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Occupational Segregation and the Role of the Public Workforce System:

An Examination of Individual Training Accounts[1]

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COMMUNITY DEVELOPMENT & REGIONAL OUTREACH

Key Findings

In this report, we explore how the occupational representation of six groups of workers — Black women and Black men, Hispanic women and Hispanic men, and White women and White men — varies in two settings: the U.S. labor market overall and the occupational training choices pursued by participants in the public workforce system. Finding that certain groups of workers are overrepresented or underrepresented in a set of occupations in the broader economy would not necessarily be noteworthy if these patterns were not associated with wage levels, but prior research shows that occupational segregation plays a role in the well-known gender and racial wage gaps (Blau and Kahn 2017; Paul et al. 2022; del Rio and Alonso-Villar 2015). Viewed through this lens, it is also important to understand whether the types of occupations selected by those trained through the public workforce system would be expected to produce equitable labor market opportunities by gender, race, and ethnicity. Our findings include:

- U.S. labor market data covering the years 2017 to 2021 indicate that women were much more likely than men to work in lower-wage, segregated occupations. The same was true for Hispanic and Black workers relative to White workers.

- The occupations in which White men were overrepresented had annual wages that were roughly $20,000 to $30,000 higher than the occupations in which the other five groups of workers were overrepresented.

- Training provided through the public workforce system's individual training accounts (ITAs) from 2017 to 2019 prepared women and men for dramatically different occupations. Men tended to pursue training in higher-paid occupations in transportation, the skilled trades, and information technology, whereas women's training occupations commonly prepared them for lower-paid work in health care.

- As a result, whereas roughly one in 10 men pursued training for a lower-wage, segregated occupation, the rate was much higher for women overall and for Hispanic women (47 percent) and Black women (40 percent) in particular.

- Even though the training occupations chosen by workers varied little by race and ethnicity, those pursued by White women and White men had, on average, annual wages roughly $5,000 greater than those pursued by Black and Hispanic participants of the same gender.

Background on Occupational Segregation

For the purposes of this report, occupational segregation is defined as "the inequitable division of workers across occupations by demographic characteristics such as race and gender" (Palacios et al. 2022, p. 6). Decades of data suggest that occupational segregation by gender declined during the second half of the last century, but integration stalled in the late 1990s or early 2000s (Blau et al. 2013; del Rio and Alonso-Villar 2015; Hegewisch et al. 2010). Similarly, segregation by race appears to have declined through the 1980s or 1990s but either plateaued or increased thereafter (Jardina et al. 2023; del Rio and Alonso-Villar 2015). One recent estimate covering the years 2008 through 2012 suggests that 28 percent of workers would need to change their occupation in order to desegregate the workforce by gender, race, and ethnicity; the estimate was only a modestly higher 30 percent in 1980 (Alonso-Villar and del Río 2020).

Work is generally more highly segregated by gender than by race (del Rio and Alonso-Villar 2015; Hegewisch et al. 2010) and for workers with lower levels of educational attainment (Blau et al. 2013; Hegewisch et al. 2010; Jardina et al. 2023). Of particular relevance to this study, examinations of participant data from a variety of public workforce programs also show strong gendered patterns in the types of occupations that men and women pursue through training (Reed et al. 2012; Berk 2012; Maxwell et al. 2012; Weiss 2010).

In theory, the sorting of workers into different occupations could be economically harmless to workers if this process were unrelated to wages, but this is not the reality. Research clearly shows that occupations in which Black and Hispanic workers and women are overrepresented are more likely to pay lower wages than occupations typically held by White workers and men (e.g., Gibson et al. 1998; England et al. 2007; Hegewisch et al. 2010; Hamilton et al. 2011; Hancock et al. 2021; Glynn and Boesch 2022; Bui et al. 2023).[3] This pattern persists for jobs of various skill levels (Hegewisch et al. 2010) and among similarly educated workers (Jardina et al. 2023). Thus, the uneven distribution of workers across occupations and industries contributes materially to the gender and racial pay gaps (Blau and Kahn 2017; Paul et al. 2022; del Rio and Alonso-Villar 2015).

Apart from its impact on wages, occupational segregation is associated with a variety of additional inequitable outcomes. For example, recent research suggests that job quality is higher in occupations generally held by White men than in occupations in which they are underrepresented (Bui et al. 2023). At the same time, men, Black workers, and Hispanic workers are more likely than others to experience a fatal on-the-job injury (USDOL 2023). During the COVID-19 pandemic, women were overrepresented in industries that bore the brunt of early job losses and absorbed a disproportionate share of these losses (Glynn and Boesch 2022).[4] Further, women and workers of color — but Black women and Hispanic women in particular — were much more likely than White men to work in essential occupations that required close physical proximity to others, thus increasing their likelihood of catching the virus (Hamilton et al. 2021).

The causes of occupational segregation are not only rooted in history but also perpetuated by contemporary labor market practices. Where gender is concerned, social norms, expectations, and the labeling of jobs as masculine or feminine play a role in shaping not only the career aspirations and preparation of workers but also the behavior of employers and others in a position to influence employment outcomes (National Research Council 1986). The result is a "cultural consensus" that distinguishes men's work from women's work and is reproduced through workplace practices (Reskin and Bielby 2005, p. 73). If such a consensus exists with regards to race, it began during slavery, when Black workers were engaged primarily in agricultural, domestic, and other service work (Solomon et al. 2019) and "occupational and legal segregation was justified by stamping the slave as racially inferior" (Banks and Whatley 2022, p. 432). Far from ending after emancipation, occupational segregation was maintained in the Jim Crow South, where Black workers were generally segregated from White workers and all but prevented from supervising them (Dewey 1952). The latter limitation "goes a long way toward explaining the concentration of Black workers at the bottom of the occupation distribution and in the most disagreeable and dangerous jobs in the economy" (Banks and Whatley 2022, pp. 435-436).

Beginning with the Equal Pay Act of 1963 and the Civil Rights Act of 1964, Congress passed laws to end employment

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[3]   Moreover, some research suggests that as women represent a greater share of an occupation's workers over time, the occupation's relative wages fall because the work becomes devalued (Levanon et al. 2009).

[4]   The pandemic-induced recession was a departure from prior recessions, which tended to affect men's employment more than women's (Alon et al. 2020).

discrimination by gender and race (USEEOC 2009), but there is ample evidence that it persists (see reviews by Blau and Kahn 2017 and Quillian et al. 2017) and can directly affect occupational opportunities (Pager et al. 2009). The "occupational opportunity structure" — that is, the set of occupations available to workers of a given gender, race, and ethnicity in light of institutionalized and informal barriers (National Research Council 1986) — is narrowed by factors other than discrimination, including caregiving responsibilities that can be complicated by the scarcity of affordable childcare and lead to time out of the labor force, a workplace culture that does not support family responsibilities or that is hostile to nontraditional workers, the absence of networks and mentors in historically segregated professions, and differences in the selected fields of study in higher education and in workforce training programs (review by Glynn and Boesch 2022). We explore the last mechanism — specifically, training provided through the public workforce system — in this report.

