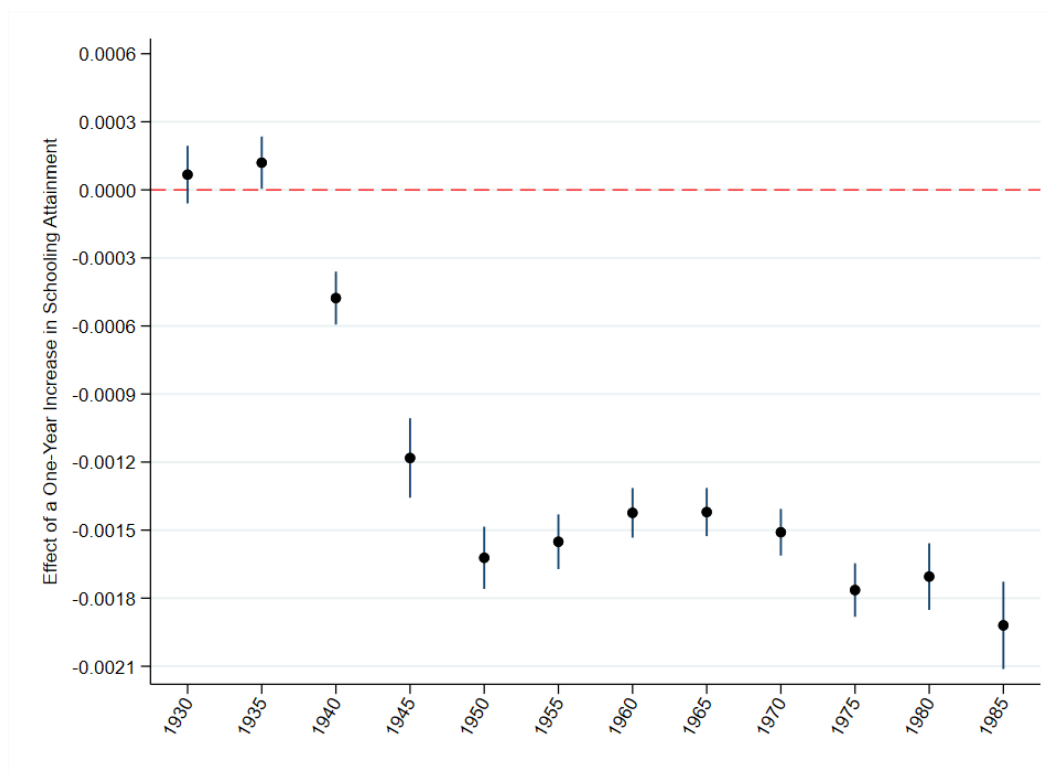
**(d) Comparison: Health Services Workers**



Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

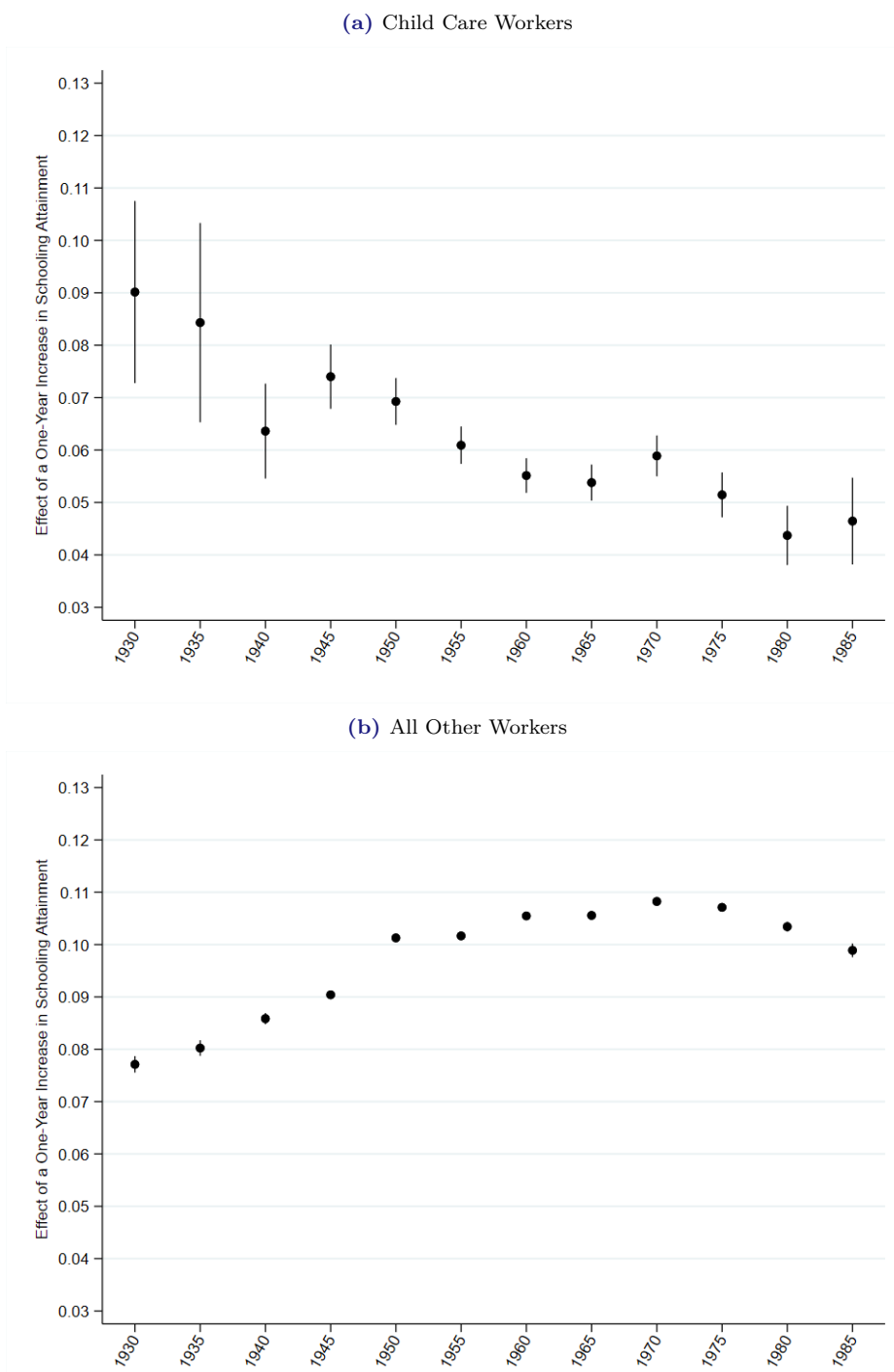
Notes.—The sample includes women ages 30 to 59 who worked more than 26 weeks in the previous year. All analyses are weighted using the Census/ACS person weight.

