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DISCUSSION PAPER SERIES

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ABSTRACT

Revisiting Occupational Segregation and the Valuation of Women's Work*

While population ageing increases the demand for care work, new technologies, including AI, reinforce the importance of human interaction, with recent research finding significant wage premiums for social skills. Against this background, we investigate two factors behind the gender wage gap: occupational gender segregation and lower pay in female-dominated occupations, especially care work, where social skills are central. Using 1972-2024 CPS data, we show that occupational gender segregation remains pronounced in the United States, with many care occupations remaining female-dominated. This continues to correlate with lower wages. Conditional on observable characteristics, a 1 percentage point increase in the occupational share of women during 2015-24 was associated with a wage decrease of 0.22 percent for women and 0.20 percent for men. We then analyze whether returns to social skills are distorted in the care sector, where we hypothesize that the wage returns on workers' performance are lower due to the public-goods aspect of care work. Based on combined CPS and O*Net data, we investigate occupation-level skills returns for 2015-24. They are indeed insignificant for care workers but sizeable for business services workers.

JEL Classification: H41, J16, J21, J24, J31

Keywords: occupational gender segregation, undervaluation of women's work, future of work, care work, returns to skills, social skills, new technologies and AI, gender wage gap

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1. Introduction

The U.S. labor market has been characterized by high levels of occupational gender segregation. After occupations had become more gender integrated for at least three decades, further progress stagnated or at least slowed from the mid-1990s onward (Blau, Brummund, and Liu 2013; Blau 2025; England, Levine, and Mishel 2020, Hegewisch et al. 2010). Occupational gender segregation matters economically because wages for both women and men have traditionally been lower in occupations with greater shares of women (Blau and Kahn 2017; Forster et al. 2020; Hegewisch and Hartmann 2014; Olivetti et al. 2024). Female-dominated care work is a pertinent example (e.g., Folbre, Gautham, and Smith 2023). Such undervaluation of female-dominated work is consistent with the view that, while individuals' skills are key for their labor market success, the value that markets and societies attach to skills also depends on who possesses those skills and what is being produced (ILO 2023; Osterman et al. 2022).

In the coming decades, population aging is likely to further increase the demand for female-dominated care work at the same time as the demand for male-dominated work in the area of information technology is expected to rise (see ILO forthcoming). There are two alternative scenarios for the impact of these trends on gender equality in the labor market. The first focuses on the relative stability of occupational segregation and the undervaluation of skills associated with women's work, suggesting that it is unlikely that the labor market will become more equal for women and men. A second scenario, however, is suggested by research highlighting the increasing returns to social skills and human interaction (Deming 2017, among others) and a competitive advantage for women because women are more likely to employ social skills (Cortes, Jaimovich, and Siu 2024; Cortés et al. 2024). In the era of AI, social skills will gain even greater recognition, to the extent that the automation of certain cognitive tasks shifts workers' time use to human interaction, which cannot be automated (Lee et al. 2025; Shao et al. 2025). Taken together, these latter analyses suggest that gender inequality in wages could decline further as a result of market forces, whereas the first scenario would suggest that absent major change, gender inequality will continue if not worsen.

Against this background, our analysis proceeds three-fold. First, we examine recent trends in occupational segregation by calculating the index of dissimilarity at the detailed occupational level and highlighting developments in selected occupations for 1972 to 2024. Second, we examine the economic significance of occupational segregation by relating individuals' annual wages to the share of women working in their occupation. In these two parts, we build on our earlier work with Jeffrey Hayes and Heidi Hartmann (Hegewisch et al. 2010; see also Hegewisch and Liepmann 2013). Third, we use a skills-based approach and compare the occupation-level remuneration of social skills, as well as cognitive and manual skills, in female-dominated care work and more gender-balanced business services, focussing on years 2015 to 2024. As discussed below, this analysis extends Folbre, Gautham, and Smith (2023) and Pietrykowski (2017).

Using harmonized data from the March Annual Social and Economic Supplement of the Current Population Survey (CPS) (Flood et al. 2024), we find that after stagnating from the mid-1990s onward, occupational gender segregation started to decline again from 2010 onward, albeit at a modest pace. There was a more notable further decline after 2020, associated with the COVID-19–related recession. In 2024, the index of dissimilarity equalled 46.8 (compared with 51.9 and 2010 and 51.8 in 2000), which represents the share of

women or men who would have to switch occupations for their share in each occupation to correspond to their share in overall employment. Many care occupations, in particular, continue to employ large shares of women, with only small increases in male employment in more recent years. In contrast, many managerial and professional occupations – often in the broadly understood area of business services- have witnessed a marked increase in female employment shares over time. At the other side of the spectrum, more technical occupations in construction, manufacturing, and IT-related fields remain male-dominated.

We subsequently show that the relationship between the occupational share of women and workers' annual wages continues to hold. Controlling for educational attainment, age, working time, and general wage differences between women and men, among other characteristics, we find that a 1 percentage point increase in the occupational share of women is associated with a 0.21 percent decline in annual wages for the pooled years 2015 to 2024. The same estimated decline is similar for female workers (-0.22 percent) and male workers (-0.20 percent). Over the decades studied, the negative association between wages and the share of women working in an occupation has remained remarkably unchanged. Analyzed for different educational groups, the relationship has become more negative for college-educated workers, while becoming slightly less pronounced for workers without a college degree.

To explore occupation-level skills returns as one mechanism underlying lower wages for female-dominated work, we then focus on the returns to skills in the care sector compared to business services. The care sector comprises diverse health, education, and social assistance occupations with varying entry requirements and wage levels. During years 2015 to 2024, 75.3 percent of care workers were female and the sector accounted for a large share of total female employment (41.1 percent). Business services – defined as comprising finance, insurance, real estate, professional, scientific and management industries, and public administration- are instead more gender balanced (46.8 percent were female and the sector accounted for 25.6 percent of total female employment). Because the care sector and the business services sector have similar educational requirements but different gender compositions, comparing the two yields informative insights into the broader theme of the valuation of women's work (Folbre et al. 2023).

We are particularly interested in the returns to social skills because the labor economics literature stresses their growing importance: In Deming's (2017) model, social skills improve workers' productivity in team contexts, resulting in higher wages for more socially skilled workers. We hypothesize, however, that this positive effect of social skill use on wages is distorted for care workers because of a number of well-established factors leading to the undervaluation of care work. This includes its characteristic as a public good, which makes it more difficult for care workers to capture the returns to their performance (Dwyer 2013; England 2005a; England et al. 2002; Folbre et al. 2023).

To test this hypothesis, we merge the CPS data with O*Net data (Carpenter et al. 2022), focusing on pooled years 2015 to 2024. Following Deming (2017), we construct a social skill index based on occupational skill requirements for coordination of action, negotiation, persuasion, and social perceptiveness. We additionally account for cognitive skills (as in Acemoglu and Autor 2011) and manual skills (as in Cortes, Jaimovich, and Siu 2024). We then regress annual wages on these skill variables interacted with different sector indicators and include the same control variables as in the previous wage analysis. Consistent with

our hypothesis, we find that a one standard-deviation increase in occupation-level social skill use increases annual wages in care services by 2.3 percent, but the effect is statistically insignificant. The same effect is precisely estimated and around 2.5 times larger (at 5.8 percent) for business services. The pattern is remarkably similar for women and men, workers with different levels of educational attainment, most race and ethnicity groups, and for the individual social skills components of the index. In contrast, cognitive skills are associated with relatively large and statistically significant wage returns for both care services and business services. Manual skills are associated with smaller and less statistically significant wage returns in both sectors. Therefore, social rather than cognitive and manual skills cause the differential occupation-level skills returns between care services and business services. This finding is robust in accounting for skills bundles, specifically the joined occupational requirements of social and cognitive as well as social and manual skills.

Our paper relates to the already mentioned studies that investigate trends in occupational gender segregation until 2009 (Blau et al. 2013; Hegewisch et al. 2010) and, at the more aggregated level, until 2017 (England et al. 2020). We replicate the main conclusions of these studies and provide an updated analysis of occupational segregation until 2024, analyzing whether within or between-occupational effects drive the changes, presenting results for different educational levels and race and ethnicity groups, and tracking the relationship between female occupational shares and wages.

Our main contribution is to analyze how differential returns to skills help explain the undervaluation of female-dominated work, using the example of the care sector. A rich literature investigates the low remuneration of care work compared to other type of work (e.g., England and Folbre 1999; England, Budig, and Folbre 2002; England 2005; Dwyer 2013; ILO 2018; Osterman et al. 2022; Folbre, Gautham, and Smith 2023). Folbre, Gautham, and Smith (2023) contrast care work with business services and find that the former pays significantly less despite similar levels of educational attainment. We apply and extend these authors' approach to study skills returns. In this sense, our analysis is inspired by wage setting contexts aimed at achieving comparable worth, i.e., equal pay for work of equal value, that have long recognized the importance of accounting for skills in addition to educational attainment and other job demands (see for example Wage Equity Study Team 2023). Our skills analysis also complements Pietrykowski (2017), who shows that caring and assisting skills in the United States are associated with a wage penalty in lower-wage occupations and a wage premium in higher-wage, male-dominated occupations. We instead investigate the returns to social skills in different sectors and occupations that encompass a range of wage levels.

Our skills analysis is likewise motivated by the growing literature that stresses the importance of social skills (Deming 2017; Deming and Kahn 2018; Weinberger 2014). Several studies analyze these developments from a gender perspective, demonstrating that the increased demand for social skills has enhanced women's labor market prospects. Black and Spitz-Oener (2010) show for Germany that women's greater use of social (and analytical) skills correlated with a narrowing of the gender wage gap between 1979 and 1999. For the United States, Borghans, Ter Weel, and Weinberg (2014) find that the rising returns to social skills mirror the closing of the gender wage gap up until 1992. Cortes, Jaimovich, and Siu (2024) link the growing reliance on social skills in high-wage occupations to more women entering such occupations between 1980 and 2016. Finally, Cortés et al. (2024) provide causal estimates that women in the United

States were better able to adapt to technological change than men, as between 1980 and 2017 women moved into higher-paying occupations that require social (and abstract) tasks and thus improved their relative wages.

We complement this literature by showing that the occupation-level returns to social skills are not uniform across the labor market. Our findings suggest that the previously mentioned studies capture longer-term shifts towards greater gender integration of initially male-dominated occupations that narrowed the gender wage gap. In contrast, workers in more female-dominated care work do not benefit to the same extent from the occupational returns to social skills. In combination with the slow shift towards greater gender integration of occupations in recent years, this makes a rapid closing of the remaining gender wage gap unlikely.

In the following Section 2, we describe our data, main variables, and sample. Section 3 presents trends in occupational gender segregation, followed by our analysis of the link between female employment shares and occupational wages in Section 4. Section 5 includes our analysis of sectoral wage returns to social skills as well as cognitive and manual skills. Section 6 summarizes and briefly discusses broader implications for the expected evolution of the gender wage gap.

2. Data, Main Variables, and Sample Definition

We analyze data from the March Annual Social and Economic Supplement (ASEC) of the CPS, which is representative of the civilian, noninstitutionalized population. It provides cross-sectional, annual information over a long timeframe, covering demographic and personal characteristics and comprehensive employment outcomes, such as an individual's employment status, occupation, and wages in the previous calendar year. We use the harmonized version of these data as provided by IPUMS (Flood et al. 2024) and focus on years 1972 to 2024.

An advantage of the CPS data relates to the availability of a harmonized classification of occupations, which allows us to assess longer-term, annual trends in occupational gender segregation with the same underlying data source. Specifically, we use the detailed occupational variable that is based on the 2010 Census Bureau's ACS classification standard and was harmonized across time by Flood et al. (2024). These researchers achieved the most consistent occupational categories across surveys, grouping more detailed occupations together when these were not separately elicited in previous years. They confirmed the robustness of their groupings through a trends analysis of key occupational outcomes (IPUMS 2025).

Our analysis considers employed individuals in the civilian labor force, aged 25 to 64. We disregard very small occupational categories with less than 20 observations in a given year, which leads us to exclude 1.4 per cent of the initial sample. The final sample consists of around 3,250,000 observations, employed in on average 294 different occupations per year. We present summary statistics for this sample in Appendix Table A.1. Throughout the analysis, we weight results by ASEC person weights.

To classify occupational skills requirements, we merged the CPS data with O*Net data. We rely on the 26.1 version of O*Net from November 2021 as provided by Carpenter et al. (2022), because it contains a crosswalk between the highly detailed occupational classification of O*Net and the 2010 Census Bureau's ACS occupational classification standard. We employ this crosswalk with minor modifications.[2] For our analysis of occupational skills returns, we restrict the attention to years 2015 to 2024, because the 2021 O*Net skills data is likely inaccurate for earlier years. We focus on social skills but also create measures of cognitive and manual skills. The details of the variable construction are provided in Section 5.