The Public Workforce System and Individual Training Accounts

Signed into law in 2014, the Workforce Innovation and Opportunity Act (WIOA) codifies the nation's approach to public workforce development. Services provided through WIOA-funded programs are accessed by individuals at one of the thousands of career centers operating across the country; these services can include using public computers for job searches and resume-writing software, attending workshops on interviewing, participating in career counseling, and the like. In this report, we focus on services delivered by the Adult, Dislocated Worker, and Youth programs covered by Title I of WIOA. The first program supports local workforce development activities designed for anyone 18 and over, the second is for laid-off workers unlikely to return to their prior field, and the third is for in-school and out-of-school youth 14 to 24 years of age (Collins and Bradley 2022).

Within these programs, a subset of participants receives occupational training, and the primary way that these programs facilitate classroom-based occupational training is through an individual training account (ITA) (Mack and Dunham 2020). Individuals who qualify for training[5]

and receive an ITA can work with a career counselor to develop a tailored employment plan and select a training opportunity that aligns with their career goals. In addition to being appropriate for the individual, the training must be geared toward an occupation that is considered to be in demand locally and must be offered by a training provider on the eligible training provider list. This model has been described as "informed customer choice" because career center staff provide information and guidance to individuals who are ultimately free to make their own decision, within the confines of the lists of in-demand occupations and eligible training providers. Funds in the ITA are used to pay for training costs, generally capped at between $5,000 and $10,000 (Eberts 2019). In program year 2021 alone, over 140,000 individuals who received training exited the Adult, Dislocated Worker, and Youth programs, and 60 percent purchased their occupational training via an ITA.[6]

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[5]   In order to qualify for training, program participants must be unable to receive adequate funding from other government sources (e.g., Pell grants), require skills training to achieve economic self-sufficiency, and have the skills and resources considered necessary to complete the training successfully (Eberts 2019).

[6]   Authors' calculations derived from SPRA (2023).

Where the public workforce system is concerned, we focus our analysis on the types of training occupations workers select rather than their experiences in the labor market following the training. Prior research on the effectiveness of occupational training provided through the Adult and Dislocated Worker programs at improving participants' employment and earnings outcomes is mixed (e.g., Fortson et al. 2017; Heinrich et al. 2013; Andersson et al. 2022), and previous research, confirmed by our own analysis, finds only a minority of participants who received occupation-

> ## We focus on the training delivered through the public workforce system rather than the outcomes of such training because the former better captures both the intent of the participant and the use of public funding.

specific training through these programs found a job in their chosen field or a related one (Fortson et al. 2017). We focus on the training delivered through the public workforce system rather than the outcomes of such training because the former better captures both the intent of the participant and the use of public funding. Understanding the barriers that prevent a participant from translating training into gainful employment in their chosen field is critically important but outside the scope of our analysis. Instead, our goal is to answer the question: Absent such barriers, what type of work would await those who received ITA-funded occupational training?

We build on the findings from three recent examinations of the training offered through the public workforce system. The first, focusing on training grant recipients aged 50 and over, finds evidence of gendered patterns in the occupational training pursued and generally higher posttraining earnings for men than for women (Workcred 2021).[7] The second contemporary analysis reaches similar conclusions and, as we do, examines occupational training choices intersectionally by gender, race, and ethnicity, but it is limited in scope to Colorado (Clark and Richard 2022). The third is a thorough analysis of the programs offered by eligible training providers nationally. Among its findings is that only 39 percent of programs train participants for a top-100 opportunity occupation — a job that generally pays above the national annual median wage and does not require a four-year college degree.[8] This study suggests that many participants earn low wages after completing their training and that programs associated with the lowest wages disproportionately serve women and participants of color, leading the authors to posit "that publicly funded training programs may perpetuate occupational segregation" (Deming et al. 2023). We further investigate this possibility.

Data and Methods

In the Landscape Analysis section that follows, we use American Community Survey data (2017–2021) to explore how six groups of workers — Black women and men, Hispanic women and men, and White women and men — are overrepresented and underrepresented across higher- and lower-wage occupations. To do so, we calculate a crowding index that compares each group's proportion in an occupation with its proportion among similarly educated people in the broader population (i.e., defined as the education range typical for an occupation using the 25th and 90th percentile education level of its workers). Consistent with prior studies (Bergmann 1971; Gibson et al. 1998; Hamilton et al. 2011), we consider a group to be overrepresented in an occupation if the crowding index for that group is above 1.1, indicating that the group's share of employment in that occupation is greater than 110 percent of its share of the similarly educated population. An occupation is proportionally represented for a group if its index is from 0.9 to 1.1 and underrepresented if the index is below 0.9, or less than 90 percent of its share of

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[7]   Earlier analyses of the Adult and Dislocated Workers programs reach similar conclusions (Maxwell et al. 2012; Weiss 2010).
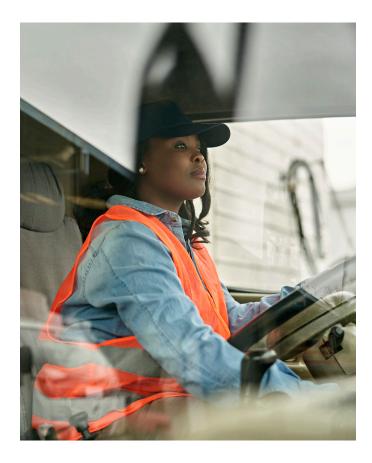
[8]   More information on opportunity occupations is available at www.philadelphiafed.org/community-development/workforce-and-economic-development/opportunity-occupations-revisited.

the similarly educated population. As an example from our analysis, Hispanic women represent 25.21 percent of all dental assistants but constitute only 8.26 percent of the population with the education typical of a dental assistant (i.e., from a high school diploma/GED to a bachelor's degree). As a result, Hispanic women are considered overrepresented among dental assistants because their crowding index is 3.05 (25.21 percent/8.26 percent), well above the 1.1 threshold for occupational overrepresentation.

In the Training Analysis section, our objective is to discern the extent to which ITA recipients trained for lower-wage, segregated occupations during the study period. To do so, we analyze over 280,000 training occupations pursued by participants in the Adult, Dislocated Worker, and Youth programs whose training was funded through an ITA and began in the 2017–2019 period. Data on participants and their occupational training are from the Participant Individual Record Layout (PIRL) files published by the U.S. Department of Labor's Employment and Training Administration.[9] Using earlier American Community Survey data (2013–2017) more compatible with PIRL data during these years, we again calculate a crowding index and refer to occupations as segregated for a given group if that group is overrepresented (i.e., the crowding index is above 1.1). We classify occupations as lower or higher wage using Occupational Employment and Wage Statistics data (May 2019) from the U.S. Bureau of Labor Statistics.