**Figure 6:** Estimates of the Relationship Between Schooling Attainment and Child Care Employment Decisions by Birth Cohort



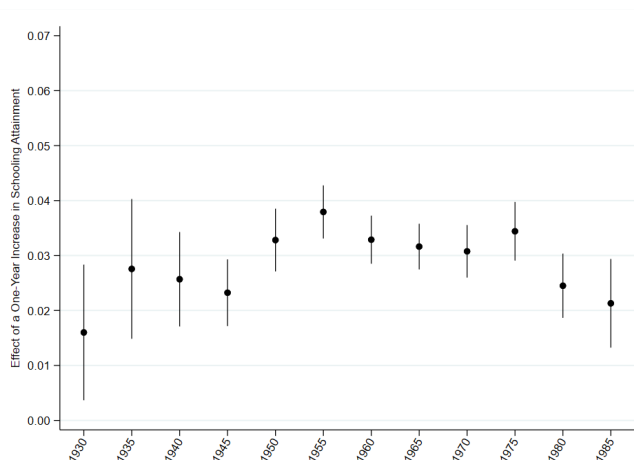
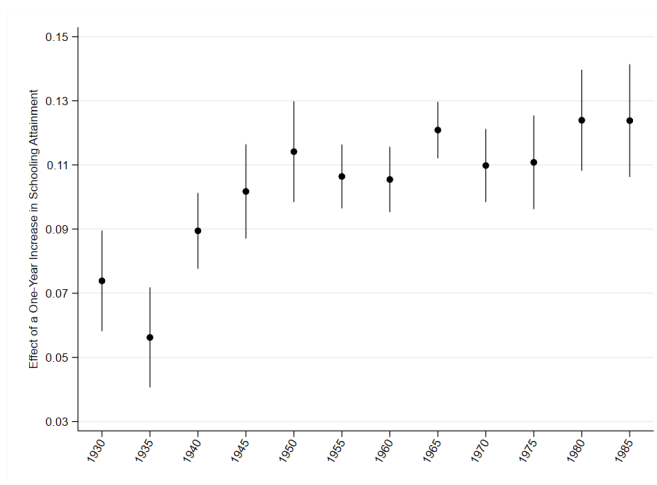
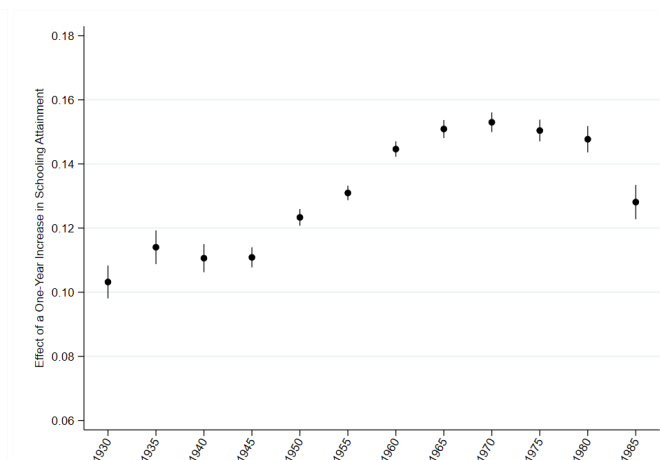
Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

Notes.—This figure presents estimates from regressions of a binary indicator of employment in the child care industry on years of schooling attainment. A separate regression is estimated for each birth cohort, and the coefficient on schooling (along with the 95% confidence interval) is presented. The sample includes women ages 30 to 59 who worked more than 26 weeks in the previous year. All regressions include controls for age, age-squared, marital status, non-white, immigrant, urban residence, and southern state residence. All analyses are weighted using the Census/ACS person weight.