3. Trends in Occupational Gender Segregation

In this section, we show that occupational gender segregation remains widespread, using Duncan and Duncan's (1955) index of dissimilarity as a summary measure for the overall extent of occupational gender segregation in the United States. The index is defined as follows:

$$D = 0.5 * \sum_{j=1}^{J} \left| \frac{M_j}{M} - \frac{W_j}{W} \right| \qquad (1)$$

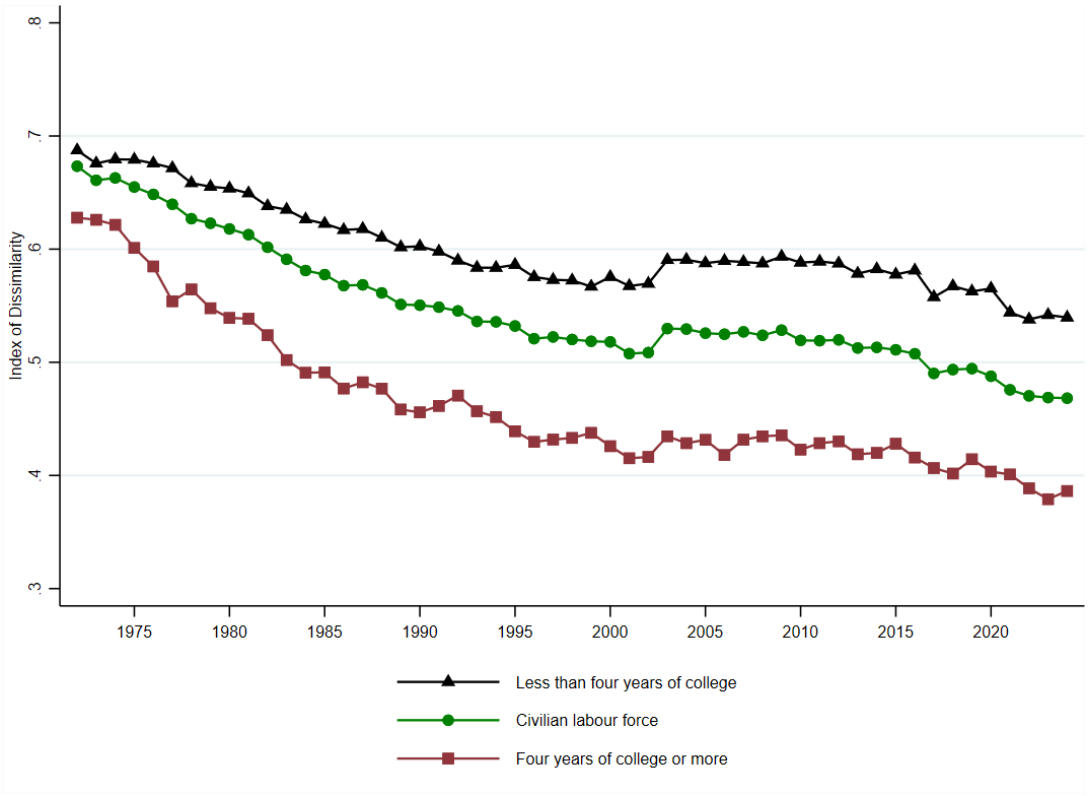
where M_j and W_j are the number of men and women working in a detailed occupation j, respectively, and M and W reflect the male and female population size in the labor market. The index takes the value of zero when the share of women (and men) in each detailed occupation equals the share of women (and men) in total employment (complete gender integration). It takes the value of one when occupations are entirely segregated by gender. Intermediate values indicate the share of women (or men), who would need to change occupations, for all occupations to be fully gender balanced.

In 2024, the value of the index for the civilian labor force aged 25 to 64 was 46.8, indicating that almost half of all employed women and men would have to change occupations for the gender distribution in each occupation to equal that in the overall workforce. While the 2024 value of the index is the lowest measured since 1972, the trends in the index over the last five decades show a substantial change in the pace of occupational gender integration (see Figure 1 and Appendix Table A.2 with the underlying values). In the 1970s to 1990s, the value of the index for the civilian labor force declined steadily, from 67.3 in 1972 to 61.8 in 1980, 55.1 in 1990, and 51.8 in 2000. During the first decade of the 2000s, there was no further progress, and the trend reversed, reaching 53.0 in 2003 and still remaining at 52.8 in 2009, before falling to 51.9 in 2010. From 2010 onwards, the value of the index began to decline again, albeit at a slower pace than in earlier decades, reaching 48.8 in 2020 at the onslaught of the COVID-19-pandemic-related recession, and 46.8 in 2024.[3]

[2] Specifically, we needed to aggregate and cross-walk a few occupations to match the O*Net data with the harmonized occupational variable of Flood et al. (2024).

[3] In Appendix Table A.3, we compare our results to those of Blau, Brummund, and Liu (2013), who stress the importance of using a gender-specific occupational crosswalk. Even independently of the crosswalk methodology, we expect differences in results related to choices of the data, starting year, and underlying occupational codes. There are indeed some nuanced differences: Between 2000 and 2009, Blau, Brummund, and Liu (2013) find a small decline

Figure 1. The occupational index of gender dissimilarity 1972-2024, for all employed individuals and by educational attainment

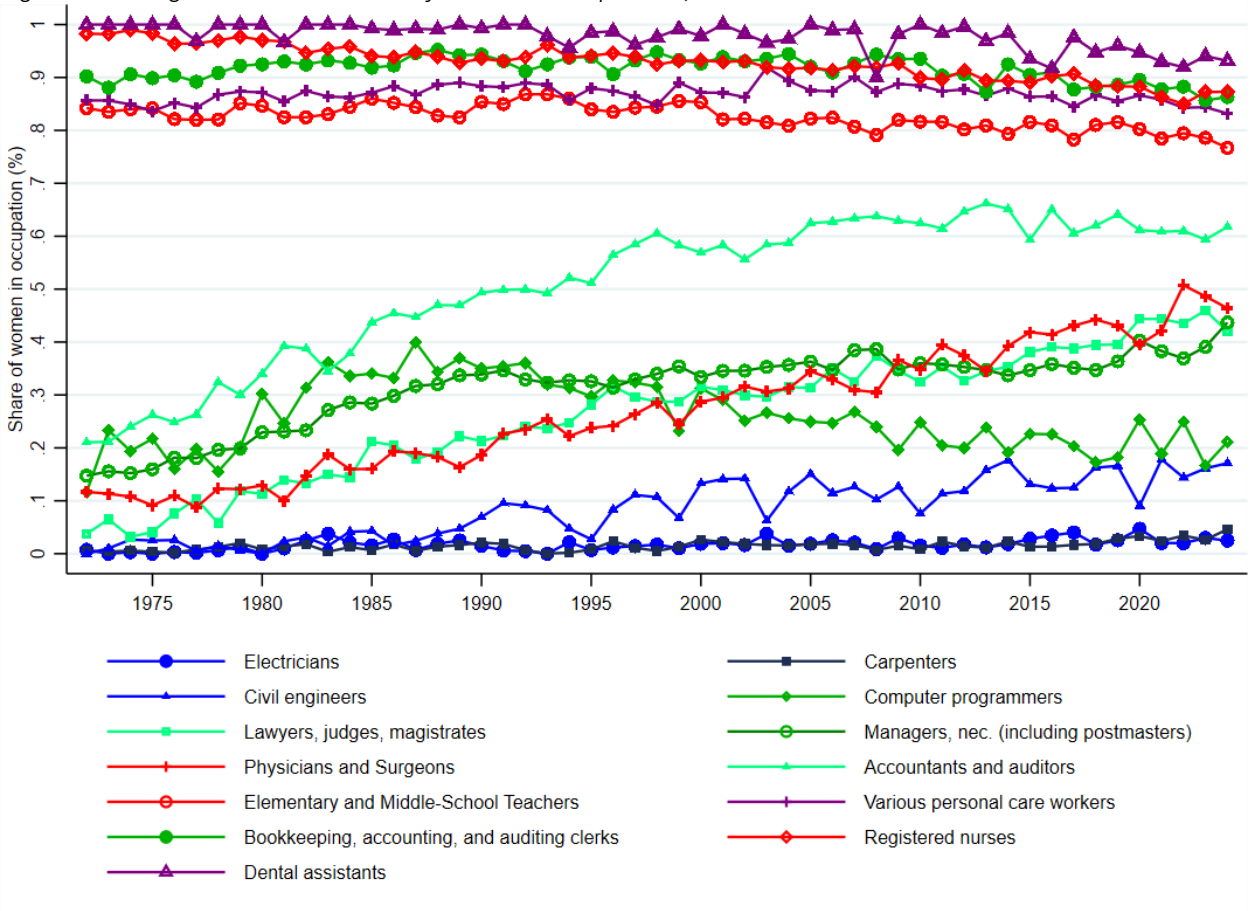


Notes: The Index of Dissimilarity is shown for the civilian labor force and separately for individuals with and without a four-year college degree, for years 1972 to 2024 and ages 25 to 64, weighted by ASEC person weights. Occupations are classified following the Census Bureau's coding scheme from 2010, harmonized by Flood et al. (2024).

There are substantial differences in the level of segregation for individuals with and without a four-year college degree. Segregation is lower for individuals who hold a four-year college degree, with an index value of 38.6 in 2024; compared to an index value of 54.0 in 2024 for individuals without a four-year college degree (Figure 1 and Appendix Table A.2). Between 1972 and 1990, change towards occupational gender integration was stronger for individuals with a four-year college degree, while change occurred at a more modest pace for individuals without college degrees. From the early 1990s onwards until the late 2000s, the pace of change stagnated if not partially reversed for both educational groups. For both groups, the trend towards gender integration continued from 2009 onwards, but the pace of change was slower. 2020 – the onset of the COVID-19-related recession – brought stronger declines in segregation until 2023. This was followed by an increase in segregation in 2024 for individuals with a four-year college degree but not for their counterparts without a college degree (Figure 1).

in segregation by 1 percentage point, while we find a small increase by 0.9 percentage points. Reassuringly, however, we replicate their finding that "segregation by sex declined substantially but at a diminishing pace over the decades". In addition, we similarly find that segregation decreases in educational attainment.

Figure 2. Change in women's share of selected occupations, 1972 to 2024



Notes: The graph shows the evolution of the share of women in selected occupations, including occupations where the majority of workers has a four-year college degree ("accountants and auditors", "civil engineers", "computer programmers", "elementary and middle-school teachers", "physicians and surgeons", and "registered nurses"), and occupations where the majority of workers does not hold a four-year college degree ("dental assistants", "carpenters", "electricians", "bookkeeping, accounting, and auditing clerks", and "various personal care workers"). "Various personal care workers" combines "nursing, psychiatric, and home health aides", "medical assistants and other healthcare support occupations", "personal care aides", and "other personal care and service workers".

Figure 2 illustrates that the trends towards integration have not been uniform across occupations, by highlighting developments within specific care, business services, and technical occupations. To begin with, many of the most female-dominated occupations belong to the domain of care work, which leads us to focus on care work in our analysis below (Section 5). This includes occupations such as "elementary and middle school teachers" and "registered nurses", which typically require a college degree, and which have historically been open to women when most other professional occupations were still closed to them. Female-dominated care work also includes occupations not requiring a college degree, such as "dental assistants" and "various personal care workers". In more recent years, consistent with the modest decline in overall gender segregation discussed before, some of these care occupations witnessed small declines in women's predominance.

Many professional and managerial occupations in the (broadly understood) area of business services have a more even gender composition, which makes it interesting to compare these occupations to care work, as we do in Section 5. They include, for example, "accountants and auditors" and "lawyers, judges, and magistrates" (two occupations requiring a college degree) and "not otherwise classified managers, including postmasters", a large occupation in which the majority of workers do not hold a college degree. At the same time, there are examples of care occupations, such as "physicians and surgeons", that have achieved a similar gender balance (Figure 2). Historically, these professional and managerial occupations were closed to women. Women's greater entry to these occupations coincided with the strong expansion of female labor force participation in the 1970s to 1990s, and the dismantling of legal and institutional barriers to women's education and employment in such fields (see Bailey et al. 2012; Goldin 2006).

At the other end of the spectrum are predominantly male technical and trade occupations, exemplified by the strongly male-dominated occupations of "carpenters" and "electricians" and by the only slightly more gender-integrated occupations of "engineers" and "computer programmers" (Figure 2). As England (2010; 2011) argues, lower pay in female-dominated occupations provided incentives for women to move into male-dominated occupations, while it did not incentivize men to move into female-dominated occupations. Yet potentially hostile treatment in male-dominated technical and trade jobs, particularly those requiring on-the-job training, meant that women were more likely to move into jobs that were accessible through college education. Professional and managerial occupations, moreover, were especially accessible to women because they more closely resembled the lower-requirement clerical support occupations (such as "bookkeeping, accounting, and auditing clerks" in Figure 2) often held by women in their mothers' generation. Women entering such occupations thus conformed with beliefs in gender essentialism or the innate traits of women and men.