Please see the appendix for more information on our data and methodological approach.

Landscape Analysis

In this section, we describe how levels of occupational representation and wages vary for different groups of workers in the broader U.S. labor market. Consistent with recent similar research (Biu et al. 2023), Figure 1 shows the annual wages for occupations in which each of the six groups of workers were overrepresented and underrepresented from 2017 to 2021. As illustrated by the blue bars, White men were overrepresented in occupations that, on average, paid roughly $20,000 to $30,000 more than the occupations in which the other five groups of workers were overrepresented. Hispanic and Black women, in particular, were crowded into very low-wage work.
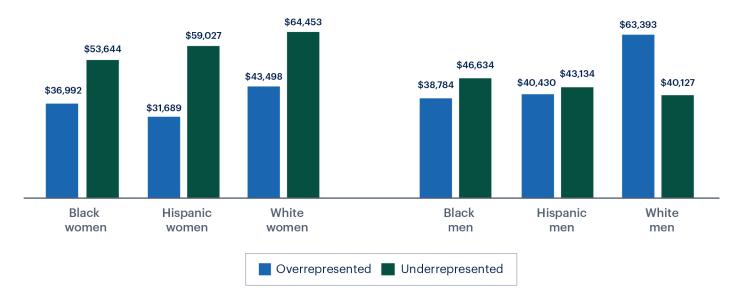

Examining levels of occupational underrepresentation adds nuance to this exercise (see the green bars in Figure 1). All three groups of women were underrepresented in occupations that, collectively, could be considered higher wage. Only for White men were wages lower, on average, for occupations in which they were underrepresented than in occupations in which they were overrepresented.

Figure 2 shows how workers were distributed across three categories of occupations: those paying lower wages in which the group was overrepresented, which we refer to as segregated; those paying lower wages in which the group was proportionally or underrepresented (i.e., "Lower-wages, other" in the figure); and those paying higher wages. As illustrated by the blue shading, more than half of Hispanic women (58 percent) and nearly half of Hispanic men (48 percent) worked in lower-wage, segregated occupations. Among those of the same race or ethnicity, women were
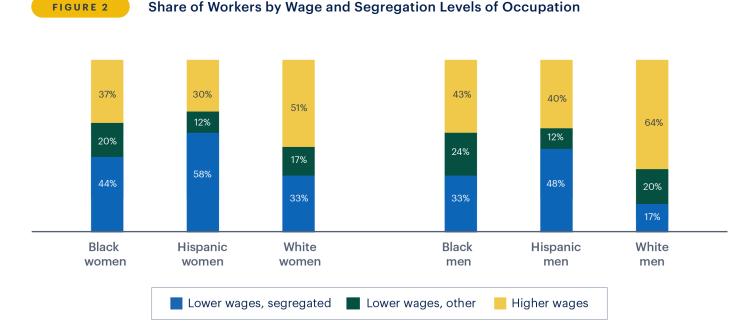
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[9]   Annual summary data for the Adult, Dislocated Worker, and Youth programs analyzed in this report indicate which broad training occupations are pursued by participants of different genders, races, and ethnicities, but information on specific training occupations and the intersection of gender and race/ethnicity is not available in these annual tables (e.g., SPRA 2023).

FIGURE 1

Annual Wages of Occupations by Level of Representation

Overrepresented **Underrepresented**

	Overrepresented	Underrepresented
Black women	$36,992	$53,644
Hispanic women	$31,689	$59,027
White women	$43,498	$64,453
Black men	$38,784	$46,634
Hispanic men	$40,430	$43,134
White men	$63,393	$40,127

Note: Values represent the weighted average of the overrepresented and underrepresented occupations' annual median wages, with the weight reflecting the group's employment in each occupation. The sample is restricted to those 18 to 64 years of age with wage and salary income ("wages") and excludes those who are unemployed, self-employed, or working in a military-specific occupation. Although estimates include wages earned from all jobs in the previous 12 months, in this analysis, they are wholly attributed to a worker's primary occupation.

Source: Authors' analysis of U.S. Census Bureau, American Community Survey 5-year Public Use Microdata Sample (2017–2021) retrieved from IPUMS USA, University of Minnesota, www.ipums.org

FIGURE 2

Share of Workers by Wage and Segregation Levels of Occupation

Lower wages, segregated **Lower wages, other** **Higher wages**

	Lower wages, segregated	Lower wages, other	Higher wages
Black women	44%	20%	37%
Hispanic women	58%	12%	30%
White women	33%	17%	51%
Black men	33%	24%	43%
Hispanic men	48%	12%	40%
White men	17%	20%	64%

Note: The sample is restricted to those from 18 to 64 years of age with wage and salary income ("wages") and excludes those who are unemployed, self-employed, or working in a military-specific occupation. Workers' annual wages are attributed to their primary occupation and used to estimate each occupation's annual median wage. Occupations are classified as lower or higher wage based on their relationship to the annual median wage for all workers in this restricted sample ($42,390).

Source: Authors' analysis of U.S. Census Bureau, American Community Survey 5-year Public Use Microdata Sample (2017–2021) retrieved from IPUMS USA, University of Minnesota, www.ipums.org

consistently more likely than men to work in a lower-wage, segregated occupation. Among those of the same gender, Hispanic workers were the most likely to be working in lower-wage, segregated occupations, followed by Black workers and then White workers. Nearly two-thirds of White men (64 percent) worked in higher-wage occupations, compared with roughly one-third of Hispanic women (30 percent) and Black women (37 percent).

Training Analysis

In this section, we transition to our analysis of the types of occupational training pursued by ITA recipients from 2017 to 2019. To provide context for this analysis, it is worth noting that ITA recipients as a group were not demographically or socioeconomically representative of the broader U.S. working-age population. Relatively speaking, participants were generally younger (a median age of 33 versus 40 for the working-age population), had lower levels of formal education (57 percent had no more than a high school diploma versus 37 percent), and were less likely to be employed (31 percent versus 73 percent) at program entry. Participating women had higher levels of educational attainment and were more likely to be employed than was true for participating men, but they were also more likely to be classified as low income and substantially more likely to be a single parent (see Table A.2 in the appendix for select characteristics of ITA recipients).[10]

Figure 3 lists the top-10 training occupations for each group of workers, along with the estimated annual median wage for each and the cumulative share of training occupations represented. Several important observations can be gleaned from this figure:

Training occupations varied dramatically by gender but were fairly similar by race and ethnicity. As Figure 3 illustrates, women and men shared few top-10 training occupations (highlighted in yellow): heavy and tractor-trailer truck drivers for all three race/ethnicity groups, nursing assistants for Black and Hispanic women and men, and registered nurses for White women and men.