**Figure 7:** Estimates of the Relationship Between Schooling Attainment and Wages by Birth Cohort

Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

Notes.—The figures present selection-corrected estimates from regressions of log hourly wages on years of schooling attainment. A separate regression is estimated for each birth cohort, and the coefficient on schooling (along with the 95% confidence interval) is presented. The sample includes women ages 30 to 59 who worked more than 26 weeks in the previous year. All regressions include controls for age, age-squared, marital status, non-white, immigrant, urban residence, and southern state residence. The exclusion restrictions (from the binary child care occupational choice model) include the number of children in the family and real non-wage income. All analyses are weighted using the Census/ACS person weight.

**Figure 8:** Estimates of the Relationship Between Schooling Attainment and Wages by Birth Cohort**(a)** School-Based Early Educators**(b)** Personal Care and Service Workers**(c)** Health Care Workers

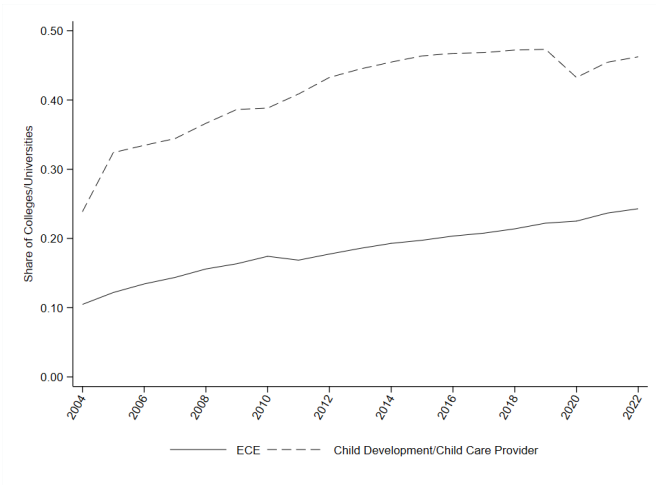
Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

Notes.—The figures present selection-corrected estimates from regressions of log hourly wages on years of schooling attainment. A separate regression is estimated for each birth cohort, and the coefficient on schooling (along with the 95% confidence interval) is presented. The sample includes women ages 30 to 59 who worked more than 26 weeks in the previous year. All regressions include controls for age, age-squared, marital status, non-white, immigrant, urban residence, and southern state residence. The exclusion restrictions (from the binary child care occupational choice model) include the number of children in the family and real non-wage income. All analyses are weighted using the Census/ACS person weight.

