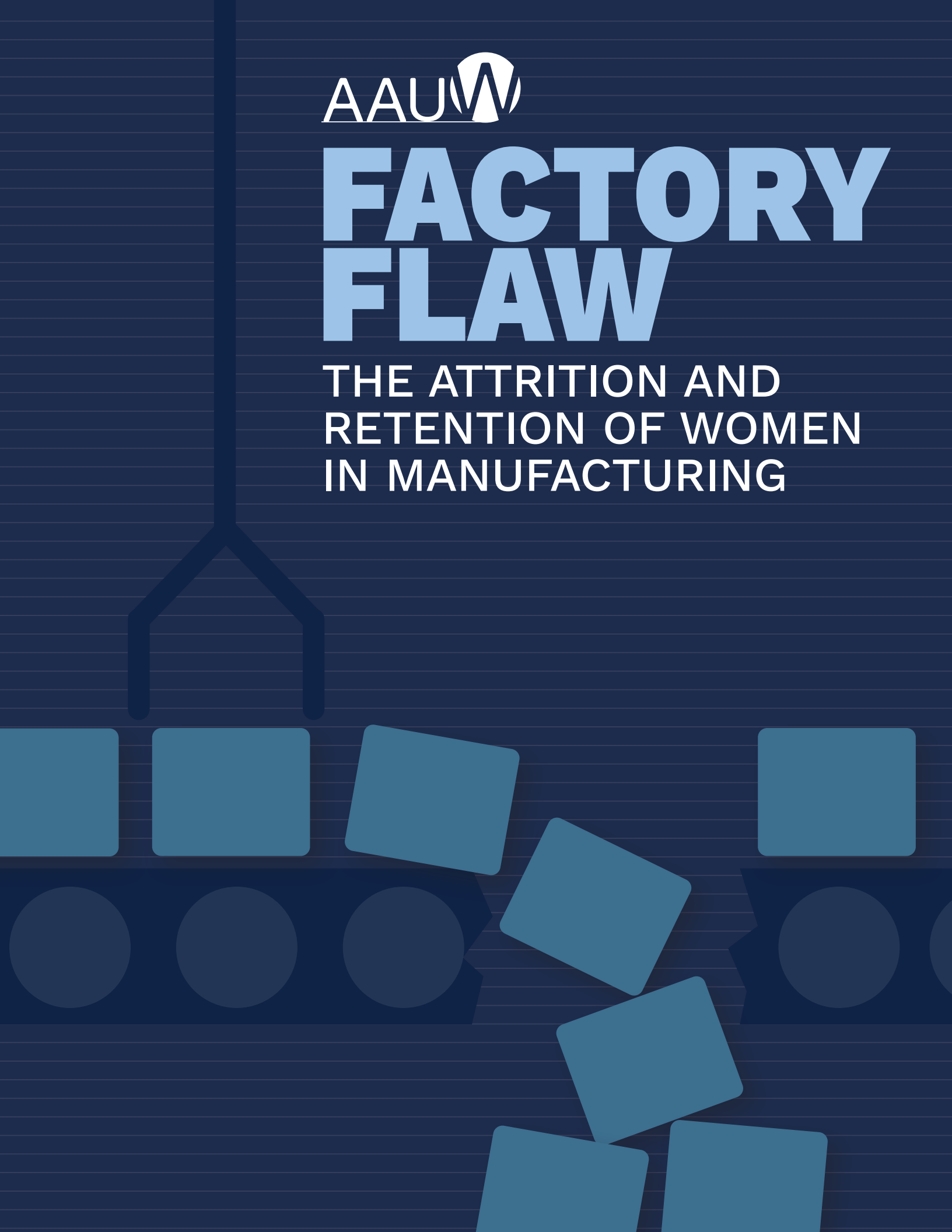
AAUW

FACTORY FLAW

THE ATTRITION AND RETENTION OF WOMEN IN MANUFACTURING



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ACKNOWLEDGEMENTS

Factory Flaw: The Attrition and Retention of Women in Manufacturing was researched and written by Lauren Haumesser, Ph.D., AAUW Research Associate and Melissa Mahoney, Ph.D., independent consultant. Kate Nielson, J.D., AAUW Director of Public Policy and Legal Advocacy, and Leticia Tomas Bustillos, Ph.D., AAUW Federal Policy Manager, provided additional support in developing recommendations.

AAUW is thankful to the International Brotherhood of Electrical Workers, the Coalition of Labor Union Women, Women in Manufacturing, and DuPont Specialty Products for circulating our survey of women in manufacturing jobs on which a portion of our analysis is based.

AAUW gratefully acknowledges the generous support of The Arconic Foundation, which made this report and its publication possible.

FOREWORD

A cornerstone of AAUW's commitment to ensuring economic security for women is our work to close the gender pay gap. For much of our 140-year history, we have been working to ensure that equal pay becomes the law of the land. And while there has been significant movement since we began our efforts, that progress seems to have stalled over the past several decades—and a stubborn pay gap remains.

One of the prime explanations for this persistent gap is the fact that women tend to work in jobs and in industries that pay less than those fields dominated by men. Nowhere is this more apparent than in manufacturing, where women make up only about one-third of all employees—and the industry subsectors in which women work are among the lowest paid.

This report, made possible by a generous grant from The Arconic Foundation, explores the barriers to women in manufacturing and examines what can be done to encourage women to enter, thrive and advance in this industry. In removing barriers for women in manufacturing, we also aim to ensure more women persist in the sector, reducing attrition rates. Doing so is an essential endeavor: Not only will women and their families gain from having access to these well-paying jobs, but the industry will benefit richly from skills, talents and diversity that more women can bring.

AAUW's research reports, such as this one, inform and advance our ongoing programs, our work with employers and our advocacy efforts with state and federal policy makers. We hope *Factory Flaw: The Attrition and Retention of Women in Manufacturing* will inspire and empower others to join us in our efforts to increase the presence—and the power—of women in the manufacturing world.

Julia T. Brown, Esq.
Board Chair

Kimberly Churches
Chief Executive Officer

INTRODUCTION

For years, Americans have worried about the loss of manufacturing jobs. But while the number of Americans employed in the manufacturing industry has declined dramatically since the late 1970s, that trend has reversed in the last decade: In January 2010, 11.6 million Americans worked in manufacturing; by January 2020, 12.8 million did.[1]

The recent uptick in manufacturing is good news for workers. Across demographics, workers in manufacturing jobs make more, on average, than the population as a whole.[2] This is especially true for women, who make 11.5% more than their counterparts in other private-sector jobs.[3] Manufacturing jobs also tend to offer good benefits relative to other private-sector jobs.

Yet too few women are able to take advantage of this wage premium: Only 29.2% of all manufacturing employees are women. This gender imbalance is, of course, bad for women. It is also bad for employers, who have reported difficulties in finding workers qualified for jobs in high-tech subfields such as computer manufacturing. To help women and their employers, it is important to understand whether women are leaving their manufacturing jobs, why they do so and how employers can encourage them to stay.

Little research has been done on women's experiences in blue-collar industries in general—let alone manufacturing in particular. But social scientists have identified a number of reasons women leave jobs in other industries. Women who experience sexual harassment and women who encounter a glass ceiling are more likely to leave their jobs than those who do not.[4] And women who work in industries dominated by men like manufacturing are more likely to experience sexual harassment and sense they are being passed over for promotions.[5] Moreover, women who leave toxic work environments—such as those caused by sexual harassment—are likely to earn less in their new jobs.[6] This experience may be particularly pronounced for women who leave manufacturing, since jobs in the industry tend to pay well and have good benefits relative to other private-sector jobs.[7] But research also indicates a number of reasons women stay in their jobs, including satisfaction with their employer's paid family leave and flexible work policies.[8] None of these studies, however, focuses specifically on women in manufacturing jobs.

The economics research on women's experiences in manufacturing is similarly thin. A small body of research shows the decline in manufacturing employment was particularly hard on women without a college education, as employers are looking increasingly to hire workers for more highly-skilled jobs.[9] Additional evidence suggests that the decline in manufacturing has affected even those women who do not work in the industry. By reducing employment opportunities, for instance, the decline in manufacturing has contributed to increased opioid usage and opioid- and other drug-related deaths since the late 1990s and early 2000s.[10] Opioid use could also damage women's job prospects if, for example, they were to fail an employer's mandatory drug test. But none of this research explains directly why women leave the manufacturing industry.

In short, then, there is no research on women's attrition from manufacturing jobs—despite the fact that the industry has grown over the last decade and that manufacturing jobs can afford women long-term economic security.

This study aims to remedy that gap by assessing four areas of concern: the status of women in manufacturing, whether women in manufacturing are more likely to leave

their jobs than women working in other industries, why women leave manufacturing jobs and what might encourage them to stay. To study these questions, we designed, collected and analyzed survey data from 214 women who work in the manufacturing industry in the United States; the survey ran between April and July 2020. We analyzed employment and wage trends in U.S. manufacturing over the last two decades using aggregate data published by the Bureau of Labor Statistics and calculations made from the Census Bureau's Current Population Survey Outgoing Rotation Group (CPS ORG).

Our research found that women have been significantly affected by the overall decline in the industry over the last few decades. The decline in manufacturing has affected women directly—in the form of lost jobs and wages—and indirectly, on other dimensions of well-being. Less educated women who cannot fill the increasingly highly skilled jobs in the industry were particularly hard hit. Using data from 2018 and 2019, we also identified a number of factors that make women more or less likely to leave their manufacturing jobs. Overall, women in manufacturing are more likely to leave their jobs than women in other industries. But certain subsets of women—older women, mothers, women living in rural areas, union members, and Black and Asian women—were less likely to leave their jobs. Experiencing sexual harassment, sensing that they are outnumbered by men and being passed over for promotions and raises also increase the likelihood that women will leave their jobs. Being satisfied with paid family-leave policies and the availability of flexible work measures, on the other hand, can make women more likely to stay. At the end of the report, we offer recommendations to employers and policymakers to improve retention of women in manufacturing jobs.

The loss of manufacturing jobs in the early 2000s disproportionately hurt women. Even as the industry has started to recover, women in manufacturing face persistent problems—including sexual harassment, inequality in pay and promotions, and dissatisfaction with family leave—and are more likely to leave their jobs than women in other industries.

STATUS OF WOMEN IN MANUFACTURING

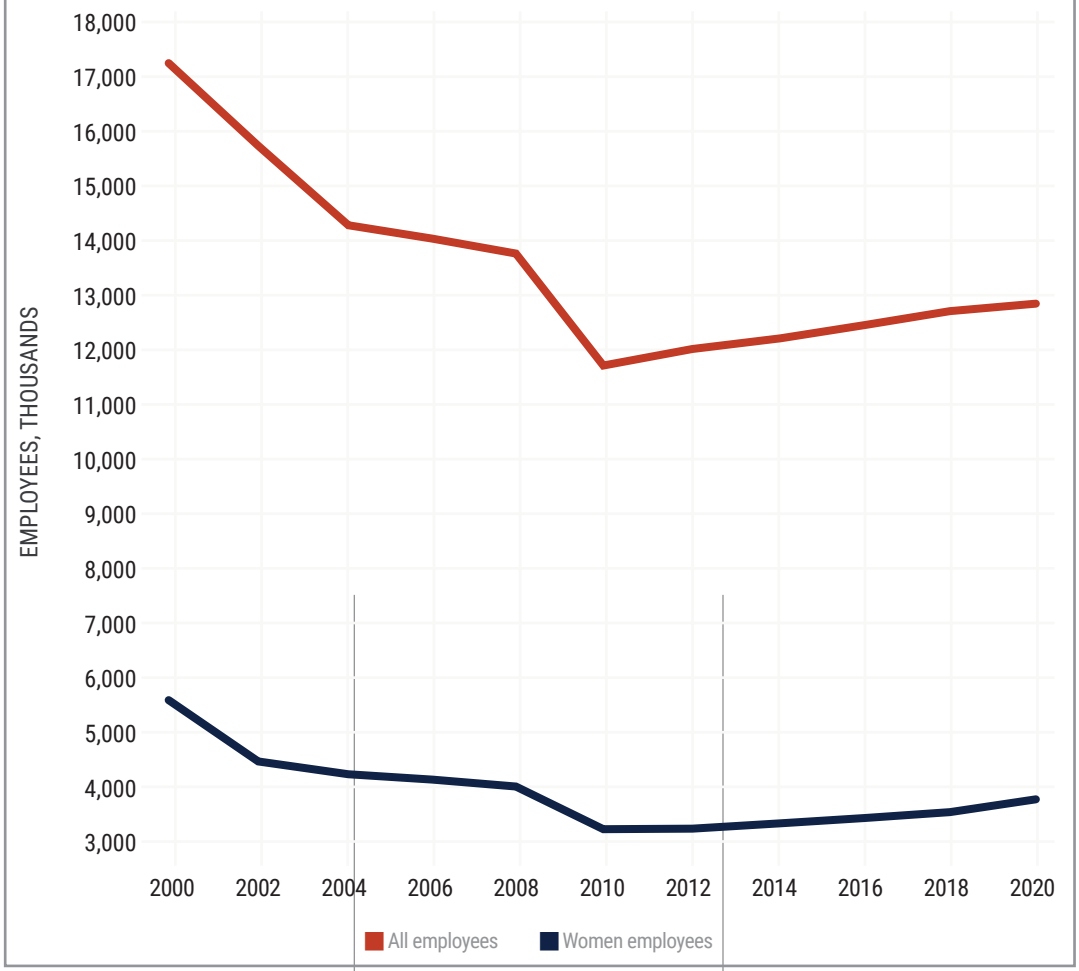
Manufacturing employment declined from 2000 to 2010, rebounded since 2010 for both men and women. According to data from the Bureau of Labor Statistics (BLS), total employment in manufacturing declined by 4.4 million jobs between January 2000 and January 2020—a 26% reduction. The culprits in this decline are capital-intensive production, the automation of production in manufacturing, and international competition—particularly from countries like China, where there are large pools of relatively inexpensive unskilled labor.[11] The decline in employment hit women workers harder than men: Women lost 31% of their jobs in the industry (from about 5.4 to 3.7 million) whereas men lost 23% of their positions (11.9 to 9.2 million).