Returning to aggregate occupational segregation, in Appendix Figure A.1 we show that occupational gender segregation also pertains to different race and ethnicity groups. It is highest between female and male Hispanic workers, followed by Black workers, White workers, and finally Asians and Pacific Islanders. The corresponding values for the index of dissimilarity in 2024 amounted to 52.7, 52.3, 46.9, and 41.7, respectively. These within-group patterns are related to the finding that gender segregation is lower in occupations requiring at least four years of college (see above); and that Asian workers are most likely, while Hispanic workers least likely, to have college-level education (U.S. Census Bureau 2025). In comparison, segregation by race and ethnicity between women (and, likewise, between men) is lower, although such segregation is substantial, and additionally shows little change since the mid-1990s.[4] England (2005b) notes that such differences between women are largely due to differences in educational attainment, and that women across race and ethnicity groups are similarly concentrated in female-dominated occupations. Dill

[4] In 2024, the index of occupational segregation between Black and White women was 25.4 (compared to 29.5 in 1995), 28.8 between Asian and Pacific Islander women and White women (compared to 31.8 in 1995), and 30.6 between Hispanic and White women (compared to 31.4 in 1995). The index of segregation between men by race and ethnicity is marginally higher than that between women but shows similar levels of stability (see Appendix Figure A2). Del Rio and Alonso-Villar (2015) provide a rich discussion of changes in occupational segregation by gender, race and ethnicity in the United States. See also Branch and Hanley (2014) for an analysis of trends in occupational upgrading and its falling impact on wages for Black women over time.

and Duffy (2022), however, highlight the role of discrimination beyond educational attainment in the overrepresentation of Black women in the lowest paying healthcare segments.

We end this section by decomposing the changes in occupational gender segregation into two parts. A change in the index of occupational gender segregation can be due to a change in the gender composition of individual occupations (the composition effect) or due to different growth rates of occupations with lower or higher gender integration (the occupational mix effect; Blau and Hendricks, 1979). As shown in Table 1, the composition effect was particularly strong in the 1970s and 1980s when women were able to move into previously male-dominated occupations. Even if weaker, the composition effect continued to matter in the four following decades. With one exception, in each decade the mix effect was weaker than the composition effect but also contributed to the decline in gender segregation. The exception was the first decade of the 2000s, the only decade with a positive value for the mix effect. Consistent with findings by Dwyer (2013), this may partly be due to the strong (and polarized) employment growth of female-dominated care occupations. While the composition effect continued to be negative (such that individual occupations became more integrated), because of the strong mix effect the overall result was a marginal increase in gender segregation between 2000 and 2010. From 2010 onwards, the return to a decline in the index of segregation again reflects both growing integration of individual occupations and, though relatively less influential, stronger growth of more integrated occupations.

Table 1: The impact of the composition and mix effects on the Index of Dissimilarity, 1972-2024, selected years

	(1)	(2)	(3)	(4)	(5)	(6)
	Index of Dissimilarity	Change relative to previous year considered	Composition effect	Occupational mix effect	Relevance, composition effect (%)	Relevance, mix effect (%)
1972	67.33					
1980	61.79	-5.54	-5.38	-0.16	0.97	0.03
1990	55.05	-6.74	-5.48	-1.26	0.81	0.19
2000	51.80	-3.25	-2.07	-1.17	0.64	0.36
2010	51.94	0.14	-1.74	1.88	n/a	n/a
2020	48.77	-3.17	-2.12	-1.05	0.67	0.33
2024	46.83	-1.94	-1.77	-0.16	0.91	0.08

Notes: Based on Blau and Hendricks' (1979) decomposition method.

4. Female Employment Shares and Occupational Wages

The high levels of occupational gender segregation shown before have economic consequences for workers, because female-dominated occupations have traditionally paid less (see Blau and Kahn 2017 and Hegewisch and Hartmann 2014; and Esquivel 2017 for international evidence). In this section, we investigate the extent to which this relationship still holds, how it varies by educational attainment, and how it has changed over time.

Since various factors may cause female-dominated occupations to pay less – such as requirements concerning education and experience or hours of work – we control for such factors by running regressions of the following type:

$$\log(w_i) = \beta_0 + \beta_1 share\_women_i + X_i' \beta_2 + \beta_3 female_i + \varepsilon_i \qquad (2).$$

Our outcome variable is total annual wages[5] of an employee i (excluding earnings from self-employment) before taxes. We transform this variable to 2023 values; and exclude zero values and the highest 1 percent. The CPS measures wages for the previous calendar year. Our main explanatory variable, the share of women working in an individual's occupation ($share\_women_i$), is therefore also measured for the previous calendar year. We first analyze pooled data for years 2015 to 2024, before comparing these findings to past trends and considering effect heterogeneity. We cluster standard errors at the level of major occupational groups to allow for common occupational shocks.

Our full set of control variables X_i include, first, year and state fixed effects and indicator variables for metropolitan area or principal city residence. Second, as human capital controls we include indicator variables for educational attainment (high school, some college or an associate's degree, and four years of college or more). Since wages typically increase with experience, we also control for age and its square, noting that age proxies only imperfectly for work experience. Third, annual wages will be lower for women, if their working time is lower than men's. We thus control for the number of working weeks in the previous calendar year, expressed as a variable with six categories. We also control for usual weekly working hours in the previous calendar year and their square.[6] Fourth, we include indicator variables for race and ethnicity, captured by five categories. Finally, female-dominated occupations may merely pay less because women in general earn less than men, and because these occupations, by definition, employ many women. In our most complete specification, we therefore include an indicator variable for being a woman. That way, we identify two separate effects: the residual gender wage gap (β_3) and, our parameter of main interest, the effect of working in an occupation with more women (β_1) for both women and men.

The results in Table 2 confirm the negative wage effect of working in an occupation with more women. As one would expect, the effect becomes smaller with the successive addition of control variables, especially when finally including the gender dummy (column 5). However, even under this most complete

[5] More precisely, these are wages (paid relative to working time) and salaries (paid as a fixed amount per month), which we refer to as "wages" for ease of exposition.

[6] Working weeks are not available as a continuous variable, which is why we control for working weeks and weekly hours rather than transforming annual wages to hourly wages.

specification, a 1 percentage point increase in the occupational female share is associated with a decline in wages by 0.242 log points (0.21 percent). Expressed differently, moving from a male-dominated occupation with 25 percent women to a female-dominated one with 75 percent women, is associated with an average annual wage decrease of 10.75 percent. The magnitude of this effect is economically meaningful, and for women it adds to the general gender wage gap (which is already at 12.7 log points or 11.9 percent after controlling for observable characteristics).

Table 2: Regression of logged wages on occupational shares of women, 2015-2024

	(1)	(2)	(3)	(4)	(5)
	All	All	All	All	All
Occupational female share	-0.434**	-0.442**	-0.370***	-0.365***	-0.242**
	(0.188)	(0.183)	(0.098)	(0.095)	(0.094)
Female					-0.127***
					(0.009)
Constant	11.051***	10.763***	5.298***	5.375***	5.394***
	(0.131)	(0.092)	(0.130)	(0.124)	(0.120)
Basic Controls	NO	YES	YES	YES	YES
Human capital controls	NO	NO	YES	YES	YES
Hours controls	NO	NO	YES	YES	YES
Race and Ethnicity	NO	NO	NO	YES	YES
Gender	NO	NO	NO	NO	YES
Observations	573,030	573,030	573,030	573,030	573,030
R-squared	0.021	0.039	0.466	0.472	0.476

Notes: The table shows regression results for specification (2), covering all workers during 2015-2024. The outcome variable is an employee's logged annual wages (2023 dollars) from the previous calendar year. "Basic controls" include year and state fixed effects, and indicators for metropolitan area or principal city residence. "Human capital controls" account for age and its square (as imperfect proxies for work experience) and educational attainment (high school, some college or associate's degree, four-year college degree). "Hours controls" include weeks worked (six categories) and usual weekly work hours in the previous calendar year and their square. "Race and ethnicity" include fixed effects for five categories and "gender" is a dummy variable for being female. Robust standard errors in parenthesis are clustered at the broader occupational level; ***, and ** denote significance at the 1 and 5 percent levels.

As shown in Table 3, both women and men earn less when working in occupations with more women: Conditional on control variables, a 1 percentage point increase in the occupational female share is associated with a decline in wages by 0.248 log points (0.22 percent) for women and 0.227 log points (0.20 percent) for men. The effects are stronger for workers with college degrees (–0.34 log points or –0.29 percent), compared to –0.17 log points (–0.15 percent) for workers without a college degree. Yet while college-educated workers are more strongly impacted by the wage penalty in female-dominated jobs, non-college educated workers tend to earn lower wages than college-educated workers, regardless of their gender, and thus find it more difficult to make a living wage. In addition, the residual gender wage gap (β_3) is larger for workers without a college degree (see Table 3, columns 3 and 4): conditional on the control variables, women without a college degree earn 17.1 percent less than their male counterparts; compared to 10.5 percent for women with a college degree.

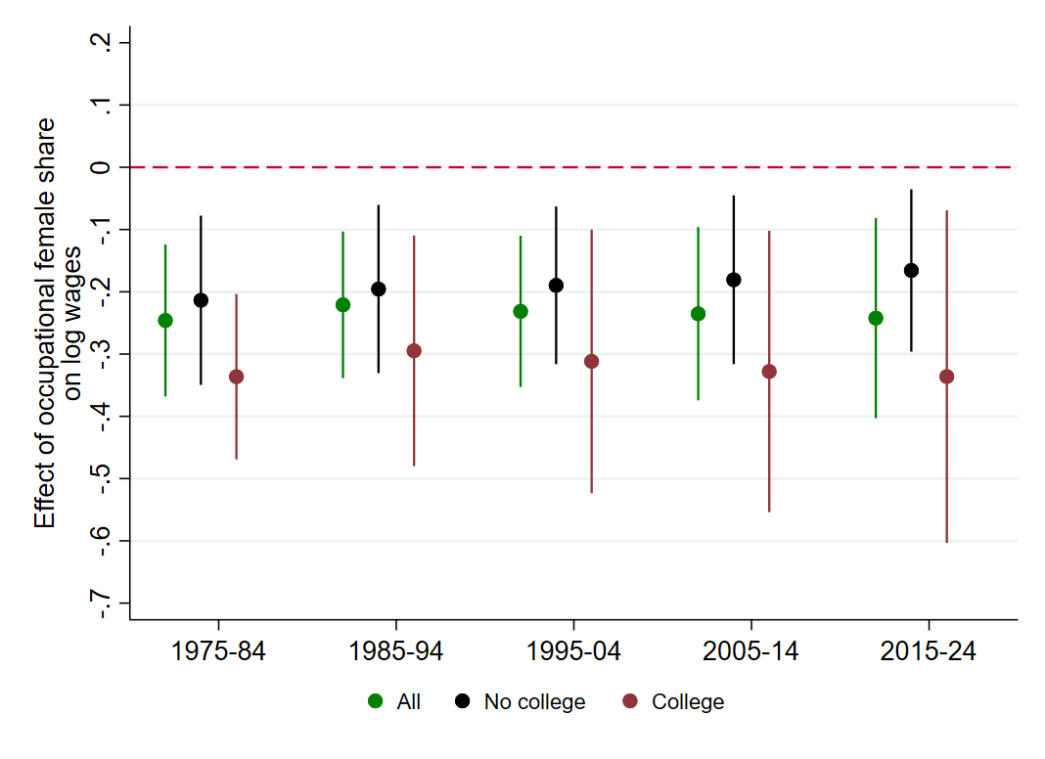
Table 3: Regression of logged wages on occupational shares of women, 2015-2024, by gender and educational attainment

	(1) Women	(2) Men	(3) No college	(4) College
Occupational female share	-0.248*	-0.227**	-0.166**	-0.336**
	(0.144)	(0.091)	(0.076)	(0.156)
Female			-0.158***	-0.100***
			(0.012)	(0.012)
Constant	5.370***	5.303***	5.645***	5.751***
	(0.119)	(0.136)	(0.117)	(0.191)
Basic Controls	YES	YES	YES	YES
Human capital controls	YES	YES	YES	YES, w/o educ.
Hours controls	YES	YES	YES	YES
Race and Ethnicity	YES	YES	YES	YES
Gender	NO	NO	YES	YES
Observations	282,382	290,648	336,059	236,971
R-squared	0.499	0.418	0.450	0.379

Notes: See Table 2.

Finally, we assess the evolution of the effects from 1975 to 2024 by pooling data in 10-year intervals (Figure 3). For all workers combined, the relationship between female occupational shares and wages is very stable over time. While there was a small increase in the point estimates for years 1975 to 1984 compared to years 1985 to 1994, the effect barely changed thereafter (if anything, it became more negative). There is, however, some heterogeneity by educational attainment. For workers without a college degree, point estimates increased slightly, implying that wage penalties associated with high occupational shares of women decreased over time in these occupations. By contrast, the negative relationship between female occupational shares and pay for workers with a four-year college degree became more pronounced from 1985-94 onwards.

Figure 3: Relationship between wages and the occupational share of women, all workers and separately by educational attainment, for different time intervals



Notes: The figure illustrates regression results for β_1 in specification (2) and 90 percent confidence intervals, estimated for all workers and separately by educational attainment, pooling years in five different intervals. All control variables are included (see column (5) in Table 2). Standard errors are clustered at the broader occupational level.