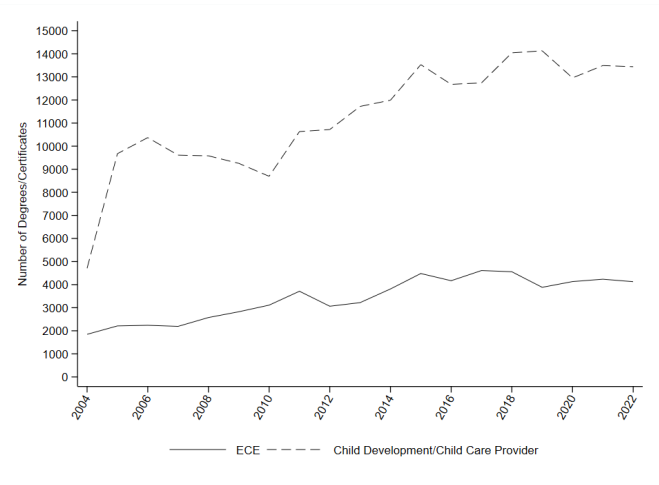


**Figure 9:** Child Care-Related Certificates and Degrees Awarded by Public Community Colleges

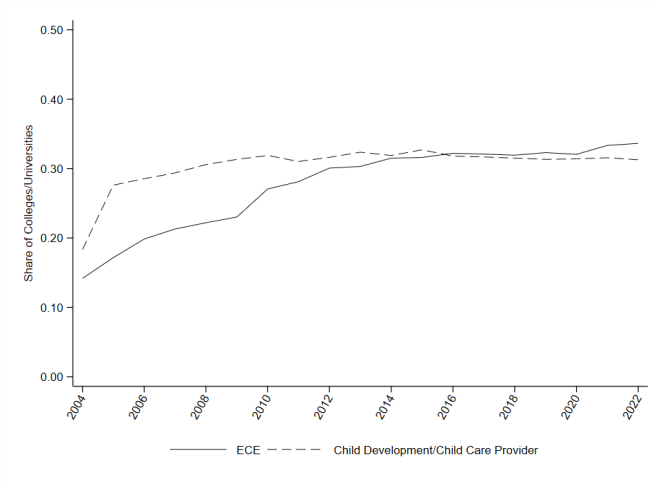
(a) Share Offering Certificates



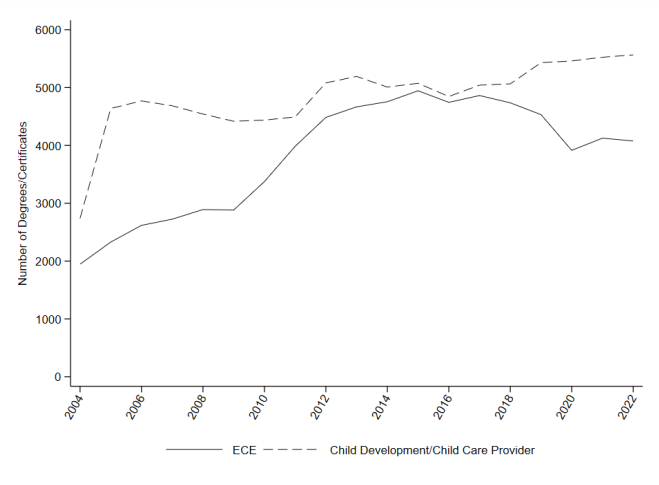
(b) Number of Certificates Awarded



(c) Share Offering Associate's Degrees

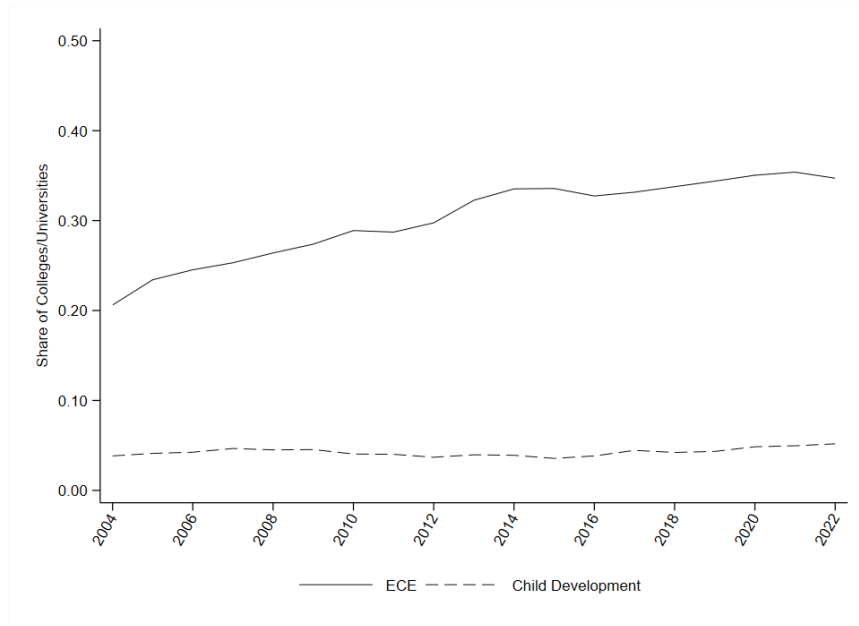
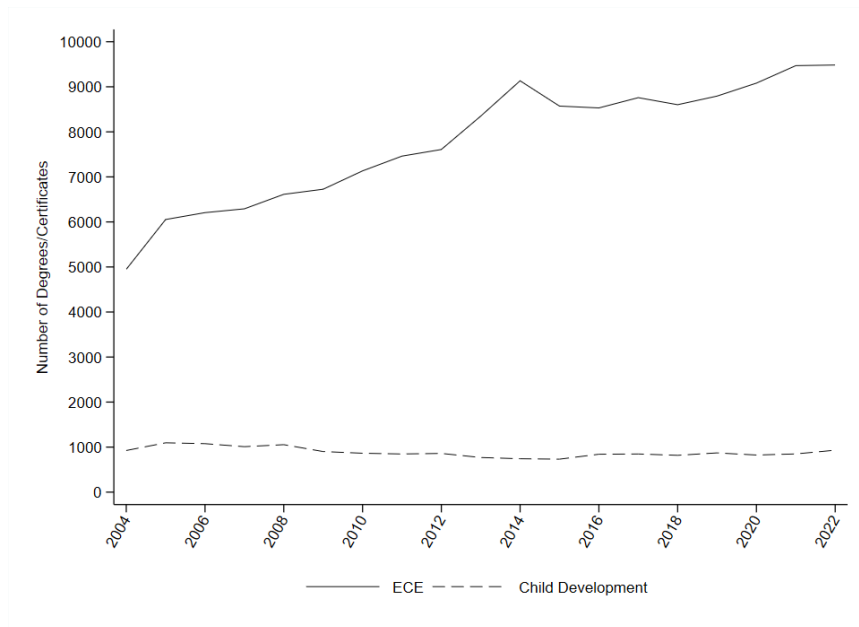


(d) Number of Associate's Degrees Awarded



Source.—Integrated Postsecondary Education Data System (IPEDS), 2004-2022.

Notes.—Child care-related certificates and degrees include Early Childhood Education and Teaching (referred to as “ECE” in the figures), Child Development, and Child Care Provider/Assistant. All figures are based on public community colleges.