On the other hand, occupations in the top 10 for more than one same-gender group were numerous and are shaded blue in Figure 3. Although their

specific rankings differed, the vast majority of top-10 training occupations repeated for at least two groups of workers of the same gender. For women, these occupations were commonly in health care, whereas for men, training was frequently pursued for jobs in transportation, the skilled trades, and IT-related fields.

Extending well beyond the top 10 for these six groups, the training pursued by ITA recipients was highly correlated for same-gender groups and more modestly (albeit still significantly) correlated for groups of the same race and ethnicity. Groups overlapping in neither — for example, Black men and Hispanic women — generally exhibited low levels of correlation (see Figure 4).

The wage profile for training occupations was higher for men than for women. In Figure 3, the green font indicates that an occupation's annual median wage is above the national median used in the Training Analysis. This was the case for nine of the top-10 training occupations for White men, eight of the top 10 for Black men, and six of the top 10 for Hispanic men. Half or more of the most common training occupations for each group of women paid less than the national annual median wage; for Hispanic women, this was the case for the two most common occupations (nursing assistants and medical assistants).

Training was highly concentrated in some cases. A substantial share of the occupational training pursued by Black men (47.3 percent), Hispanic men (34.0 percent), and White men (31.6 percent) was focused on a single occupation: heavy and tractor-trailer truck drivers. The top-10 training occupations accounted for nearly two-thirds of all occupational training for Black women (63.4 percent) and Black men (64.3 percent); for White men, they accounted for just over half of all training (51.5 percent).

As suggested in Figure 3, the wages associated with training occupations generally favored men over women, and this relationship is supported in Figure 5. For groups of the same race/ethnicity, the annual wages for training occupations were generally $3,000–$4,000 higher for men than for women. For same-gender groups — and in spite of the fact that their training choices were highly correlated — typical training occupation wages for Black and Hispanic

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[10]   Estimates for the working-age population (18 to 64 years of age) are based on the authors' analysis of U.S. Census Bureau, American Community Survey 5-year Public Use Microdata Sample (2017–2021) retrieved from IPUMS USA, University of Minnesota, www.ipums.org.

FIGURE 3

Top-10 Training Occupations

Black women	Number	Annual wage	Cumulative percent
Nursing Assistants	8,212	$28,059	16.8
Licensed Practical and Licensed Vocational Nurses	5,766	*$45,490*	28.6
Medical Assistants	4,436	$34,861	37.7
Registered Nurses	4,099	*$72,197*	46.1
Heavy and Tractor-Trailer Truck Drivers	3,463	*$45,427*	53.1
Phlebotomists	1,298	$34,819	55.8
Medical Records and Health Information Technicians	1,278	*$44,138*	58.4
Dental Assistants	968	$32,816	60.4
Pharmacy Technicians	793	$34,798	62.0
Medical Secretaries	687	$35,526	63.4

Black men	Number	Annual wage	Cumulative percent
Heavy and Tractor-Trailer Truck Drivers	17,909	*$45,427*	47.3
Welders, Cutters, Solderers, and Brazers	1,226	*$44,138*	50.6
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	999	*$46,218*	53.2
Security Guards	867	$27,560	55.5
Computer User Support Specialists	777	*$49,005*	57.5
Computer and Information Systems Managers	545	*$147,430*	59.0
Nursing Assistants	543	$28,059	60.4
Supervisors of Construction and Extraction Workers	523	*$70,408*	61.8
Network and Computer Systems Administrators	506	*$84,906*	63.1
Computer Network Support Specialists	433	*$58,469*	64.3

Hispanic women	Number	Annual wage	Cumulative percent
Nursing Assistants	3,414	$28,059	13.7
Medical Assistants	2,842	$34,861	25.1
Registered Nurses	2,071	*$72,197*	33.3
Licensed Practical and Licensed Vocational Nurses	1,705	*$45,490*	40.2
Heavy and Tractor-Trailer Truck Drivers	936	*$45,427*	43.9
Dental Assistants	905	$32,816	47.5
Medical Records and Health Information Technicians	823	*$44,138*	50.8
Phlebotomists	672	$34,819	53.5
Bookkeeping, Accounting, and Auditing Clerks	629	*$42,390*	56.1
Medical Secretaries	512	$35,526	58.1

Hispanic men	Number	Annual wage	Cumulative percent
Heavy and Tractor-Trailer Truck Drivers	8,111	*$45,427*	34.0
Welders, Cutters, Solderers, and Brazers	932	*$44,138*	37.9
Security Guards	926	$27,560	41.8
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	911	*$46,218*	45.6
Electricians	745	*$57,262*	48.7
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	443	$36,608	50.6
Computer User Support Specialists	435	*$49,005*	52.4
Light Truck or Delivery Services Drivers	366	$35,443	54.0
Network and Computer Systems Administrators	342	*$84,906*	55.4
Nursing Assistants	331	$28,059	56.8

White women	Number	Annual wage	Cumulative percent
Registered Nurses	8,523	*$72,197*	14.0
Licensed Practical and Licensed Vocational Nurses	6,988	*$45,490*	25.5
Nursing Assistants	6,477	$28,059	36.2
Medical Assistants	4,814	$34,861	44.1
Heavy and Tractor-Trailer Truck Drivers	2,252	*$45,427*	47.8
Medical Records and Health Information Technicians	2,048	*$44,138*	51.2
Dental Assistants	1,522	$32,816	53.7
Medical Secretaries	1,065	$35,526	55.5
Phlebotomists	1,065	$34,819	57.2
Bookkeeping, Accounting, and Auditing Clerks	1,051	*$42,390*	58.9

White men	Number	Annual wage	Cumulative percent
Heavy and Tractor-Trailer Truck Drivers	16,018	*$45,427*	31.6
Welders, Cutters, Solderers, and Brazers	2,534	*$44,138*	36.6
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,415	*$46,218*	39.4
Computer and Information Systems Managers	1,157	*$147,430*	41.7
Electricians	1,056	*$57,262*	43.8
Registered Nurses	1,032	*$72,197*	45.8
Computer User Support Specialists	786	*$49,005*	47.4
Network and Computer Systems Administrators	705	*$84,906*	48.8
Computer Occupations, All Other	683	*$89,502*	50.1
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	681	$36,608	51.5

Key:

Blue shading highlights occupations that repeat for at least two groups of the same gender.

Yellow italicized font indicates occupations that repeat for both gender groups of the same race/ethnicity.

Green italicized font indicates that an occupation's annual median wage is above the national median of $37,840 as reported in the OEWS data set.

Note: Occupational titles are from the 2010 SOC coding system. The sample is restricted to trainings begun by participants 18 to 64 years of age during the 2017–2019 period and associated with an ITA and a valid training occupation (excluding military-specific occupations). Annual median wages are from the OEWS data set.

Sources: Authors' analysis of U.S. Department of Labor, Employment and Training Administration, Participant Individual Record Layout (PIRL) microdata (2017–2019); U.S. Bureau of Labor Statistics, Occupational Employment and Wage Statistics (OEWS) MB3 estimates (May 2019); U.S. Census Bureau, American Community Survey 5-year Public Use Microdata Sample (2013–2017) retrieved from IPUMS USA, University of Minnesota, www.ipums.org

Rank-Order Correlation of Training Occupations

	Black women	Black men	Hispanic women	Hispanic men	White women
Black men	0.317**				
Hispanic women	0.821**	0.112			
Hispanic men	0.246**	0.863**	0.229**		
White women	0.794**	0.129	0.835**	0.160*	
White men	0.217**	0.860**	0.113	0.836**	0.253**

Key:

** indicates significance at the 0.01 level (two-tailed)

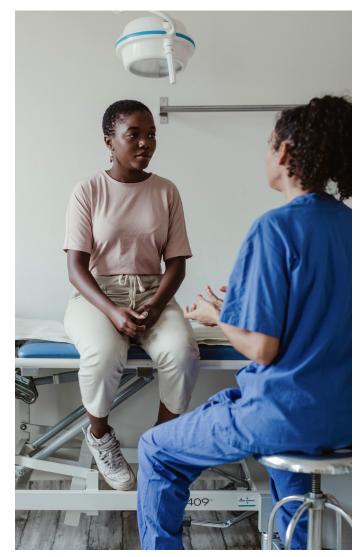* indicates significance at the 0.05 level (two-tailed)

Blue shading indicates groups with the same gender.

Yellow shading indicates groups with the same race/ethnicity.

Note: The sample is restricted to trainings begun by participants 18 to 64 years of age during the 2017–2019 period and associated with an ITA and a valid training occupation (excluding military-specific occupations). The more than 700 occupations with any training reported were ranked in descending order for each group. To reduce the number of ties common among occupations with few or no trainings for a given group, the Spearman correlation coefficients presented in this table are based on only the occupations that ranked in the top 100 for any group. A total of 173 occupations capturing 94.9 percent of total trainings for these six groups were included in this analysis.

Source: Authors' analysis of U.S. Department of Labor, Employment and Training Administration, Participant Individual Record Layout (PIRL) microdata (2017–2019)

workers trailed those for White workers by roughly $5,000. For women, this is at least partly explained by the most common training occupation for each group as shown in Figure 3: registered nurses (annual median wage of $72,197) for White women compared with nursing assistants (annual median wage of $28,059) for Black women and Hispanic women. Among men, it is worth noting that the low-wage occupations of security guards and nursing assistants appear among the top 10 for Black and Hispanic trainees but not for White trainees.
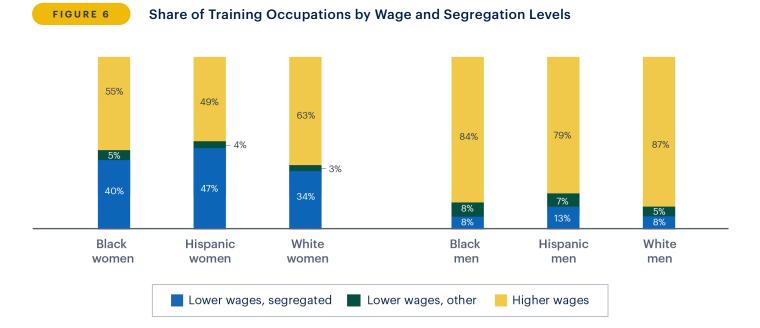
As we did for the broader labor market earlier, we classify the training occupations by their wage and segregation levels and present the results for each of the six groups of participants in Figure 6. Consistent with our findings for the economy at large, women and Hispanic workers were more likely than their counterparts to train for lower-wage, segregated jobs. As illustrated by the blue shading in the figure, this was true for nearly half of Hispanic women (47 percent) and smaller but still-sizable shares of Black women (40 percent) and White women (34 percent). Very few men trained for lower-wage, segregated occupations, but Hispanic men (13 percent) were more likely than others to do so. (See Table A.1 in the appendix for the number of training occupations for each group and category.)

FIGURE 5

Annual Wages of Training Occupations

Black women: $47,573
Hispanic women: $46,812
White women: $52,205
All training occupations: $51,754
Black men: $50,930
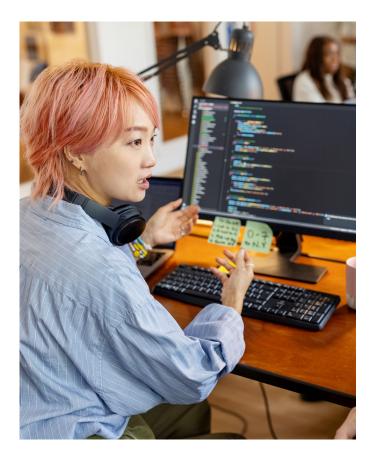Hispanic men: $50,969
White men: $56,607

Note: Annual median wages are from the OEWS data set. Values represent the weighted average of the training occupations' annual median wages, with the weight reflecting the number of participants pursuing training in each group. The estimate for "all training occupations" includes all participants, including those with missing gender, race, or ethnicity data and those identifying with other gender, race, or ethnic groups. The sample is restricted to trainings begun by participants 18 to 64 years of age during the 2017 to 2019 period and associated with an ITA and a valid training occupation (excluding military-specific occupations).

Sources: Authors' analysis of U.S. Department of Labor, Employment and Training Administration, Participant Individual Record Layout (PIRL) microdata (2017–2019); U.S. Bureau of Labor Statistics, Occupational Employment and Wage Statistics (OEWS) MB3 estimates (May 2019); U.S. Census Bureau, American Community Survey 5-year Public Use Microdata Sample (2013–2017) retrieved from IPUMS USA, University of Minnesota, www.ipums.org

FIGURE 6

Share of Training Occupations by Wage and Segregation Levels

Black women: 40% Lower wages, segregated; 5% Lower wages, other; 55% Higher wages
Hispanic women: 47% Lower wages, segregated; 4% Lower wages, other; 49% Higher wages
White women: 34% Lower wages, segregated; 3% Lower wages, other; 63% Higher wages
Black men: 8% Lower wages, segregated; 8% Lower wages, other; 84% Higher wages
Hispanic men: 13% Lower wages, segregated; 7% Lower wages, other; 79% Higher wages
White men: 8% Lower wages, segregated; 5% Lower wages, other; 87% Higher wages

Legend: ■ Lower wages, segregated ■ Lower wages, other ■ Higher wages

Note: The sample is restricted to trainings begun by participants 18 to 64 years of age during the 2017 to 2019 period and associated with an ITA and a valid training occupation (excluding military-specific occupations). Occupations are classified as lower or higher wage based on their relationship to the national median of $37,840 as reported in the OEWS data set. Occupations are classified as segregated if, for a given group, the crowding index exceeds 1.1.