5. The Valuation of Social Skills

The previous sections have highlighted the relative stability of occupational gender segregation, including in large care occupations, and of lower pay in predominantly female occupations. We now turn to investigating underlying reasons for such lower pay, focussing on the remuneration of skills – and social skills[7] in particular– as an explanatory factor that will play an important role in the future of work and, to our knowledge, has not yet been emphasized by prior literature in this context. Technological change means that social skills and human interaction are becoming increasingly important and should command positive wage returns (Deming 2017). In the era of AI, this already ongoing trend is likely to gain in relevance. Based

[7] We will define these skills as in Deming (2017), based on O*Net's skills of coordination of action, negotiation, persuasion, and social perceptiveness (see Section 5.2). We use "social skills" as an umbrella term, noting that other authors refer to "socio-emotional", "people", "soft", or "interpersonal" skills, among others, with variation in how these skills are measured. In supplementary analysis, we thus employ Pietrykowski's (2017) skills variables (i.e., O*Net's skills of assisting and caring, establishing and maintaining interpersonal relationships, and service orientation).

on task assessments by AI experts, for example, Shao et al. (2025) conclude that interpersonal skills will be increasingly demanded by employers, because of the comparatively lower automation potential of these skills. A study on Japanese nursing homes, moreover, showed that AI robots took over some of workers' more arduous tasks related to heavy lifting and information monitoring, while workers could focus more on human interaction (Lee et al. 2025). The increased importance of social skills, however, suggests a puzzle as to why female-dominated work, especially care work, is not remunerated better. Indeed, care work typically requires high levels of social skills. This puzzle interacts with another major future-of-work trend: the expected growth of care work, which already employs many workers, particularly women, in the context of an ageing population with greater care needs. In the following, we investigate this puzzle, studying the occupation-level skills returns to social skills in different sectors.

5.1 Theoretical Considerations and Hypothesis

A rich literature has shown that care wage penalties persist after controlling for observable characteristics, such as educational attainment. In this literature, care work is typically defined as comprising diverse health, education, and social assistance occupations across the wage distribution. Care work is associated with the unpaid labor women have traditionally performed in households, which is argued to be one origin of the care wage penalty (e.g., England and Folbre 1999; England, Budig, and Folbre 2002; England 2005; Dwyer 2013; ILO 2018; Osterman et al. 2022; Folbre, Gautham, and Smith 2023).

The evidence of care wage penalties and the related discourse around the undervaluation of care work are in apparent contradiction with a growing labor economics literature assessing skills returns. Several studies show that social skills have gained in importance and are now crucial for obtaining higher wages in the United States (Weinberger 2014; Deming 2017; Deming and Kahn 2018). The fact that women have entered higher-wage jobs that rely on such skills - consistent with women's integration into different professional and managerial occupations, as exemplified in Section 3 - has decreased the gender wage gap in several high-income countries (Black and Spitz-Oener 2010; Borghans et al. 2014; Cortes et al. 2024; Cortés et al. 2024).

Deming (2017) rationalizes why mastering social skills is beneficial for workers. In his economic model, social skills allow workers to better contribute to teams. As a result of competitive market mechanisms, productivity increases arising from social skill use are passed on to workers through higher wages. Under the assumption that women have comparative advantages in social skills (e.g., Borghans, Ter Weel, and Weinberg 2014; Cortes, Jaimovich, and Siu 2024) or simply use these skills more often, productivity and wage increases should be higher for women. Deming (2017) also argues that social skills yield productivity increases in occupations requiring interactions between workers and customers or workers and clients, providing examples from care services (health care, teaching) and business services (consulting, legal services).

Why then, are wages lower in female-dominated fields, which rely heavily on social skills, such as care work? An important factor is that public good provision is a central element of care work (Dwyer 2013; England 2005a; England et al. 2002). In economic theory, a public good exists whenever its consumption by one person does not preclude its consumption by others. This creates the free-rider problem, which implies that

competitive markets fail to produce the outcomes that are optimal for social welfare. In the absence of political interventions, the public good is then underpaid and underprovided. As England et al. (2002) have first argued, care work creates diffuse social and economic benefits, which, on average, are less central to other types of work. To illustrate this, a good teacher makes their students more productive, with benefits for the students' future employers and customers. If a nursing aide effectively applies measures to prevent the spread of an infectious disease, individuals who escape infection, and the entire health care system, benefit, an effect that was evident during the COVID-19 pandemic (ILO 2023). Finally, if dementia patients are taken care of professionally, the patients' family members may have more time available and may be able to take up paid employment, thereby contributing to the economy. At the same time, at its full cost or value, care services are unaffordable for many potential buyers (e.g., Blau 2001; U.S. Department of the Treasury 2021). Yet public spending, which would be one mechanism to correct for the market inefficiencies associated with public goods, only partially compensates for the provision of care. In many countries, there have been pressures to reduce such spending (e.g., Budig and Misra 2010; Dwyer 2013).

Given the particular features of the care economy, we hypothesize that the effective use of social skills may make care workers more productive, but that the resulting productivity increases are not passed on to care workers in the way they would be under the theoretical framework of perfect competition. Beyond the public goods argument, there are additional, well-established reasons for this hypothesis. First, there is incomplete information regarding the quality of care. It is difficult to measure even the immediate output of care workers, which includes abstract concepts such as an enhanced quality of life, increased life expectancy, self-confident children or better-educated students. The quality of care also depends on the reactions of the care recipients, which are difficult to observe. Incomplete information, together with reduced consumer sovereignty, generates incentives for employers to offer lower care service quality and wages (Folbre and Smith 2017; Folbre et al. 2023). Second, care workers have limited bargaining power. Their comparatively high intrinsic motivation may lead them to accept lower wages (see Besley and Ghatak 2005). Non-professionalized, lower-wage care work is disproportionately performed by racial and ethnic minorities, who on average have more limited bargaining power (Dwyer 2013). There is, moreover, market concentration in health care and education in the United States. Such monopsonistic structures imply that care workers have comparatively fewer options to improve wages by changing employers. This effect is compounded to the extent that female workers are on average less likely to commute for earning higher wages, given care responsibilities for their own families (Allegretto and Graham-Squire 2023; Boushey and Bahn 2019; Folbre et al. 2023; Matsudaira 2014). Third, scholars have emphasized that the perception of skills depends partly on who performs that skill, with work traditionally performed by women often being perceived as less demanding than it is (Osterman et al. 2022).

Hypothesis and its empirical test. In summary, we hypothesize that productivity increases arising from social skills use, as in Deming's (2017) model, are not fully passed on to care workers through higher wages. To test this empirically, we analyze the wage returns to social skill use for care workers in comparison to other workers. Following Folbre et al. (2023), we pay particular attention to the comparison with business services workers. Care workers and business services workers have similar levels of formal qualification (and, as we find in Section 5.3, share similar skill requirements). Yet, on average, in business services, public goods

provision plays a less central role, "firms and workers can [more] clearly demonstrate dollar value" (Folbre et al. 2023), and the other factors just discussed, such as workers' limited bargaining power, are comparatively less applicable.[8] Unlike for care workers, we therefore expect Deming's (2017) model to apply more accurately to business services workers, such that social skill use commands a wage premium for them.

5.2 Econometric Approach for Estimating Returns to Skills

Our regression model estimates the returns to social skills in different sectors and occupations, employing the sectoral and occupational groupings of Folbre, Gautham, and Smith (2023). It has the following form:

$$\log(w_{ij}) = \beta_0 + \alpha_{care} * social_j * care_i + \alpha_{bus} * social_j * business_i + \alpha_{othserv} * social_j * otherservice_i + \alpha_{nonserv} * social_j * nonservice_i + \beta_1 cognitive_j + \beta_2 manual_j + \beta_3 care_i + \beta_4 business_i + \beta_5 otherservice_i + \beta_6 nonservice_i + X'_{it}\beta_7 + \varepsilon_{it}, \quad (3)$$

where $care_i$, $business_i$, $otherservice_i$, and $nonservice_i$ are dummy variables equal to one if a worker i is employed in the care services sector, business services sector, other services sector, or non-services sector, respectively. "Care services" include education, health, and social assistance industries; "business services" include industries such as finance, insurance, real estate, professional, scientific and management industries, and public administration (see Appendix Table A.4). Since Folbre, Gautham, and Smith (2023) emphasize the importance of different sectors in shaping the relative remuneration of workers, we study returns to occupation-level skills by sector. We further conduct an analogous analysis based on broad occupations, replacing in specification (3) sectors by occupational groups and differentiating between managerial occupations, business and financial occupations, professionals (excluding care work), care work occupations, and all others.

We measure skills at the detailed occupational level, according to the 26.1 version of O*NET (see Section 2). We restrict this analysis to pooled years 2015 to 2024. The version of O*NET, which we use, was collected up until 2021. While we expect occupational skills not to change drastically in the short run, over a longer period, skills requirements likely change. As such, we refrain from applying the more recent skills information to earlier years.

For comparability, we use the skills conceptualizations of existing studies. Following Deming (2017), we define the social skills content ($social_j$) of an occupation j as the average of four O*NET skills: coordination (adjusting action in relation to others' action), negotiation (bringing others together and trying to reconcile differences), persuasion (persuading others to change their minds of behaviour), and social perceptiveness (being aware of others' reactions and understanding why they react as they do). We provide results for the

[8] We certainly do not claim that business services do not entail any public goods creation. Indeed, one can think of business activities – for example in legal services or consulting, but also in other areas – where social value is clearly generated; and the definition of "business services" employed here even includes public sector and labor relations activities, for which public good provision is central (see Appendix Table A.4 for definitions). We instead argue that, on average, the public good character is less central for business services than care services *as a whole*.

average $social_j$ score, but also assess each of the four skills separately and complement the analysis with Pietrykowski's (2017) additional measures.

O*NET provides measures of how important a skill is for an occupation (importance measure) and which level of sophistication of the same skill the occupation requires (level measure). For each of the skills variables that we use, we standardize the importance and level measures to range from 0 to 100. We then take their product and divide it by 1,000 (see Escudero, Liepmann, and Podjanin 2024). In theory, the resulting skills variables range from zero to 10, where a value of 10 implies that the skill is both "extremely important" for an occupation and is required at the "highest level" of sophistication. In practice, our $social_j$ index ranges across all occupations from a minimum of 0.471 (e.g., for "machinists" and "pressers, textile, garment, and related materials") to a maximum value of 4.578 (e.g., for "social workers" and "directors, religious activities and education").[9] The individual skills variables have similar ranges.

The main parameters of interest in specification (3) are α_{care}, α_{bus}, $\alpha_{othserv}$, and $\alpha_{nonserv}$. They capture whether within the care, business, other-services, and non-services sector, respectively, wages are higher for workers employed in an occupation that relies strongly on social skills, compared with workers in the same sector who are employed in an occupation that relies less on the same types of skills. Following the hypothesis derived above, we expect these returns to social skills to be higher in the business sector than in the care sector ($\alpha_{bus} > \alpha_{care}$). Our theoretical expectations are less clear for $\alpha_{othserv}$ and $\alpha_{nonserv}$. "Other services" include many sales workers, whose social skills may also be undervalued (Osterman et al. 2022; ILO 2023). Social skills may be comparatively less relevant for "non-services", where it is unclear how this affects skills returns. We consider these as empirical questions that we explore in the following.

Finally, wages w_{ij} are defined as in Section 4; and X_{it} represents the control variables introduced there. We additionally control for an occupation's cognitive ($cognitive_j$) and manual ($manual_j$) skills content (and present alternative specifications where we test the presence of skills bundles, by interacting the social skills index with the cognitive and manual index, respectively). For the cognitive skills index, we rely on the average of the following three O*NET work activities: analysing data or information, thinking creatively, and interpreting the meaning of information for others (Acemoglu and Autor 2011). For the manual skills index, we use the average of the O*NET abilities "multilimb coordination" and "gross body coordination" (Cortes et al. 2024). Again, for each of these variables we take the standardized product of level and importance scores, before computing the average. This implies that the indices have a theoretical range from zero to 10, but the actual values span a smaller range. Also as before, we cluster standard errors at the major occupational group to allow for common economic shocks at the broader occupational level.

[9] These values are based on our calculations and available for all occupations upon request.

5.3 Findings

We start by discussing summary statistics for all workers and different sectors as shown in Table 4. Appendix Table A.5 contains similar summary statistics for different occupational groups.[10]

In Table 4, some of the general characteristics illustrate the interest of studying care services within the broader theme of the valuation of women's work. First, care services are female dominated. 75.3 percent of workers in care services are women, compared with 46.8 percent in business services, 49.3 percent in other services, and 23.6 percent in the non-services sector. Care services are moreover the most important broad sector for women, accounting for 41.1 percent of all female employment during 2015-24. Second, echoing earlier findings by Folbre, Gautham, and Smith (2023), care services are a pertinent example for the lower pay associated with female-dominated work that we studied in Section 4. The average wages in care services, as shown in Column (2) of Table 4, are 7.8 percent lower than the average wages of all workers (Column (1)) and 25.3 percent lower than the wages of business services workers (Columns (3)). This is true even though care services workers have a higher level of educational attainment than the average worker and a similar, if not slightly higher, level of educational attainment than business services workers.[11]

Regarding skill types, we find that workers in care services have the highest social skills index (at 2.7 compared to an average of 2.3 for all sectors combined and a second-highest value of 2.4 for business services; Table 4). This is especially due to high scores for coordination (adjusting action in relation to others' action) and social perceptiveness skills. For negotiation and persuasion, the scores are instead higher for business services than for care services, but the differences are small. Occupations in care services moreover have the highest scores for the three additional skills studied by Pietrykowski (2017), assisting and caring for others, establishing and maintaining interpersonal relationships, and service orientation. Finally, the cognitive skills index for care services slightly exceeds the overall average, while the manual skills index slightly falls below the overall average (Table 4).

[10] While there can be cases where a worker is employed in a care occupation but not in the care services sector (e.g., a nurse working in an enterprise), this is not common. The two largest occupations for care services, for example, are "elementary and middle-school teachers" and "registered nurses". In comparison, the largest two occupations for business services are "other managers, including postmasters" and "software developers, applications and systems".

[11] More formally, in a regression with our full set of control variables (see Table 2, Column (5)), wages of care workers are 16.2 percent lower than those of business services workers. The effect is statistically significant at the 5 percent level and similar for workers with and without a college degree. Looking instead at occupations, the same regression yields 20.7 percent lower wages for care occupations (statistically significant at the 5 percent level) compared to the reference category of managers. This effect is slightly larger for workers without a college degree. Details on the underlying regressions are available from the authors.

Table 4: Summary statistics for general characteristics and skills variables, all and by sector, 2015-24

	(1) All	(2) Care services	(3) Business serv.	(4) Other services	(5) Non-services
General characteristics:					
Female share in sector (%)	0.483	0.753	0.468	0.493	0.236
Sector's share in fem. empl. (%)	1.00	0.411	0.256	0.203	0.133
Sector's share in male empl. (%)	1.00	0.126	0.272	0.195	0.403
Wage & salary inc. (2023 dollars)	67452.5 (47844.3)	62172.5 (41830.8)	83259.0 (53753.5)	48221.7 (39291.6)	70818.8 (46823.5)
No high-school (%)	0.063	0.024	0.033	0.095	0.107
High-school or 1 yr of col. (%)	0.399	0.261	0.307	0.539	0.517
Some col. / Assoc. Degree (%)	0.114	0.131	0.103	0.114	0.109
4 years of college or more (%)	0.424	0.585	0.557	0.252	0.267
Skills variables as in Deming (2017):					
Socioemotional skills index	2.338	2.655	2.422	2.290	1.991
	(0.902)	(0.812)	(0.827)	(0.929)	(0.911)
Coordination	2.654	2.977	2.656	2.517	2.446
	(0.874)	(0.817)	(0.811)	(0.884)	(0.891)
Negotiation	1.864	1.933	2.037	1.931	1.578
	(0.955)	(0.763)	(0.928)	(1.032)	(1.021)
Persuasion	2.080	2.186	2.278	2.151	1.732
	(0.998)	(0.805)	(0.952)	(1.121)	(1.022)
Social Perceptiveness	2.755	3.526	2.717	2.560	2.206
	(1.078)	(1.102)	(0.886)	(0.927)	(0.901)
Additional skills variables (Pietrokovsky, 2017):					
Assisting & Caring	2.528	4.411	1.899	2.253	1.574
	(1.932)	(2.386)	(1.446)	(1.127)	(0.770)
Interpersonal Relationships	4.717	5.467	5.014	4.338	3.992
	(1.351)	(1.213)	(1.209)	(1.140)	(1.288)
Service Orientation	2.407	3.076	2.303	2.543	1.777
	(0.925)	(0.854)	(0.682)	(0.892)	(0.750)
Cognitive and manual skills:					
Cognitive skills index	2.573	2.705	3.165	2.065	2.234
	(1.303)	(1.179)	(1.246)	(1.142)	(1.325)
Manual skills index	0.766	0.576	0.431	0.869	1.205
	(0.775)	(0.558)	(0.675)	(0.645)	(0.898)
N	573,030	150,917	151,675	113,979	156,459

Notes: Sectors are defined as in Folbre, Gautham, and Smith (2023). Section 5.2 provides details on the skills variables.

Table 5 shows regression results for the sectoral relationships between social skills and wages. In all specifications with varying control variables, our hypothesis is confirmed that the returns to social skills are higher in business than in care services. According to our preferred specification with all control variables, shown in column (4), a one-standard-deviation increase in the social skill index is associated with a 5.8 percent increase in annual wages in business services. The underlying coefficient is statistically significant at the 5 percent level. In contrast, a one-standard-deviation increase in the social skill index is associated with a 2.3 percent increase in annual wages in care services, and the underlying coefficient is insignificant at conventional levels.[12] The effects for other services are similar to those of care services, while the effects for non-services are similar to those of business services. In the Appendix, we present analogous results for occupational groups rather than sectors, finding that there are significant positive returns to social skills for managers, while these are negligible and insignificant for care occupations (column (4) of Table A.6).[13]

Returning to the sectoral approach and including from now on the full set of control variables, Table 6 presents regression results separately for men and women and four different education groups, while Appendix Table A.7 does the same for different age and race and ethnicity groups. It is remarkable that our main finding is very consistent across these groups. Wage premia related to social skills are always higher for business services than care services, irrespective of the group studied. For business services, the underlying coefficients are statistically significant for all groups, with only two exceptions (workers with some college or associate degrees, and Asian and Hawaiian/Pacific Islanders, possibly related to the smaller sample sizes for these groups). For care services, the underlying coefficients are instead statistically insignificant for all groups. We also show that the gap in social skills returns between business and care services is comparatively large for workers with lower educational attainment (defined as having completed only high-school or less) and for Hispanic workers. Finally, significant wage premia for social skills in "other services" are found only for workers with four-year college degrees and white workers, whereas significant wage premia for social skills are found for more groups in "non-services".

[12] Our regression controls for general sectoral wage differences. This implies that adding a further control for workers' public sector employment, which otherwise would have been important, has no meaningful impact. After adding this control, the coefficient on the interactions between the social skill index and care services is 0.027 (standard error = 0.033); the same coefficient is 0.067 (standard error = 0.025) for the interaction with business services. These coefficients are almost identical to the ones discussed in the main text.

[13] Perhaps surprisingly, we find no such returns for business occupations, while the point estimate is large, but imprecisely estimated, for professionals (excluding care).

Table 5: Regression results capturing the relationship between social skills and wages by sector, all workers during 2015-2024

	(1)	(2)	(3)	(4)
Social*Care services	0.066*	0.094**	0.023	0.028
	(0.034)	(0.042)	(0.033)	(0.032)
Social*Business services	0.151***	0.139***	0.066**	0.068**
	(0.037)	(0.042)	(0.031)	(0.025)
Social*Other services	0.006	0.105**	0.027	0.025
	(0.036)	(0.041)	(0.023)	(0.018)
Social*Non-services	0.179***	0.097**	0.061*	0.051*
	(0.042)	(0.044)	(0.030)	(0.026)
Cognitive skills index	0.232***	0.222***	0.144***	0.131***
	(0.025)	(0.025)	(0.019)	(0.019)
Manual skills index	0.070**	0.051	0.071***	0.038
	(0.028)	(0.036)	(0.023)	(0.029)
Constant	9.947***	9.720***	5.105***	5.366***
	(0.071)	(0.116)	(0.098)	(0.094)
Sectoral fixed effects	NO	YES	YES	YES
Basic controls	NO	YES	YES	YES
Human capital controls	NO	NO	YES	YES
Hours controls	NO	NO	YES	YES
Gender, race and ethnicity	NO	NO	NO	YES
Observations	573,030	573,030	573,030	573,030
R-squared	0.204	0.218	0.509	0.520
Implied %-increase in wage & salary income from one standard deviation increase in skills index:				
Social*Care services	0.055	0.080	0.019	0.023
Social*Business services	0.135	0.123	0.056	0.058
Social*Other services	0.006	0.103	0.025	0.024
Social*Non-services	0.179	0.093	0.057	0.048
Cognitive skills index	0.340	0.324	0.202	0.182
Manual skills index	0.056	0.041	0.057	0.030

Notes: The table shows regression results for specification (3), for all workers during 2015-2024. The outcome variable is an employee's logged annual wages (2023 dollars) from the previous calendar year. Social, cognitive, and manual skills indices are defined for detailed occupations (see Section 5.2 for details), referring to individuals' occupations in the previous calendar year. "Sectoral fixed effects" differentiate between care services, business services, other services, and non-services. Other control variables are defined as in Table 2. Robust standard errors in parenthesis are clustered at the broader occupational level, where ***, **, and * denotes significance at the 10, 5, and 1 percent level, respectively. Implied %-increases are calculated by transforming the log-point estimates to percent changes, multiplied by the relevant standard deviation (see Table 4).

Table 6: Regression results capturing the relationship between social skills and wages by sector, by gender and education, 2015-2024

	(1)	(2)	(3)	(4)	(5)	(6)
	Women	Men	No high-school	High-school	Some col., assoc. degr.	4 yr college
Social*Care services	0.020	0.014	0.023	-0.019	0.016	0.038
	(0.034)	(0.037)	(0.046)	(0.039)	(0.046)	(0.032)
Social*Business serv.	0.062***	0.066*	0.138***	0.082**	0.039	0.069**
	(0.022)	(0.032)	(0.033)	(0.030)	(0.023)	(0.027)
Social*Other services	0.013	0.026	0.019	0.029	0.017	0.072***
	(0.015)	(0.024)	(0.030)	(0.021)	(0.019)	(0.019)
Social*Non-services	0.050*	0.047	0.107**	0.049	0.036	0.101***
	(0.025)	(0.031)	(0.039)	(0.031)	(0.035)	(0.032)
Cognitive skills index	0.144***	0.117***	0.061**	0.102***	0.141***	0.152***
	(0.022)	(0.018)	(0.024)	(0.017)	(0.025)	(0.023)
Manual skills index	0.044	0.016	-0.001	0.015	0.097***	0.027
	(0.047)	(0.024)	(0.018)	(0.021)	(0.033)	(0.051)
Constant	5.304***	5.342***	6.144***	5.926***	5.841***	5.396***
	(0.119)	(0.112)	(0.146)	(0.102)	(0.111)	(0.123)
Sectoral fixed effects	YES	YES	YES	YES	YES	YES
Basic controls	YES	YES	YES	YES	YES	YES
Human capital controls	YES	YES	YES	YES	YES	YES
Hours controls	YES	YES	YES	YES	YES	YES
Gender, race and ethnicity	YES	YES	YES	YES	YES	YES
Observations	282,382	290,648	38,879	230,583	66,597	236,971
R-squared	0.542	0.467	0.469	0.482	0.481	0.440
Implied %-increase in wage & salary income from one standard deviation increase in skills index:						
Social*Care services	0.016	0.013	0.017	-0.015	0.013	0.026
Social*Business serv.	0.053	0.057	0.107	0.072	0.031	0.054
Social*Other services	0.012	0.025	0.016	0.027	0.015	0.066
Social*Non-services	0.048	0.043	0.069	0.043	0.032	0.094
Cognitive skills index	0.192	0.169	0.061	0.128	0.184	0.189
Manual skills index	0.026	0.014	-0.001	0.012	0.077	0.015

Notes: The table shows regression results for specification (3), for 2015-2024 by gender and education. See the notes of Table 5 for more details. Implied %-increases are calculated by transforming the log-point estimates to percent changes, multiplied by the relevant standard deviation of the respective group.

In Appendix Table A.8, we again show results for all workers, assessing in separate regressions the wage effects of the individual components of the social skills index (columns (1) – (4)). It is striking to observe that our central findings continue to hold for all four individual social skill types: The individual social skills are positively and significantly correlated with wages in business services, with effects ranging from a 3.5 percent increase in annual wages for coordination skills to a 6.4 percent increase for persuasion skills (assuming a one-standard-deviation increase in the respective skill variable). All individual social skills again yield insignificantly estimated effects in care services, where point estimates suggest annual wage increases ranging from 0.7 percent for negotiation skills to 3.4 percent for social perceptiveness (assuming a one-standard-deviation increase in the respective skill variable).

Interestingly, the general pattern changes when we instead consider the wage effects related to assisting and caring, relationship building, and service orientation, which are the additional skills analyzed by Pietrykowski (2017). For these, only relationship building positively and significantly correlates with higher wages in business services (column (6) in Table A.8). Moreover, assisting and caring stands out as the only social skill that yields a wage premium in care services (column (5) in Table A.8), but this is confined to more highly educated workers (Appendix Table A.9). Additionally, assisting and caring yields *negative* wage effect for non-services workers and insignificant effects for workers in business services and other services (column (5) of Table A.8). Overall, these findings suggest that not all social skills are equal, which future research could examine further.

So far, our analysis has controlled for cognitive and manual skills. We now turn to exploring their role across sectors in greater detail. In Table 7, we interact sectoral indicator variables with the social skills index as well as with the cognitive (column (1)) and the manual skills index (column (2)). The differential return to social skills between care and business services is robust to this change in our specification. In addition, we find that cognitive skills yield sizeable premia in all four sectors considered. These returns amount to 20.3 percent for care services, 19.0 percent for business services, 15.1 percent for other services, and 11.8 percent for non-services, assuming a one-standard-deviation increase in the cognitive skills index for the respective sector. Across sectors, the returns to manual skills are instead statistically insignificant, with the exception of non-services. Overall, these findings indicate that social skills, rather than cognitive or manual skills, drive the differential skills returns between care and business services.

Finally, we also assess the robustness of our results to the inclusion of skills bundles. Studies consistently show that social and cognitive skills are complements, which jointly drive higher wages (Deming (2017), Deming and Kahn (2018), and Weinberger (2014) for the United States; ILO (forthcoming) for several middle-income countries). In Appendix Table A.10, we therefore include additional triple interaction terms between social skills, cognitive skills, and sector indicators (column (1)). Column (2) does the same for manual skills. Our main finding is robust to this changed specification. Social skills continue to be positively and significantly related to wages in business services, while the same is not true for care services. Surprisingly, our analysis does not replicate the complementarity of social and cognitive skills. This may be because we measure skill requirements at the occupational level, given our interest in wage differences between occupations. Previous analyses instead measured skill requirements at the job-vacancy (Deming and Kahn 2018; ILO forthcoming) or worker level (Deming 2017; Weinberger 2014). Replicating our analysis with such data, could be another intriguing avenue for future research.

Table 7: Regression results capturing the relationships of social, cognitive and manual skills with wages by sector, all workers during 2015-2024

	(1)		(2)
Social*Care services	0.004	Social*Care services	0.040
	(0.027)		(0.034)
Social*Business services	0.059**	Social*Business services	0.060**
	(0.025)		(0.024)
Social*Other services	0.029	Social*Other services	0.017
	(0.022)		(0.021)
Social*Non-services	0.093***	Social*Non-services	0.055**
	(0.029)		(0.026)
Cognitive*Care services	0.159***	Manual*Care services	0.091
	(0.025)		(0.059)
Cognitive*Business services	0.142***	Manual*Business services	0.006
	(0.017)		(0.032)
Cognitive*Other services	0.124***	Manual*Other services	0.017
	(0.025)		(0.021)
Cognitive*Non-services	0.085***	Manual*Non-services	0.043*
	(0.022)		(0.023)
Manual skills index	0.034	Cognitive skills index	0.129***
	(0.027)		(0.017)
Constant	5.357***	Constant	5.303***
	(0.095)		(0.111)
Observations	573,030		573,030
R-squared	0.521		0.520
Sectoral fixed effects	YES	Sectoral fixed effects	YES
Basic controls	YES	Basic controls	YES
Human capital controls	YES	Human capital controls	YES
Hours controls	YES	Hours controls	YES
Gender, race and ethnicity	YES	Gender, race and ethnicity	YES
Implied %-increase in wage & salary income from one standard deviation increase in skills index:			
Social*Care services	0.003	Social*Care services	0.033
Social*Business services	0.050	Social*Business services	0.051
Social*Other services	0.027	Social*Other services	0.016
Social*Non-services	0.089	Social*Non-services	0.052
Cognitive*Care services	0.203	Manual*Care services	0.053
Cognitive*Business services	0.190	Manual*Business services	0.004
Cognitive*Other services	0.151	Manual*Other services	0.011
Cognitive*Non-services	0.118	Manual*Non-services	0.039
Manual skills index	0.027	Cognitive skills index	0.179

Notes: The table shows regression results for specification (3), for 2015-2024 and all workers. In column (2), each sector is additionally interacted with the cognitive skills index; in column (3), each sector is additionally interacted with the manual skills index. The outcome variable is an employee's logged annual wages (2023 dollars) from the previous calendar year. See Table 5 for more details. Implied %-increases are calculated by transforming the log-point estimates to percent changes, multiplied by the relevant standard deviation of the respective skill variable.

6. Conclusions

In this article, we provide an updated analysis of trends in occupational gender segregation in the United States and related implication for wages. We show that occupational gender segregation continues to be an influential feature of the labor market, that trends towards further integration of occupations have slowed compared to earlier decades, and that wages for both women and men continue to be significantly lower in occupations employing greater shares of women.

We then investigate differential occupational skills returns as one underlying mechanism for these wage patterns, focussing on the female-dominated care sector in comparison to the more gender-balanced business services sector. We specifically examine returns to social skills because previous studies have shown that social skills command increasing wage premia, and that this development has caused a decline in the gender wage gap. To reconcile the apparent contradiction of these findings with our analysis of occupational wages, we hypothesize that the occupational returns to social skills are distorted in female-dominated sectors, especially care. This is because public good provision is, on average, more central in care services than in business services and due to several other, well-established features of care work, such as care workers' more limited bargaining power. Our findings support our hypothesis: returns to social skills are significant in business services but not in care services. This finding extends to different groups of workers and is robust to accounting for the relevance of cognitive and manual skills, including in the form of skills bundles. Overall, our findings indicate that social skills, rather than cognitive or manual skills, drive the differential returns to skills between care and business services.

The care sector already employs a large share of the overall workforce and can be expected to grow further due to population ageing. Our findings of lower returns to social skills for care workers, combined with only slow shifts towards greater gender integration of occupations in recent years, are aligned with Blau's (2025) conclusion that absent major policy or social change, the labor market is unlikely to become more equal for women and men. A change towards greater valuation of care workers' skills would be beneficial for the whole economy, counterbalancing labor shortages, generating positive economic and societal spill-over effects that arise from a functioning care sector, and contributing to greater gender equality. The ILO Resolution on decent work and the care economy- an international agreement reached by Governments, workers' and employers' representatives- recognizes this potential. It thus reaffirms the State's central role for "care provision, funding, regulation and ensuring high standards of quality, safety and health for care workers and care recipients" (ILO 2024).

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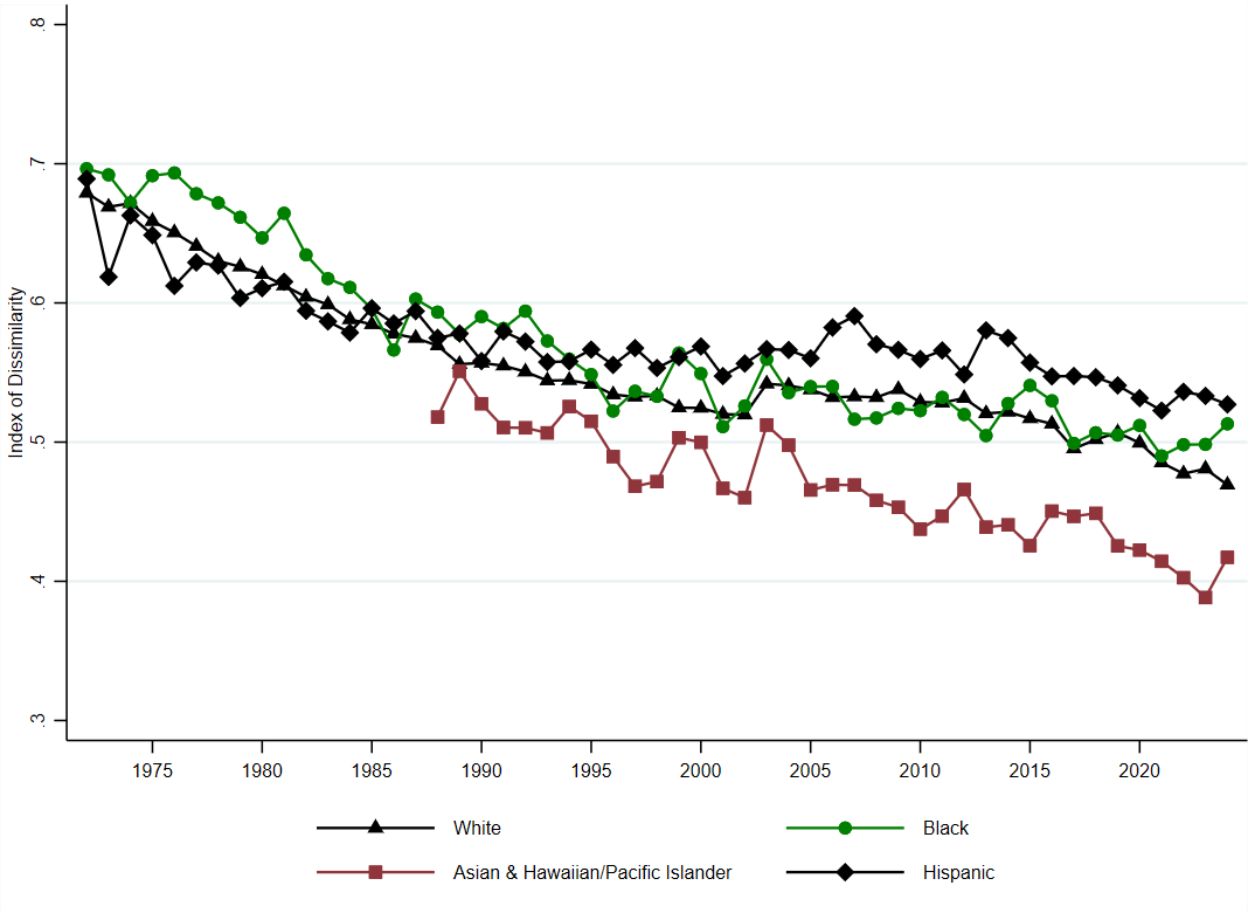
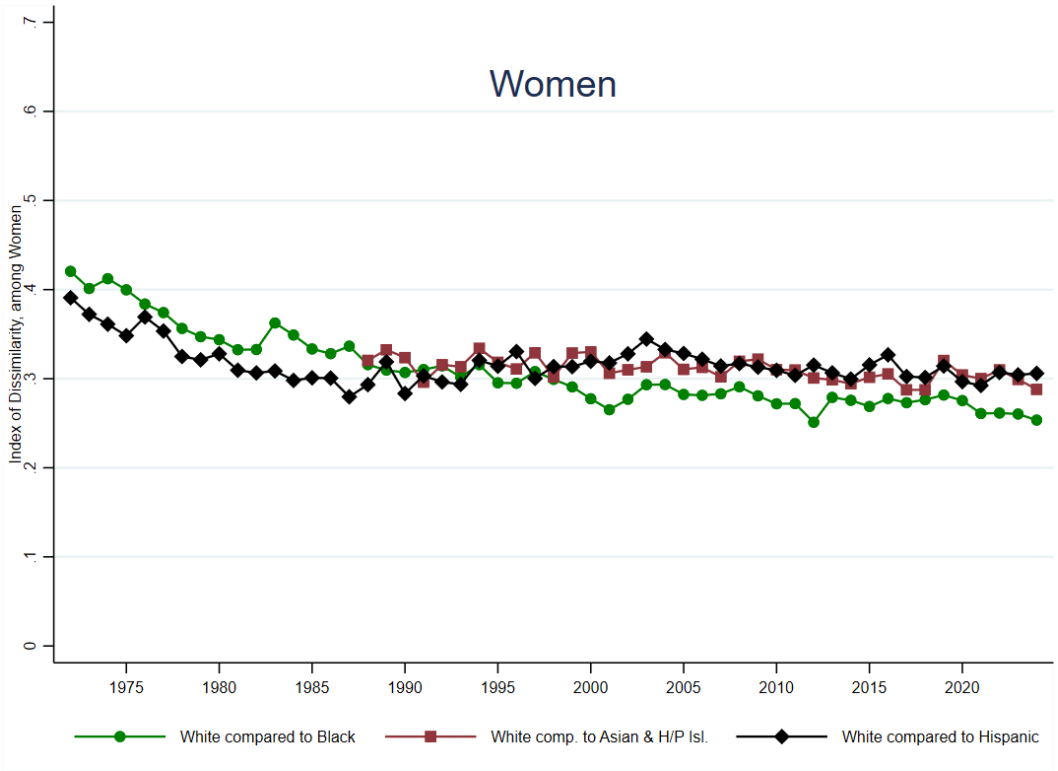
Appendix: Additional tables and figures (intended for online publication)

Figure A.1: The index of dissimilarity by race and ethnicity, 1972-2024



Notes: "White", "black" and "Asian and Hawaiian/Pacific Islander" only include non-Hispanics. "Asian and Hawaiian/Pacific Islander" can be identified from 1988 onwards. 2 per cent of the observations are excluded because they report belonging to other groups.