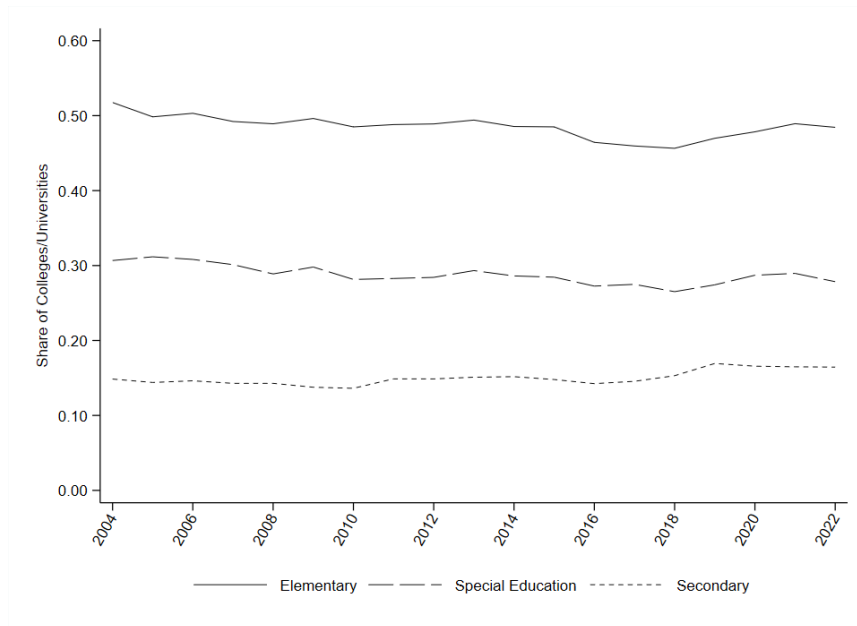
**Figure 10:** Child Care-Related Degrees Awarded by Public Four-Year Colleges and Universities**(a)** Share Offering Bachelor's Degrees**(b)** Number of Bachelor's Degrees Awarded

Source.—Integrated Postsecondary Education Data System (IPEDS), 2004-2022.

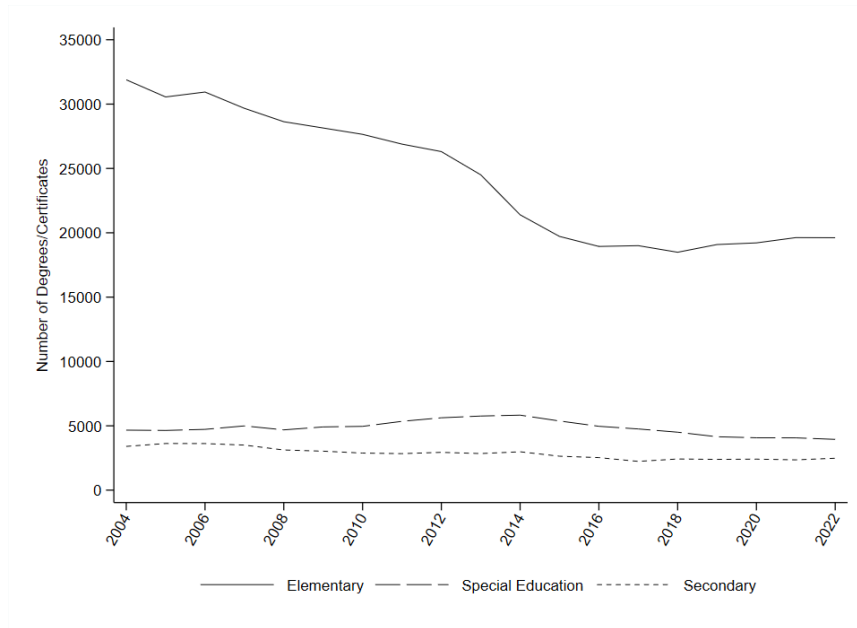
Notes.—Child care-related degrees include Early Childhood Education and Teaching (referred to as “ECE” in the figures) and Child Development. All figures are based on public four-year colleges and universities.

**Figure 11:** Education Degrees Awarded by Public Four-Year Colleges and Universities

**(a)** Share Offering Bachelor's Degrees



**(b)** Number of Bachelor's Degrees Awarded



Source.—Integrated Postsecondary Education Data System (IPEDS), 2004-2022.

Notes.—Education degrees include Elementary, Secondary, and Special Education. All figures are based on public four-year colleges and universities.

**Table 1:** Schooling Attainment and Wages of the Child Care Workforce

	(1)	(2)	(3)	(4)
	Yrs. of Schooling	HS Dropout	BA+	Hourly Wage
<b>Panel A: Child Care Workforce</b>				
All Child Care Workers	13.60	0.066	0.331	13.87
Private Household	12.72	0.137	0.272	14.71
Home-Based	12.69	0.112	0.201	11.63
Center-Based	13.96	0.044	0.374	14.37
<b>Panel B: Other Occupations</b>				
All Other Workers	14.42	0.048	0.466	24.13
School-Based Early Educators	15.65	0.019	0.729	22.12
Personal Care and Service Workers	13.21	0.038	0.209	16.66
Health Services Workers	15.47	0.008	0.582	33.37

Source.—American Community Survey (ACS), 2021-2022

Notes.—The sample includes women ages 30 to 59 who worked more than 26 weeks in the previous year. Column (1) reports the average years of schooling attained for each occupational category. Columns (2) and (3) report the share of workers with no more than 11 years of schooling (i.e., high school dropouts) and the share of workers with at least 16 years of schooling (i.e., bachelor's degree or more), respectively. Column (4) reports the median hourly wage. All analyses are weighted using the ACS person weight.