Sources: Authors' analysis of U.S. Department of Labor, Employment and Training Administration, Participant Individual Record Layout (PIRL) microdata (2017–2019); U.S. Bureau of Labor Statistics, Occupational Employment and Wage Statistics (OEWS) MB3 estimates (May 2019); U.S. Census Bureau, American Community Survey 5-year Public Use Microdata Sample (2013–2017) retrieved from IPUMS USA, University of Minnesota, www.ipums.org

Discussion

In this report, we explore patterns of occupational segregation both in the U.S. labor market overall and in the occupational training selections of ITA recipients in the public workforce system's Adult, Dislocated Worker, and Youth programs. We find that women, Hispanic, and Black workers were much more likely than men and White workers to be employed in lower-wage, segregated occupations. Consequently, the occupations in which these groups of workers were overrepresented had annual wages that were roughly $20,000 to $30,000 lower than the occupations in which White men were overrepresented. Further, we find that the training pursued by ITA recipients was gendered in a way that, on average, prepared men for occupations paying higher wages than those chosen by women — in spite of the fact that women's trainings generally take longer than men's (SPRA 2023). A sizable minority of Hispanic, Black, and White women (in that order) prepared for occupations that

were not only lower wage but also segregated. How might this pattern be reversed, so that women — particularly Hispanic and Black women, who tend to experience the lowest rates of upward occupational mobility in the broader labor market (Escobari et al. 2021) — receive training from the public workforce system that prepares them for higher-paying occupations, including ones in which they have traditionally been underrepresented?

The determination of which programs are eligible for public training dollars may be worth further examination. As shown in this report and recent research (Deming et al. 2023), some of the most prevalent training occupations — nursing assistants, security guards — generally pay very low wages. Programs that prepare participants for high-wage, high-growth, and high-volume occupations could be promoted without sacrificing customer choice, and some states have begun considering wage levels and career advancement in their assessment of which occupations are in demand (Deming et al. 2023).

Because employers are seen as a valuable customer of the public workforce system (Dunham et al. 2020), making lower-wage occupations ineligible for training dollars may be unpopular with businesses needing to fill these types of positions (Deming et al. 2023). Further, some of the most prevalent lower-wage training occupations identified in this report are in the health-care sector and are expected to experience strong job growth in the coming years.[11] This opens the door for improving the quality of these economically important jobs — a process that may begin with raising wages but could also include addressing issues such as job security, flexibility, and worker treatment (Dunne and Wardrip 2023).

Another opportunity may lie in bolstering the quality and quantity of information that is critical to the public workforce system's "informed customer choice" approach. Providing clear and accessible information is among 10 principles for developing a successful career navigation program (Fuller et al. 2023) and can help participants make "more empowered and better decisions" (Selzer and Eyster 2017, p. 90). However, a recent review of states' eligible training provider lists — and the more than 75,000 associated training programs — suggests that information is difficult to access electronically and rarely includes data such as completion rates or posttraining earnings that participants may want to consider before

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[11] U.S. Bureau of Labor Statistics, Employment Projections program, 2022–2032, Table 1.4, available at www.bls.gov/emp/tables/occupations-most-job-growth.htm.

choosing a particular path. Lacking hard data, participants may rely more heavily on recommendations from their personal networks (Deming et al. 2023), which are often themselves segregated (McPherson et al. 2001). Additional investments to enhance the capacity of career navigators could help participants identify less obvious, higher-paying professional goals (Deming et al. 2023) — an important departure from the public workforce system's emphasis on rapid job placement rather than training in nontraditional fields that could lead to greater economic security (Gatta 2014; Weiss 2010).

Even participants with perfect information on training programs and access to effective career navigation services may encounter other barriers to a career in certain higher-wage occupations. For example, once in the workplace, an employee with an identity that has been traditionally underrepresented in a given occupation — in terms of gender, race, ethnicity, or any combination thereof — may face what is referred to in higher education as a "chilly climate" that is discouraging, unwelcoming, and not conducive to persistence and success (Palacios et al. 2022; Hall and Sandler 1982). Worse still are women's experiences of sexual harassment and discrimination in male-dominated industries, occupations, and worksites (Center for American Progress 2018; Hulett et al. 2008; Reed et al. 2012) and Black employees' greater experiences, relative to those of their White coworkers, of workplaces that are less inclusive, accepting of diversity, and fair (Hancock et al. 2021). Enforcement of antiharassment policies, mentorship, peer support, and employee resource groups (Reed et al. 2012; Foldy 2019) are among the strategies that could improve the odds of persistence and success for those who train for and attain nontraditional roles.

We close with a few caveats important for interpreting our findings and a proposal for future research. As mentioned earlier, our Training Analysis focuses on the types of occupations ITA recipients select and the typical wages associated with those occupations rather than on participants' posttraining experiences in the labor market. Even though a minority of participants who receive occupation-specific training find a job in their chosen field or a related one (Fortson et al. 2017), the training occupations chosen by ITA recipients reflect the intent of the participant and the expected, if not always realized, outcomes of publicly funded training.

Second, it is important to acknowledge that our analysis is conducted at the national level because data reliability concerns prevent us from estimating occupational segregation levels at the state or local levels. As a result, our findings mask differences — in training activities, segregation patterns, and wage levels — that play out in subnational labor markets (Gibson et al. 1998; Alonso-Villar and del Río 2020).

Third, the crowding index that we adopt takes as a given the level of educational attainment in the broader population — a level that varies by gender, race, and its intersection (Gibson et al. 1998). As an example from our Landscape Analysis, Black women are proportionally represented among dentists because they represent roughly 3.4 percent of the workers in this occupation and an approximately equal share of those with a professional or doctoral degree (a crowding index of 0.91). If there were no structural barriers to higher education, however, Black women would represent 6.5 percent of those with the required education (i.e., their share of the overall labor force), and many more would have the necessary credentials for this and other higher-paying occupations.[12]

Finally, we believe that the dynamics of occupational choice within the public workforce system is an area ripe for future research. In this analysis, we are blind to the factors that affect how participants set career goals and select the training appropriate to reach them. How active are career counselors in guiding these decisions? Would better or more accessible information on training and career outcomes be helpful? Are the lists of eligible training providers and in-demand occupations unnecessarily limiting choice? How important is the duration of training, and would wraparound supports expand options for some job seekers? Building on prior work (e.g., Gatta 2014), qualitative or survey research exploring the factors that affect this occupational selection process would help shed light on why we find differences in occupational training by gender, race, and ethnicity.

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[12] Authors' analysis of U.S. Census Bureau, American Community Survey 5-year Public Use Microdata Sample (2017–2021) retrieved from IPUMS USA, University of Minnesota, www.ipums.org.