Figure A.2: The index of dissimilarity capturing race and ethnic segregation among men and women, 1972-2024



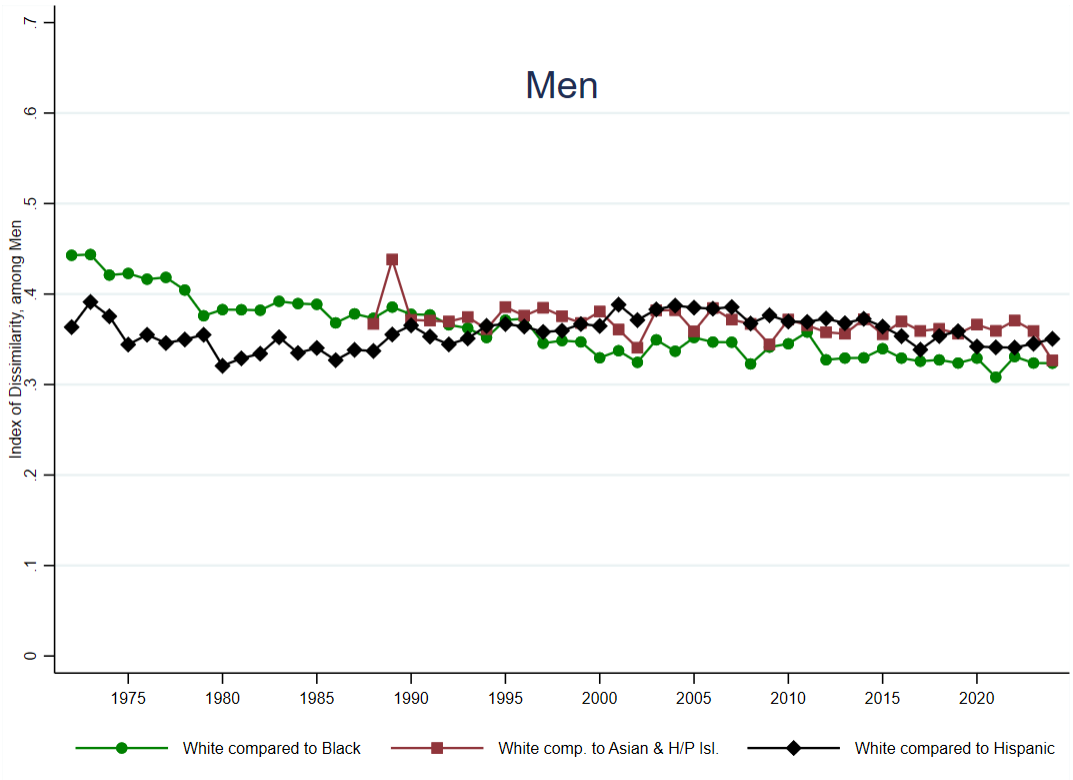


Table A.1: Summary statistics for the sample used

	(1) All years	(2) 1974-84	(3) 1984-94	(4) 1995-04	(5) 2005-14	(6) 2015-24
Female (%)	0.458	0.415	0.454	0.470	0.474	0.474
Age in years	42.2	41.1	40.3	41.7	43.3	43.4
	(10.8)	(11.1)	(10.4)	(10.1)	(10.8)	(11.2)
Wages in 2023 values	62393.9	58549.6	58882.9	61201.8	63275.5	67408.6
	(44525.4)	(40591.3)	(42756.1)	(43370.1)	(45556.6)	(47816.0)
No high-school (%)	0.218	0.578	0.379	0.098	0.083	0.066
High-school or 1 year of college (%)	0.351	0.089	0.235	0.500	0.448	0.397
Some college / Associate's degrees (%)	0.106	0.110	0.116	0.093	0.107	0.112
4 years of college or more (%)	0.325	0.224	0.270	0.309	0.361	0.425
White (%)	0.725	0.839	0.799	0.742	0.679	0.619
Black (%)	0.105	0.094	0.099	0.106	0.106	0.116
Asian & Hawaiian/Pacific Islander (%)	0.041	-	-	0.041	0.056	0.071
Hispanic (%)	0.114	0.046	0.070	0.103	0.143	0.175
Other race/ethnicity (%)	0.015	0.021	0.012	0.008	0.016	0.019
N	3,250,363	503,449	565,145	646,426	781,086	634,106

Notes: This table provides summary statistics for selected characteristics. Where relevant, standard deviations are shown in parenthesis. “White”, “black” and “Asian and Hawaiian/Pacific Islander” only include non-Hispanics. “Asian and Hawaiian/Pacific Islander” are captured from 1988 onwards.

Table A.2: The occupational index of gender dissimilarity 1972-2024, for all employed individuals and separately for workers with and without a four-year college degree (values)

Year	(1) All (civilian labor force)	(2) Less than four years of college	(3) Four years of college and more
1972	0.673	0.687	0.628
1973	0.661	0.676	0.626
1974	0.663	0.679	0.622
1975	0.655	0.679	0.601
1976	0.648	0.676	0.585
1977	0.640	0.672	0.554
1978	0.627	0.658	0.564
1979	0.623	0.655	0.548
1980	0.618	0.654	0.539
1981	0.613	0.649	0.539
1982	0.602	0.638	0.524
1983	0.591	0.635	0.502
1984	0.581	0.626	0.491
1985	0.578	0.623	0.491
1986	0.568	0.617	0.477
1987	0.569	0.618	0.482
1988	0.561	0.610	0.477
1989	0.551	0.602	0.458
1990	0.551	0.603	0.456
1991	0.549	0.598	0.461
1992	0.545	0.590	0.471
1993	0.536	0.584	0.457
1994	0.536	0.584	0.452
1995	0.532	0.586	0.439
1996	0.521	0.575	0.430
1997	0.522	0.573	0.432
1998	0.520	0.572	0.433
1999	0.519	0.567	0.438
2000	0.518	0.576	0.426
2001	0.508	0.568	0.415
2002	0.509	0.570	0.416
2003	0.530	0.590	0.435
2004	0.529	0.591	0.429
2005	0.526	0.588	0.432
2006	0.525	0.590	0.418
2007	0.527	0.589	0.432

2008	0.524	0.588	0.435
2009	0.528	0.593	0.436
2010	0.519	0.588	0.423
2011	0.519	0.589	0.429
2012	0.520	0.587	0.430
2013	0.513	0.578	0.419
2014	0.513	0.582	0.420
2015	0.511	0.578	0.428
2016	0.508	0.581	0.416
2017	0.490	0.558	0.407
2018	0.494	0.567	0.402
2019	0.494	0.563	0.414
2020	0.488	0.565	0.403
2021	0.476	0.544	0.401
2022	0.470	0.538	0.389
2023	0.469	0.542	0.379
2024	0.468	0.540	0.386

Notes: This table presents the values underlying the figure shown in the main text.

Table A.3: The Index of Dissimilarity in Comparison to Blau et al. (2013)

	(1)	(2)	(3)	(4)	(5)
	All (18-64 years)	Less than High-school	High-school	Some college / Associate's degree	4 years of college or more
Blau, Brummund, and Liu (2013), Index of Dissimilarity					
1970	64.5	64.7	67.2	64.3	61.8
1980	58.4	60.5	63.4	59.0	51.7
1990	54.1	57.8	60.6	56.6	44.8
2000	52.0	57.2	59.8	56.0	41.7
2009	51.0	59.2	58.6	54.4	40.4
Blau, Brummund, and Liu (2013), Percentage point change					
1970-1980	-6.1	-4.2	-3.8	-5.3	-10.1
1980-1990	-4.3	-2.7	-2.8	-2.4	-6.9
1990-2000	-2.1	-0.6	-0.8	-0.6	-3.1
2000-2009	-1.0	2.0	-1.2	-1.6	-1.3
This study, Index of Dissimilarity					
1972	66.8	69.6	67.8	67.6	62.1
1980	61.0	66.0	62.6	61.4	53.4
1990	54.3	60.8	59.7	57.0	44.9
2000	51.7	57.1	55.9	64.0	42.4
2009	52.6	59.7	57.3	64.2	43.5
This study, Percentage point change					
1972-1980	-5.9	-3.6	-5.2	-6.2	-8.7
1980-1990	-6.6	-5.2	-2.9	-4.4	-8.5
1990-2000	-2.6	-3.7	-3.8	7.1	-2.5
2000-2009	0.9	2.5	1.3	0.2	1.0

Notes: The results shown under "this study" now refer to individuals ages 18-64, for better comparability with Blau et al. (2013). Blau et al. (2013) use census and ACS data and the 2000 coding scheme, harmonized according to a gender-specific crosswalk. Our study uses CPS data and the 2010 coding scheme, harmonized according to a general crosswalk.

Table A.4: Definition of care services and business services, following Folbre et al. (2022)

Care services:
Offices and clinics of physicians
Offices and clinics of dentists
Offices and clinics of chiropractors
Offices and clinics of optometrists
Offices and clinics of health practitioners, n.e.c.
Hospitals
Nursing and personal care facilities
Health services, n.e.c.
Elementary and secondary schools
Colleges and universities
Vocational schools
Educational services, n.e.c.
Job training and vocational rehabilitation services
Child day care services
Family child care homes
Residential care facilities, without nursing
Social services, n.e.c.
Religious organizations
Business services:
Veterinary services
Landscape and horticultural services
Newspaper publishing and printing
Printing, publishing, and allied industries, except newspapers
Radio and television broadcasting and cable
Wired communications
Telegraph and miscellaneous communications services
Banking
Savings institutions, including credit
Credit agencies, n.e.c.
Security, commodity brokerage, and investment companies
Insurance
Real estate, including real estate-insurance offices
Advertising
Services to dwellings and other buildings
Personnel supply services
Computer and data processing services
Detective and protective services
Business services, n.e.c.

Automotive rental and leasing, without drivers
Theaters and motion pictures
Video tape rental
Legal services
Libraries
Museums, art galleries, and zoos
Labor unions
Engineering, architectural, and surveying services
Accounting, auditing, and bookkeeping services
Research, development, and testing services
Management and public relations service
Miscellaneous professional and related
Executive and legislative offices
General government, n.e.c.
Justice, public order, and safety
Public finance, taxation, and monetary
Administration of human resources programs
Administration of environmental quality
Administration of economic programs
National security and international affairs
Administration of human resources programs
Administration of environmental quality
Administration of economic programs
National security and international affairs

Table A.5: Summary statistics for general characteristics and skills variables, by occupational groups, years 2015-2024

	(1) Managers	(2) Business & finance occ.s	(3) Professionals (excl. care)	(4) Care occ.s	(5) Other services occ.s	(6) All other
General characteristics:						
Female (%)	0.438	0.578	0.355	0.777	0.560	0.154
Occ.'s share in fem. empl. (%)	0.118	0.064	0.076	0.317	0.360	0.065
Occ.'s share in male empl. (%)	0.142	0.044	0.129	0.085	0.265	0.334
Wage & salary inc. (2023 dollars)	98874.9 (56980.1)	86257.3 (49002.6)	98095.0 (53582.1)	62029.5 (41877.3)	51488.1 (39437.2)	55159.1 (33914.2)
No high-school (%)	0.019	0.007	0.004	0.020	0.079	0.157
High-school or 1 yr of col. (%)	0.286	0.204	0.157	0.214	0.533	0.626
Some col. / Assoc. Degree (%)	0.090	0.088	0.092	0.134	0.124	0.113
4 years of college or more (%)	0.605	0.701	0.746	0.632	0.264	0.104
Skills variables as in Deming (2017):						
Socioemotional skills index	3.493	2.595	2.101	2.784	2.186	1.449
	(0.390)	(0.466)	(0.473)	(0.660)	(0.868)	(0.504)
Coordination	3.919	2.583	2.407	3.058	2.371	2.033
	(0.448)	(0.562)	(0.426)	(0.655)	(0.761)	(0.663)
Negotiation	3.127	2.354	1.661	1.925	1.857	0.966
	(0.353)	(0.604)	(0.633)	(0.606)	(1.023)	(0.480)
Persuasion	3.216	2.605	1.994	2.239	2.066	1.109
	(0.551)	(0.582)	(0.536)	(0.677)	(1.116)	(0.499)
Social Perceptiveness	3.711	2.837	2.344	3.915	2.450	1.688
	(0.510)	(0.602)	(0.495)	(0.905)	(0.816)	(0.544)
Additional skills variables (Pietrokovsky, 2017):						
Assisting & Caring	2.048	1.410	1.001	5.547	2.196	1.590
	(0.770)	(0.637)	(0.793)	(2.018)	(1.047)	(0.746)
Interpersonal Relationships	5.989	5.967	4.625	5.684	4.397	3.156
	(0.847)	(0.984)	(0.663)	(0.987)	(1.005)	(0.795)
Service Orientation	2.805	2.456	1.892	3.365	2.491	1.358
	(0.662)	(0.453)	(0.432)	(0.697)	(0.738)	(0.518)
Cognitive and manual skills:						
Cognitive skills index	4.030	3.903	3.803	2.546	2.022	1.469
	(0.637)	(0.586)	(1.037)	(1.040)	(1.021)	(0.695)
Manual skills index	0.228	0.035	0.191	0.669	0.661	1.890
	(0.244)	(0.074)	(0.310)	(0.516)	(0.621)	(0.489)
N	74,637	30,836	59,154	113,158	178,364	116,881

Notes: This table provides summary statistics for selected characteristics and skills variables, for different occupational groups, with standard errors shown in parenthesis. The occupational groups are defined following Folbre, Gautham, and Smith (2023), although we separate "other service occupations" from "all other occupations". Section 5.2 provides the details on the sources and construction of the skills variables.