Table 2: Literacy and Numeracy Skills of the Child Care Workforce

	Literacy Skills				Numeracy Skills			
	Score (1a)	20th (1b)	80th (1c)	Rank (1d)	Score (2a)	20th (2b)	80th (2c)	Rank (2d)
<b>Panel A: Child Care Workforce and Other Respondents</b>								
Child Care Workers	263	0.140	0.186	—	246	0.310	0.169	—
All Other Workers	280	0.151	0.249	36	268	0.145	0.254	35
Non-Workers	255	0.287	0.126	58	238	0.291	0.126	58
<b>Panel B: Other Teachers</b>								
School-Based Early Educators	279	0.022	0.118	23	250	0.116	0.091	40
Elementary School Teachers	299	0.018	0.374	18	286	0.00	0.361	17
Secondary School Teachers	314	0.014	0.508	9	322	0.034	0.576	7
Special Education Teachers	293	0.039	0.299	23	282	0.093	0.228	26
<b>Panel C: Select Service-Based Occupations</b>								
Personal Services	260	0.237	0.129	52	244	0.256	0.115	51
Sales	268	0.189	0.179	49	252	0.198	0.157	48
Protective Services	279	0.150	0.175	38	266	0.191	0.214	38
Health Associates	276	0.126	0.206	36	257	0.153	0.195	37
Health Care Professionals	298	0.076	0.362	22	280	0.067	0.314	23
Customer Service Clerks	282	0.086	0.229	33	262	0.109	0.170	39

Source.—Program for the International Assessment of Adult Competencies (PIAAC), 2012, 2014, and 2017  
Notes.—All analyses are based on a sample of individuals ages 20 and over. Columns (1a) and (2a) report the median literacy and numeracy test scores, respectively, for each occupational category. Columns (1b) and (2b) report the share of individuals scoring in the bottom quintile of the literacy and numeracy test score distributions, respectively. Columns (1c) and (2c) report the share of individuals scoring in the top quintile of the literacy and numeracy test score distribution, respectively. Columns (1d) and (2d) report the percentile position of median literacy and numeracy scores, respectively, for child care workers within the distribution of those in a given occupational category. All analyses are weighted using the final full sample weight.

**Table 3:** Literacy and Numeracy Skills of Those Majoring in Child Care-Related Fields

	Literacy Skills		Numeracy Skills	
	Score (1a)	Rank (1b)	Score (2a)	Rank (2b)
<b>Panel A: Majors in Child Care-Related Fields</b>				
All Child Care Majors	278	—	240	—
<b>Panel B: Majors in Other Fields</b>				
Education Majors	296	35	282	15
All Other Majors	289	41	278	24
<b>Panel C: All Workers</b>				
All Workers	280	48	268	31
<b>Panel D: Majors in Child Care-Related Fields by Occupation</b>				
Child Care Workers	278	48	236	29
Non-Child Care Workers	282	51	272	54
Non-Workers	275	45	224	22

Source.—Program for the International Assessment of Adult Competencies (PIAAC), 2012, 2014, and 2017

Notes.—Columns (1a) and (2a) report median literacy and numeracy test scores, respectively, for those in each major or occupational category. Columns (1b) and (2b) report the percentile position of median literacy and numeracy scores, respectively, of those majoring in child care-related fields within the distribution of individuals in a given major or occupational category. A child care-related major is defined as the receipt of a post-secondary certificate or degree in ECE and Teaching, Education/Teaching of Individuals in Early Childhood Special Education Programs, Child Development, Child Care and Support Services Management, or Child Care Provider/Assistant. An education major is defined as a certificate or degree in Elementary, Secondary, or Special Education. All analyses are weighted using the final full sample weight.

**Table 4:** Post-Secondary Majors of Child Care Workers

	N	%	Lit 20	Num 20	Lit 80	Num 80
	(1)	(2)	(3)	(4)	(5)	(6)
Early Childhood Education	7	0.106	4/7	4/7	0/7	0/7
Elementary Education	3	0.061	0/3	0/3	0/3	1/3
General Studies	3	0.046	2/3	2/3	0/3	0/3
Psychology	3	0.048	0/3	0/3	1/3	1/3
Sociology	3	0.087	1/3	0/3	0/3	0/3
Business Admin.	3	0.028	0/3	0/3	2/3	2/3
Secretarial Science	3	0.067	1/3	0/3	0/3	0/3
Education	2	0.026	2/2	1/2	0/2	0/2
Child Development	2	0.035	0/2	0/2	1/2	1/2
Biology	2	0.026	1/2	1/2	0/2	0/2
Dental Assistant	2	0.042	0/2	1/2	1/2	1/2
Public Administration	1	0.038	No	No	No	No
Health Services	1	0.000	No	No	No	No
Communications	1	0.015	No	No	No	No
Journalism	1	0.002	Yes	Yes	No	No
Physical Education	1	0.023	Yes	Yes	No	No
Teaching Assistant	1	0.023	Yes	Yes	No	No
Education, Other	1	0.000	Yes	Yes	No	No
Computer Technology	1	0.006	No	No	No	No
Paralegal	1	0.026	No	No	No	No
Liberal Arts/Sciences	1	0.014	No	No	No	No
Marine Biology	1	0.039	No	No	No	No
Mathematics	1	0.018	No	No	Yes	No
Medieval Studies	1	0.021	No	No	No	No
Health Education	1	0.019	No	No	No	No
National Security	1	0.010	Yes	No	No	Yes
Computer Installation	1	0.018	No	Yes	No	No
Commercial Photography	1	0.008	Yes	Yes	No	No
Medical Assistant	1	0.006	No	No	No	No
Music Therapy	1	0.014	No	No	Yes	Yes
Clinical Nutrition	1	0.043	No	No	Yes	No
Business	1	0.017	Yes	Yes	No	No
Accounting	1	0.021	No	No	Yes	No
Real Estate	1	0.001	No	No	No	No
History	1	0.021	No	No	No	No
Radiology Residency	1	0.000	No	No	No	No
<b>All Majors</b>	<b>58</b>	<b>1.0</b>	<b>0.282</b>	<b>0.262</b>	<b>0.166</b>	<b>0.131</b>