Appendix

Occupational Training

Data on occupational training are from the Participant Individual Record Layout (PIRL) files published by the U.S. Department of Labor's (DOL) Employment and Training Administration (ETA). PIRL data track services delivered and outcomes achieved under the Workforce Innovation and Opportunity Act (WIOA). PIRL files include individuals served by the Adult, Dislocated Worker, Youth, Dislocated Worker Grants, Wagner-Peyser, and Veterans' programs (SPRA 2021).[13]

PIRL data sets contain hundreds of variables on the characteristics of those seeking services from the public workforce system, the training activities pursued, and the outcomes of those activities (Mack and Dunham 2020). The PIRL data are rich in that they capture a variety of variables useful for the study of occupational segregation, including race, ethnicity, and gender. We use the 2017Q4, 2018Q4, 2019Q4, and 2020Q4 PIRL annual files.[14] From these files, we include 281,109 training occupations that meet the following criteria:

- The training began during the January 1, 2017, to December 31, 2019, period.

- The participant was 18 to 64 years of age.

- Participant data were submitted by one of the 50 states or the District of Columbia; data submitted by a U.S. territory are dropped from the analysis.[15]

- For the purposes of our primary analyses, the participant identified as female or male and one of (1) Hispanic or Latino, (2) non-Hispanic Black, or (3) non-Hispanic White. Sample size issues prevent us from analyzing additional groups individually, although participants identifying with other groups and those with missing data are included in our overall estimates. For the small percentage of participants for whom data on gender, race, or ethnicity are inconsistent across the PIRL files, we use the information from the most recent file.

- The participant received an individual training account (ITA) for the participation period. We focus on ITAs because although training can happen via other mechanisms for already-employed workers, ITAs are the primary way individual job seekers in the Adult and Dislocated Worker programs receive training (Eberts 2019; Collins and Bradley 2022). Each ITA recipient in the PIRL database received services funded by the Adult, Dislocated Worker, or Youth programs.

- The training has a valid occupation code; trainings with a missing code or invalid code that cannot be used to gather information on wages and segregation levels from other data sets (described later), as well as a small number of trainings for military-specific occupations, are dropped from the analysis. We convert the O*NET occupation codes reported in the PIRL data to 2010 Standard Occupational Classification (SOC) codes.[16] The record for each participation period can include information for up to three occupations, and individuals can have multiple participation periods; all are included in this analysis if the participant received an ITA. Even so, 97.5 percent of the individuals in our final sample pursue training for only one occupation. We use the training occupation rather than the participant's occupation of employment after the training because this study is an analysis of occupational choice, not the employment outcomes of ITA recipients. For the same reason, we do not require the training to be completed.

The national PIRL files used in this analysis represent compilations of data submitted by states to the DOL ETA. Owing to either differences in the delivery of training or gaps in the data collection process, data for some states are incomplete or entirely absent. For example, none of the trainings reported in the PIRL data set in Idaho or Vermont are associated with an ITA, so they are missing from this analysis. Other states fail to report the training occupation code or the training entry date at disproportionate rates, and for some states, there are large discontinuities in the number of qualifying trainings from year

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[13]   Collins and Bradley (2022) provide a good overview of WIOA and its constituent programs.

[14]   PIRL data are available on the U.S. Department of Labor website: www.dol.gov/agencies/eta/performance/results-archive.

[15]   Participants' state of residence is not provided in the publicly available PIRL data, so we use this as a proxy.

[16]   O*NET occupations are finer-grained that SOC codes, but mapping the former to the latter is straightforward. More on the relationship between O*NET and 2010 SOC codes can be found here: www.onetcenter.org/taxonomy.html.

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to year.[17] As a result, our findings reflect the training activity that is *fully documented* during the study period but cannot necessarily be considered descriptive of all training activity *delivered* during the study period.

Defining and Calculating Occupational Segregation

In this paper, we measure occupational segregation using a crowding index derived from the U.S. Census Bureau's American Community Survey (ACS) 5-year Public Use Microdata Sample (PUMS), accessed via IPUMS USA (Ruggles et al. 2023). This occupational crowding index was used by Bergmann (1971) and further developed by Gibson et al. (1998), Hamilton et al. (2011), and Holder (2018). For a given group of workers defined by gender, race, and ethnicity (e.g., non-Hispanic White women), our implementation of the index compares the group's proportion in an occupation with its proportion among similarly educated people in the broader population. Following Gibson et al. (1998) and Hamilton et al. (2011), we define the education range typical for an occupation using the 25th and 90th percentile education level of its workers.[18] To be consistent with our treatment of the PIRL data, we restrict the ACS PUMS file to people 18 to 64 years of age; to calculate each group's representation in an occupation and the typical education range for each occupation, we further restrict the sample to those employed and working for wages (i.e., not self-employed) and exclude those in military-specific occupations. To calculate each group's share of similarly educated people in the broader population, we restrict the sample by age only (i.e., 18 to 64 years of age). In this analysis, those identifying as Hispanic or Latino can be of any race; those classified as Black or White do not identify as Hispanic or Latino. The sample sizes for groups other than Black, Hispanic, and White are too small to produce reliable estimates.

Consistent with the previously cited literature, we consider a group to be overrepresented in an occupation if the crowding index for that group is above 1.1, indicating that the group's share of employment in that occupation is greater than 110 percent of its share of the similarly educated population. An occupation is proportionally represented for a group if its index is from 0.9 to 1.1 and underrepresented if the index is below 0.9. As an example from our Landscape Analysis, the crowding index tells us that Black men are overrepresented among janitors and building cleaners. We know this because while Black men make up 7.3 percent of the population with the education typical of this occupation (i.e., a high school diploma/GED through an associate's degree), they represent 11.8 percent of workers in this profession. As a result, the crowding index for Black men in the janitors and building cleaners occupation is 1.6 (11.8 percent/7.2 percent), well above the 1.1 threshold for occupational overrepresentation.

In the Landscape Analysis, these data are used to calculate the occupational crowding indices and to classify workers into categories reflecting representation levels; in this analysis, we use the most recent 5-year ACS PUMS data set available (2017–2021), which encompasses our PIRL sample (2017–2019). In the Training Analysis, crowding indices are applied to the training data to determine whether workers were preparing for employment in segregated occupations, which have an index above 1.1; for this analysis, we use a slightly older ACS PUMS data set (2013–2017) because this is the last file to incorporate an occupational coding system compatible with our PIRL sample.[19]

Defining Lower-Wage Occupations

In this analysis, we classify occupations into those paying lower wages and those paying higher wages using two different data sets but the same guiding principle: The national annual median wage should serve as the threshold between these two sets of occupations. In the Landscape Analysis, we rely solely on the 2017–2021 ACS PUMS data set. In this analysis,

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[17]   Others also remark on the varying level of data quality or missing data across states (SPRA 2023; Workcred 2021).

[18]   We treat education as an ordinal variable and assign each individual to one of 19 categories ranging in ascending order from less than a first-grade education to a professional or doctoral degree. For a given occupation, the categories capturing the 25th and 90th percentile workers — and all categories in between — define its typical education range.

[19]   The ACS data set uses an occupational classification system that, in some cases, is not as fine-grained as the 2010 SOC codes derived from the PIRL data. As a result, we apply the crowding indices for these sometimes-broader occupations to the PIRL training data using a SOC-to-ACS crosswalk provided by the U.S. Bureau of Labor Statistics and available upon request.

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the sample is restricted to those 18 to 64 years of age with wage and salary income ("wages") and excludes those who are unemployed, self-employed, or working in a military-specific occupation. Although wage data reported in the ACS include wages earned from all jobs in the previous 12 months, in this analysis, we attribute them wholly to a worker's primary occupation and use them to estimate each occupation's annual median wage. Occupations are classified as lower or higher wage based on their relationship to the national annual median wage for these workers overall ($42,390).

In the Training Analysis section of this report, the annual median wages applied to the training occupation are from the Occupational Employment and Wage Statistics (OEWS) MB3 estimates (May 2019).[20] If, according to the OEWS data set, the occupation is one in which workers are generally paid annually for less than full-time, year-round work (e.g., teachers, pilots), we use the annual median wage reported in the OEWS data set. For most occupations, however, we multiply the hourly median wage (in the OEWS data set) by the median weekly hours for the occupation's workers (as calculated from the 2013–2017 ACS PUMS data set) and by 52 weeks to estimate the occupation's annual median wage. Occupations are classified as lower or higher wage based on their relationship to the national median of $37,840 as reported in the OEWS data set.

In light of the strong wage growth that occurred between 2019 and the publication of this report, these thresholds may appear surprisingly low; in fact, the annual median wage in the May 2022 OEWS data set is a much higher $46,310. However low the thresholds used in this analysis may seem, they approximated the midpoint for wage and salary earnings when the occupational trainings analyzed in this report were delivered.

Table A.1 provides the counts of unique training occupations from our PIRL sample and shows how they were distributed by the training occupations' wage and segregation levels. See Figure 6 in the main report for a graphical presentation of the data.

TABLE A1

Number of Training Occupations by Wage and Segregation Levels

	Lower wages, segregated	Lower wages, other	Higher wages	Total
Black women	19,491	2,666	26,726	48,883
Hispanic women	11,757	1,044	12,169	24,970
White women	20,476	1,958	38,315	60,749
Black men	3,025	2,997	31,828	37,850
Hispanic men	3,205	1,785	18,857	23,847
White men	3,996	2,607	44,029	50,632
Other/Missing gender, race, ethnicity	34,178			34,178
Total sample				281,109

Note: The sample is restricted to trainings begun by participants 18 to 64 years of age during the 2017 to 2019 period and associated with an ITA and a valid training occupation (excluding military-specific occupations). Occupations are classified as lower or higher wage based on their relationship to the national median of $37,840 as reported in the OEWS data set. Occupations are classified as segregated if, for a given group, the crowding index exceeds 1.1.

Sources: Authors' analysis of U.S. Department of Labor, Employment and Training Administration, Participant Individual Record Layout (PIRL) microdata (2017–2019); U.S. Bureau of Labor Statistics, Occupational Employment and Wage Statistics (OEWS) MB3 estimates (May 2019); U.S. Census Bureau, American Community Survey 5-year Public Use Microdata Sample (2013–2017) retrieved from IPUMS USA, University of Minnesota, www.ipums.org

[20] We use a crosswalk available at www.bls.gov/oes/soc_2018.htm to convert the May 2019 OEWS MB3 data to the 2010 SOC codes used to analyze the training occupations in the PIRL data. OEWS MB3 data are available on the U.S. Bureau of Labor Statistics website: www.bls.gov/oes/oes-mb3-methods.htm.

Appendix

Table A.2 provides summary demographic and socioeconomic data for the 273,894 participants in the PIRL sample used in this analysis. Note that the number of participants is slightly lower than the number of training occupations reported in Table A.1 because some participants in the PIRL data set are associated with more than one training occupation.

TABLE A2

Select Characteristics of Participants at Program Entry

	Sample size	Median age	Single parent	With disability	High school education or less	Employed	Low income
Black women	47,674	31	36%	4%	56%	39%	78%
Hispanic women	24,265	30	29%	4%	59%	31%	70%
White women	58,730	32	27%	6%	51%	38%	60%
Black men	37,247	34	9%	5%	66%	26%	67%
Hispanic men	23,404	31	7%	5%	66%	24%	60%
White men	49,265	36	6%	9%	59%	26%	50%
Other/Missing gender, race, ethnicity	33,309	35	15%	6%	50%	28%	58%
Total sample	273,894	33	19%	6%	57%	31%	63%

Note: Percentages reflect the share of participants with data available and exclude those with missing data. The sample is restricted to participants 18 to 64 years of age with at least one training begun during the 2017 to 2019 period and associated with an ITA and a valid training occupation (excluding military-specific occupations).

Source: Authors' analysis of U.S. Department of Labor, Employment and Training Administration, Participant Individual Record Layout (PIRL) microdata (2017–2019)

Sensitivity Analyses

In addition to using the methods described previously, we conducted this analysis under a variety of alternative scenarios to ensure that making minor changes to the methodology would not materially change the patterns described in the report. The results of these sensitivity analyses are as follows:

- Rather than using crowding index thresholds of 0.9 and 1.1, we ran the analysis using 0.8 and 1.2 thresholds to classify groups of workers as underrepresented, proportionally represented, or overrepresented in a given occupation. Doing so, we find the same general patterns conveyed in this report with two exceptions: First, the share of White women classified as working in a lower-wage, segregated occupation in Figure 2 falls by 7 percentage points in our Landscape Analysis of the broader economy. Also in the Landscape Analysis, the annual wages for occupations in which Hispanic men are underrepresented fall modestly below the annual wages for occupations in which they are overrepresented. Using our preferred crowding index thresholds, this is the case only for White men (see Figure 1).

- Rather than comparing an occupation's annual median wages with the national median in order to classify the occupation as paying lower or higher wages, we ran the analysis using wage thresholds that were $5,000 lower and, alternately, $5,000 higher. While the share of employment classified as lower wage and segregated falls and rises in the Landscape

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Analysis, the same general patterns remain the same (i.e., higher shares for women and for non-White workers). In the Training Analysis, raising the threshold has little effect on the share of training occupations classified as lower-wage and segregated. Lowering the wage threshold, however, reduces the share of training occupations classified as such by a little more than half because a noteworthy number have annual median wages that fall between the threshold used in this report ($37,840) and one that is $5,000 lower ($32,840); even at these across-the-board lower levels, the general pattern of women and non-White workers being more likely to train for lower-wage, segregated occupations persists.

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