As can be seen in Figure 1, however, the industry has begun to rebound since 2010. From January 2000 to January 2010, total employment in the industry declined by 34%, with women losing relatively more jobs than did men.[12] From 2010 to 2020, on the other hand, the industry added 1.4 million jobs, a 12% increase. Women's and men's employment rebounded at the same rate (12%) over that period (see Figure 1). This modest uptick in employment is a function of broader economic recovery and increased manufacturing output following the 2008 financial crisis and the Great Recession.

Despite the fluctuations in employment over the last 20 years, women's share in total manufacturing employment hovered around 29% throughout the period.

Women work in a variety of manufacturing subsectors. In 2019, women worked 35.7% of all jobs in nondurable goods manufacturing and 23.9% in durable goods manufacturing (see Table 1). Yet they made up the bulk of employment in two subsectors, both of which are in nondurable goods: apparel at 67.3% and textile products at 53.5%. Women workers made up the lowest share of total employment in subsectors such as primary metals (14.3%), wood products (14.9%), nonmetallic mineral products (16.5%), and petroleum and coal products (16.9%). All of these–with the exception of petroleum and coal products–are in durable goods manufacturing.

Figure 1. Total Employment and Women's Employment in U.S. Manufacturing, 2000 to 2020



Source: Bureau of Labor Statistics, Employment, Hours, and Earnings from the Current Employment Statistics survey. Accessed May 21, 2020.

Table 1. Average hourly earnings, employment and employment changes in U.S. manufacturing by subsector, 2000 to 2019. (Subsectors ranked by share of women in employment.)

	Share of Women in Subsector Employment -Feb 2019	Average Hourly Wage -Feb 2019	Total Employment (in 1,000s)			Total Employment Changes			
						2000 to 2010		2010 to 2019	
			2000	2010	2019	Total (1,000s)	% Change	Total (1,000s)	% Change
Manufacturing	28.3	27.48	17,263	11,528	12,840	-5,735	-33%	1,312	11%
Durable Goods	23.9	28.95	10,877	7,064	8,059	-3,813	-35%	995	14%
Nondurable goods	35.7	24.95	6,386	4,464	4,781	-1,922	-30%	317	7%
Subsectors									
Apparel	67.3	21.78	484	157	110	-327	-68%	-46	-30%
Textile product mills	53.5	19.58	230	119	113	-111	-48%	-6	-5%
Miscellaneous durable goods manufacturing	42.3	25.98	728	567	618	-161	-22%	51	9%
Printing and related support activities	39.4	23.2	807	488	425	-319	-40%	-63	-13%
Food manufacturing	38.3	20.98	1553	1451	1643	-103	-7%	193	13%
Textile mills	37.8	20.8	378	119	109	-259	-69%	-10	-9%
Miscellaneous nondurable goods manufacturing	37.7	25.84	276	211	314	-65	-23%	103	49%
Chemicals	32.6	32.4	980	787	850	-194	-20%	63	8%
Computer and electronic products	31.8	36.75	1,820	1,095	1,081	-725	-40%	-14	-1%
Semiconductors and electronic components	33.9	32.19	676	369	377	-307	-45%	8	2%
Electronic instruments	30.7	40.26	488	406	424	-81	-17%	18	4%
Communications equipment	30.5	38.2	239	117	84	-121	-51%	-34	-29%
Plastics and rubber products	31.5	23.84	951	625	737	-326	-34%	112	18%
Electrical equipment and appliances	30.1	28	591	360	405	-231	-39%	46	13%
Motor vehicles and parts	26.8	26.87	1,314	679	999	-635	-48%	320	47%
Furniture and related products	25.5	22.03	680	357	388	-323	-47%	31	9%
Transportation equipment	24.2	32.58	2,057	1,333	1,734	-724	-35%	401	30%
Paper and paper products	24	26.4	605	395	365	-210	-35%	-29	-7%
Machinery	19	29.79	,1457	996	1,126	-461	-32%	130	13%
Fabricated metal products	18.9	25.22	1,753	1,282	1,492	-471	-27%	210	16%
Petroleum and coal products	16.9	42.97	123	114	115	-9	-8%	1	1%
Nonmetallic mineral products	16.5	25.31	554	371	422	-183	-33%	51	14%
Wood products	14.9	21.07	615	342	409	-273	-44%	67	19%
Primary metals	14.3	27.22	622	362	385	-260	-42%	23	6%

Sources: Bureau of Labor Statistics (BLS), Employment, Hours, and Earnings from the Current Employment Statistics survey. Accessed May 23, 2020; BLS, Employment and Earnings Data, Table B-5a. Employment of women on nonfarm payrolls by industry sector, seasonally adjusted. Accessed May 23, 2020; BLS, Employment and Earnings Data, Table B-3a.Average hourly and weekly earnings of all employees on private nonfarm payrolls by industry sector, seasonally adjusted. Accessed May 24, 2020

Between 2000 and 2010, job losses were particularly acute in subsectors dominated by women such as apparel and textile products, which cut 68% and 48% of all workers, respectively. Jobs were added in 17 of the 24 manufacturing subsectors shown in Table 1 between 2010 and 2019. It is notable, however, that apparel, which has a long history of employing women, continued to shrink: 30% of jobs were cut over the period. These declines are due in large part to trade exposure, particularly from China, since work in this subsector tends to be labor intensive and thus more easily substitutable with cheaper imports.[13]

Women are underrepresented in higher-paying manufacturing subsectors.

Manufacturing subsectors in which women workers are more represented tend

to pay lower hourly wages. Indeed, the share of women employed in a subsector and average hourly wages are negatively correlated by 32%. Take, for example, the difference in wages and representation in durable and nondurable goods. In February 2019, women accounted for only 23.9% of workers in durable goods manufacturing jobs, which paid $28.95 per hour—$1.47 above the average of $27.48 for all manufacturing jobs. Yet they accounted for 35.7% of workers in nondurable goods jobs, which paid below-average wages ($24.95 per hour). Another example: Women made up only 16.9% of workers in the petroleum and coal products subsectors, which paid the highest wages of any subsector in 2019 ($42.97), but they accounted for 53.5% of workers in textile product mills, which paid the lowest wage ($19.58) of any subsector that year.

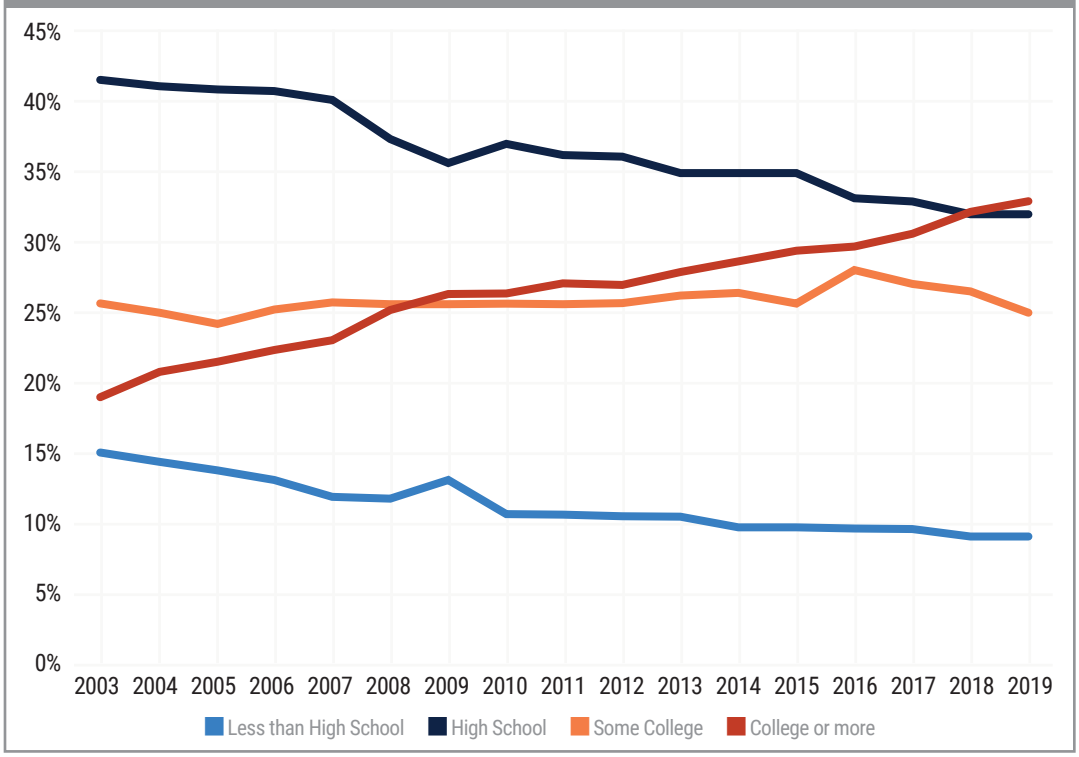
Undergraduate and graduate education has become more important for women's employment in manufacturing.

Historically, manufacturing has been a good source of employment for both men and women who hold a high school diploma or less. But between 2003 and 2019, the share of manufacturing jobs held by women with only a high school degree declined from 41% to 32%.[14] The share held by those with less than a high school diploma also declined from about 15% to 9%. At the same time, college and graduate education has become more important for women in the industry. In 2003, 19% of women's jobs in manufacturing were held by those with at least a four-year college degree–by 2019, 33% were. In fact, by 2018, more women in manufacturing had a college degree than had only a high school diploma (see Figure 2). Higher education has also become more important for men in manufacturing, but the change is not as dramatic as for women (see Figure 3). In 2019, 20% of men in manufacturing held at least a college degree, compared to 32% of women.

In terms of the total number of jobs, between 2003 and 2019 women without a bachelor's degree lost jobs in manufacturing. Those with only a high school diploma lost 609,000 positions (a 29% decline), those with less than a high school degree lost 314,000 positions (a 42% decline) and those with some college lost 153,000 positions (a 12% decline). Offsetting these losses, women with at least a bachelor's degree gained employment in manufacturing over the period. Employment by women with a college

Men are more likely than women to hold the highest-paying manufacturing jobs: Only 17% of workers in the petroleum and coal fields, which pay almost $43 an hour, are women. But women account for more than half of workers in textile jobs, which pay under $20 an hour.

Figure 2. Share of Women's Manufacturing Employment by Education Level, 2003 to 2019



Source: Author's calculations from CEPR data. n.d. "CPS Outgoing Rotation Group." CEPR Data. http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/ (accessed June 4, 2020).

degree increased by 41%, or 307,000 jobs, and those with advanced degrees increased employment in manufacturing by a staggering 95%, or 227,000 jobs.

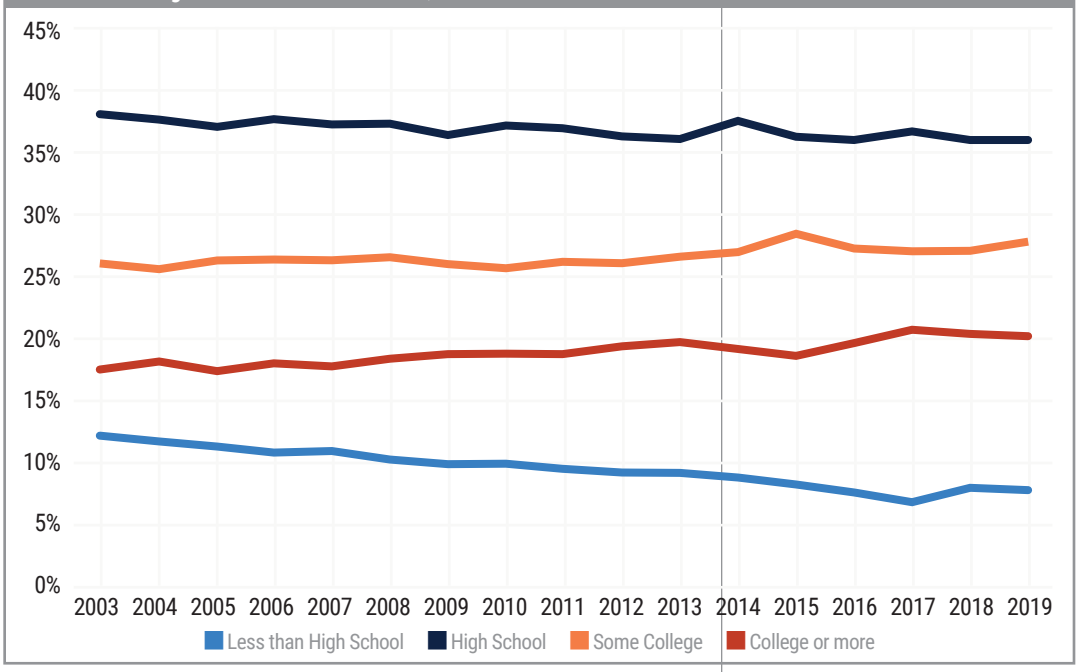
These figures illustrate the fact that American employers are seeking to hire workers with more education to fill more highly-skilled jobs than they did in the past.

White women still make up the majority of women in manufacturing, but their share of employment in the industry has fallen while that of employment of Hispanic and Asian women has increased.

Between 2003 and 2019, white women's share of employment decreased from 66% to 58% (Figure 4). The employment share of Hispanic women, on the other hand, increased from 15% in 2003 to 20% in 2019. For Black and Asian women, their respective shares in employment stayed about the same over the entire period. For Black women, this was at about 11% of total women's employment and for Asian women, it was about 8%.

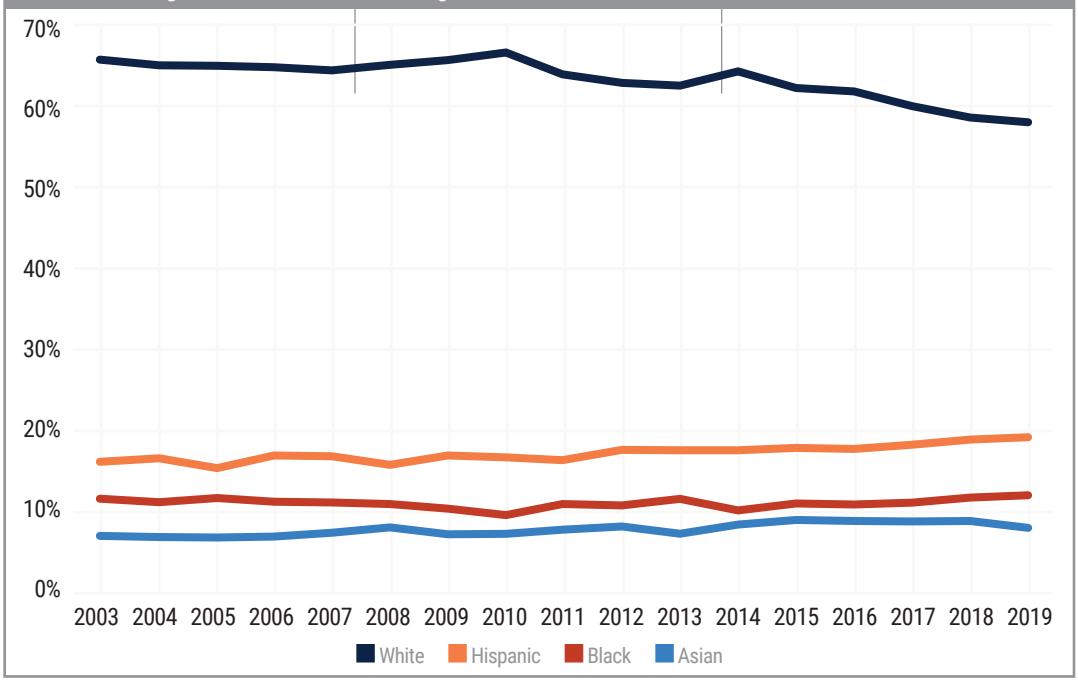
In terms of number of manufacturing jobs, only Asian and Hispanic women saw gains between 2003 and 2019. But while Asian women have gained jobs in relatively well-paying subsectors, Hispanic women have gained jobs in relatively low-paying

Figure 3. Share of Men's Manufacturing Employment by Education Level, 2003 to 2019



Source: Author's calculations from CEPR data. n.d. "CPS Outgoing Rotation Group." CEPR Data. http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/ (accessed June 4, 2020).

Figure 4. Share of Women's Manufacturing Employment by Race and Ethnicity, 2003 to 2019



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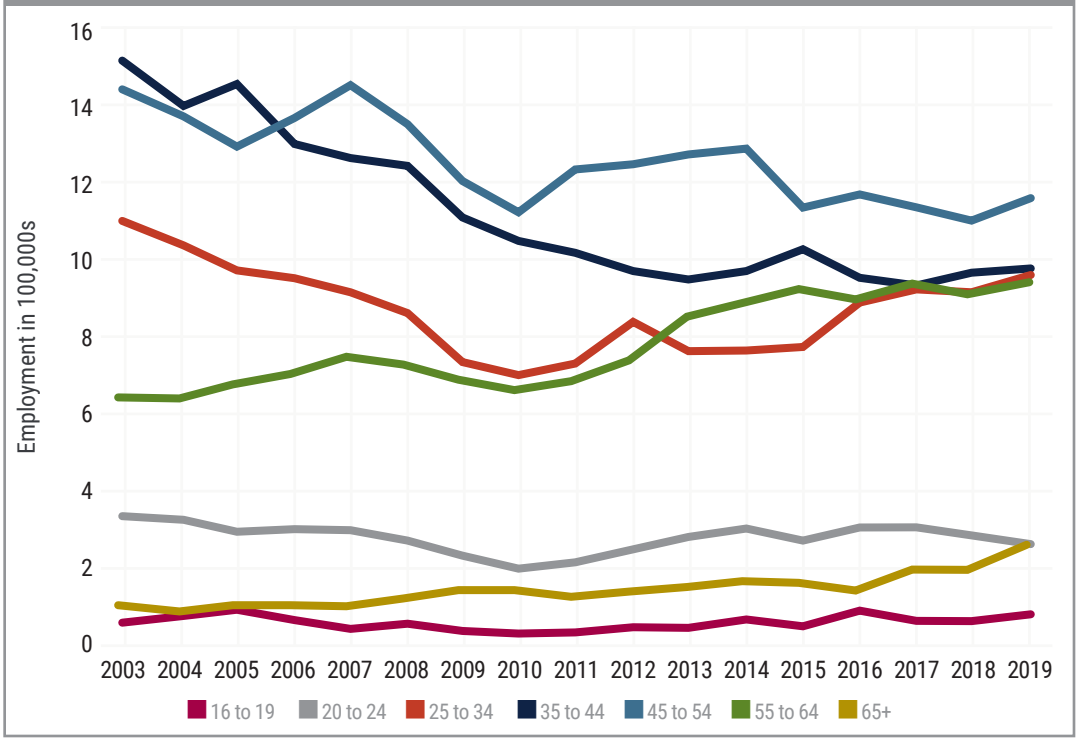
subsectors. Of the 76,000 jobs Asian women gained, most were in chemical manufacturing (36,000), transportation equipment (31,000), and food manufacturing (30,000). On average, jobs in chemical manufacturing and transportation equipment are relatively well paid in the industry.[15] The vast majority of the 141,000 jobs Hispanic women gained, however, were in food manufacturing (121,000 jobs)—jobs that are relatively lower-skilled and lower-paid.[16]

Prime working-age women and men lost jobs in manufacturing, while those aged 55+ gained jobs between 2003 and 2019.

Across the board, workers aged 25 to 54 lost jobs in manufacturing between 2003 and 2019. The loss was most significant for those aged 35 to 44 (See Figures 5 and 6). Women in this age group lost 35% of their jobs over the period (522,000 jobs), whereas men lost 31% (1.1 million positions). Workers aged 55+, on the other hand, saw large gains in this period. Women aged 55 to 64 increased their employment by 45% (284,000 jobs). Men in this age group saw a 57% increase in their employment (839,000 jobs). Individuals over age 65 saw the largest percentage gains in employment of any age group: Women saw a 135% gain in their employment (148,000 jobs), whereas men had a 130% increase in employment (309,000 jobs). At least two factors could explain these trends: a decline in the appeal of manufacturing jobs among prime-age workers, particularly as the wage premium relative to other industries has shrunk; and older workers putting off retirement because they need extra earnings to make ends meet.

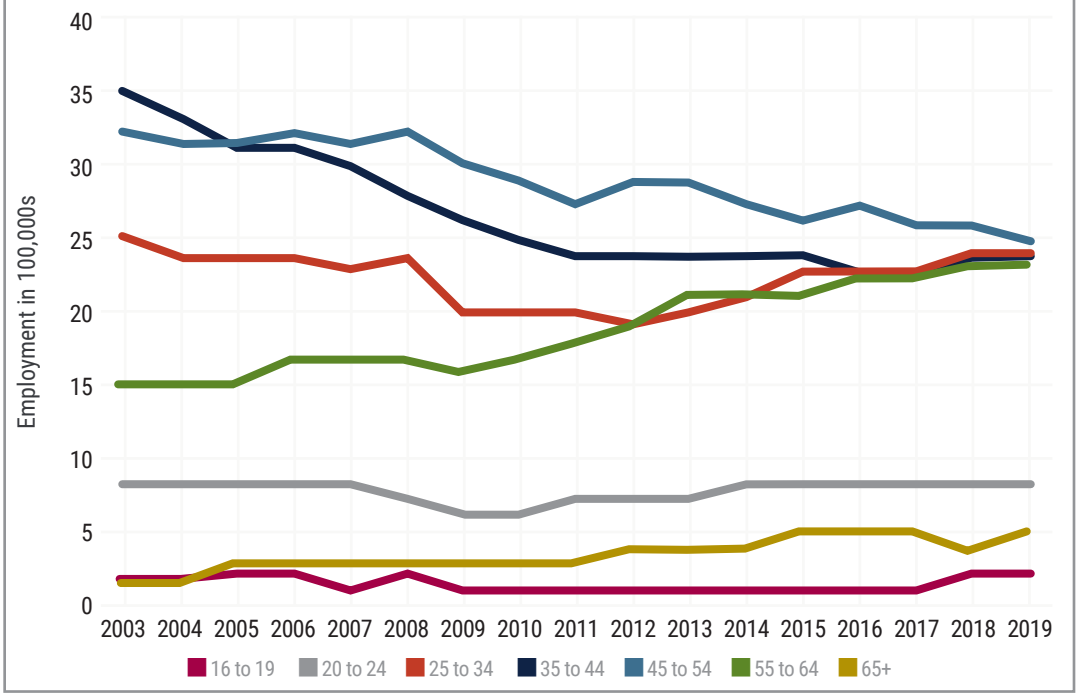
Only men who did not belong to unions gained jobs in manufacturing between 2003 and 2019.

Figure 5. Women's Manufacturing Employment by Age, 2003 to 2019



Source: Author's calculations from CEPR data. n.d. "CPS Outgoing Rotation Group." CEPR Data. http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/ (accessed June 4, 2020).