Source.—Program for the International Assessment of Adult Competencies (PIAAC), 2012, 2014, and 2017

Notes.—Column (1) reports the number of child care workers who obtained each listed post-secondary degree, while column (2) reports the weighted percent of child care workers with each listed degree. Column (3) provides information on the workers whose literacy score is in the bottom quintile of the test score distribution for their relevant two-digit CIP major. For majors obtained by more than one child care worker, the column presents the number of workers scoring in the bottom quintile. For majors obtained by one child care worker, the column notes whether that individual scored in the bottom quintile. Column (4) presents the analogous information for the numeracy test. Columns (5) and (6) report the analogous information for those scoring in the top quintile of the literacy and numeracy distributions, respectively. The bottom row presents summary information for all 58 child care workers with a post-secondary degree. All analyses are weighted using the final full sample weight.

**Table 5:** High-Skilled Labor Market Opportunities and Child Care Employment Decisions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CC Work	CC Work	CC Work	CC Work	CC Work	Private HH	Home	Center
High-Skilled Employment Share	-0.016** (0.008)	—	-0.017** (0.008)	0.107*** (0.026)	0.017 (0.015)	-0.005** (0.002)	-0.009** (0.004)	-0.003 (0.006)
High-Skilled Wage Differential	—	-0.005*** (0.001)	-0.005*** (0.001)	0.028*** (0.006)	0.014*** (0.003)	-0.000 (0.000)	0.001* (0.001)	-0.005*** (0.001)
Sample	14+ Yrs.	14+ Yrs.	14+ Yrs.	<=11 Yrs.	12 Yrs.	14+ Yrs.	14+ Yrs.	14+ Yrs.
Outcome Mean	0.014	0.014	0.014	0.023	0.020	0.001	0.003	0.010
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

Notes.—This table presents estimates from regressions of a binary indicator of employment in the child care sector on two key variables: the share of women employed in high-skilled occupations and the log ratio of the hourly wage for women in high-skilled occupations to the hourly wage of child care workers. High-skilled occupations are those whose workers are in the top quintile of (years of) schooling attainment for all occupations. Both variables are calculated in birth cohort  $\times$  state cells. The outcome in columns (1) through (5) is a binary indicator for employment in the child care sector, while the outcomes in columns (6), (7), and (8) are binary indicators for employment in the private household, home-based, and center-based child care sectors, respectively. The sample in all models includes women ages 30 to 59 who worked more than 26 weeks in the previous year. The sample in columns (1), (2), (3), (6), (7), and (8) is further limited to those with 14 or more years of schooling. The sample in column (4) is limited to those with 11 or fewer years of schooling, while the sample in column (5) is limited to those with 12 years of schooling. All regressions include controls for age, age-squared, marital status, non-white, immigrant, years of schooling, number of children, urban residence, birth cohort fixed effects, and state fixed effects. All analyses are weighted using the Census/ACS person weight. Standard errors are clustered in birth cohort  $\times$  state cells. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



**Table 6: High-Skilled Labor Market Opportunities and the Schooling Attainment of Child Care Workers**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sch. Yrs.	Sch. Yrs.	Sch. Yrs.	<=11 Yrs.	14+ Yrs.	16+ Yrs.	Sch. Yrs.	Sch. Yrs.	Sch. Yrs.
High-Skilled Employment Share	-3.700*** (1.049)	—	-4.014*** (1.003)	0.320*** (0.105)	-0.156 (0.171)	-0.348** (0.152)	-5.726* (3.289)	-2.006 (1.316)	-3.653*** (1.207)
High-Skilled Wage Differential	—	-0.993*** (0.206)	-1.034*** (0.200)	0.077*** (0.022)	-0.178*** (0.031)	-0.151*** (0.029)	-1.389** (0.546)	-0.244 (0.253)	-1.038*** (0.226)
Sample	CC Work	CC Work	CC Work	CC Work	CC Work	CC Work	Private HH	Home	Center
Outcome Mean	13.20	13.20	13.20	0.087	0.371	0.250	12.37	12.48	13.64
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