Table A.6: Regression results capturing the relationship between social skills and wages by broad occupational group, all workers during 2015-2024

	(1) All	(2) All	(3) All	(4) All	(5) Women	(6) Men
Social*Managers	0.143***	0.142***	0.080***	0.083***	0.076***	0.092***
	(0.033)	(0.008)	(0.005)	(0.005)	(0.006)	(0.007)
Social*Business occs	0.153***	-0.042	-0.004	-0.002	0.015	-0.028***
	(0.045)	(0.029)	(0.013)	(0.013)	(0.023)	(0.005)
Social*Professionals	0.257***	0.174	0.080	0.083	0.146**	0.023
(excl. care)	(0.059)	(0.137)	(0.101)	(0.090)	(0.070)	(0.094)
Social*Care occupations	0.102**	0.119	0.022	0.014	0.010	-0.033
	(0.037)	(0.079)	(0.063)	(0.058)	(0.057)	(0.065)
Social*Other services occs	0.090*	0.143**	0.058	0.040	-0.006	0.090**
	(0.050)	(0.068)	(0.042)	(0.037)	(0.038)	(0.033)
Social *Other occupations	0.290***	0.204***	0.148***	0.125**	0.088	0.144***
	(0.071)	(0.064)	(0.051)	(0.046)	(0.067)	(0.044)
Cognitive skills index	0.211***	0.195***	0.129***	0.124***	0.151***	0.091***
	(0.029)	(0.032)	(0.027)	(0.027)	(0.030)	(0.025)
Manual skills index	0.011	-0.004	0.045	0.017	0.021	0.009
	(0.052)	(0.060)	(0.036)	(0.041)	(0.054)	(0.038)
Constant	9.945***	9.831***	5.017***	5.191***	5.061***	5.209***
	(0.115)	(0.146)	(0.154)	(0.153)	(0.194)	(0.155)
Sectoral fixed effects	NO	YES	YES	YES	YES	YES
Basic controls	NO	YES	YES	YES	YES	YES
Human capital controls	NO	NO	YES	YES	YES	YES
Hours controls	NO	NO	YES	YES	YES	YES
Gender, race and ethnicity	NO	NO	NO	YES	YES	YES
Observations	573,030	573,030	573,030	573,030	282,382	290,648
R-squared	0.194	0.204	0.503	0.514	0.538	0.461
Implied %-increase in wage & salary income from one standard deviation increase in skills index						
Social*Managers	0.060	0.060	0.032	0.034	0.030	0.038
Social*Business occs	0.077	-0.019	-0.002	-0.001	0.007	-0.013
Social*Professionals	0.139	0.090	0.039	0.041	0.081	0.010
Social*Care occupations	0.071	0.083	0.015	0.009	0.006	-0.023
Social*Other services occs	0.082	0.133	0.052	0.035	-0.005	0.086
Social *Other occupations	0.170	0.114	0.080	0.067	0.049	0.077
Cognitive skills index	0.306	0.281	0.179	0.172	0.202	0.129
Manual skills index	0.009	-0.003	0.036	0.013	0.012	0.008

Notes: The table shows regression results for specification (4), for all workers during 2015-2024, but replacing sectors by occupations. The outcome variable is an employee's logged annual wages (2023 dollars) from the previous calendar year. Indices for social, cognitive, and manual skills are defined for detailed occupations (see Section 5.2 for details), referring to individuals' occupations in the previous calendar year. "Occupational fixed effects" differentiate between managers, business occupations, professionals (excluding care), care occupations, other service occupations, and other occupations. All other control variables are defined as in Table 5. Robust standard errors in parenthesis are clustered at the broader occupational level, where ***, **, and * denoted significance at the 10, 5, and 1 percent levels,

respectively. Implied %-increases are calculated by transforming the log-point estimates to percent changes, multiplied by the relevant standard deviation value (see Table A.5 above).

Table A.7: Regression results capturing the relationship between social skills and wages by sector, for different age groups and by race and ethnicity, during years 2015-2024

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	25-34	35-54	55-64	White	Black	Asian & H/P Isl	Hispanic
Social*Care services	0.020	0.031	0.019	0.032	0.038	0.031	0.030
	(0.030)	(0.033)	(0.036)	(0.033)	(0.027)	(0.054)	(0.036)
Social*Business services	0.061*	0.070***	0.056**	0.071***	0.079***	0.030	0.093***
	(0.031)	(0.024)	(0.022)	(0.022)	(0.026)	(0.035)	(0.029)
Social*Other serv.	0.024	0.029	0.015	0.036**	0.022	-0.014	0.020
	(0.022)	(0.018)	(0.019)	(0.016)	(0.018)	(0.026)	(0.024)
Social*Non-services	0.044	0.054**	0.036	0.051*	0.029	0.034	0.067**
	(0.028)	(0.024)	(0.030)	(0.026)	(0.029)	(0.025)	(0.030)
Cognitive skills index	0.117***	0.131***	0.145***	0.126***	0.126***	0.177***	0.112***
	(0.020)	(0.018)	(0.019)	(0.020)	(0.018)	(0.017)	(0.019)
Manual skills index	0.060*	0.032	0.018	0.051	0.017	0.039	0.005
	(0.031)	(0.029)	(0.029)	(0.032)	(0.024)	(0.040)	(0.023)
Constant	5.128***	5.694***	8.428***	5.257***	5.415***	5.027***	5.676***
	(0.244)	(0.111)	(1.220)	(0.080)	(0.099)	(0.202)	(0.156)
Sectoral fixed effects	YES	YES	YES	YES	YES	YES	YES
Basic controls	YES	YES	YES	YES	YES	YES	YES
Human capital controls	YES	YES	YES	YES	YES	YES	YES
Hours controls	YES	YES	YES	YES	YES	YES	YES
Gender, race and ethnicity	YES	YES	YES	YES	YES	YES	YES
Observations	150,273	313,978	108,779	346,596	61,376	43,224	108,199
R-squared	0.529	0.517	0.495	0.503	0.502	0.551	0.499
Implied %-increase in wage & salary income from one standard deviation increase in skills index:							
Social*Care services	0.015	0.025	0.017	0.026	0.033	0.024	0.026
Socio-em.*Business serv.	0.049	0.060	0.050	0.060	0.067	0.023	0.085
Socio-emotional*Other services	0.022	0.028	0.014	0.034	0.020	-0.012	0.018
Social*Non-services	0.038	0.051	0.035	0.049	0.023	0.030	0.054
Cognitive skills index	0.159	0.183	0.205	0.169	0.171	0.278	0.147
Manual skills index	0.048	0.025	0.014	0.039	0.013	0.026	0.004

Notes: The table shows regression results for specification (4), for years 2015-2024 and different age and race/ethnicity groups. The abbreviation in column (6) stands for "Asian & Hawaiian/Pacific Islander". The outcome variable is an employee's logged annual wages (2023 dollars) in the previous calendar year. Skills and control variables are defined as in Table 5. Robust standard errors in parenthesis are clustered at the broader occupational level, where ***, **, and * denoted significance at the 10, 5, and 1 percent level, respectively. Implied %-increases are calculated by transforming the log-point estimates to percent changes, multiplied by the relevant standard deviation value of the respective group.

Table A.8: Regression results capturing the relationship between different social skills and wages by sector, 2015-2024

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Skill variable:	Coordination	Negotiation	Persuasion	Social Perceptiveness	Assisting & caring	Relationship building	Service orientation
Skill var.*Care services	0.010	0.009	0.028	0.030	0.032**	0.011	0.031
	(0.039)	(0.028)	(0.029)	(0.024)	(0.012)	(0.035)	(0.033)
Skill var.*Business serv.	0.042*	0.057**	0.065***	0.057**	-0.008	0.026*	0.023
	(0.021)	(0.022)	(0.020)	(0.024)	(0.010)	(0.014)	(0.029)
Skill var.*Other services	-0.005	0.020	0.030**	0.024	-0.003	0.016	0.020
	(0.021)	(0.015)	(0.014)	(0.015)	(0.017)	(0.017)	(0.023)
Skill var.*Non-services	0.021	0.038	0.057**	0.053**	-0.027*	0.005	0.058*
	(0.018)	(0.026)	(0.022)	(0.021)	(0.014)	(0.012)	(0.033)
Cognitive skills index	0.136***	0.136***	0.133***	0.133***	0.140***	0.138***	0.141***
	(0.020)	(0.018)	(0.017)	(0.017)	(0.012)	(0.016)	(0.014)
Manual skills index	0.025	0.041	0.049	0.038	0.012	0.032	0.040
	(0.033)	(0.030)	(0.029)	(0.028)	(0.022)	(0.032)	(0.026)
Constant	5.383***	5.400***	5.365***	5.333***	5.255***	5.339***	5.302***
	(0.086)	(0.104)	(0.105)	(0.105)	(0.126)	(0.125)	(0.101)
Observations	573,030	573,030	573,030	573,030	573,030	573,030	573,030
R-squared	0.519	0.519	0.520	0.520	0.520	0.519	0.519
Sectoral fixed effects	YES	YES	YES	YES	YES	YES	YES
Basic controls	YES	YES	YES	YES	YES	YES	YES
Human capital controls	YES	YES	YES	YES	YES	YES	YES
Hours controls	YES	YES	YES	YES	YES	YES	YES
Gender, race, ethnicity	YES	YES	YES	YES	YES	YES	YES
Implied %-increase in wage & salary income from a one standard deviation increase in skills variable:							
Skill var.*Care services	0.008	0.007	0.023	0.034	0.078	0.013	0.027
Skill var.*Business serv.	0.035	0.054	0.064	0.052	-0.012	0.032	0.016
Skill var.*Other services	-0.004	0.021	0.034	0.023	-0.003	0.018	0.018
Skill var.*Non-services	0.019	0.040	0.060	0.049	-0.021	0.006	0.045
Cognitive skills index	0.190	0.190	0.185	0.185	0.196	0.193	0.197
Manual skills index	0.020	0.032	0.039	0.030	0.009	0.025	0.032

Notes: The table shows regression results for specification (3), for 2015-2024 and all workers. Each column uses a different social skill type, as indicated in the header. Implied %-increases are calculated by transforming the log-point estimates to percent changes, multiplied by the relevant standard deviation of the respective skill variable. More details on "assisting and caring" are provided in Table A.9.

Table A.9: Regression results capturing the relationship between assisting and caring skills and wages by sector, by education during 2015-2024

	(1)	(2)	(3)	(4)
	No high-school	High-school	Assoc. degree / some college	4 year college
Assisting & caring*Care services	-0.007	0.009	0.041***	0.045***
	(0.007)	(0.013)	(0.012)	(0.010)
Assisting & caring*Business services	-0.020	-0.003	-0.004	0.000
	(0.014)	(0.015)	(0.006)	(0.012)
Assisting & caring*Other services	-0.040*	-0.012	0.003	0.025
	(0.021)	(0.012)	(0.007)	(0.030)
Assisting & caring*Non-services	-0.036	-0.023	-0.020	-0.012
	(0.031)	(0.014)	(0.016)	(0.025)
Cognitive skills index	0.097***	0.120***	0.139***	0.151***
	(0.018)	(0.013)	(0.013)	(0.019)
Manual skills index	-0.024	0.004	0.061**	-0.049
	(0.019)	(0.021)	(0.023)	(0.035)
Constant	6.212***	5.810***	5.694***	5.266***
	(0.138)	(0.103)	(0.102)	(0.115)
Observations	38,879	230,583	66,597	236,971
R-squared	0.467	0.480	0.485	0.442
Sectoral fixed effects	YES	YES	YES	YES
Basic controls	YES	YES	YES	YES
Human capital controls	YES	YES	YES	YES
Hours controls	YES	YES	YES	YES
Gender, race and ethnicity	YES	YES	YES	YES
Implied %-increase in wage & salary income from a one standard deviation increase in skills index:				
Assisting & caring*Care services	-0.016	0.020	0.108	0.110
Assisting & caring*Business services	-0.024	-0.004	-0.007	0.000
Assisting & caring*Other services	-0.034	-0.012	0.004	0.033
Assisting & caring*Non-services	-0.022	-0.017	-0.016	-0.010
Cognitive skills index	0.098	0.151	0.181	0.188
Manual skills index	-0.017	0.003	0.048	-0.026

Notes: The table shows regression results for specification (4), for years 2015-2024 and different educational attainment levels. The outcome variable is an employee's logged annual wages (2023 dollars) in the previous calendar year. The used social skills variable is "assisting and caring". Control variables are defined as in Table 5. Robust standard errors in parenthesis are clustered at the broader occupational level, where ***, **, and * denoted significance at the 10, 5, and 1 percent level, respectively. Implied %-increases are calculated by transforming the log-point estimates to percent changes, multiplied by the relevant standard deviation value of the respective skills variable.

Table A.10: Regression results capturing the relationships of social, cognitive and manual skills – and related interactions - with wages by sector, all workers during 2015-2024

	(1)		(2)
Social*Care services	0.008	Social*Care services	-0.008
	(0.033)		(0.036)
Social*Business services	0.170***	Social*Business services	0.050*
	(0.042)		(0.028)
Social*Other services	0.028	Social*Other services	0.078**
	(0.062)		(0.030)
Social*Non-services	0.159***	Social*Non-services	0.033
	(0.034)		(0.027)
Cognitive*Care services	0.163***	Manual*Care services	-0.152**
	(0.039)		(0.059)
Cognitive*Business services	0.212***	Manual*Business services	-0.062
	(0.033)		(0.054)
Cognitive*Other services	0.123**	Manual*Other services	0.165**
	(0.058)		(0.060)
Cognitive*Non-services	0.137***	Manual*Non-services	-0.029
	(0.037)		(0.087)
Social*Cognitive*Care services	-0.001	Social*Manual*Care services	0.123***
	(0.012)		(0.015)
Social*Cognitive*Business services	-0.034**	Social*Manual*Business services	0.101***
	(0.014)		(0.027)
Social*Cognitive*Other services	0.001	Social*Manual*Other services	0.031
	(0.024)		(0.020)
Social*Cognitive*Non-services	-0.024**	Social*Manual*Non-services	-0.089**
	(0.010)		(0.034)
Manual skills index	0.039	Cognitive skills index	0.040
	(0.026)		(0.052)
Constant	5.346***	Constant	5.462***
	(0.143)		(0.121)
Observations	573,030		573,030
R-squared	0.521		0.522
Sectoral fixed effects	YES	Sectoral fixed effects	YES
Basic controls	YES	Basic controls	YES
Human capital controls	YES	Human capital controls	YES
Hours controls	YES	Hours controls	YES
Gender, race and ethnicity	YES	Gender, race and ethnicity	YES

Notes: The table shows regression results as in Table 7. Additionally, triple interactions are included between social and cognitive skills and the four different sectors (column (1)) and between social and manual skills and the four different sectors (column (2)).