Figure 6. Men's Manufacturing Employment by Age, 2003 to 2019



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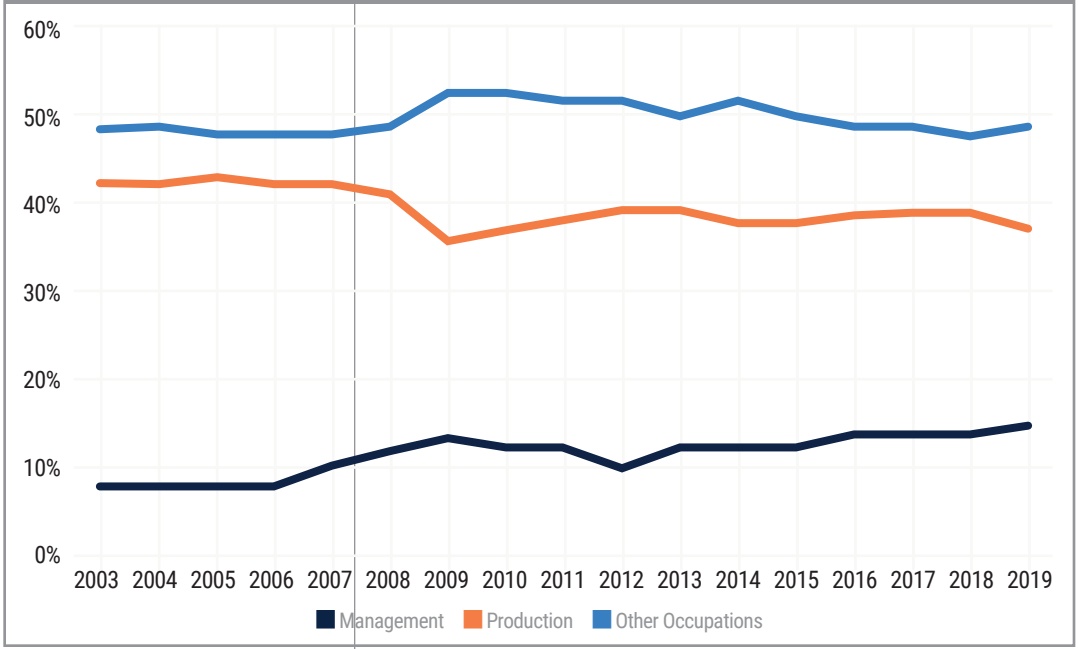
From 2003 to 2019, union members lost a significant number of jobs: Unionized men lost 37% of their jobs, and unionized women lost 40% of theirs (Table 2). But over the same period, men who were not union members increased employment by 12%, whereas non-unionized women lost 8% of their jobs.

Though the loss of collective bargaining hurts all workers in terms of pay and working conditions, it is especially harmful for women, who benefit

Figure 7. Share of Women's Employment in Manufacturing by Broad Occupation, 2003 to 2019



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The number of union jobs in manufacturing has shrunk, and women have been especially harmed: Wages are higher—and the gender pay gap is narrower—for unionized workers.

the most from union membership. An analysis from the Economic Policy Institute (EPI) found that in 2016, wages were 23% higher for unionized women workers than those who are not. Unionization also helps close the wage gap: Unionized women earn 94% of the hourly wage of their male counterparts, but non-unionized women earn only 78% of what non-unionized male workers earn.[17] This reveals that unionization also decreases the likelihood that women workers experience gender pay discrimination on the job—so with unionization declining, it is likely that pay discrimination is rising. The decline in unionization and concurrent decline in women's wages also makes women less likely to tolerate the sexual harassment, gender discrimination and other unfavorable conditions that they may encounter on the job, as research shows that workers are only willing to work jobs with higher risk of these if a pay premium is attached to them.[18]

The relative importance of management occupations to women's employment in manufacturing grew since 2003, whereas the relative importance of production occupations shrunk.

Since 2003, more women have worked in production than any other category of manufacturing (Figure 7). The share of women working in production jobs, however, declined by about 5 percentage points from 42.2% in 2003 to 37.6% in 2019. Management occupations comprised an average of 11% of women's employment in manufacturing and the importance of this occupational category increased from 9% of women's employment to 13%.[19]

Women's average hourly wages in manufacturing are consistently less than men's, but women's wages grew at a faster rate on average than men's since 2003.

Between 2003 and 2019, women's hourly wages increased faster, on average, than did men's (Table 3). Yet a gender wage gap persisted across the wage distribution over the period—but it shrank more at the higher percentiles of the wage distribution than it did at the lower ones. The largest closure occurred at the 99th percentile, where the relative wages of women

Table 2. Change in Employment by Sex and Union Status, 2003 to 2019

		Job Change	Percentage change
Women	Unionized	**-191,966**	**-40%**
	Not Unionized	**-360,499**	**-8%**
	Not Specified	**9,939**	**6%**
Men	Unionized	**-697,062**	**-37%**
	Not Unionized	**227,101**	**12%**
	Not Specified	**-124,366**	**-24%**

Source: Author's calculations from CEPR data. n.d. "CPS Outgoing Rotation Group." CEPR Data. http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/ (accessed June 4, 2020).

and men went from 72% in 2003 to 94% in 2019. At the 90th percentile, the relative wage improved from 74% to 83%. This means that, while well-off women are closing the manufacturing wage gap, women at the lower end of the income ladder are being left behind.

White women in manufacturing consistently earned more on average than Black and Hispanic women and less than Asian women. Between 2003 and 2019, Black and Hispanic women's wages declined relative to their white counterparts (Table 4). In 2019, Black women earned 78% of what white women workers did—which is down 5 percentage points from 2003—and Hispanic women earned 66% of what white women did—a 4 percentage point decrease. The position of Asian women, on the other hand, improved by 15 percentage points, from 101% in 2003 to 116% in 2019. This increase relative to white women is also reflected in Asian women's relative wage increase between 2003 and 2019, which was the largest of any racial/ethnic group (Table 5). This is likely because in 2019, over 50% of Asian women working in manufacturing had a college or advanced degree, compared to less than 40% of white women—indicating that Asian women are more represented in high-skilled manufacturing jobs.

Table 3. Average hourly wage for those employed in manufacturing by income decile and sex, 2003 and 2019 (in 2019 dollars)

	Women				Men				Women's wage / Men's wage	
Wage Percentile	2003	2019	Change	% change	2003	2019	Change	% change	2003	2019
10th	$10.24	$11	0.76	7%	$12.54	$13.50	0.96	8%	82%	81%
20th	12.19	13.00	0.81	7%	15.32	16.00	0.68	4%	80%	81%
30th	13.93	15.00	1.07	8%	18.08	18.27	0.19	1%	77%	82%
40th	15.63	16.50	0.87	6%	20.89	21.00	0.11	1%	75%	79%
50th	17.55	18.80	1.25	7%	23.68	24.15	0.47	2%	74%	78%
60th	20.06	21.43	1.37	7%	27.86	28.07	0.21	1%	72%	76%
70th	23.41	25.48	2.07	9%	32.14	33.60	1.46	5%	73%	76%
80th	27.86	32.82	4.96	18%	38.69	40.85	2.16	6%	72%	80%
90th	36.81	46.15	9.34	25%	49.53	55.56	6.03	12%	74%	83%
99th	69.64	96.90	27.26	39%	96.08	103.25	7.17	7%	72%	94%
All	21.41	24.60	3.19	15%	28.46	30.69	2.23	8%	75%	80%

Source: Author's calculations from CEPR data. n.d. "CPS Outgoing Rotation Group." CEPR Data. http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/ (accessed June 4, 2020).

Table 4. Average hourly wage as a share of white average hourly wage by sex and race/ethnicity, manufacturing sector, 2003 and 2019

	Women			Men		
Race/Ethnicity	2003	2019	% point change	2003	2019	% point change
Black	83%	78%	-5	74%	71%	-3
Hispanic	70%	66%	-4	65%	72%	7
Asian	101%	116%	15	110%	119%	9
Other	89%	95%	7	85%	78%	-8

Source: Author's calculations from CEPR data. n.d. "CPS Outgoing Rotation Group." CEPR Data. http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/ (accessed June 4, 2020).

Table 5. Average hourly wage for those employed in manufacturing by sex and race/ethnicity, 2003 and 2019 (in 2019 dollars)

	Women				Men			
Race/Ethnicity	2003	2019	change	% change	2003	2019	change	% change
White	$22.93	$26.77	$3.84	17%	$30.55	$32.78	$2.23	7%
Black	19.06	20.86	1.80	9%	22.74	23.28	0.54	2%
Hispanic	16.15	17.61	1.46	9%	19.75	23.51	3.76	19%
Asian	23.12	31.05	7.93	34%	33.56	38.85	5.29	16%
Other	20.30	25.51	5.21	26%	26.1	25.42	-0.68	-3%

Source: Author's calculations from CEPR data. n.d. "CPS Outgoing Rotation Group." CEPR Data. http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/ (accessed June 4, 2020).

ARE WOMEN IN MANUFACTURING MORE LIKELY TO LEAVE THEIR JOBS?

Women in manufacturing are more likely to leave the industry that employs them.

In our analysis, we also looked at the contributions of two key variables—gender and employment in manufacturing—to the likelihood that a worker would leave a job in any major industry between 2018 and 2019 (Table 2).[20] Strikingly, we found that women in manufacturing were more likely to leave their jobs for work in other industries than women working in other industries and men working in any industry were. This finding holds when controlling for age, race, marital status, parental status, union membership, region and local economic activity. While it also holds when controlling for sexual harassment, doing so reduces the magnitude of the likelihood. In other words, when women are less likely to experience sexual harassment on the job, they are less likely to leave manufacturing work altogether than they otherwise would be.

Women are more likely than men to leave the manufacturing industry, as well as more likely to leave the industry than women in other fields. A possible explanation: Sexual harassment appears to be especially widespread in the manufacturing industry.

WHY DO WOMEN LEAVE?

Sexual harassment

Women working in manufacturing are more likely to experience sexual harassment than those in women-dominated or even gender-equal sectors.[21] Experiences like this could make women feel less safe on the job. It could also make it harder for them to be promoted, which could lead to lower pay and lower rates of overall job satisfaction among women working in the sector.[22] Indeed, research shows that women who leave toxic work environments, such as those caused by sexual harassment, are likely to earn less in their new jobs than they did before.[23]

Our research found that women who face sexual harassment at work are more likely to leave their job—but the relationship between sexual harassment and quitting is more complex than one might expect.[24]

In our analysis of industry transitions, we found that women who are less likely to experience sexual harassment at work—proxied by a higher proportion of women to men in a workplace—are less likely to leave for jobs in other industries. The less likely women are to experience workplace sexual harassment, the less likely they are to leave jobs in manufacturing—a finding that reveals how important eliminating sexual harassment is to keeping women in the manufacturing industry.

The survey data we collected, however, complicate these findings. Women who responded to our survey experienced sexual harassment at alarming rates: 68.2% of women of color and 62.6% of white women reported experiencing some form of harassment at their workplace (see Figure 8). One woman described the unnerving experience of having "a male coworker wrap his hand around her neck from behind". Others described enduring harassment "on a daily basis" and "every single day." Notably, whether an employer-mandated sexual harassment training had no effect whatsoever on whether harassment ultimately occurred—a finding that reminds us that harassment results from structural power imbalances, not the choices of a few bad actors.

Yet, unlike making

the decision to leave the industry in general, there was no relationship between experiencing most forms of harassment and women's willingness to accept a comparable job at a different manufacturer. Women who experienced unwanted verbal and physical advances were the only ones who were more likely to report higher turnover intentions—yet even then, the relationship was quite weak.[25] Sadly, it seems that women believe that harassment is an industry-wide problem, and have accepted it as the price of doing a job they otherwise enjoy. According to one woman, the industry "is male-oriented. Basically[,] if you are a woman, expect comments. And get over it." Other women wrote off harassing behavior as "men being men," and said it was women's responsibility to stick up for each other. But sexual harassment stems from a power imbalance in the workplace: Individual women cannot be personally responsible for changing this structural problem.

The glass maze

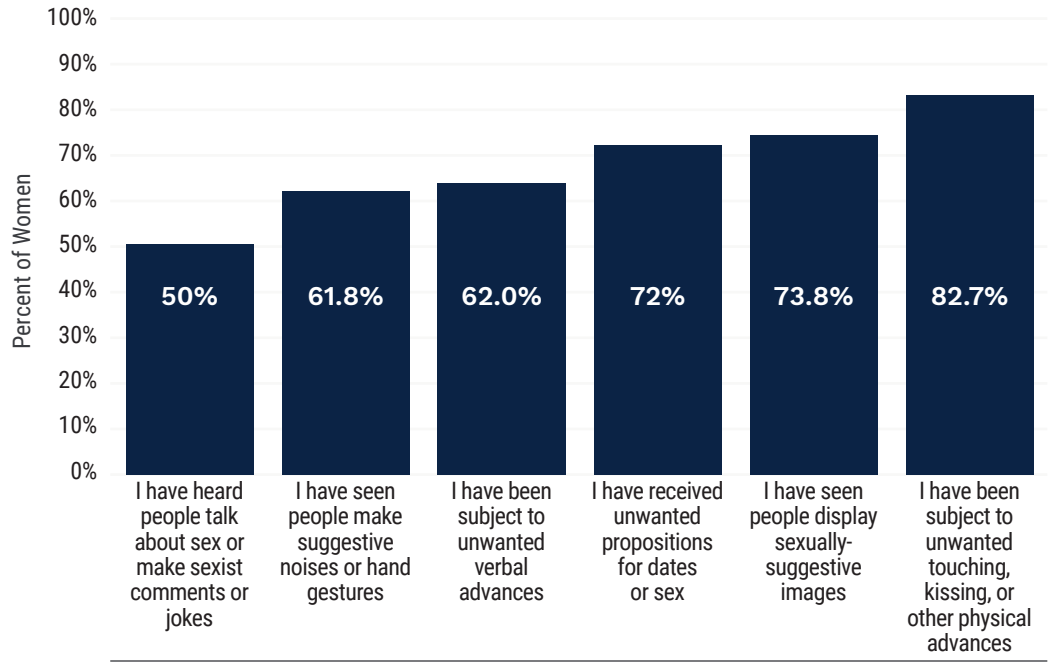
Women are far more likely to leave their jobs if they perceive that men receive more promotions or more pay than women do.

Our analysis of industry transitions shows that, the greater the share of women managers in a sub-industry—or more permeable the glass ceiling—the less likely women are to move away from jobs in an industry. Similar to our analysis of sexual harassment, we found that controlling for the height of the glass ceiling reduces the likelihood that women in manufacturing will leave the industry.

The survey data bear these findings out. Of women surveyed, 31.5% reported feeling that men received more promotions than women. Since nearly 90% of respondents worked in production jobs, it appears that women are encountering gender-based barriers at every level of employment and promotion, not just at the top—a reality that psychologist Linda Jean Schaumann has conceptualized as a "glass maze."[26] (Only 15.6% said they felt that men received more pay for the same work—perhaps a result of the high rate of unionization among women surveyed.) When these responses were combined into one variable, the results were astounding: Nearly 30% of the difference in whether a woman would accept a job at another employer could be attributed to whether she believed men received more promotions or pay than women.[27]

Open responses to the survey substantiate these findings: Again and again, women reported that men who are supervisors judged them more harshly than the men on their teams and overlooked women's contributions. In response to a question asking what her employer could do to make her more satisfied at work, one woman said, "Treat me as an equal. Forget my gender." A second asked "to be treated equally to the men, [whether] it's doing something wrong or right." Another reported, "They give us easier job[s] because they silently believe we aren't capable of doing as much as the men. It's humiliating." Others described being ignored or dismissed by men at work, and multiple women reported having to "work twice as hard" to earn the same recognition that men get. If manufacturers want to retain women, they must pay and promote them equally to men.

Figure 8. Sexual Harrassment in Manufacturing



Source: AAUW survey of women in manufacturing jobs

Workplaces dominated by men

Women who feel outnumbered by men at work are no more likely to take a job at another employer than those who do not feel they are in the minority.[28] This is despite the fact that roughly a third of women feel outnumbered either at their current

employer in general (36.7%) or in their department in particular (33.7%).

These results could mean one of two things. On the one hand, women may have accepted that manufacturing is a field dominated by men, and therefore do not anticipate that moving from one manufacturer to another would change the gender dynamics. Some of the open-response comments support this hypothesis. One woman wrote, "As a woman in manufacturing, it slowly becomes clear that there are still remnants of a 'good old boys[']club."

On the other hand, working in an environment dominated by men may not be inherently bad or difficult. Perhaps what matters is not how many men there are, but whether they treat their women colleagues fairly and respectfully. One woman recalled how at her previous employer—a steel manufacturer—she "didn't realize [she] was the only woman in the department for a really long time… because…[she] had a great support team. They were all men. They never treated [her] differently and were genuinely interested in [her] growth and success." When the team changed, however, the situation deteriorated: The men asked her to "do mundane things" and "treated [her] like an assistant." Less ambiguous were women's feelings on women bosses, whom they universally called out as respectful, helpful and interested in their development.

Woman of color in manufacturing are outnumbered on the basis of both gender and race, making them feel especially isolated and unwelcome.

An interesting note: Women of color were far more likely to report feeling outnumbered at their employer than white women were.[29] This is despite the fact that the survey item asked solely about gender, not race. This finding indicates that being a woman of color in manufacturing is doubly isolating: Women of color feel outnumbered on the basis of gender and race.

Parental status and paid family leave

Women who are parents are less likely to leave the manufacturing industry altogether than those who are not. Yet while being a parent reduced the likelihood that a woman would leave a manufacturing job, it increased the likelihood that a man would. These findings suggest that childcare responsibilities constrain mothers' decisions to change jobs—but did not do so for fathers. By contrast, women who are parents or who care for an aging relative are no more or less likely to accept a comparable manufacturing job at a different employer than those who do not have caregiving responsibilities—perhaps because merely switching employers carries less risk than leaving the industry as a whole.

More definitive, however, are the effects of paid family leave. Research by EPI shows that, for all workers aged 18 to 64, the total compensation premium—calculated as the sum of wages and benefits, like paid leave—for manufacturing relative to other private sectors was 15%, as opposed to the 10.4% premium for wages alone.[30] Although the data to disaggregate this calculation by gender is not available, it is likely that the additional premium on total compensation matters profoundly for women workers, especially those of child-bearing age. More generous benefits and paid leave time could make jobs in manufacturing more attractive to women.

Our survey substantiates this hypothesis. Dissatisfaction with the amount of paid family leave is a key reason that all women—even women who are not mothers—leave their manufacturing jobs.[31] Altogether, 69.2% of women were not satisfied with the amount of paid family leave. Women's dissatisfaction came through in their written comments on our survey. "Offer maternity leave with full pay rather than just short-term disability pay," one woman suggested. Others requested "more paid time off for pregnancy, taking care of a child, and other related care" and "increas[ing] the number of weeks of maternity leave." But family leave is not just about caring for children. One woman recounted how her husband, who works in the same company, gets a "huge amount for sick pay" and was using that benefit to take care of a relative. If manufacturers want to retain women workers, they will need to improve family leave policies to allow women more paid time to take care of their children and their families.

What other characteristics explain women's departure from manufacturing?

In our econometric analysis, several other key independent variables had a significant impact on women's job transitions away from manufacturing: age, parental status, rural area, union membership and state-level economic activity. Most of these factors reduced women's industry mobility. The exception to this is state-level per capita GDP, which made women more likely

to leave manufacturing; this makes sense, since greater economic activity increases job alternatives. Regarding parental status: It is notable, that while being a parent reduced the likelihood that a woman would leave a manufacturing job, it increased the likelihood that a man would. Being Black or Asian reduced the likelihood that a woman would leave a manufacturing job relative to white women working in the industry.

Having a four-year college diploma increased the likelihood that a person would leave a job in manufacturing in the full sample and in the sample of men. In contrast, having a college degree did not have a significant impact on women's transitions away from jobs in manufacturing. This could be a reflection that better-educated men may have relatively more job market opportunities and may be more likely to seek them out, particularly when confronted with the overall decline in U.S. manufacturing over the last decades.[32]

HOW CAN WE KEEP WOMEN IN MANUFACTURING?

Our findings above demonstrate that eliminating sexual harassment, ensuring equality in pay and promotions, and providing adequate paid family leave can all encourage women to stay in manufacturing jobs and in the manufacturing industry. Here is how employers and policymakers can take action on those and other measures:

Sexual Harassment

Changing workplace culture is a key component of stopping sexual harassment, but our research found that sexual harassment training is not working. To urge system change and make harassment training more effective, employers can:

- ***Create a well-defined sexual harassment policy:*** The policy must include examples of prohibited behavior and be based on a commitment to diversity and inclusion, rather than compliance. Anti-harassment policies should be comprehensive and prohibit harassment based on any protected characteristic.
- ***Institute a complaint process procedure:*** There should be a complaint procedure that identifies HR professionals designated to document and investigate complaints, and explain this process to employees. According to the EEOC, this process should be "multi-faceted, offering a range of methods, multiple points-of-contact, and geographic and organizational diversity where possible, for an employee to report harassment."[33]
- ***Take training seriously:*** Merely attending a mandatory seminar won't stop harassment. Instead, employers need to conduct in-person, interactive trainings that last at least four hours.[34]
- ***Involve men in the training:*** Research suggests that there is a backlash against training when it is conducted by a woman, but not when it is conducted by a man.[35]
- ***Conduct bystander awareness training:*** Beyond standard sexual harassment training, bystander training empowers people to stop harassment in its tracks. Though bystanders are unlikely to be nearby when the most egregious harassment occurs, their intervention in the early stages of harassment can prevent perpetrators from escalating their behaviors.[36]
- ***Conduct climate surveys:*** Regular, anonymous climate surveys will help ascertain existing workplace culture, identify potential areas for growth for the employer and guide the revision of training and other procedures.

Legislation is another important way to tackle workplace sexual harassment. Solutions must be comprehensive, including a number of provisions to protect workers and fix overly narrow standards created through problematic case law. Policymakers can:

- ***Codify strong protections:*** This includes enacting anti-retaliation provisions, prohibiting non-disparagement and non-disclosure agreements unless requested by the employee, banning pre-dispute mandatory arbitration, expanding protections to cover all employees, instituting strong penalties and eliminating caps on damages awarded to workers who have experienced discrimination.
- ***Specifically, enact strong federal legislation and state equivalents:***
  - The Bringing an End to Harassment by Enhancing Accountability and Rejecting Discrimination (BE HEARD) Act would ensure all workers can do their jobs without fear of harassment by building on existing civil rights laws to provide new protections

for workers, while also safeguarding existing discrimination laws.

- The Ending the Monopoly of Power Over Workplace harassment through Education and Reporting (EMPOWER) Act would increase transparency and training in the workplace, making it less difficult for employees to come forward and report inappropriate behavior.
- The Pregnant Workers Fairness Act would end another form of sex discrimination and promote women's health and economic security by ensuring reasonable workplace accommodations for workers whose ability to perform the functions of a job are limited by pregnancy, childbirth or a related medical condition.

Ensuring equality in pay and promotions

The gender and racial pay gaps are persistent. Over the last several decades, these gaps have started to close. But progress is slow and both employers and alike must take action to speed the pace of change.

In addition to being ethical and good for employees, pay equity is beneficial to employers because it drives higher retention and morale, according to our research. Employers should:

- ***Conduct pay audits:*** Pay audits can be used to understand, monitor and address gender pay differences. Regularly analyzing pay decisions—when salaries are set, when job functions change, when bonuses are awarded or raises given—ensures that salaries remain equitable and employers comply with the law.
- ***Prohibit retaliation for wage disclosure:*** Pay disparities are notoriously difficult to detect and many employers punish employees for asking about or sharing that information. Such punitive pay-secrecy policies make it difficult for workers to remedy wage disparities because they cannot find out if they're being paid less. Employers should not impose such policies and should proactively ban retaliation against employees seeking this information.
- ***Ban the use of prior salary history:*** The practice of using past salaries to set current wages perpetuates the gender pay gap because it assumes that prior salaries were fairly established by previous employers. Relying on salary history allows a new employer to continue underpaying an employee who faced a pay gap and lost wages due to bias or discrimination at a previous job. Salary history questions can also introduce bias and discrimination into the recruitment process of a company that may be attempting to avoid it. Employers should prohibit the use of salary history and instead use market research to determine what the position is worth to the organization.
- ***Publicize wage ranges for all job postings:*** Increased transparency levels the playing field when job applicants are negotiating their salaries. Publishing salary ranges also provides employers with the opportunity to proactively ensure they are in line with the market and correct any disparities that may have arisen over time.

Policymakers have the opportunity to support workers by providing needed protections and encouraging employers to be good actors. They should:

- ***Make existing law stronger:*** Over the years we have learned a lot about the ways pay discrimination works, so we must enact laws to close existing loopholes. Additionally, policymakers should strengthen penalties for equal pay violations, prohibit the use of salary history in employment decisions, prohibit retaliation against workers who voluntarily discuss or disclose their wages, and support data collection and research. At the federal level, enacting the Paycheck Fairness Act, as well as the Pay Equity for All Act and the Fair Pay Act, would codify these recommendations.
- ***Build off of state successes:*** Over the past decade, states have enacted a bevy of laws designed to close the gender and racial pay gaps. Implementing pieces of federal bills and enacting new, progressive provisions at the state level enables timely discoveries about which policies work.
- ***Enact the Protecting the Right to Organize (PRO) Act:*** Union membership plays a critical role in ensuring pay equality. Unionized women earn 94% of the hourly wage of unionized men, whereas non-unionized women earn only 78% of what non-unionized men earn.[37]

Current efforts to curb sexual harassment do not appear to be effective. Employers should be more proactive in offering training programs and establishing reporting procedures, and we need stronger state and federal laws to help tackle the persistent problems.

Thus, though the decline in union membership in manufacturing jobs hurts all workers, it especially hurts women, who rely on unions to guarantee a fair wage.[38] The PRO Act would expand various labor protections related to employees' rights to organize and collectively bargain in the workplace.

Improve Paid Family Leave

Despite many cultural and legal advances in American society, women are generally expected to be the primary caretaker in their families—both of children as well as other family members who need assistance. Coupled with a lack of systematic supports for new parents, this has profound consequences on women's careers and paychecks.

Employers can address this by:

- ***Offering paid family and medical leave to all employees:*** To support all workers and address yawning pay and promotion gaps, employer-sponsored leave must be fully paid, cover time away for both caretaking and personal medical reasons and be equally available to men and women.
- ***Encouraging all employees to utilize their leave:*** Even if employers offer generous leave, if the workplace culture discourages it or penalizes those who use it, employees will not utilize it. This will penalize those workers who have no alternative but to use it.

To support employers who may not be able to afford to offer comprehensive paid leave, policymakers should enact a national paid leave system.

- ***Pass the Family and Medical Insurance Leave (FAMILY) Act:*** This bill would establish paid medical and parental leave for all workers.
- ***Pass the Healthy Families Act:*** This bill would allow workers to earn paid sick days to cover temporary and minor illnesses and caregiving.
- ***Enact state level responses:*** In the absence of a comprehensive federal paid leave policies, many states have enacted their own reforms. State should continue this practice, both to support their residents and to try out new approaches that may one day be implemented at the federal level.

Institute Flexible Work Measures

The availability of flexible work measures can help retain women in manufacturing jobs. Our research found that women whose employers offer flextime—that is, flexibility in when workers start or end their workdays—are moderately less likely to accept a position at another employer.[39] Employers should:

- Offer a variety of flexible work measures—including flextime, a compressed work week, shift swapping, shift splitting and the ability to work part time. These measures give manufacturers the certainty that they will have workers on the line when they need them—while affording workers the flexibility to take care of their families.

Support Higher Education Access

As new jobs in manufacturing demand greater skills and education, opening doors to more women to acquire associate, bachelor and advanced degrees is an essential component of recruiting and retaining women in the industry. Policymakers should enact legislation that:

- ***Protects Pell Grants and ensures that they work for all students:*** Need-based grant aid helps alleviate the amount of debt students must assume to attend college. The federal Pell Grant Program is critical to many students' success in higher education. Congress should double the maximum Pell Grant and restore its purchasing power to cover the increased costs of college attendance.
- ***Addresses additional costs students face beyond tuition:*** Often lost in the conversation about affordable higher education are the other costs incurred by students during their time in school. For example, many students are also parenting while enrolled in college and may take on additional loans that students without dependent children do not need. The costs of child care put it out of reach for many student parents, making affordable on-campus child care a necessary and effective resource. The federal program to support this type of affordability, Child Care Access Means Parents in School (CCAMPIS), should be fully funded to continue to support parenting students as they pursue higher education.
- ***Offers broad-based student loan debt cancellation and supports repayment and assistance approaches that reflect borrowers' realities:*** The global pandemic and resulting economic crisis have laid bare the struggles of many borrowers, particularly women, people of color and low-income individuals. Offering a range of approaches—including student debt cancellation, streamlined income-driven repayment options, refinancing and private student loan discharge in bankruptcy—will support individuals and their families, while enabling them progress confidently in their careers.

Employers can also support their workforce by:

- ***Providing tuition reimbursement:*** Education assistance—whether through tuition payments, loan repayment or grants—is a great way to support current employees,

help retain exceptional workers and recruit high-quality candidates.

- ***Creating apprenticeship programs:*** Apprenticeships are a great way to learn on the job. They provide direct access to jobs and offer debt-free career training. Employers can ensure they have a pipeline of women entering their workplace by creating and promoting these types of opportunities.

Diversify Employee Resource Groups

Employers often point to employee resource groups as evidence of an inclusive work environment. Yet there is little research on whether the groups do, in fact, increase job satisfaction or decrease turnover.[40]

Our research found that, for white women, the availability of employee resource groups helped reduce turnover. For women of color, however, this was not the case.[41] These findings indicate that women of color do not gain the same sense of support from women's resource groups that white women do—likely because the groups, like the industry itself, are heavily white, and therefore do not attend to women of color's intersectional identities. One white woman's comment can help us understand why women of color may not feel helped by general resource groups. "I'm offended that ANY of this has to be questioned as a 'woman' race or religion," she wrote, "I do not think my color, race and/or gender should matter." A white woman's race may not matter at work, but a woman of color's probably does—and women of color need to have spaces to find support.

Employers should:

- ***Organize more diverse employee resource groups***: These could include groups for women of color and for mothers. These groups can make more women feel welcome on the factory floor.

Checklist for Retaining Women in Manufacturing Jobs

	Employers	Policymakers
Stop sexual harassment	❑ Create a well-defined sexual harassment policy ❑ Institute a complaint process procedure ❑ Make sexual harassment training in-person and interactive ❑ Involve men in sexual harassment training sessions ❑ Conduct bystander awareness training ❑ Employers should have and encourage the use of an anonymous tip line for those who experience or witness harassing behavior.	❑ Codify strong anti-harassment protections ❑ Enact the Bringing an End to Harassment by Enhancing Accountability and Rejecting Discrimination (BE HEARD) Act ❑ Enact the Ending the Monopoly of Power Over Workplace harassment through Education and Reporting (EMPOWER) Act ❑ Enact the Pregnant Workers Fairness Act
Ensure equality in pay and promotions	❑ Conduct pay audits ❑ Prohibit retaliation for wage disclosure ❑ Ban the use of prior salary history ❑ Publicize wage ranges for all job postings	❑ Enact the Paycheck Fairness Act ❑ Enact the Pay Equity for All Act ❑ Enact the Fair Pay Act ❑ Enact the Protecting the Right to Organize (PRO) Act
Improve paid family leave	❑ Offer paid family and medical leave to all employees ❑ Encourage all employees to use their leave	❑ Pass the Family and Medical Insurance Leave (FAMILY) Act ❑ Pass the Healthy Families Act
Offer flexible work measures	❑ Offer flextime ❑ Offer compressed work weeks ❑ Offer shift swapping ❑ Offer shift splitting ❑ Offer the ability to work part time	
Support higher education access	❑ Provide tuition reimbursement ❑ Create apprenticeship programs	❑ Protect Pell Grants ❑ Address costs beyond tuition, including by fully funding Child Care Access Means Parents in School (CCAMPIS) ❑ Offer broad-based student loan debt cancellation and support realistic repayment and assistance approaches
Diversify employee resource groups	❑ Include groups specifically for women of color ❑ ERG leaders should be welcomed to bring concerns and ideas for workplace culture improvements to HR. HR should create avenues for anonymous or confidential feedback.	

APPENDIX

Table A1. Impact of Manufacturing on Job Transitions between Major Industries, 2018 to 2019

	(1) Basic Model			(2) Basic Model+ % female in subsector			(3) Basic Model + % female managers in subsector		
VARIABLES	All	Women	Men	All	Women	Men	All	Women	Men
Female	-0.0517***			-0.00611			-0.0105*		
	(0.00513)			(0.00566)			(0.00562)		
Manufacturing	0.0224***	0.0677***	0.00144	-0.0290***	-0.0430***	-0.0230**	-0.0309***	-0.0483***	-0.0238**
	(0.00775)	(0.0139)	(0.00938)	(0.00828)	(0.0155)	(0.00984)	(0.00838)	(0.0157)	(0.00995)
Female share of sub-industry employment				-0.290***	-0.408***	-0.185***			
				(0.0143)	(0.0209)	(0.0202)			
Female share of sub-industry managers							-0.333***	-0.484***	-0.207***
							(0.0174)	(0.0259)	(0.0242)
Black	0.0271***	0.0157	0.0433***	0.0346***	0.0249**	0.0489***	0.0350***	0.0257**	0.0490***
	(0.00957)	(0.0119)	(0.0156)	(0.00948)	(0.0117)	(0.0156)	(0.00950)	(0.0117)	(0.0156)
Hispanic	0.0103	0.0107	0.00841	0.00562	0.0104	0.00436	0.00500	0.00905	0.00411
	(0.00767)	(0.0106)	(0.0110)	(0.00764)	(0.0104)	(0.0110)	(0.00764)	(0.0104)	(0.0110)
Asian	-0.0212**	-0.0248*	-0.0205	-0.0165*	-0.0263**	-0.0133	-0.0183*	-0.0283**	-0.0148
	(0.00955)	(0.0131)	(0.0139)	(0.00947)	(0.0128)	(0.0139)	(0.00948)	(0.0128)	(0.0139)
Age	-0.00160***	-0.00171***	-0.00153***	-0.00155***	-0.00166***	-0.00150***	-0.00152***	-0.00161***	-0.00148***
	(0.000263)	(0.000359)	(0.000382)	(0.000261)	(0.000353)	(0.000381)	(0.000261)	(0.000353)	(0.000381)
Married	-0.00154	-0.00236	-0.00489	-0.00267	0.000764	-0.00717	-0.00230	0.000316	-0.00646
	(0.00739)	(0.00874)	(0.0136)	(0.00733)	(0.00863)	(0.0135)	(0.00734)	(0.00865)	(0.0136)
Parent	-0.0119**	-0.0181**	-0.00541	-0.0111**	-0.0130*	-0.00658	-0.0108**	-0.0134*	-0.00600
	(0.00552)	(0.00762)	(0.00796)	(0.00548)	(0.00750)	(0.00793)	(0.00548)	(0.00750)	(0.00793)
Union Member	-0.0923***	-0.0930***	-0.0910***	-0.0873***	-0.0749***	-0.0907***	-0.0840***	-0.0726***	-0.0876***
	(0.00619)	(0.00824)	(0.00925)	(0.00618)	(0.00817)	(0.00925)	(0.00619)	(0.00819)	(0.00925)
College Graduate	-0.0108**	-0.00636	-0.0145*	0.00989*	0.00313	0.00664	0.0101*	0.00572	0.00564
	(0.00549)	(0.00746)	(0.00814)	(0.00556)	(0.00734)	(0.00856)	(0.00558)	(0.00737)	(0.00857)
Ln of Wage	-0.0201***	-0.0235***	-0.0170**	-0.0258***	-0.0303***	-0.0208***	-0.0243***	-0.0274***	-0.0203***
	(0.00471)	(0.00655)	(0.00675)	(0.00468)	(0.00641)	(0.00674)	(0.00468)	(0.00643)	(0.00674)
Rural	-0.0218***	-0.0300***	-0.0123	-0.0203***	-0.0242***	-0.0133	-0.0203***	-0.0240***	-0.0132
	(0.00679)	(0.00884)	(0.0103)	(0.00674)	(0.00872)	(0.0103)	(0.00675)	(0.00873)	(0.0103)
South	-0.00921	-0.00842	-0.00898	-0.0101	-0.0120	-0.00845	-0.00944	-0.0103	-0.00855
	(0.00794)	(0.0105)	(0.0119)	(0.00787)	(0.0103)	(0.0119)	(0.00788)	(0.0104)	(0.0119)
Midwest	0.00877	0.000840	0.0179	0.00478	-0.00428	0.0150	0.00647	-0.00234	0.0162
	(0.00782)	(0.0104)	(0.0117)	(0.00776)	(0.0102)	(0.0116)	(0.00776)	(0.0102)	(0.0117)
West	0.0269***	0.0351***	0.0207*	0.0229***	0.0246**	0.0198*	0.0244***	0.0274**	0.0204*
	(0.00794)	(0.0108)	(0.0116)	(0.00789)	(0.0107)	(0.0116)	(0.00790)	(0.0107)	(0.0116)
State GDP per capita	5.74e-07**	4.21e-07	7.25e-07**	5.79e-07***	4.06e-07	7.30e-07**	6.03e-07***	4.40e-07	7.46e-07**
	(2.27e-07)	(2.99e-07)	(3.41e-07)	(2.25e-07)	(2.94e-07)	(3.40e-07)	(2.25e-07)	(2.94e-07)	(3.40e-07)
Constant	0.359***	0.333***	0.337***	0.490***	0.585***	0.419***	0.489***	0.584***	0.417***
	(0.0256)	(0.0337)	(0.0372)	(0.0261)	(0.0352)	(0.0381)	(0.0262)	(0.0355)	(0.0382)
Observations	36,461	18,331	18,130	36,461	18,331	18,130	36,461	18,331	18,130
R-squared	0.016	0.016	0.011	0.031	0.047	0.017	0.029	0.044	0.016

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table A2. Impact of Manufacturing on Job Transitions between Major Industries with Interaction, 2018 to 2019

	(1) Basic Model	(2) Basic Model + Region + State GDP per capita + % female in subsector
VARIABLES		
Female	-0.0591***	-0.00948
	(0.00537)	(0.00597)
Manufacturing	-0.000624	-0.0371***
	(0.00922)	(0.00951)
Female X Manufacturing	0.0658***	0.0278*
	(0.0166)	(0.0167)
Female share of sub-industry employment		-0.287***
		(0.0144)
Black	0.0273***	0.0344***
	(0.00945)	(0.00949)
Hispanic	0.0196***	0.00526
	(0.00746)	(0.00764)
Asian	-0.0109	-0.0170*
	(0.00933)	(0.00948)
Age	-0.00162***	-0.00155***
	(0.000262)	(0.000261)
Married	-0.00209	-0.00250
	(0.00739)	(0.00733)
Parent	-0.0123**	-0.0109**
	(0.00552)	(0.00548)
Union Member	-0.0897***	-0.0871***
	(0.00608)	(0.00618)
College Graduate	-0.0115**	0.00969*
	(0.00549)	(0.00556)
Ln of Wage	-0.0181***	-0.0257***
	(0.00469)	(0.00468)
Rural	-0.0262***	-0.0201***
	(0.00670)	(0.00674)
South		-0.00985
		(0.00787)
Midwest		0.00513
		(0.00776)
West		0.0231***
		(0.00789)
State GDP per capita		5.79e-07**
		(2.25e-07)
Constant	0.396***	0.490***
	(0.0210)	(0.0261)
Observations	36,461	36,461
R-squared	0.015	0.031

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table A3. Attrition in Manufacturing, 2018 to 2019

	Basic Model + Region + State GDP per capita		
VARIABLES	All	Women	Men
Black	0.0175	-0.103**	0.0850**
	(0.0322)	(0.0498)	(0.0417)
Hispanic	0.0213	-0.0425	0.0512*
	(0.0234)	(0.0416)	(0.0283)
Asian	-0.0330	-0.115**	0.0156
	(0.0286)	(0.0471)	(0.0361)
Age	-0.00215***	-0.00545***	-0.000704
	(0.000788)	(0.00158)	(0.000909)
Married	0.0134	0.0203	-0.0110
	(0.0228)	(0.0333)	(0.0315)
Parent	0.0161	-0.0621*	0.0517***
	(0.0165)	(0.0318)	(0.0192)
Union Member	-0.0560**	-0.118**	-0.0437*
	(0.0222)	(0.0465)	(0.0249)
College Graduate	0.0406**	0.0426	0.0360*
	(0.0185)	(0.0364)	(0.0213)
Female	0.0187		
	(0.0173)		
Ln of Wage	-0.0342**	-0.0477	-0.0279
	(0.0162)	(0.0304)	(0.0189)
Rural	-0.0419**	-0.0543	-0.0314
	(0.0179)	(0.0365)	(0.0204)
South	-0.0625***	-0.0473	-0.0688**
	(0.0235)	(0.0422)	(0.0281)
Midwest	0.0368	0.0883*	0.0178
	(0.0267)	(0.0504)	(0.0314)
West	0.0241	0.0445	0.0135
	(0.0260)	(0.0465)	(0.0312)
State GDP per capita	2.00e-06**	3.75e-06**	1.25e-06
	(8.96e-07)	(1.70e-06)	(1.05e-06)
Female share of sub-industry employment			
Female share of sub-industry managers			
Constant	0.314***	0.473***	0.268***
	(0.0845)	(0.162)	(0.0968)
Observations	4,240	1,209	3,031
R-squared	0.028	0.049	0.029

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, *

Econometric Analysis

Motivation

The regression analysis conducted in our report explores the contribution of being a woman and working in manufacturing to the likelihood that a worker will leave a job in any major industry between 2018 and 2019. It also explores factors that might explain why women workers left manufacturing jobs between the two years, including key socio-economic characteristics and proxies for the likelihood a woman will experience sexual harassment on the job and the severity of the glass ceiling in each manufacturing sub-industry.

Empirical Strategy

We estimate the following linear probability model:

$$Y_{isr} = \boldsymbol{\beta} X_{isr} + \boldsymbol{\alpha} \times \text{GSP per capita}_s + \Omega_r + \boldsymbol{\varepsilon}_{isr}$$

where Y_{isr} is an indicator of whether person i in state s and region r transitioned from a job in one major industry in 2018 to another in 2019. Our explanatory variables, X's, include controls for race (African American and Asian American and Pacific Islander (AAPI) indicators), ethnicity (a Hispanic indicator), age, an indicator for union membership, an indicator if the person married, an indicator if the person has children, sex, an indicator if the person is a college graduate, an indicator if the person lives in a rural area, the hourly wage rate (natural log of), and an indicator for whether the person works in manufacturing. We also include region effects, Ω_r, for each of the large four regions of the country as defined by the Census Bureau (Northeast, Midwest, South, and West). We also include Gross State Product per capita to capture local business cycles, percentage of workers in a sub-industry who are women as a proxy for likelihood that a woman will experience sexual harassment, and percentage of managers in a subindustry who are women to proxy the extent of the glass ceiling. We estimate fully saturated models for all individuals of prime working age (22 to 65), women of prime working age, as well as for men of the same age group. This is a falsification test since we are investigating why women leave jobs in manufacturing and it would be insightful if the effect of our explanatory variables were stronger for women than for men (although arguably not necessarily non-existent for men).

Data Description

CPS ORG data:

In our analysis, we use data from the Outgoing Rotation Group (ORG) files of the CPS for years 2018 and 2019, accessed from the Center for Economic Policy Research.[42] Households in the CPS are interviewed every month for four months. After an eight-month break, they are interviewed again monthly for four months. The fourth and eighth interviews of this cycle make up the ORG and contain information on wage income, hours worked for pay, and basic demographic variables. Using unique individual identifiers in the CPS ORG, we match information from the fourth and eighth interviews from individuals across the two years we study, 2018 and 2019.

Our dependent variables are: (1) job transitions between all major industries. It takes the value of 1 if the person moved jobs from one main industry in 2018 to another in 2019; and (2) job transition away from manufacturing. It takes a value of 1 if the person left a job in manufacturing between 2018 and 2019.

Additional control variables:

To control for variations in the economic climate across US states, we use data on Gross State Product per capita for 2018.[43]

Survey Collection and Design

Data for this study were collected using a convenience sample of women currently working in manufacturing jobs who are members of the International Brotherhood of Electrical Workers, the Coalition of Labor Union Women, Women in Manufacturing, or employees of the manufacturer DuPont Specialty Products. The survey was administered online between April 28 and July 17, 2020. Since representatives from each organization sent the survey to their respective members, no response rate is available. The total sample was n=214.

All respondents were women working in manufacturing in the United States of America. 36.4% of respondents (n=75) were 55-64 years old; the median age group was 45-54 years old. 86% of respondents (n=172) were white; 4% (n=8) were Hispanic, Latinx, or Spanish; 5.5% were Black or African American (n=11); 2% were Asian (n=4); .5% were American Indian or Alaska Native (n=1); 1% were Native Hawaiian or other Pacific Islander (n=2); and 1% were other (n=2). Due to the small number of respondents in most of the racial/ethnic groups, for our analysis, we consolidated these groups into white women (n=172) and women of color (n=28). Respondents worked in 21 U.S. states or territories, with the mode being Iowa (n=94; 53.7%).

In terms of educational attainment, 70% of respondents (n=142) had completed some college, a high school diploma, or less than a high school diploma. The remaining 30% (n=61) held an Associate's, Bachelor's, or Master's degree or above. 29.2% (n=59) had completed vocational training, while 70.8% (n=143) had not.

There was moderate variability in pay and low variability in job description and union membership. 42.5% of respondents (n=82) earned an annual salary of $40,001-60,000; 87% (n=168) earned $80,000 or less. 89.9% of respondents worked in production (as opposed to management or other), and 92.2% were members of a labor union.

The survey measured the following variables, which, in our analysis, were used as independent or intervening variables: amount of paid family leave, amount of paid vacation/personal time, work environment dominated by men, sexual harassment at current employer, availability of mentorship programs, availability of employee resource groups, availability of a variety of flexible work measures, sense of unequal pay, sense of unequal promotions, facility of getting a comparable job, parental status, caregiver status, and employer-mandated sexual harassment training. The key dependent variable was turnover intentions, measured with the item, "If it were offered to me, I would accept a job with the same pay at a different employer." Responses to this variable were measured on a Likert-type scale of strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree. Space constraints prevent us from publishing the methodology for the measurement and coding of the independent and intervening variables; that information is available on request.

Endnotes

[1] "FRED Graph," Federal Reserve Bank of St. Louis: Economic Research, accessed November 17, 2020, https://fred.stlouisfed.org/graph/?g=oKEB.

[2] The difference in hourly pay is especially acute when comparing low-skilled manufacturing jobs versus service sector jobs. Data for the BLS shows that the average hourly wage for all private sector jobs was $28.43 in January 2020. For all manufacturing jobs, it was $28.19. For food services and drinking places, the average hourly wage was $15.37. (Data accessed May 21, 2020.)

[3] Lawrence Mishel, "Yes, Manufacturing Still Provides a Pay Advantage, but Staffing Firm Outsourcing Is Eroding It" (Washington, D.C.: Economic Policy Institute, March 12, 2018), epi.org/141193. The wage premium for men in the 2010s was 9.3%. Note that the 11.5% figure controls for experience level, education level, regional division, race, and Hispanic ethnicity.

[4] On the effects of sexual harassment on turnover intentions among female lawyers, see David N. Laband and Bernard F. Lentz, "The Effects of Sexual Harassment on Job Satisfaction, Earnings, and Turnover among Female Lawyers," *Industrial and Labor Relations Review* 51, no. 4 (July 1998): 594–607; on the effects of harassment on care workers, see Julian Barling, A. Gail Rogers, and E. Kevin Kelloway, "Behind Closed Doors: In-Home Workers' Experience of Sexual Harassment and Workplace Violence," *Journal of Occupational Health Psychology* 6, no. 3 (2001): 255–69; for a longitudinal study on sexual harassment and turnover in the military, see Carra S. Sims, Fitz Drasgow, and Louise F. Fitzgerald, "The Effects of Sexual Harassment on Turnover in the Military: Time-Dependent Modeling," *Journal of Applied Psychology* 90, no. 6 (2005): 1141–52; Linda Jean Schaumann has conceptualized the glass ceiling as a "glass maze," to articulate the reality that women encounter gender-based discrimination at every level of employment and promotion. See Linda Jean Schaumann, "An Exploration of the 'Glass Ceiling' for Managerial Women Utilizing a Theoretical Model of Organizational Turnover" (Chicago, University of Illinois, Chicago, 1994); I. M. Jawahar's study of executive-level women in the U.S. found that when women believe they have run up against a glass ceiling—or any social or organizational barrier at work—they are more likely to leave their job I.M. Jawahar, "Perceived Organizational Support for Women's Advancement and Turnover Intentions: The Mediating Role of Job and Employer Satisfaction," *Women in Management Review* 21, no. 8 (2006): 643–61.

[5] Chelsea R. Willness, Piers Steel, and Kibeom Lee, "A Meta-Analysis of the Antecedents and Consequences of Workplace Sexual Harassment," *Personnel Psychology* 60, no. 1 (2007): 127–62; Kim Parker, "Women in Majority-Male Workplaces Report Higher Rates of Gender Discrimination," Pew Research Center, *Fact Tank: Facts in the Numbers* (blog), March 7, 2018, https://www.pewresearch.org/fact-tank/2018/03/07/women-in-majority-male-workplaces-report-higher-rates-of-gender-discrimination/.

[6] Heather Mclaughlin, Christopher Uggen, and Amy Blackstone, "The Economic and Career Effects of Sexual Harassment on Working Women," *Gender and Society* 31, no. 3 (2017): 333–58.

[7] Mishel, "Manufacturing Still Provides a Pay Advantage."

[8] Katherine Louise Ross, "Pregnancy and Work: A Mixed-Methods Study of Job Satisfaction and Turnover Intentions During a First Pregnancy" (Dissertation, University of Maryland, College Park, 2017), 44; Robert J. Blomme, Arjan Van Rheede, and Debbie M. Tromp, "Work-Family Conflict as a Cause for Turnover Intentions in the Hospitality Industry," *Tourism and Hospitality Research* 10, no. 4 (2010): 269–85.

[9] Kerwin Kofi Charles, Erik Hurst, and Mariel Schwartz, "The Transformation of Manufacturing and the Decline in US Employment," *NBER Macroeconomics Annual* 33 (2018): 307–72; Marc Levinson, "Job Creation in the Manufacturing Revival" (Washington, D.C.: Congressional Research Service, 2017).

[10] Charles, Hurst, and Schwartz, "Transformation of Manufacturing"; Alan B. Krueger, "Where Have All the Workers Gone?: An Inquiry Into the Decline of the U.S. Labor Force Participation Rate" (Washington, D.C.: Brookings, n.d.), https://www.brookings.edu/wp-content/uploads/2018/02/kruegertextfa17bpea.pdf.

[11] David Autor, Gordon H. Hanson, and David Dorn, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," American Economic Review 103 (2013): 2121–68; Justin R. Pierce and Peter K. Schott, "The Surprisingly Swift Decline of U.S. Manufacturing Employment," American Economic Review 106 (2016): 1632–62; Daron Acemoglu and Pascual Restrepo, "Robots and Jobs: Evidence from US Labor Markets" (National Bureau of Economic Research, March 2017); Charles, Hurst, and Schwartz, "Transformation of Manufacturing."

[12] With a 39% decline in employment (about 2.1 million jobs), women lost relatively more jobs than men did between 2000 and 2010. Men lost 31% of their jobs over the period, 3.7 million positions.

[13] David H. Autor, David Dorn, and Gordon H. Hanson, "The Geography of Trade and Technology Shocks in the United States," *American Economic Review* 103, no. 3 (2013): 220–25.

[14] The 2003 to 2019 period is used because: (a) the consistent industry identifier in the source data only goes back to 2003 and (b) 2019 is currently the most recent year of data available.

[15] In 2019, jobs in chemical manufacturing paid $32.40 per hour on average whereas jobs in transportation equipment paid $32.58.

[16] According to the BLS, food manufacturing jobs paid $20.98 per hour on average compared to $27.48 on average for manufacturing jobs as a whole. (BLS, Employment and Earnings Data, Table B-3a. Average hourly and weekly earnings of all employees on private nonfarm payrolls by industry sector, seasonally adjusted. Accessed May 24, 2020.) Since the vast majority of Hispanic women employed in food manufacturing in 2019 had a high school diploma or less, we feel comfortable deducing that these jobs are lower skilled.

[17] Elise Gould and Celine McNicholas, "Unions Help Narrow the Gender Wage Gap," *Economic Policy Institute: Working Economics Blog* (blog), April 3, 2017, https://www.epi.org/blog/unions-help-narrow-the-gender-wage-gap/.

[18] Joni Hersch, "Compensating Differentials for Sexual Harassment," *American Economic Review* 101, no. 3 (2011): 630–34.

[19] As with women, production occupations have been the most significant to men's employment in the industry since 2003, averaging 41% of their employment over the period. Management occupations comprised 14% of men's employment in manufacturing over the period whereas all other occupations made up about 46% of men's manufacturing employment. Over the entire period, however, the contributions of these broad occupation categories to men's employment in manufacturing changed very little.

[20] We conducted our analysis using several linear probability specifications on 2018 and 2019 data from the CPS ORG. This analysis was conducted on the full sample of workers, the sample of women workers, and the sample of men workers. Specifics about the models are provided in the appendix. Our main findings are provided in Table A1.

[21] Parker, "Women in Majority-Male Workplaces;" it is conceivable that the decline in U.S. manufacturing employment itself amplified the likelihood that women experience sexual harassment on these jobs since increased competition in a shrinking job pool could lead to dangerous gender stereotypes about who appropriately works manufacturing jobs taking a more reactionary hold.

[22] Willness, Steel, and Lee, "Meta-Analysis."

[23] Mclaughlin, Uggen, and Blackstone, "The Economic and Career Effects of Sexual Harassment on Working Women."

[24] This finding corroborates the research of other scholars on women's quit intentions and actual turnover in fields as varied as law, in-home care, and the military. See Laband and Lentz, "The Effects of Sexual Harassment"; Barling, Rogers, and Kelloway, "Behind Closed Doors: In-Home Workers' Experience of Sexual Harassment and Workplace Violence"; Sims, Drasgow, and Fitzgerald, "The Effects of Sexual Harassment on Turnover in the Military: Time-Dependent Modeling."

[25] The relationship between whether a woman had received unwanted verbal advances and whether she would accept a job at a different employer is weak and statistically significant (x^2=6.238, df=2, p=.044). Cramer's V (= .192) indicates a weak to moderate relationship between the variables; 19 percent of difference in whether a woman would accept a job at a different employer can be attributed to whether she experienced unwanted verbal advances. The relationship between whether a woman experienced physical harassment and whether she would accept a job at a different employer is weak but statistically insignificant (x^2=2.212, df=2, p=.331; Cramer's V = .112) The relationship may not rise to the level of statistical significance because only 17.3% of respondents had experienced unwanted physical advances. Since unwanted physical advances can feel more threatening than unwanted verbal advances, this relationship merits further study with a larger sample size.

[26] Schaumann, "An Exploration of the 'Glass Ceiling,'" 3–4.

[27] Strong relationship (54.4% difference between women who would accept a job at another employer and believe there is a glass ceiling and those who would accept a job at another employer and believed there was not a glass ceiling). Statistically significant (x^2=30.415, df=16, p=.016). Cramer's V (Cramer's V= .299) indicates a strong relationship between the variables; nearly 30 percent of the difference in whether a woman would accept a job at another organization can be attributed to her sense of whether there is a glass maze at her current employer.

[28] The Chi-Square test results for this relationship were as follows: x^2=6.997, df=4, p=.136; Cramer's V=.138.

[29] The relationship between whether a woman was a woman of color and whether she felt significantly outnumbered at her employer or in her department is moderate and statistically significant. (x^2=11.325, df=2, p=.003; Cramer's V=.249).

[30] The study did not disaggregate this calculation by gender.

[31] The relationship between whether a woman was satisfied with the amount of paid leave at her current employer and whether she would accept a comparable job at a different organization was moderate and statistically significant (x^2=17.319, df=4, p=.002). Cramer's V (Cramer's V=.25) indicates that in this model, 25 percent of difference in whether a woman would accept a job at another organization can be attributed to her satisfaction with her current employer's paid family leave policies. The relationship between leave satisfaction and willingness to accept employment elsewhere becomes even stronger among women who are parents, explaining 32.1% of variance (Cramer's V= .321) at p=.002.

[32] While the hourly wage rate reduced the likelihood that a person would leave a manufacturing job, as expected, this impact was only significant in the full sample.

[33] Chai R. Feldblum and Victoria A. Lipnic, "Select Task Force on the Study of Harassment in the Workplace: Report of Co-Chairs Chai R. Feldblum and Victoria A. Lipnic" (Washington, D.C.: Equal Employment Opportunity Commission, June 2016), https://www.eeoc.gov/select-task-force-study-harassment-workplace.

[34] Zachary T. Kalinoski et al., "A Meta-Analytic Evaluation of Diversity Training Outcomes," *Journal of Organizational Behavior* 34, no. 8 (November 2013): 1076–1104; Sharyn J. Potter et al., "Conveying Campus Sexual Misconduct Policy Information to College and University Students: Results from a Seven Campus Study," *Journal of American College Health* 64, no. 6 (April 2016): 438–47.

[35] Justine Tinkler, Skylar Gremillion, and Kira Arthurs, "Perceptions of Legitimacy: The Sex of the Legal Messenger and Reactions to Sexual Harassment Training," *Law and Social Inquiry* 40, no. 1 (Winter 2015): 152–74.

[36] Sharyn J. Potter and Mary M. Moynihan, "Bringing in the Bystander In-Person Prevention Program to a U.S. Military Installation: Results From a Pilot Study," *Military Medicine* 176, no. 8 (August 2011): 870–75.

[37] Gould and McNicholas, "Unions Help Narrow the Gender Wage Gap."

[38] "Union Membership Rate 8.6 Percent in Manufacturing, 23.4 Percent in Utilities, in 2019," *U.S. Bureau of Labor Statistics, TED: The Economics Daily* (blog), February 3, 2020, https://www.bls.gov/opub/ted/2020/union-membership-rate-8-point-6-percent-in-manufacturing-23-point-4-percent-in-utilities-in-2019.htm?view_full.

[39] The relationship between whether a woman's employer offered flextime and whether she would accept a comparable job at a different organization was moderate and statistically significant (x^2=11.063, df=2, p=.004). Cramer's V (Cramer's V=.253) indicates that 25 percent of difference in whether a woman would accept a job at another organization can be attributed to her satisfaction with her current employer's paid family leave policies. Our research found no relationship between a variety of other flexible work measures (including a compressed work week, shift swapping, shift splitting, and the ability to work part time) and women's willingness to accept a job at a different manufacturer—but that is likely because our survey was administered during the Covid-19-induced economic collapse, when women might have been feeling risk-averse. In less uncertain times, women may leave their jobs to seek more flexible schedules. And even in our survey, women's comments indicate that they are interested in a variety of flexible work measures, especially flex time, shift swapping, and a compressed work week.

[40] For a brief overview of the history of employee resource groups as well as the thin literature on the topic, see Theresa M. Welbourne, Skylar Rolf, and Steven Schalchter, "The Case for Employee Resource Groups: A Review and Social Identity Theory-Based Research Agenda," *Personnel Review* 46, no. 8 (2017): 1816–34; For an example of a study that does not adequately examine the effect of resource groups on job satisfaction, see Deloitte, "Minding the Manufacturing Gender Gap: How Manufacturers Can Get Their Fair Share of Talented Women," 2015, https://www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-minding-the-manufacturing-gender-gap-final.pdf.

[41] The relationship between the availability of employee resource groups and willingness to accept a job at a different employer was moderate and statistically significant for white women (x^2=7.272, df=2, p=.026; Cramer's V = .269). For women of color, that relationship was weak and statistically insignificant (x^2=.471, df=2, p=.790; Cramer's V = .154). Our sample was only 14% women of color—which was representative of manufacturing as a whole, but the low cell counts threaten the external validity of this analysis. Still, given the vast difference in results between white women and women of color, we feel comfortable saying that these groups are likely far more meaningful for and inclusive of white women than women of color. The question of race and employee resource groups merits further study with a larger sample size.

[42] "CPS ORG Uniform Extracts, Version 2.5" (Washington, D.C.: Center for Economic and Policy Research, 2020), https://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/cps-org-data/.

[43] "Annual Gross Domestic Product (GDP) by State: Real GDP Per Capita," U.S. Bureau of Economic Analysis, n.d., https://apps.bea.gov/iTable/index.cfm#reqid=70%26step=1%26isuri=1.

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