Notes.—This table presents estimates from regressions of child care workers' schooling attainment on two key variables: the share of women employed in high-skilled occupations and the log ratio of the hourly wage for women in high-skilled occupations to the hourly wage of child care workers. High-skilled occupations are those whose workers are in the top quintile of (years of) schooling attainment for all occupations. Both variables are calculated in birth cohort  $\times$  state cells. The outcome in columns (1), (2), (3), (7), (8), and (9) is years of schooling attainment; the outcome in column (4) is a binary indicator equal to one if years of schooling is 11 or fewer; the outcome in column (5) is a binary indicator equal to one if years of schooling is 14 or more; and the outcome in column (6) is a binary indicator equal to one if years of schooling is 16 or more. The sample in all models includes women ages 30 to 59 who worked more than 26 weeks in the previous year. The sample in columns (1) through (6) is further limited to all child care workers, while the sample in columns (7), (8), and (9) are limited to those employed in the private household, home-based, and center-based child care sectors, respectively. All regressions include controls for age, age-squared, marital status, non-white, immigrant, number of children, urban residence, birth cohort fixed effects, and state fixed effects. All analyses are weighted using the Census/ACS person weight. Standard errors are clustered in birth cohort  $\times$  state cells. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## A Appendix Figures and Tables

**Table A1:** Select Summary Statistics for Child Care Workers and All Other Employed Women

	Married		Non-White		Immigrant		No. Children	
	CC (1a)	Other (1b)	CC (2a)	Other (2b)	CC (3a)	Other (3b)	CC (4a)	Other (4b)
1930-1934 Birth Cohort	0.688	0.685	0.286	0.181	0.078	0.080	1.12	0.89
1935-1939 Birth Cohort	0.752	0.696	0.269	0.193	0.073	0.089	1.44	1.14
1940-1944 Birth Cohort	0.710	0.675	0.286	0.196	0.126	0.089	1.13	1.06
1945-1949 Birth Cohort	0.675	0.645	0.339	0.209	0.174	0.098	0.84	0.73
1950-1954 Birth Cohort	0.661	0.638	0.380	0.235	0.201	0.114	0.73	0.59
1955-1959 Birth Cohort	0.650	0.634	0.422	0.261	0.233	0.129	0.94	0.71
1960-1964 Birth Cohort	0.646	0.627	0.439	0.298	0.248	0.153	1.14	0.88
1965-1969 Birth Cohort	0.660	0.623	0.440	0.346	0.257	0.182	1.47	1.14
1970-1974 Birth Cohort	0.645	0.615	0.430	0.386	0.240	0.197	1.70	1.34
1975-1979 Birth Cohort	0.597	0.593	0.428	0.409	0.208	0.195	1.75	1.41
1980-1984 Birth Cohort	0.564	0.564	0.434	0.415	0.185	0.172	1.61	1.35
1985-1989 Birth Cohort	0.516	0.523	0.431	0.423	0.142	0.154	1.41	1.10

Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

Notes.—The sample includes women ages 30 to 59 who worked more than 26 weeks in the previous year. “CC” indicates the subset of child care workers, while “Other” indicates the subset of all other employed women. The columns report the share of married workers, share of non-white workers, share of immigrant workers, and the number of children within the family. All analyses are weighted using the Census/ACS person weight.

**Table A2:** Additional Estimates of the Effect of Labor Market Opportunities on Child Care Workers

	(1)	(2)	(3)	(4)
	CC Work	CC Work	Sch. Yrs.	Sch. Yrs.
High-Skilled Employment Share	-0.020** (0.008)	-0.013* (0.008)	-4.138*** (0.993)	-3.166*** (0.946)
Low-Skilled Wage Differential	0.002 (0.003)	—	0.818** (0.410)	—
Medium-Skilled Wage Differential	0.001 (0.004)	—	-0.792 (0.543)	—
High-Skilled Wage Differential	-0.007** (0.001)	—	-1.000** (0.420)	—
Child Care Wage	—	0.005*** (0.001)	—	1.060*** (0.207)
Sample	14+ Yrs.	14+ Yrs.	CC Work	CC Work
Outcome Mean	0.014	0.014	13.20	13.20
Demographic Controls	Yes	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes

Source.—U.S. Decennial Census, 1980-2000 and American Community Survey (ACS), 2005-2022.

Notes.—This table presents estimates from regressions of a binary indicator of employment in the child care sector as well as regressions of child care workers' schooling attainment on the share of women employed in high-skilled occupations and the log ratio of the hourly wage for women in various occupations to the hourly wage of child care workers. Low-skilled occupations are those whose workers are in the bottom quintile of (years of) schooling attainment for all occupations. Medium-skilled occupations are those whose workers are in the middle quintile of schooling attainment. High-skilled occupations are those whose workers are in the top quintile of schooling attainment. All variables are calculated in birth cohort  $\times$  state cells. The outcome in columns (1) and (2) is a binary indicator for employment in the child care sector, and the outcome in columns (3) and (4) is years of schooling. The sample in all models includes women ages 30 to 59 who worked more than 26 weeks in the previous year. The sample in columns (1) and (2) is further limited to those with 14 or more years of schooling. The sample in columns (3) and (4) is limited to all child care workers. All regressions include controls for age, age-squared, marital status, non-white, immigrant, years of schooling [columns (1) and (2) only], number of children, urban residence, birth cohort fixed effects, and state fixed effects. All analyses are weighted using the Census/ACS person weight. Standard errors are clustered in birth cohort  $\times$  state cells. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .