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Professional certifications and occupational licenses: evidence from the Current Population Survey

This article uses data from the Current Population Survey to analyze the role of professional certifications and occupational licenses in the U.S. labor market. It discusses the prevalence of these credentials among the employed by age, gender, race, ethnicity, educational attainment, and occupation. This analysis also explores the relationships between certifications, licenses, and earnings. Finally, the article presents new data on certification and licensing by detailed occupation and whether the credential is required for one's job.

Evan Cunningham
cpsinfo@bls.gov

Evan Cunningham was formerly an economist in the Office of Employment and Unemployment Statistics, U.S. Bureau of Labor Statistics.

In 2018, more than 43 million people in the United States held a professional certification or license. The prevalence of occupational licenses, common in fields such as healthcare, law, and education, has risen substantially over the past 50 years.[1] Professional certifications, while less common than licenses, can signal proficiency in fast-changing fields like project management, software development, and financial analysis. Both of these time-limited credentials can serve as alternative forms of educational attainment, demonstrating a level of skill or knowledge needed to perform a specific type of job. As a result, researchers and others have developed an interest in using government surveys to measure the prevalence of certifications and licenses and tying these credentials to labor market outcomes and earnings. To meet this need, in January 2015, the Bureau of Labor Statistics (BLS), working with the federal Interagency Working Group on Expanded Measures of Enrollment and Attainment (GEMEnA), added questions on certifications and licenses to the Current Population Survey (CPS). This article provides an in-depth analysis of CPS data on professional certifications and licenses for 2018.

Professional certifications and licenses: what they are

As mentioned previously, in the CPS, certifications and licenses are credentials that demonstrate a level of skill or knowledge needed to perform a specific type of job. Both terms refer to time-limited credentials that need to be renewed periodically. The fundamental difference between the two is the issuer of the credential: certifications are

issued by nongovernmental certification bodies, whereas licenses are awarded by a federal, state, or local government agency. Thus, licenses convey a legal authority to work in an occupation, while a certification on its own does not.[2]

How certifications and licenses are measured in the Current Population Survey

In January 2015, the following three questions on certifications and licenses were added to the CPS, based on the work of GEMEnA:[3]

1. *Do you have a currently active professional certification or a state or industry license? Do not include business licenses, such as a liquor license or a vending license.*

   This question is used to identify people with a certification or license. People may have more than one of these credentials.

2. *Were any of your certifications or licenses issued by the federal, state, or local government?*

   This second question is asked of people who answered “yes” to the first question. People who answer “yes” are classified as having a license. People with a license may also have a certification.[4]

3. *Earlier you told me you had a currently active professional certification or license. Was your certification or license required for your job?*

   This third question is asked later in the interview of employed people who answered “yes” to the first question. In this question, “required” can mean either legally required (a license to be a practicing doctor, for example) or required by an employer (such as a computer maintenance certification).[5]

In 2018, 43.7 million people in the United States held a currently active certification or license—16.9 percent of the civilian noninstitutional population. Among the employed, 24.1 percent held one of these credentials, compared with 12.1 percent of the unemployed and 5.6 percent of those not in the labor force. Licenses were the more common credential—21.8 percent of employed people held a license, while only 2.3 percent held a certification but no license.[6] Of the 37.6 million employed people with a certification or license, 32.5 million—or 87 percent—usually worked full time (35 or more hours per week). (See table 1.) Finally, 84.4 percent of employed people with a certification or license responded that their credential was required for their job. Among those with a license, 87.0 percent said their credential was required, compared with 60.0 percent for those with a certification, but no license.[7]

Table 1. Certification and licensing status of the civilian noninstitutional population 16 years and over by employment status, 2018 annual averages

Employment status	Number of people (thousands)					Percent distribution				
	Total	With a certification or license[1]			Without a certification or license	Total	With a certification or license[1]			Without a certification or license
		Total	With a certification, but no license	With a license[2]			Total	With a certification, but no license	With a license[2]	
Civilian noninstitutional population	257,791	43,691	4,197	39,495	214,099	100.0%	16.9%	1.6%	15.3%	83.1%
Civilian labor force	162,075	38,321	3,658	34,664	123,753	100.0	23.6	2.3	21.4	76.4
Employed	155,761	37,556	3,546	34,010	118,205	100.0	24.1	2.3	21.8	75.9
Usually work full time	128,572	32,533	3,152	29,381	96,040	100.0	25.3	2.5	22.9	74.7
Usually work part time	27,189	5,024	394	4,630	22,165	100.0	18.5	1.4	17.0	81.5
Unemployed	6,314	765	112	654	5,549	100.0	12.1	1.8	10.4	87.9
Not in the labor force	95,716	5,370	539	4,831	90,346	100.0	5.6	0.6	5.0	94.4

Notes:

See footnotes at end of table.

(1) A person may have more than one certification or license.

(2) People with a license may also have a certification.

Source: U.S. Bureau of Labor Statistics.

Certifications, licenses, and employment status

In 2018, people with a currently active certification or license participated in the labor force at a higher rate and had a lower unemployment rate than people without one of these credentials. The labor force participation rate—the proportion of the civilian noninstitutional population working or looking for work—for those with a certification or license was 87.7 percent in 2018, compared with 57.8 percent for those with no certification or license. The unemployment rate—the number of people actively looking and available for work as a percentage of the labor force—for people with one of these credentials, at 2.0 percent, was less than half the rate for people with no certification or license (4.5 percent). These results generally held for people in all age, sex, race, ethnicity, and educational attainment groups. (See table 2.)

Table 2. Employment status of the civilian noninstitutional population by certification and licensing status and selected characteristics, 2018 annual averages

Characteristic	Labor force participation rate		Employment–population ratio		Unemployment rate	
	With a certification or license(1)	Without a certification or license	With a certification or license(1)	Without a certification or license	With a certification or license(1)	Without a certification or license
Total, 16 years and over	87.7%	57.8%	86.0%	55.2%	2.0%	4.5%
16 to 24 years	86.1	53.3	82.3	48.5	4.4	9.0
25 to 54 years	94.0	78.6	92.3	75.7	1.8	3.8
55 years and over	74.6	34.3	73.1	33.2	2.0	3.3
Men	90.1	65.0	88.3	62.1	2.0	4.5
Women	85.7	50.9	84.0	48.6	2.0	4.5
White	87.6	57.6	86.0	55.3	1.8	4.0
Black or African American	87.4	57.9	84.5	53.6	3.3	7.3
Asian	89.5	59.1	88.2	57.0	1.5	3.4
Hispanic or Latino ethnicity(2)	89.0	63.5	86.8	60.3	2.5	5.0
Total, 25 years and over	87.8	58.7	86.2	56.6	1.9	3.7
Less than a high school diploma	84.8	44.4	81.9	41.9	3.4	5.8
High school graduates, no college(3)	88.4	54.3	85.9	51.9	2.8	4.3

See footnotes at end of table.

Table 2. Employment status of the civilian noninstitutional population by certification and licensing status and selected characteristics, 2018 annual averages

Characteristic	Labor force participation rate		Employment–population ratio		Unemployment rate	
	With a certification or license[1]	Without a certification or license	With a certification or license[1]	Without a certification or license	With a certification or license[1]	Without a certification or license
Some college or associate degree	87.5	60.2	85.6	57.9	2.2	3.7
Some college, no degree	86.7	58.7	84.5	56.3	2.5	4.0
Associate degree	88.3	62.8	86.5	60.8	2.0	3.2
Bachelor's degree or higher	87.9	67.7	86.7	66.0	1.4	2.5
Bachelor's degree only	88.5	68.8	87.2	67.0	1.5	2.5
Advanced degree[4]	87.3	65.3	86.1	63.6	1.3	2.6

Notes:

[1] A person may have more than one certification or license.

[2] People of Hispanic or Latino ethnicity can be of any race.

[3] Includes people with a high school diploma or equivalent.

[4] Includes people with a master's, professional, or doctoral degree.

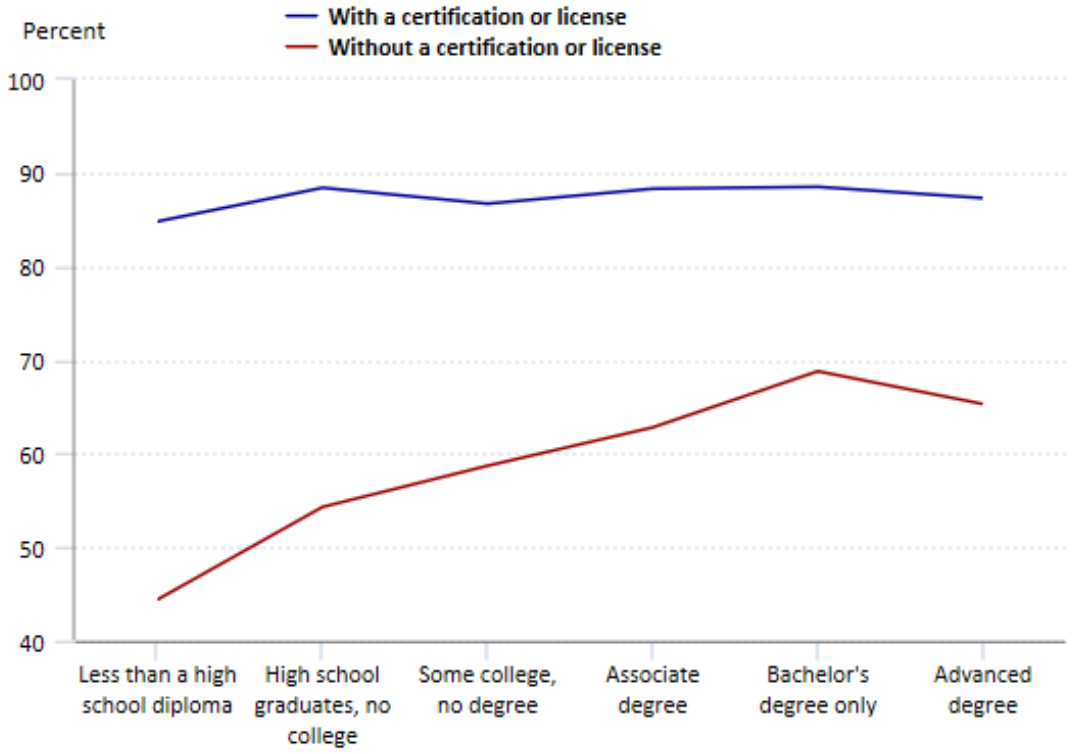
Source: U.S. Bureau of Labor Statistics.

Labor force participation rates typically vary by demographic characteristics such as age, sex, race, ethnicity, and educational attainment. However, the size of these participation rate gaps depends on certification and licensing status. Among those with a certification or license, differences in labor force participation between demographic groups tended to be smaller compared with those without one of these credentials. For example, among those with a certification or license in 2018, the participation rate for people ages 25 to 54 (often referred to as the prime working age), at 94.0 percent, was about 19 percentage points higher than the rate for people age 55 and over (74.6 percent). Among those without a certification or license, the prime-working-age participation rate, at 78.6 percent, was about 44 percentage points higher than the participation rate for those 55 and over (34.3 percent). The labor force participation rate gap between men and women was also smaller among those with one of these credentials. Among those with a certification or license, the participation rate for men (90.1 percent) was only about 4 percentage points higher than the rate for women (85.7 percent), compared with a difference of about 14 percentage points among those with no certification or license (65.0 percent for men and 50.9 percent for women).

This pattern was perhaps most striking for educational attainment. For those with no certification or license, labor force participation increased steadily with educational attainment, ranging from 44.4 percent among people age 25 and over with less than a high school diploma, to 68.8 percent for people in the same age group with a bachelor’s degree. For those with a credential, however, labor force participation was above 80 percent for every education level. In fact, the participation rate for people with a certification or license and at least a high school diploma,

regardless of how much additional education they attained, was 87.9 percent. The participation rate for those with a certification or license but less than a high school diploma was only slightly lower, at 84.8 percent. An important caveat, however, is that people with less than a high school diploma represent a very small share of those with a professional certification or license. Higher levels of educational attainment are often required for obtaining a license, so people with a certification or license tend to have higher levels of educational attainment than those without such credentials. (See figure 1.)

Figure 1. Labor force participation rates by certification and licensing status and educational attainment, 2018 annual averages



Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics.

View Chart Data

Prevalence of certifications and licenses among the employed

Since labor force participation rates are generally higher and unemployment rates lower for people with a professional certification or license, the remainder of this article focuses on the employed. This section discusses trends in the prevalence of certifications and licenses by demographic factors including age, sex, race, and ethnicity.

Employed people with a certification or license were disproportionately of prime working age (25 to 54) or older (55 and over). In 2018, 26.0 percent of workers ages 25 to 54 and 26.6 percent of workers age 55 and over held a certification or license. Younger workers (ages 16 to 24) were considerably less likely to hold one of these credentials, with just 9.7 percent doing so in 2018. Among employed people in their prime working age, those ages

25 to 34 were somewhat less likely to hold one of these credentials (23.2 percent) than those ages 35 to 44 (27.7 percent) or ages 45 to 54 (27.3 percent). The prevalence of certification and licensing did not vary substantially for workers age 35 and over. These patterns held for those with a certification but no license, as well as for those with a license. (See table 3.)

Table 3. Certification and licensing status of employed people 16 years and over by age and sex, percent distribution, 2018 annual averages

Characteristic	Total employed	With a certification or license[1]			Without a certification or license
		Total	With a certification, but no license	With a license[2]	
Total, 16 years and over	100.0%	24.1%	2.3%	21.8%	75.9%
16 to 24 years	100.0	9.7	1.0	8.7	90.3
25 to 54 years	100.0	26.0	2.5	23.5	74.0
25 to 34 years	100.0	23.2	2.3	20.9	76.8
35 to 44 years	100.0	27.7	2.8	24.9	72.3
45 to 54 years	100.0	27.3	2.5	24.8	72.7
55 years and over	100.0	26.6	2.3	24.3	73.4
55 to 64 years	100.0	26.3	2.4	23.8	73.7
65 years and over	100.0	27.5	2.0	25.5	72.5
Men, 16 years and over	100.0	21.4	2.5	18.9	78.6
16 to 24 years	100.0	7.7	1.0	6.7	92.3
25 to 54 years	100.0	22.4	2.9	19.5	77.6
25 to 34 years	100.0	18.7	2.7	16.0	81.3
35 to 44 years	100.0	23.9	3.1	20.8	76.1
45 to 54 years	100.0	25.0	2.8	22.2	75.0
55 years and over	100.0	25.7	2.4	23.3	74.3
55 to 64 years	100.0	25.0	2.6	22.4	75.0
65 years and over	100.0	27.7	2.0	25.7	72.3
Women, 16 years and over	100.0	27.1	2.0	25.2	72.9
16 to 24 years	100.0	11.7	0.9	10.8	88.3
25 to 54 years	100.0	30.1	2.1	28.0	69.9
25 to 34 years	100.0	28.5	1.9	26.6	71.5
35 to 44 years	100.0	32.0	2.3	29.7	68.0
45 to 54 years	100.0	30.0	2.2	27.8	70.0
55 years and over	100.0	27.6	2.1	25.4	72.4
55 to 64 years	100.0	27.7	2.2	25.5	72.3
65 years and over	100.0	27.2	2.0	25.2	72.8

Notes:

[1] A person may have more than one certification or license.

[2] People with a license may also have a certification.

Source: U.S. Bureau of Labor Statistics.

The low prevalence of certifications and licenses among younger workers is most likely related to the nature of these credentials. Many licenses require certain levels of educational attainment or supervised work experience that are difficult to attain before reaching the age of 25. For example, all states require physicians and surgeons to be licensed, which involves graduating from an accredited medical school and completing residency training in an area of specialty, which typically takes from 7 to 11 years.[8] In addition, obtaining a license often involves high upfront financial costs, which can be more difficult for younger workers to afford.[9]

Employed women were more likely to hold a certification or license than employed men. In 2018, 27.1 percent of employed women held a certification or license, compared with 21.4 percent of employed men. Nearly all of the difference was due to the gender gap in the prevalence of licenses, rather than certifications. Employed women (25.2 percent) were 6 percentage points more likely to hold a license than employed men (18.9 percent). This may reflect, in part, differences in the occupational distribution of employment between women and men. For example, women are more likely to be employed as teachers or nurses, occupations that generally require a license. In 2018, employed men were slightly more likely to hold a certification, at 2.5 percent, than employed women (2.0 percent). Not including those ages 16 to 24, the gap between women and men in the prevalence of these credentials declined with age. Women ages 25 to 34 were about 10 percentage points more likely to hold a certification or license than men ages 25 to 34, while women age 55 and over were only about 2 percentage points more likely to hold one of these credentials.

A look at the major race and ethnicity groups reveals that employed Whites had the highest prevalence of certification and licensing, at 24.9 percent in 2018, followed by employed Blacks or African Americans (21.8 percent) and Asians (20.9 percent). Employed people of Hispanic or Latino ethnicity, at 14.9 percent, were the least likely to hold one of these credentials. These patterns generally held for both those with a certification but no license and those with a license. As with age, employed women were more likely than their male counterparts to hold a certification or license within each major race and ethnicity group. Of all these groups, White women, at 27.9 percent, were the most likely to hold one of these credentials in 2018, while Hispanic men were the least likely (13.2 percent). This may also reflect differences in age, educational attainment, and occupation among employed people in the major race and ethnicity groups. (See table 4.)

Table 4. Certification and licensing status of employed people 16 years and over, by sex, race and ethnicity, percent distribution, 2018 annual averages

Characteristic	Total employed	With a certification or license[1]			Without a certification or license
		Total	With a certification, but no license	With a license[2]	
White	100.0%	24.9%	2.3%	22.6%	75.1%
Men	100.0	22.4	2.6	19.8	77.6
Women	100.0	27.9	2.0	26.0	72.1
Black or African American	100.0	21.8	2.1	19.6	78.2
Men	100.0	18.1	2.4	15.8	81.9
Women	100.0	25.0	1.9	23.1	75.0
Asian	100.0	20.9	2.4	18.5	79.1
Men	100.0	17.6	2.8	14.8	82.4

See footnotes at end of table.

Table 4. Certification and licensing status of employed people 16 years and over, by sex, race and ethnicity, percent distribution, 2018 annual averages

Characteristic	Total employed	With a certification or license[1]			Without a certification or license
		Total	With a certification, but no license	With a license[2]	
Women	100.0	24.7	2.0	22.7	75.3
Hispanic or Latino ethnicity[3]	100.0	14.9	1.6	13.3	85.1
Men	100.0	13.2	1.7	11.5	86.8
Women	100.0	17.1	1.4	15.7	82.9

Notes:

See footnotes at end of table.

(1) People may have more than one certification or license.

(2) People with a license may also have a certification.

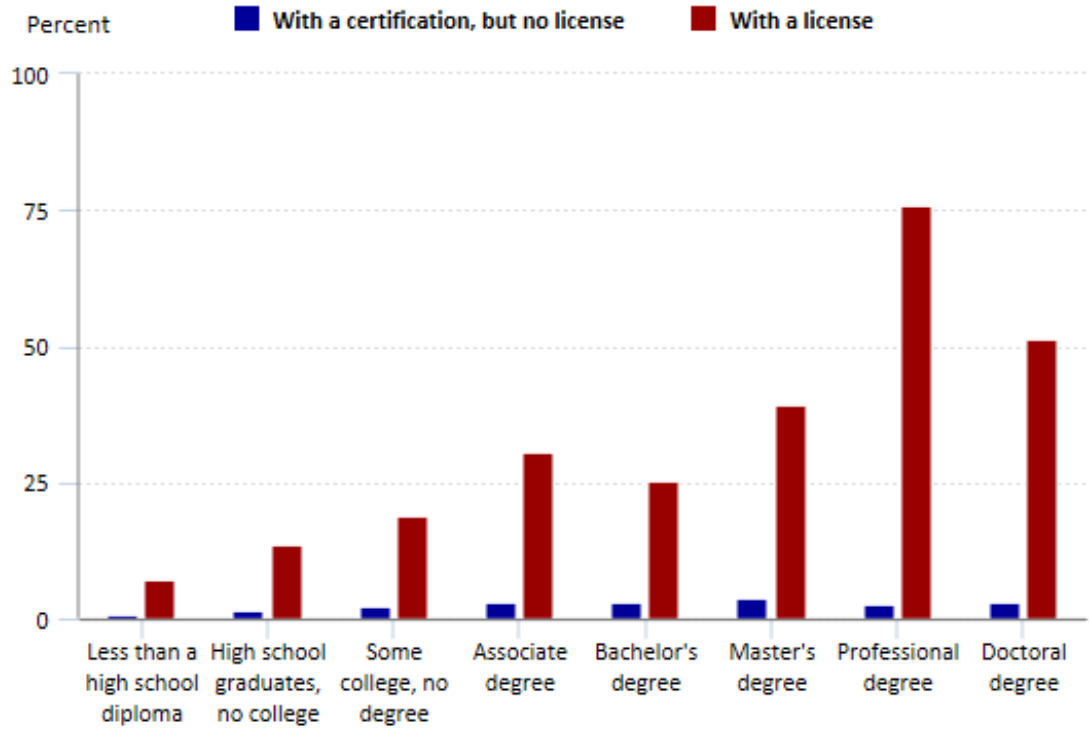
(3) People of Hispanic or Latino ethnicity may be of any race.

Source: U.S. Bureau of Labor Statistics.

Educational attainment

Reaching a specified level of educational attainment is often a requirement for obtaining a professional certification or license. CPS data show that, in 2018, employed people age 25 and over with higher levels of educational attainment were more likely to hold a certification or license. Just under half (48.9 percent) of workers with an advanced degree held a certification or license, compared with only 8.1 percent of those with less than a high school diploma. Workers with an associate's degree (33.4 percent) or a bachelor's degree only (28.5 percent) were more likely to hold one of these credentials than those with some college but no degree (21.1 percent) or those with only a high school diploma (14.9 percent). This pattern was mostly driven by differences in the prevalence of licenses, rather than certifications, between education levels. However, workers with at least some college experience were more likely to have a certification but no license than those with only a high school diploma or less education. (See figure 2.)

Figure 2. Percent of employed persons with a certification or license by educational attainment, 2018 annual averages



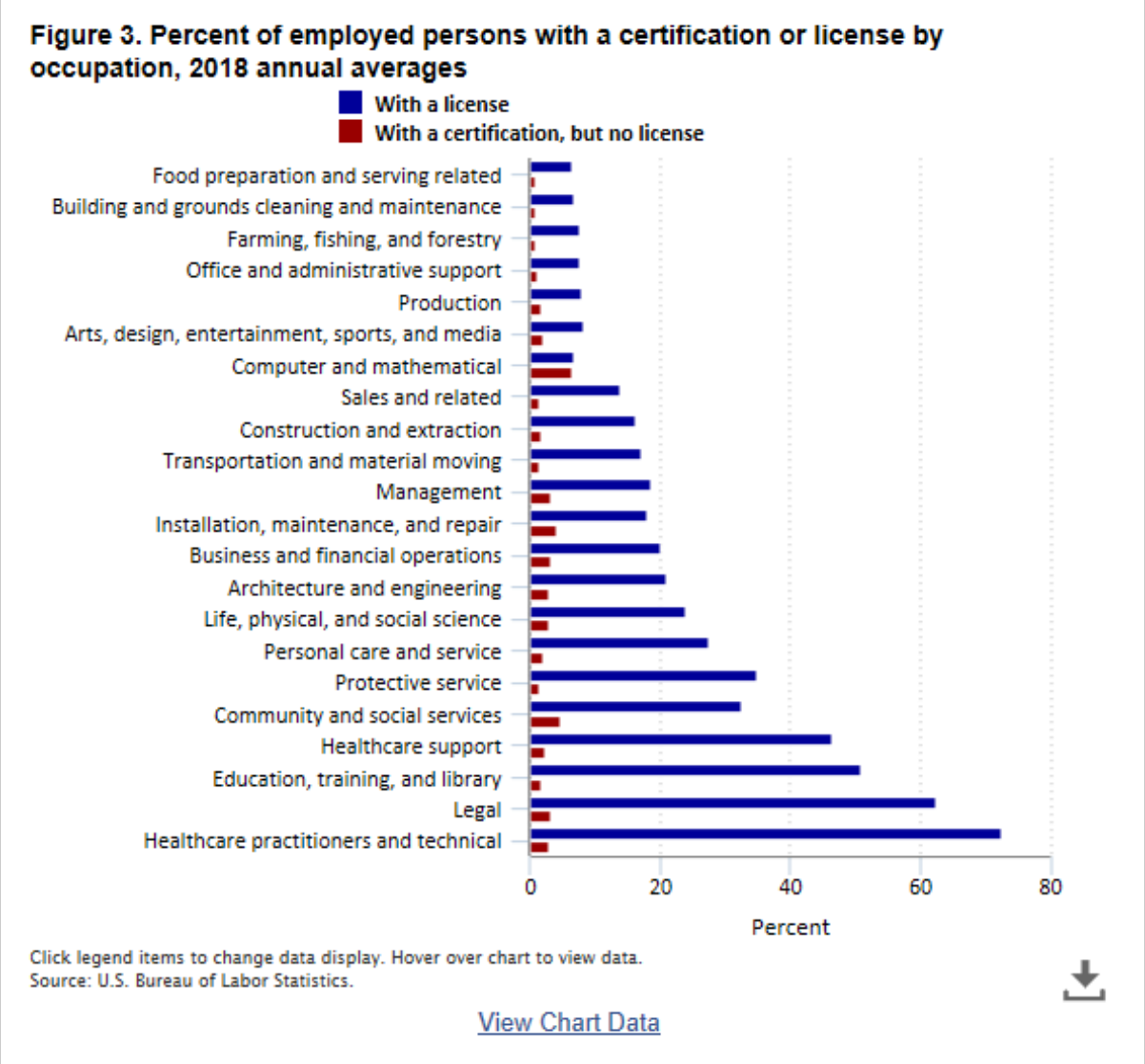
Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics.

View Chart Data

The prevalence of certification and licensing varied among the three advanced degree categories. Workers with a professional degree (78.6 percent) were much more likely to hold a certification or license than those with a master's (42.9 percent) or doctoral (54.6 percent) degree, probably because many workers with a professional degree are employed in legal occupations or in healthcare occupations, where obtaining a license is common.[10] Workers with a master's degree were the most likely (3.7 percent) to hold a professional certification but no license.

Occupation

Among the employed, the prevalence of certifications and licenses varied widely by occupation. In 2018, the share of workers with a currently active certification or license was highest among healthcare practitioners and technical occupations (75.7 percent) and legal occupations (65.9 percent). In addition, about half of workers in education, training, and library occupations (52.7 percent) and in healthcare support occupations (49.0 percent) held one of these credentials. By contrast, there were four occupational groups in which less than 1 in 10 workers held a certification or license: food preparation and serving related occupations (7.4 percent); building and grounds cleaning and maintenance occupations (7.9 percent); office and administrative support occupations (9.1 percent); and farming, fishing, and forestry occupations (8.6 percent). (See figure 3.)



In nearly all occupational groups, licenses appear to be the dominant credential. In the groups in which these credentials were most prevalent, more than 90 percent of credentialed workers held a license. In every occupational group, more workers held a license than a certification. The only exception was computer and mathematical occupations, in which 6.6 percent of workers held a certification but no license, and 6.9 percent held a license. The share of workers with a certification but no license reached 4 percent in only two other occupational groups—installation, maintenance, and repair occupations (4.1 percent) and community and social service occupations (4.6 percent). However, it is important to note that the occupational groups displayed in figure 3 are broad. Some jobs within an occupational group may have a high prevalence of certification and licensing, while others in the same group may not.

In 2018, a large majority of jobs with the highest *share* of licensed workers were in healthcare. However, when occupations were ranked according to the *number* of licensed workers, a wide variety of sectors were represented. In 2018, there were 2.6 million registered nurses with a license (81 percent of all employed registered nurses), 2.5 million licensed elementary and middle school teachers (72 percent) and 1.0 million licensed lawyers (84 percent). The level of licensed physicians and surgeons (926,000) did not quite reach one million, but the share with a

license was about 85 percent. Although licenses were less prevalent among nursing, psychiatric, and home health aides (48 percent) and driver/sales workers and truck drivers (26.7 percent), these occupations accounted for just under 1 million licensed workers. Other detailed occupations with a high number of licensed workers include secondary school teachers (811,000; 76 percent); real estate brokers and sales agents (738,000; 69 percent); and hairdressers, hairstylists, and cosmetologists (566,000, 68 percent). These results show that occupational licenses are prevalent in a diverse range of detailed occupations that are spread across different industry sectors. (See table 5; also, data for all detailed occupations is available in an unpublished table upon request. Please email cpsinfo@bls.gov.)

Table 5. Employment in selected detailed occupations, by licensing status, 2018 annual averages

Employment	Total employment (thousands)	With a license (thousands)	Percent with a license
Registered nurses	3,213	2,610	81.2%
Elementary and middle school teachers	3,421	2,454	71.7
Lawyers	1,199	1,003	83.7
Nursing, psychiatric, and home health aides	2,035	975	47.9
Drivers/sales workers and truck drivers	3,549	947	26.7
Physicians and surgeons	1,094	926	84.6
Managers, all other	4,827	845	17.5
Secondary school teachers	1,062	811	76.4
Real estate brokers and sales agents	1,072	738	68.8
Hairdressers, hairstylists, and cosmetologists	834	566	67.9
Accountants and auditors	1,929	513	26.6
Licensed practical and licensed vocational nurses	658	417	63.4
Counselors	895	384	42.9
Education administrators	955	384	40.2
Insurance sales agents	619	378	61.1
Postsecondary teachers	1,417	378	26.7
Electricians	887	364	41.0
Police and sheriff's patrol officers	728	333	45.8
Health practitioner support technologists and technicians	694	328	47.2
Chief executives	1,573	327	20.8

Note: People with a license may also have a certification. Not all detailed occupations are shown.

Source: U.S. Bureau of Labor Statistics.

In 2018, professional certifications were less prevalent than occupational licenses, and they were most common among workers in computer and mathematical occupations. Examples of occupations with a high prevalence of certifications include computer network architects (24 percent), information security analysts (18 percent), and network and computer systems administrators (15 percent). In 2018, the share of workers with a certification but no license did not exceed 25 percent in any detailed occupation with employment of more than 50,000. Among workers in management occupations, 580,000 held a professional certification in 2018. Other occupations with the largest number of certified workers include software developers, members of the clergy, registered nurses, automotive service technicians and mechanics, and financial managers.

As mentioned previously, there is often substantial variation in the prevalence of these credentials within occupational groups. Consider legal occupations, for example, which include lawyers, judicial law clerks; judges, magistrates and other judicial workers; paralegals and legal assistants;[11] and miscellaneous legal support workers. In 2018, 84 percent of lawyers held a license, compared with only 21 percent of paralegals and legal assistants. This difference underscores the limitations of using intermediate occupation groups, which include many different kinds of specific occupations, to analyze the role of certifications and licenses in the labor market.

After seeing these data, readers may be curious as to why detailed occupations that are "universally licensed" in theory do not have licensing rates of 100 percent. Beyond the caveat that measures of the prevalence of certification and licensing from the CPS are self- or proxy-reported (See endnote 2.), the exact reasons often depend on the job in question and the relevant state and local licensing laws. (See "Occupational licensing regulation in the United States.")

Occupational licensing regulation in the United States

In the United States, occupational licensing laws are generally enacted by state governments and executed by licensing boards, often composed of professionals from within the occupation. These laws can be quite complex. The two main forms of licensing are "title" and "practice" acts.

A "title" act (also called "right to title") is when a government requires that prospective workers meet certain criteria in order to advertise themselves as a member of an occupation. Interior designers in Georgia are regulated this way. To be called a "registered interior designer," one must meet education and work experience requirements and pass an examination. Those who are not officially registered may still provide many of the same services, but using the title of "interior designer" is a misdemeanor.* It is important to note that although the Georgia law provides for the granting of interior designer "certificates," this credential would be considered a license in the Current Population Survey since it is awarded by a governmental licensing agency.

A "practice" act, or "right to practice" regulation, is a stricter form of licensing. Such laws make it illegal for anyone to perform the services associated with an occupation without a license. Many of the most well-known examples are among healthcare practitioners, such as physicians and surgeons, nurses and nurse practitioners, and physical and occupational therapists. Lawyers also typically cannot provide legal services or represent clients in a court of law without being licensed, which involves obtaining a law degree (Juris Doctor or J.D.), passing the bar examination, and having their "character and fitness" confirmed by their state's board of examiners.† However, over the past several decades, some states have expanded "right to practice" licensing laws to cover a wide variety of occupations, including cosmetologists, barbers, funeral directors, florists, tour guides, locksmiths, and professional wrestlers.‡

States may also enact legislation that requires workers to be licensed in order to legally perform specific tasks, while allowing unlicensed workers to perform the remaining work. For example, in different states, there are different limits on the scope of tasks that nurse practitioners are allowed to perform. In Illinois, nurse practitioners are allowed to prescribe medication, while in Missouri, only physicians can do so.§ Anyone can call themselves an accountant, but only a licensed certified public accountant (CPA) can perform a mandatory audit for a publically traded company.** Another variation is when laws require

unlicensed workers to be supervised by a licensed worker when performing specific tasks. For example, in most states, licensed dental hygienists are required to perform their work, which could include teeth cleaning, fluoride treatment, or initial screenings, under the supervision of a licensed dentist. However, in some states, licensed dental hygienists are permitted to perform some of these tasks without a dentist present, and in a few states, they are allowed to own their own dental hygiene practices.††

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* See Morris M. Kleiner, *Guild-ridden labor markets: the curious case of occupational licensing* (Kalamazoo: Upjohn Institute for Employment Research, 2015), pp. 20–22, http://www.upjohn.org/publications/upjohn-institute-press/guild-ridden-labor-markets-curious-case-occupational-licensing, and Georgia Law Title 43, Ch. 4, Article 2, http://sos.ga.gov/plb/acrobat/Laws/23_Architects_And_Interior_Designers_43-4.pdf.

† See "Bar admissions basic overview," American Bar Association, https://www.americanbar.org/groups/legal_education/resources/bar_admissions/basic_overview.html.

‡ See Kleiner, *Guild-ridden labor markets*, pp. 1–3.

§ Ibid., pp. 47–50.

** See "Become a CPA—FAQs," Association of International Certified Public Accountants (AICPA), http://www.aicpa.org/becomeacpa/faqs.html. Also see "All about auditors: what investors need to know, https://www.sec.gov/reportspubs/investor-publications/investorpubsaboutauditorshtm.html.

†† See Morris M. Kleiner and Kyoung Won Park, "Battles among licensed occupations: analyzing government regulations on labor market outcomes for dentists and hygienists," NBER Working Paper No. 16560 (Cambridge, MA: National Bureau of Economic Research, November 2010), http://www.nber.org/papers/w16560.pdf.

As an example, consider the case of physicians and surgeons. After 4 years of medical school, (unlicensed) medical school graduates typically begin their residencies. Medical residents work for pay under the supervision of a licensed physician or surgeon in their chosen specialty for at least 3 years. After the completion of their residency, these physicians and surgeons can then apply for a license, which gives them legal permission to practice medicine independently in their jurisdiction.[12] Although the CPS questionnaire does not address this issue specifically, the vast majority of the 146,000 unlicensed physicians and surgeons in 2018 were almost certainly medical residents.

Educational attainment within occupations

Within occupational groups, the prevalence of professional certifications and licenses varies substantially by educational attainment. Overall, these results are analogous to those discussed previously in the "Education" and "Occupation" sections of this article. The prevalence of certification and licensing increased with educational attainment and varied widely between the intermediate occupation groups. Workers with a professional degree and those employed in legal occupations; healthcare practitioner and technical occupations; or education, training, and library occupations held certifications and licenses at the highest rate. This is to be expected, because lawyers, physicians, surgeons, nurses, and teachers fall into these groups. Workers with the lowest rates had a

high school diploma or less or were employed in sales and office occupations; natural resources, construction, and maintenance occupations; production occupations; and many service occupations. (See table 6.)

Table 6. Percentage of employed people 25 years and over with a certification or license by occupation and educational attainment, 2018 annual averages

Intermediate occupation	Total	Less than a high school diploma	High school graduates, no college[1]	Some college, no degree	Associate's degree	Bachelor's degree	Master's degree	Professional degree	Doctoral degree
Total, 25 years and over	26.1%	8.1%	14.9%	21.1%	33.4%	28.5%	42.9%	78.6%	54.6%
Management, professional, and related occupations	36.9	12.9	17.6	23.7	40.7	32.7	45.9	81.7	55.8
Management, business, and financial operations occupations	22.9	10.7	15.8	19.9	23.9	21.5	30.3	55.2	42.5
Management occupations	22.3	10.8	16.4	19.6	25.5	19.7	30.6	57.4	42.0
Business and financial operations occupations	24.3	—	13.1	20.9	19.7	24.8	29.6	51.0	43.8
Professional and related occupations	47.1	18.7	20.6	28.2	50.8	41.8	54.4	85.6	58.0
Computer and mathematical occupations	14.1	—	11.4	14.0	19.3	13.0	14.5	—	13.3
Architecture and engineering occupations	25.1	—	14.4	18.9	18.9	26.6	30.8	—	18.0
Life, physical and social science occupations	29.4	—	—	18.6	26.9	23.3	34.5	45.1	32.4
Community and social services occupations	38.8	—	20.4	20.4	26.8	27.8	55.3	—	56.2
Legal occupations	67.2	—	20.0	25.2	30.0	32.2	64.2	89.2	83.5
Education, training, and library occupations	55.5	—	20.3	26.6	30.2	60.6	70.4	62.9	32.8
Arts, design, entertainment, sports, and media occupations	11.1	—	8.3	8.4	14.3	10.2	13.9	—	—
Healthcare practitioners and technical occupations	77.2	—	38.7	57.0	78.4	77.9	81.0	93.2	88.5
Service occupations	24.6	8.6	18.7	29.1	44.3	31.0	33.0	48.4	36.4
Healthcare support occupations	51.3	35.0	44.0	51.6	64.4	54.1	56.4	—	—

See footnotes at end of table.

Table 6. Percentage of employed people 25 years and over with a certification or license by occupation and educational attainment, 2018 annual averages

Intermediate occupation	Total	Less than a high school diploma	High school graduates, no college[1]	Some college, no degree	Associate's degree	Bachelor's degree	Master's degree	Professional degree	Doctoral degree
Protective service occupations	39.0	19.7	30.0	38.9	50.5	41.5	38.7	—	—
Food preparation and serving related occupations	9.3	4.5	7.6	10.3	19.2	11.8	14.9	—	—
Building and grounds cleaning and maintenance occupations	8.3	3.2	6.9	13.3	18.4	18.0	13.3	—	—
Personal care and service occupations	33.3	22.2	30.0	34.0	51.7	29.0	33.7	—	—
Sales and office occupations	13.6	4.5	8.2	13.0	16.8	16.8	25.4	49.4	43.8
Sales and related occupations	18.1	4.9	11.8	17.6	21.3	21.8	29.7	53.8	46.0
Office and administrative support occupations	9.8	4.1	5.5	9.8	13.9	11.3	20.4	—	—
Natural resources, construction, and maintenance occupations	19.9	6.4	17.9	25.3	37.4	23.9	29.3	—	—
Farming, fishing, and forestry occupations	10.2	2.9	11.6	17.8	19.3	21.4	—	—	—
Construction and extraction occupations	19.2	6.0	17.8	26.4	40.1	25.8	32.9	—	—
Installation, maintenance and repair occupations	22.9	11.5	19.2	24.7	36.2	22.2	24.6	—	—
Production, transportation, and material moving occupations	15.8	9.7	14.1	18.7	21.4	19.6	24.9	—	—
Production occupations	10.4	3.9	8.3	13.8	18.9	13.7	16.8	—	—
Transportation and material moving occupations	20.5	15.7	19.2	22.8	24.3	24.2	30.6	—	—

Notes:

See footnotes at end of table.

(1) Includes people with a high school diploma or equivalent.

Note: Dashes indicate no data available or data do not meet publication standards. Percentages are not presented when base is less than 50,000. People may have more than one certification or license.

Source: U.S. Bureau of Labor Statistics.

While the prevalence of certifications and licenses in service occupations, at 24.6 percent in 2018, was about in line with the share of all workers who held one of these credentials, there was much variation within this occupational group. Certifications and licenses were most prevalent in healthcare support occupations, in protective service occupations, and in personal care and service occupations. Within these occupations, workers with an associate's degree were most likely to hold one of these credentials. In healthcare support occupations, these workers were mostly nursing, psychiatric, and home health aides and medical assistants. Within protective service occupations, they tended to be employed as police officers, security guards, or firefighters. Personal care and service occupations include hairdressers, hairstylists and cosmetologists, as well as barbers. Professional certifications and licenses were relatively uncommon in food preparation and serving related occupations and in building and grounds cleaning and maintenance occupations.

Finally, within professional and related occupations, those employed in computer and mathematical occupations and in arts, design, entertainment, sports, and media occupations held certifications and licenses at a lower rate, regardless of their level of educational attainment. In 2018, only 13.9 percent of those with a master's degree who were employed in arts occupations held a certification or license; among those with a bachelor's degree, 10.2 percent held one of these credentials. Among all workers in professional and related occupations, 54.4 percent of those with a master's degree and 41.8 percent of those with bachelor's degree held a certification or license in 2018. Despite being relatively more likely to hold a certification than college graduates in other professional and related occupations, less than 15 percent of workers in computer and mathematical occupations with a bachelor's degree or higher held a certification or license.

Requirement for job

In 2018, 84.4 percent of employed people with a certification or license said the credential was required for their job. [13] (See table 7.) Among those with a credential, the percentages of workers with a required certification or license were at least 50 percent for all intermediate occupation groups. However, there was substantial variation across the groups. Generally, credentialed workers in occupational groups with the highest prevalence of certification and licensing were more likely to say their credential was required. For example, among workers with a certification or license, 98.1 percent of those employed in healthcare practitioners and technical occupations, 94.8 percent in legal occupations, and 94.8 percent in education, training, and library occupations said their credential was required. However, among credentialed workers in arts, design, entertainment, sports, and media occupations, as well as in office and administrative support occupations, less than 60 percent said their certification or license was required for their job.[14] These results show that for workers in highly credentialed occupations, a certification or license tended to be a necessary qualification for employment.

Table 7. Employed people with a certification or license, by occupation and requirement for job, 2018 annual averages

Occupation	Number of people (thousands)			Percent distribution		
	Total, with a certification or license	Required for job	Not required for job	Total, with a certification or license	Required for job	Not required for job
Total, 16 years and over	37,556	31,709	5,847	100.0%	84.4%	15.6%
Management, professional, and related occupations	22,290	19,558	2,732	100.0	87.7	12.3
Management, business, and financial operations occupations	5,767	4,273	1,494	100.0	74.1	25.9
Management occupations	3,991	2,921	1,070	100.0	73.2	26.8
Business and financial operations occupations	1,776	1,352	424	100.0	76.1	23.9
Professional and related occupations	16,522	15,284	1,238	100.0	92.5	7.5
Computer and mathematical occupations	690	413	277	100.0	59.9	40.1
Architecture and engineering occupations	780	615	165	100.0	78.8	21.2
Life, physical, and social science occupations	415	350	65	100.0	84.4	15.6
Community and social services occupations	995	872	123	100.0	87.6	12.4
Legal occupations	1,247	1,182	65	100.0	94.8	5.2
Education, training, and library occupations	4,910	4,656	254	100.0	94.8	5.2
Arts, design, entertainment, sports, and media occupations	351	199	152	100.0	56.7	43.3
Healthcare practitioners and technical occupations	7,135	6,998	137	100.0	98.1	1.9
Service occupations	5,791	5,001	790	100.0	86.4	13.6
Healthcare support occupations	1,780	1,671	109	100.0	93.9	6.1
Protective service occupations	1,170	1,081	89	100.0	92.4	7.6
Food preparation and serving related occupations	607	376	231	100.0	62.0	38.0
Building and grounds cleaning and maintenance occupations	462	288	175	100.0	62.2	37.8
Personal care and service occupations	1,772	1,585	187	100.0	89.5	10.5
Sales and office occupations	4,035	2,677	1,358	100.0	66.3	33.7
Sales and related occupations	2,430	1,866	564	100.0	76.8	23.2
Office and administrative support occupations	1,605	810	795	100.0	50.5	49.5

See footnotes at end of table.

Table 7. Employed people with a certification or license, by occupation and requirement for job, 2018 annual averages

Occupation	Number of people (thousands)			Percent distribution		
	Total, with a certification or license	Required for job	Not required for job	Total, with a certification or license	Required for job	Not required for job
Natural resources, construction, and maintenance occupations	2,723	2,276	447	100.0	83.6	16.4
Farming, fishing, and forestry occupations	97	73	24	100.0	75.4	24.6
Construction and extraction occupations	1,510	1,285	224	100.0	85.1	14.9
Installation, maintenance, and repair occupations	1,117	918	199	100.0	82.2	17.8
Production, transportation, and material moving occupations	2,717	2,198	519	100.0	80.9	19.1
Production occupations	859	587	272	100.0	68.3	31.7
Transportation and material moving occupations	1,857	1,610	247	100.0	86.7	13.3

Note: People may have more than one certification or license.

Source: U.S. Bureau of Labor Statistics.

The share of workers who held a required credential also varied by detailed occupation. In general, virtually all workers in occupations with the highest prevalence of licensing said the credential was required for their job. For example, among lawyers; physicians and surgeons; and elementary, middle and secondary school teachers, at least 97 percent of credentialed workers said their license was required for their job in 2018. However, among credentialed workers in occupations in which certifications and licenses were less prevalent, a majority still needed the credential. For example, among paralegals and legal assistants (24 percent of whom held a certification or license in 2018), about 69 percent of those with a certification or license said the credential was required for their job. Of the 47 percent of police and sheriff's patrol officers who held a certification or license, the credential was a requirement about 96 percent of the time. Thus, even in occupations in which certifications and licenses were not as prevalent, these credentials were often a necessary condition for employment. The results may have been driven, in part, by differences in occupational licensing regulation by state.

Within detailed occupations in which the shares of people holding a certification (but no license) were the highest, the credential was less likely to be a requirement. Among computer network architects, information security analysts, computer and information systems managers, and software developers, the share of workers with a certification or license who said their credential was required for their job was closer to 50 percent than 100 percent. For workers in these occupations, the credential may have served primarily as a resume boost. However, among other occupations with a relatively high prevalence of certifications, this was not the case. In 2018, about 84 percent of the clergy and 86 percent of automotive service technicians and mechanics with a certification or license said the credential was required for their job.

Earnings

In 2018, median weekly earnings for full-time wage and salary workers with a currently active professional certification or license were 35 percent higher than earnings for those without one of these credentials. However, the relationship between earnings and certification and licensing status was more complex than this 35-percent difference might suggest. As discussed in previous sections, older and more highly educated workers were more likely to hold a certification or license. In addition, the percent difference in earnings between those with and without a certification or license increased with age and decreased with educational attainment. Both the incidence of certification and licensing and the percent difference in earnings varied substantially across occupations. Finally, workers with a certification or license who said their credential was required for their job received higher earnings, on average, than those with a credential that was not required. The following sections discuss how earnings and certification and licensing status interact with age, sex, race, ethnicity, educational attainment, occupation, and requirement for job. It is important to note that these comparisons of earnings by certification and licensing status and demographic characteristics are on a broad level and do not control for these factors simultaneously.[15]

Earnings by certification and licensing status and demographic characteristics

In 2018, weekly earnings for full-time wage and salary workers with a certification or license, at $1,106, were 35 percent higher than earnings for those without a certification or license ($818).[16] (See table 8.) Earnings for workers with a certification but no license, at $1,196, were slightly higher than earnings for those with a license ($1,093). This difference was likely driven, in part, by the concentration of professional certifications in computer and mathematical occupations, in which workers tend to have relatively high earnings.[17]

Table 8. Median weekly earnings of full-time wage and salary workers, by certification and licensing status, age, sex, race, and ethnicity, 2018 annual averages

Characteristic	Full-time wage and salary workers (thousands)	Median weekly earnings		Percent difference
		With a certification or license[(1)]	With no certification or license	
Total, 16 years and over	115,567	$1,106	$818	35.2%
16 to 24 years	10,428	634	532	19.2
25 to 54 years	80,891	1,110	858	29.4
55 years and over	24,247	1,205	916	31.6
Men, 16 years and over	64,142	1,231	907	35.7
16 to 24 years	5,818	687	560	22.7
25 to 54 years	45,061	1,236	943	31.1
55 years and over	13,263	1,347	1,048	28.5
Women, 16 years and over	51,425	990	726	36.4
16 to 24 years	4,611	607	512	18.6
25 to 54 years	35,830	996	754	32.1
55 years and over	10,984	1,118	770	45.2
White, 16 years and over	88,953	1,133	847	33.8
Men	50,570	1,252	935	33.9
Women	38,384	1,017	743	36.9

See footnotes at end of table.

Table 8. Median weekly earnings of full-time wage and salary workers, by certification and licensing status, age, sex, race, and ethnicity, 2018 annual averages

Characteristic	Full-time wage and salary workers (thousands)	Median weekly earnings		Percent difference
		With a certification or license[1]	With no certification or license	
Black or African American, 16 years and over	15,041	838	657	27.5
Men	7,282	950	699	35.9
Women	7,760	780	619	26.0
Asian, 16 years and over	7,643	1,342	1,021	31.4
Men	4,169	1,545	1,169	32.2
Women	3,474	1,152	875	31.7
Hispanic or Latino ethnicity, 16 years and over[2]	20,297	899	648	38.7
Men	12,226	990	691	43.3
Women	8,071	808	592	36.5

Notes:

See footnotes at end of table.

(1) People may have more than one certification or license.

(2) People of Hispanic or Latino ethnicity may be of any race.

Source: U.S. Bureau of Labor Statistics.

In 2018, weekly earnings for those with a certification or license were substantially higher than earnings for those without one of these credentials for all major age groups. However, the percent difference in earnings between those with and without a credential increased with age. Weekly earnings for credentialed full-time wage and salary workers age 55 years and over, at $1,205, were 32 percent higher than earnings for those without a credential ($916). Earnings for credentialed workers ages 25 to 54, at $1,110, were 29 percent higher than those of their noncredentialed counterparts ($858), while workers ages 16 to 24 with a certification or license, at $634, had 19 percent higher earnings than workers in the same age group with no certification or license ($532).

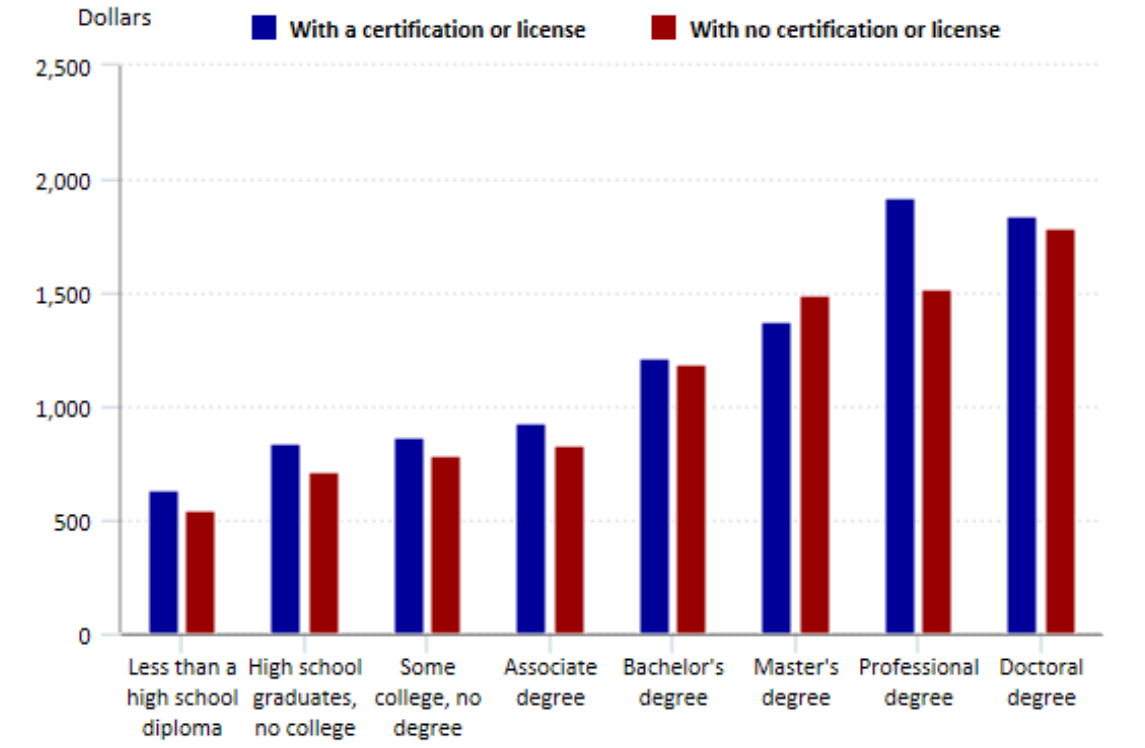
In 2018, for every age group, earnings for men were higher than earnings for women, independent of certification or licensing status. Both male and female full-time wage and salary workers ages 16 to 24 with a certification or license had about 20 percent higher earnings than those without a credential. Among the employed ages 25 to 54, both men and women had about one-third higher earnings than their counterparts without a certification or license. However, earnings for women workers age 55 and over with a certification or license were 45 percent higher than earnings for those without one of these credentials. For men age 55 and over, earnings for credentialed workers were 29 percent higher than earnings for those without a certification or license.

The difference in earnings between those with and without a certification or license also varied by race and ethnicity. The largest percent difference in earnings was among Hispanic full-time wage and salary workers. Earnings for Hispanic workers with a certification or license, at $899 in 2018, were 39 percent higher than the earnings for those without one of these credentials ($648). Among Whites (34 percent), Blacks (28 percent), and Asians (31 percent), the percent differences in earnings were similar.[18]

Earnings by certification and licensing status and educational attainment

In 2018, percent differences in earnings between those 25 years and over with and without a certification or license generally declined with educational attainment. For all workers with less than a bachelor's degree, the median earnings for those with a certification or license were considerably higher than the median earnings for those without one of these credentials. Workers with less than a high school diploma who had a certification or license, at $636, had 16 percent higher earnings than similarly educated workers without such credentials ($546). Those with a high school diploma but no college had 17 percent higher earnings when they had a certification or license ($837 compared with $715). Credentialed workers with some college or an associate's degree ($902) had 12 percent higher earnings than their counterparts without a certification or license ($803). (See figure 4.)

Figure 4. Median weekly earnings of full-time wage and salary workers 25 years and over by certification and licensing status and educational attainment, 2018 annual averages



Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics.

View Chart Data

For workers with a bachelor's degree or higher, the percent difference in earnings between those with and without a certification or license varied substantially, especially between the three advanced-degree categories. The percent difference in earnings was highest among workers with a professional degree. In 2018, median weekly earnings for those with a professional degree and a certification or license, at $1,919, were 27 percent higher than for similarly educated workers without one of these credentials ($1,515). Earnings for workers with a master's degree and a certification or license ($1,376) were 8 percent lower than for workers with a master's degree but no additional credential ($1,492). In part, this was because credentialed workers with a master's degree were concentrated in education, training, and library occupations (such as teachers), whereas similarly educated workers without a certification or license were more likely to work in higher paying management occupations. Among workers with a doctoral degree, those with a certification or license ($1,840) received 3-percent higher earnings than those without one of these credentials ($1,790). Finally, for workers with a bachelor's degree, the difference in earnings was only 2 percent ($1,212 compared with $1,190).[19]

However, these results are subject to at least two important caveats. First, while the percent difference in earnings between those with and without a certification or license was highest for lower levels of educational attainment, very few workers with less formal education actually held one of these credentials. In 2018, of the 35.7 million employed people age 25 and over who held a certification or license, only 790,000 (about 2 percent) had less than

a high school diploma. (Workers with less than a high school diploma make up about 7 percent of total employment.) By comparison, 57 percent of employed people with a certification or license had a bachelor's degree or higher, compared with 41 percent of all employed people.

Second, because of the strong correlation between educational attainment and certification and licensing status, it is difficult to conclusively determine whether differences in earnings are driven by the traditional (education) or alternative (certification or license) form of credential. A further confounding factor, as mentioned previously, is that certain levels of educational attainment are often criteria for obtaining a certification or license. For example, in most states, an aspiring lawyer cannot become a licensed attorney without completing law school. As a result, it is difficult to determine how much of the difference in earnings between a licensed attorney and a paralegal or legal assistant can be attributed to the license.

Earnings by certification and licensing status and occupation

Differences in earnings between those with and without a certification or license varied substantially by occupation in 2018. Table 9 presents median weekly earnings by certification and licensing status and occupational group, as well as the percent difference in earnings between credentialed and noncredentialed workers. Legal occupations were a clear outlier: those with a certification or license ($1,876) had 68-percent higher earnings than those without a credential ($1,115). On the other end of the distribution, for workers in computer and mathematical occupations and in arts, design, entertainment, sports, and media occupations, the differences in earnings were not statistically significant. Among other occupation groups with a high prevalence of certification and licensing, workers with a credential in healthcare practitioners and technical occupations ($1,218) had 39-percent higher earnings than those with no certification or license ($876). The percent difference in earnings between those with and without a credential was 17 percent in education, training, and library occupations ($1,054 compared with $902), and 5 percent for healthcare support occupations ($573 compared with $548).

Table 9. Median weekly earnings of full-time wage and salary workers, by certification and licensing status, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)	Median weekly earnings		Percent difference	Is the difference statistically significant?
		With a certification or license	Without a certification or license		
Total, 16 years and over	115,567	$1,106	$818	35.2%	Yes
Management, professional, and related occupations	48,808	1,268	1,232	2.9	Yes
Management, business, and financial operations occupations	19,863	1,541	1,305	18.1	Yes
Management occupations	13,477	1,576	1,382	14.0	Yes
Business and financial operations occupations	6,385	1,445	1,159	24.7	Yes
Professional and related occupations	28,945	1,204	1,158	4.0	Yes

See footnotes at end of table.

Table 9. Median weekly earnings of full-time wage and salary workers, by certification and licensing status, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)	Median weekly earnings		Percent difference	Is the difference statistically significant?
		With a certification or license	Without a certification or license		
Computer and mathematical occupations	4,755	1,592	1,531	4.0	No
Architecture and engineering occupations	2,994	1,648	1,445	14.0	Yes
Life, physical, and social science occupations	1,308	1,443	1,195	20.8	Yes
Community and social services occupations	2,223	1,015	849	19.6	Yes
Legal occupations	1,466	1,876	1,115	68.3	Yes
Education, training, and library occupations	7,166	1,054	902	16.9	Yes
Arts, design, entertainment, sports, and media occupations	1,880	1,182	1,073	10.2	No
Healthcare practitioners and technical occupations	7,154	1,218	876	39.0	Yes
Service occupations	16,288	645	543	18.8	Yes
Healthcare support occupations	2,595	573	548	4.6	Yes
Protective service occupations	2,836	997	773	29.0	Yes
Food preparation and serving related occupations	4,394	561	497	12.9	Yes
Building and grounds cleaning and maintenance occupations	3,695	701	540	29.8	Yes
Personal care and service occupations	2,768	586	530	10.6	Yes
Sales and office occupations	23,714	889	727	22.3	Yes
Sales and related occupations	10,077	1,027	765	34.2	Yes
Office and administrative support occupations	13,637	798	710	12.4	Yes
Natural resources, construction, and maintenance occupations	11,546	1,039	788	31.9	Yes
Farming, fishing, and forestry occupations	850	726	573	26.7	Yes
Construction and extraction occupations	6,414	1,084	772	40.4	Yes
Installation, maintenance, and repair occupations	4,282	1,028	902	14.0	Yes

See footnotes at end of table.

Table 9. Median weekly earnings of full-time wage and salary workers, by certification and licensing status, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)	Median weekly earnings		Percent difference	Is the difference statistically significant?
		With a certification or license	Without a certification or license		
Production, transportation, and material moving occupations	15,210	898	682	31.7	Yes
Production occupations	7,668	898	707	27.0	Yes
Transportation and material moving occupations	7,542	897	649	38.2	Yes

Note: A person may have more than one certification or license. Statistical significance is at the 90-percent confidence level.

Source: U.S. Bureau of Labor Statistics.

However, as mentioned previously in the “Occupation” section, each intermediate occupation group includes a variety of specific jobs, with varying responsibilities and requirements for certification and licensing. Differences in earnings between those with and without a certification or license at the intermediate occupational level may be the result of these differences in job roles and responsibilities, instead of the credential. Looking at differences in earnings at the detailed occupational level partially addresses this shortcoming.

The difference in earnings for those with and without a certification or license varied substantially within occupational groups. Table 10 presents earnings data for those with and without one of these credentials for select detailed occupations. Not all occupations are presented, because many smaller occupations did not have a sufficient number of observations for reliable earnings estimates to be calculated.

Table 10. Certification and licensing status of employed people, by selected detailed occupation, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)		Median weekly earnings		Percent difference in earnings levels	Is difference statistically significant?
	With a certification or license	Without a certification or license	With a certification or license	Without a certification or license		
Total, 16 years and over	28,384	87,183	$1,106	$818	35.2%	Yes
Management, professional and related occupations	17,400	31,408	1,268	1,232	2.9	Yes
Management, business, and financial operations occupations	4,242	15,620	1,541	1,305	18.1	Yes
Management occupations	2,842	10,635	1,576	1,382	14.0	Yes
Chief executives	237	861	2,316	2,285	1.4	No

See footnotes at end of table.

Table 10. Certification and licensing status of employed people, by selected detailed occupation, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)		Median weekly earnings		Percent difference in earnings levels	Is difference statistically significant?
	With a certification or license	Without a certification or license	With a certification or license	Without a certification or license		
General and operations managers	140	799	1,474	1,321	11.6	No
Marketing and sales managers	91	873	1,574	1,565	0.6	No
Computer and information systems managers	105	497	1,986	1,855	7.1	No
Financial managers	259	899	1,720	1,381	24.5	Yes
Human resources managers	64	230	1,414	1,374	2.9	No
Construction managers	136	488	1,543	1,392	10.8	Yes
Education administrators	367	490	1,577	1,156	36.4	Yes
Food service managers	111	716	886	794	11.6	No
Medical and health services managers	291	277	1,631	1,222	33.5	Yes
Property, real estate, and community association managers	104	285	1,115	980	13.8	Yes
Social and community service managers	84	279	1,335	1,084	23.2	Yes
Managers, all other	635	2,650	1,616	1,477	9.4	Yes
Business and financial operations occupations	1,400	4,985	1,445	1,159	24.7	Yes
Claims adjusters, appraisers, examiners, and investigators	115	219	1,187	944	25.7	Yes
Compliance officers	92	186	1,402	1,250	12.2	No
Human resources workers	79	541	1,383	1,139	21.4	No
Management analysts	109	526	1,553	1,530	1.5	No
Accountants and auditors	435	1,180	1,565	1,114	40.5	Yes
Personal financial advisors	189	226	1,733	1,340	29.3	Yes
Credit counselors and loan officers	108	225	1,430	1,078	32.7	Yes
Professional and related occupations	13,158	15,788	1,204	1,158	4.0	Yes
Computer and mathematical occupations	656	4,099	1,592	1,531	4.0	No
Computer systems analysts	71	509	1,849	1,468	26.0	Yes

See footnotes at end of table.

Table 10. Certification and licensing status of employed people, by selected detailed occupation, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)		Median weekly earnings		Percent difference in earnings levels	Is difference statistically significant?
	With a certification or license	Without a certification or license	With a certification or license	Without a certification or license		
Software developers, applications and systems software	167	1,444	1,897	1,853	2.4	No
Computer support specialists	68	449	1,158	1,059	9.3	No
Computer occupations, all other	99	579	1,295	1,209	7.1	No
Architecture and engineering occupations	684	2,309	1,648	1,445	14.0	Yes
Architects, except naval	81	89	1,673	1,285	30.2	No
Civil engineers	168	242	1,767	1,332	32.7	Yes
Mechanical engineers	52	261	1,762	1,517	16.2	Yes
Engineers, all other	117	411	1,623	1,569	3.4	No
Engineering technicians, except drafters	70	328	1,175	1,116	5.3	No
Life, physical, and social science occupations	312	996	1,443	1,195	20.8	Yes
Community and social service occupations	803	1,420	1,015	849	19.6	Yes
Counselors	313	392	1,096	831	31.9	Yes
Social workers	280	473	1,016	835	21.7	Yes
Clergy	112	225	1,017	966	5.3	No
Legal occupations	896	570	1,876	1,115	68.3	Yes
Lawyers	718	135	2,083	1,510	37.9	Yes
Paralegals and legal assistants	101	311	878	965	–9.0	No
Education, training, and library occupations	4,278	2,888	1,054	902	16.9	Yes
Postsecondary teachers	315	679	1,443	1,438	0.3	No
Preschool and kindergarten teachers	273	296	785	556	41.2	Yes
Elementary and middle school teachers	2,289	741	1,031	940	9.7	Yes
Secondary school teachers	759	189	1,153	1,035	11.4	No
Special education teachers	265	58	1,058	894	18.3	No
Other teachers and instructors	122	265	1,068	920	16.1	No
Teacher assistants	163	452	557	555	0.4	No
Arts, design, entertainment, sports, and media occupations	196	1,684	1,182	1,073	10.2	No

See footnotes at end of table.

Table 10. Certification and licensing status of employed people, by selected detailed occupation, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)		Median weekly earnings		Percent difference in earnings levels	Is difference statistically significant?
	With a certification or license	Without a certification or license	With a certification or license	Without a certification or license		
Designers	74	609	1,271	1,045	21.6	Yes
Healthcare practitioners and technical occupations	5,332	1,821	1,218	876	39.0	Yes
Physicians and surgeons	701	126	2,261	1,419	59.3	Yes
Therapists, all other	102	53	1,114	930	19.8	Yes
Registered nurses	2,147	438	1,186	1,041	13.9	Yes
Clinical laboratory technologists and technicians	143	147	1,043	760	37.2	Yes
Diagnostic related technologists and technicians	186	83	1,181	924	27.8	No
Health practitioner support technologists and technicians	265	277	733	637	15.1	Yes
Licensed practical and licensed vocational nurses	322	169	804	635	26.6	Yes
Medical records and health information technicians	50	90	832	721	15.4	No
Miscellaneous health technologists and technicians	55	63	818	910	–10.1	No
Service occupations	3,833	12,456	645	543	18.8	Yes
Healthcare support occupations	1,264	1,332	573	548	4.6	Yes
Nursing, psychiatric, and home health aides	728	692	519	512	1.4	No
Dental assistants	97	99	609	602	1.2	No
Medical assistants	237	262	640	591	8.3	Yes
Protective service occupations	1,102	1,734	997	773	29.0	Yes
Firefighters	192	102	1,145	1,024	11.8	No
Bailiffs, correctional officers, and jailers	96	297	738	743	–0.7	No
Detectives and criminal investigators	61	96	1,286	1,431	–10.1	No
Police and sheriff's patrol officers	348	380	1,140	1,012	12.6	Yes
Security guards and gaming surveillance officers	237	544	634	582	8.9	No

See footnotes at end of table.

Table 10. Certification and licensing status of employed people, by selected detailed occupation, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)		Median weekly earnings		Percent difference in earnings levels	Is difference statistically significant?
	With a certification or license	Without a certification or license	With a certification or license	Without a certification or license		
Food preparation and serving related occupations	365	4,029	561	497	12.9	Yes
Chefs and head cooks	59	307	617	614	0.5	No
First-line supervisors of food preparation and serving workers	51	346	684	576	18.8	Yes
Cooks	89	1,236	511	485	5.4	No
Waiters and waitresses	72	860	561	491	14.3	Yes
Building and grounds cleaning and maintenance occupations	333	3,362	701	540	29.8	Yes
Janitors and building cleaners	125	1,547	674	564	19.5	Yes
Grounds maintenance workers	82	753	691	557	24.1	Yes
Personal care and service occupations	770	1,998	586	530	10.6	Yes
Hairdressers, hairstylists, and cosmetologists	202	107	549	539	1.9	No
Miscellaneous personal appearance workers	124	134	518	532	–2.6	No
Childcare workers	66	372	584	488	19.7	Yes
Personal care aides	150	636	509	497	2.4	No
Recreation and fitness workers	51	157	699	585	19.5	Yes
Sales and office occupations	2,750	20,964	889	727	22.3	Yes
Sales and related occupations	1,461	8,615	1,027	765	34.2	Yes
First-line supervisors of retail sales workers	194	2,226	1,003	779	28.8	Yes
First-line supervisors of non-retail sales workers	143	750	1,244	1,137	9.4	No
Cashiers	62	1,328	450	465	–3.2	No
Retail salespersons	163	1,697	881	646	36.4	Yes
Insurance sales agents	290	176	869	849	2.4	No
Securities, commodities, and financial services sales agents	51	146	1,895	1,170	62.0	Yes
Sales representatives, wholesale and manufacturing	95	1,017	1,319	1,152	14.5	No

See footnotes at end of table.

Table 10. Certification and licensing status of employed people, by selected detailed occupation, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)		Median weekly earnings		Percent difference in earnings levels	Is difference statistically significant?
	With a certification or license	Without a certification or license	With a certification or license	Without a certification or license		
Real estate brokers and sales agents	348	180	1,137	834	36.3	Yes
Office and administrative support occupations	1,288	12,349	798	710	12.4	Yes
First-line supervisors of office and administrative support workers	192	1,087	1,034	874	18.3	Yes
Billing and posting clerks	57	360	774	702	10.3	No
Bookkeeping, accounting, and auditing clerks	58	621	820	738	11.1	No
Customer service representatives	131	1,773	855	676	26.5	Yes
Receptionists and information clerks	91	844	595	606	–1.8	No
Dispatchers	53	217	852	759	12.3	Yes
Secretaries and administrative assistants	170	1,807	764	759	0.7	No
Office clerks, general	77	849	715	694	3.0	No
Office and administrative support workers, all other	60	396	1,021	771	32.4	Yes
Natural resources, construction, and maintenance occupations	2,171	9,375	1,039	788	31.9	Yes
Farming, fishing, and forestry occupations	73	777	726	573	26.7	Yes
Construction and extraction occupations	1,147	5,267	1,084	772	40.4	Yes
First-line supervisors of construction trades and extraction workers	106	435	1,289	1,010	27.6	Yes
Carpenters	79	894	887	745	19.1	Yes
Construction laborers	120	1,350	932	705	32.2	Yes
Operating engineers and other construction equipment operators	79	248	1,106	886	24.8	Yes
Electricians	330	451	1,136	841	35.1	Yes
Pipelayers, plumbers, pipefitters, and steamfitters	190	341	1,181	791	49.3	Yes
Installation, maintenance, and repair occupations	951	3,331	1,028	902	14.0	Yes
First-line supervisors of mechanics, installers, and repairers	52	219	1,380	1,048	31.7	Yes

See footnotes at end of table.

Table 10. Certification and licensing status of employed people, by selected detailed occupation, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)		Median weekly earnings		Percent difference in earnings levels	Is difference statistically significant?
	With a certification or license	Without a certification or license	With a certification or license	Without a certification or license		
Aircraft mechanics and service technicians	61	94	1,211	1,082	11.9	No
Automotive service technicians and mechanics	183	526	912	776	17.5	Yes
Bus and truck mechanics and diesel engine specialists	90	268	1,012	906	11.7	Yes
Heating, air conditioning, and refrigeration mechanics and installers	146	238	964	846	13.9	Yes
Industrial and refractory machinery mechanics	69	355	1,127	949	18.8	No
Maintenance and repair workers, general	77	379	938	839	11.8	Yes
Production, transportation, and material moving occupations	2,230	12,980	898	682	31.7	Yes
Production occupations	764	6,904	898	707	27.0	Yes
First-line supervisors of production and operating workers	82	711	1,123	963	16.6	No
Welding, soldering, and brazing workers	143	419	897	823	9.0	Yes
Inspectors, testers, sorters, samplers, and weighers	93	663	1,009	752	34.2	Yes
Production workers, all other	66	926	732	676	8.3	No
Transportation and material moving occupations	1,467	6,076	897	649	38.2	Yes
Bus drivers	114	247	619	683	–9.4	No
Driver/sales workers and truck drivers	829	1,963	953	769	23.9	Yes
Taxi drivers and chauffeurs	54	346	636	607	4.8	No
Industrial truck and tractor operators	70	527	736	633	16.3	Yes
Laborers and freight, stock, and material movers, hand	90	1,505	706	599	17.9	Yes

See footnotes at end of table.

Note: A person may have more than one certification or license. Estimates of full-time wage and salary workers for detailed occupations may not sum to totals because data are not presented for all occupations. Data are not presented for occupations for which the base is less than 50,000. Statistical significance is at the 90-percent confidence level.

Source: U.S. Bureau of Labor Statistics.

Within legal occupations in 2018, weekly earnings for lawyers with a certification or license, at $2,083, were 38 percent higher than earnings for lawyers without a credential ($1,510). On the other hand, paralegals with a credential had median weekly earnings of $878, which is not statistically different from the earnings of their counterparts without a certification or license ($965). These percent differences in earnings for individual jobs were much smaller than the percent difference in earnings for legal occupations in the aggregate. Thus, the overall difference in earnings for legal occupations was partially driven by occupational and educational differences. Within legal occupations, more than 8 in 10 workers with a certification or license were lawyers—who tend to be more highly paid—while about half of noncredentialed workers were paralegals and legal assistants. In addition, 87 percent of credentialed workers in legal occupations held an advanced degree, compared with 31 percent of noncredentialed workers.

Within education, training, and library occupations, the percent difference in earnings between those with and without a certification or license was 41 percent for preschool and kindergarten teachers and 10 percent for elementary and middle school teachers. Earnings differences were modestly positive for secondary school teachers (11 percent), special education teachers (18 percent), and other teachers and instructors (16 percent), which includes substitutes. Among postsecondary teachers and teacher assistants, by contrast, differences in median earnings for those with and without one of these credentials were not statistically significant.

However, it is important to note that among teachers, the difference in earnings may partly reflect whether the teacher is employed in a public or private school and whether the teacher is a member of a union or covered by a union contract. Research by Allegretto and Tojerow (2014) found that, when controlling for educational attainment and demographics, public school teachers were paid about 16 to 19 percent more, on average, than private school teachers during the period from 1996 to 2012.[20] They also found that unionized teachers were paid about 5 to 8 percent more, on average, than nonunion teachers, regardless of whether they were employed in a public or private school. Because public school teachers are more likely to hold a certification or license than private school teachers, it is hard to determine to what degree each of these factors is influencing the difference in earnings between teachers with and without one of these credentials.[21]

Among healthcare practitioners and technical occupations, some detailed occupations showed a substantial difference in earnings between full-time wage and salary workers with and without a credential. Physicians and surgeons with a certification or license had median weekly earnings of $2,261, which is 59 percent higher than the median for those without one of these credentials ($1,419).[22] Pharmacists and nurse practitioners, virtually all of whom held a certification or license, had median earnings of $2,071 and $1,894, respectively. The median weekly earnings for licensed practical and licensed vocational nurses who held a currently active certification or license, at $804, were 27 percent higher than the median for those without one of these credentials, at $635. Registered nurses with a certification or license ($1,186) only received 14-percent higher earnings than their counterparts without a certification or license ($1,041).[23] Nurses without a credential were likely younger and held interim or limited permits that allowed them to work under supervision while waiting for the results of their licensing test.[24]

Among diagnostic-related technologists and technicians, workers with a certification or license did not have statistically higher median earnings than those without a credential.

Earnings by occupation and requirement for job

The difference in earnings between those with and without a certification or license also depended on whether a person's credential was required for their job. In 2018, median weekly earnings for workers with a required credential, at $1,123, were 37 percent higher than they were for those without a certification or license ($818). However, median earnings for those who held a certification or license but said the credential was not required for their job, at $1,006, were only 23 percent higher. (See table 11.)

Table 11. Median weekly earnings of full-time wage and salary workers, by occupation and requirement for job, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)	Median weekly earnings			
		With a certification or license			Without a certification or license
		Total	Required for job	Not required for job	
Total, 16 years and over	115,567	$1,106	$1,123	$1,006	$818
Management, professional, and related occupations	48,808	1,268	1,257	1,390	1,232
Management, business, and financial operations occupations	19,863	1,541	1,550	1,515	1,305
Management occupations	13,477	1,576	1,595	1,540	1,382
Business and financial operations occupations	6,385	1,445	1,445	1,445	1,159
Professional and related occupations	28,945	1,204	1,203	1,228	1,158
Computer and mathematical occupations	4,755	1,592	1,524	1,637	1,531
Architecture and engineering occupations	2,994	1,648	1,666	1,579	1,445
Life, physical, and social science occupations	1,308	1,443	1,465	1,344	1,195
Community and social services occupations	2,223	1,015	1,056	883	849
Legal occupations	1,466	1,876	1,899	1,063	1,115
Education, training, and library occupations	7,166	1,054	1,059	963	902
Arts, design, entertainment, sports, and media occupations	1,880	1,182	1,202	1,156	1,073
Healthcare practitioners and technical occupations	7,154	1,218	1,224	929	876
Service occupations	16,288	645	654	600	543
Healthcare support occupations	2,595	573	571	601	548
Protective service occupations	2,836	997	999	863	773
Food preparation and serving related occupations	4,394	561	580	530	497

See footnotes at end of table.

Table 11. Median weekly earnings of full-time wage and salary workers, by occupation and requirement for job, 2018 annual averages

Occupation	Full-time wage and salary workers (thousands)	Median weekly earnings			
		With a certification or license			Without a certification or license
		Total	Required for job	Not required for job	
Building and grounds cleaning and maintenance occupations	3,695	701	794	551	540
Personal care and service occupations	2,768	586	586	583	530
Sales and office occupations	23,714	889	967	784	727
Sales and related occupations	10,077	1,027	1,070	923	765
Office and administrative support occupations	13,637	798	852	728	710
Natural resources, construction, and maintenance occupations	11,546	1,039	1,061	955	788
Farming, fishing, and forestry occupations	850	726	743	—	573
Construction and extraction occupations	6,414	1,084	1,114	932	772
Installation, maintenance, and repair occupations	4,282	1,028	1,033	1,017	902
Production, transportation, and material moving occupations	15,210	898	936	705	682
Production occupations	7,668	898	930	794	707
Transportation and material moving occupations	7,542	897	939	617	649

Note: People may have more than one certification or license. Dash indicates data not available or data did not meet publication standards.

See footnotes at end of table.

Source: U.S. Bureau of Labor Statistics.

In general, the gap in earnings between workers with a required credential and a nonrequired credential was largest in occupations with a high prevalence of certification and licensing. For example, in legal occupations, workers with a required certification or license—overwhelmingly lawyers—had median earnings of $1,899 in 2018. Workers in legal occupations with a credential that was not required, however, had median earnings of $1,063, little different from the median for those without any credential ($1,115). Workers without a required certification or license were disproportionately paralegals and legal assistants.

A similar pattern was present among healthcare practitioners and technical occupations. Workers with a required certification or license had median earnings of $1,224 in 2018, significantly higher than the median for those who held a credential that was not required ($929). Earnings for the latter group were not statistically different from earnings for workers employed in healthcare practitioners and technical occupations without a certification or license ($876). Very few workers in this occupational group held a credential that was not required, but those who did were typically technicians or technologists. On the other hand, practitioners, such as physicians, surgeons, dentists, and nurses, held credentials that were required for their job. These occupations have very different roles and responsibilities, which may be a factor in the earnings differences.

In many occupations, holding an optional certification or license was not associated with a boost in earnings. However, in computer and mathematical occupations—an occupational group with a lower prevalence of certification and licensing—median weekly earnings for workers with an optional credential ($1,637) were actually slightly higher than those for workers with a required one ($1,524).

Conclusion

This analysis of CPS data provides insight into the effect that professional certifications and licenses have in the U.S. labor market. Over 43 million people, or 16.9 percent of the population, held one of these credentials in 2018. People with a certification or license had lower unemployment rates and higher labor force participation rates. Among the employed, the prevalence of these credentials increased with age and educational attainment. Employed women were more likely to hold a certification or license than employed men. Among the race and ethnicity groups, Whites held these credentials at the highest rate and Hispanics held them at the lowest rate.

Licenses were the more common credential, held by 21.8 percent of the employed. Licensed workers were most frequently employed in legal occupations, or in jobs related to healthcare or education. Professional certifications, by contrast, were held by only 2.3 percent of workers, most of whom were employed in computer and mathematical occupations and in management occupations. In addition, a large majority of workers with a certification or license said the credential was required for their job.

Overall, earnings for workers with a credential were about one-third higher than earnings for those without one of these credentials. This percent difference in earnings increased with age, but decreased with educational attainment. In addition, workers who said their credential was required for their job had significantly higher earnings than those with an optional credential. These differences in earnings also varied widely by occupation, highlighting how the role of these credentials was often linked to a workers' specific job, as one might expect.

Although these new data from the CPS provide a useful snapshot of the prevalence of certification and licensing among U.S. workers, they are fundamentally limited in certain ways. Since the CPS is a household survey, it may not be able to accurately capture the nuances of occupational licensing regulation, such as whether a worker is covered by a “right to title” or “right to practice” law. Perhaps most importantly, because of the relatively small sample size in most states, the data are only available at the national level. Since many occupational licensing laws are passed at the state level, the applicability of CPS data to certain research questions about licensing may be limited. Still, as a tool to study changes in occupational licensing and professional certification over time and at various stages of the business cycle, these new data from the CPS should prove useful to researchers and other data users.

SUGGESTED CITATION

Evan Cunningham, "Professional certifications and occupational licenses: evidence from the Current Population Survey," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, June 2019, https://doi.org/10.21916/mlr.2019.15.

NOTES

[1] See “Occupational licensing: a framework for policymakers,” U.S. Department of Treasury Office of Economic Policy, Council of Economic Advisors (CEA), and U.S. Department of Labor, July 2015, https://obamawhitehouse.archives.gov/sites/default/files/docs/licensing_report_final_nonembargo.pdf.

[2] As defined by GEMEnA, a certification or license must be for engaging in professional, as opposed to personal, activities. For this reason, a commercial driver’s license (CDL) would count as a license, but a regular driver’s license would not. A license or certification must also be issued to a person—licenses issued to businesses, such as liquor or vending licenses, are excluded. Educational certificates awarded by an educational institution, such as a college or university, are also excluded. These credentials are not time limited, and while such training may help in the performance of a specific job, it is not necessarily required or considered proof of qualification. Finally, certificates of attendance at short-term training are not counted.

[3] For a detailed discussion of the development of CPS questions on certification and licensing, see Mary Dorinda Allard, “Adding questions on certification and licensing to the Current Population Survey,” *Monthly Labor Review*, November 2016, https://doi.org/10.21916/mlr.2016.52.

[4] BLS was unable to add questions to determine whether persons with a license also held a certification, or the number of credentials a person held. This was because adding questions to the monthly CPS is costly, and BLS did not have funding to increase the length of the survey permanently. For each question added about certifications and licenses, another question had to be removed. See Allard, “Adding questions on certification and licensing.”

[5] For multiple jobholders, the question refers to the respondent’s main job. This question is also asked of the unemployed and refers to the job at which they last worked. An important caveat to this third question is that it does not exhaustively measure the relevance of a credential to a particular job. While the question can provide information on whether a certification or license is required for a particular job, it cannot determine when a credential is not required but still helpful. Another important caveat is that the measure of the prevalence of certification and licensing is self- or proxy-reported in the CPS. People identified as holding a currently active certification or license and working in a specific occupation may not necessarily work in a state where a license is required to work in that occupation. Thus, certification and licensing data from the CPS should not be construed as complete measures of the extent of occupational licensing regulation in the United States. Even with the incorporation of results from the third question, readers should exercise caution when drawing conclusions. Respondents may not interpret “required for your job” as “legally required” or may not have sufficient knowledge of relevant licensing laws in their state.

[6] The CPS does not determine whether a person with a license has a certification, or the number of credentials of each type they hold. However, the Adult Training and Education Survey, conducted by the National Center for Education Statistics, found that a large majority of licensed workers—about 86 percent in 2016—did not hold a professional certification. See Stephanie Cronen, Megan

McQuiggan, and Sarah Grady, "Adult training and education: results from the National Household Education Surveys Program of 2016: first look," National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, February 2018, https://nces.ed.gov/pubs2017/2017103rev.pdf.

[7] While estimates from the CPS are not directly comparable to those from other sources for a variety of reasons, including the mode of survey collection, context, questions used, and the population of interest, the results were generally in line with previous studies. Conducting a national labor force survey in the summer of 2008, Morris Kleiner and Alan Krueger found that 28 percent of the labor force 18 years and over were licensed by the federal, state, or local government. In addition, data from the U.S. Census Bureau's Survey of Income and Program Participation (SIPP) showed that in 2012, 28 percent of employed persons 18 years and over held a professional certification or license. Estimates of certification and licensing status by sex, age, race, ethnicity, educational attainment, and occupation, as well as earnings differences, were also generally consistent between the data sources. However, an important shortcoming to the new data is that because of sample size concerns, BLS does not have plans to publish CPS data on certifications and licenses at the state level. This may make analyzing the data more challenging, as many occupational licensing regulations are enacted at the state level. See Morris M. Kleiner and Alan B. Krueger, "Analyzing the extent and influence of occupational licensing on the labor market," *Journal of Labor Economics*, Vol. 31, No. 2, The Princeton Data Improvement Initiative (Part 2, April 2013), pp. S173–S202; and Stephanie Ewert and Robert Kominski, "Measuring alternative education credentials: 2012," Household Economic Studies, U.S. Census Bureau, January 2014, https://www.census.gov/prod/2014pubs/p70-138.pdf. For an analysis of certification and licensing at the state level, see Morris M. Kleiner and Evgeny Vorotnikov, "Analyzing occupational licensing among the States," *Journal of Regulatory Economics*, Vol. 52, 2017, pp. 132–158, https://www.hhh.umn.edu/sites/hhh.umn.edu/files/analyzing_occupational_licensing_among_the_states.pdf.

[8] See BLS *Occupational Outlook Handbook*, "How to become a physician or surgeon," 2015, https://www.bls.gov/ooh/healthcare/physicians-and-surgeons.htm.

[9] See Ryan Nunn, "How occupational licensing matters for wages and careers," The Hamilton Project, 2018, The Brookings Institution, https://www.brookings.edu/wp-content/uploads/2018/03/es_3152018_how_occupational_licensing_matters_for_wages_and_careers.pdf.

[10] Included in master's degrees are M.A., M.S., M.Eng., M.Ed., M.S.W., and M.B.A. degrees. Included in professional school degrees are M.D., D.D.S., D.V.M., L.L.B., and J.D. degrees. Included in doctoral degrees are Ph.D. and Ed.D. degrees.

[11] The BLS *Occupational Outlook Handbook* (2015) describes paralegals and legal assistants as individuals who perform, "a variety of tasks to support lawyers, including maintaining and organizing files, conducting legal research, and drafting documents." See https://www.bls.gov/ooh/legal/paralegals-and-legal-assistants.htm.

[12] While exact license requirements vary by state, some examples are New York (http://www.op.nysed.gov/prof/med/medlic.htm) and California (http://www.mbc.ca.gov/Applicants/Physicians_and_Surgeons/).

[13] When analyzing the "requirement for job" data from the CPS, users should remember that it is the respondent who determines whether their credential is required. A "Yes" response could indicate that a certification or license is either required by law to work in specific occupations or that an employer requires it. In fact, a "Yes" response could reflect nothing more than a perception on the part of the respondent that a credential is required, even if it has no basis in reality. As a result, answers to the "requirement for job" question cannot distinguish whether a worker is covered under a "right to title" or "right to practice" regulation. (See box, "Occupational licensing regulation in the United States.") Additionally, respondents may have incomplete knowledge of the relevant credentialing laws in their state. Thus, CPS data on certifications and licenses, including the "requirement for job" question, should not be used as a comprehensive measure of occupational licensing regulations in the United States.

[14] In 2018, 75 percent of credentialed workers in farming, fishing, and forestry occupations said their certification or license was required for their job. However, because the cell sizes were smaller for this occupation group, the difference between farming, fishing, and forestry occupations and the occupation groups listed above was not statistically significant.

[15] "Earnings" refers to median usual weekly earnings of full-time wage and salary workers. The CPS data represent earnings before taxes and other deductions, and include any overtime pay, commissions, or tips typically received. In the case of multiple jobholders, only earnings received at their main job are included. Earnings reported on a basis other than weekly are converted to a weekly equivalent. The term "usual" is defined by the respondent, but if asked, interviewers are instructed to define the term as more than half the weeks worked during the past 4 or 5 months. Wage and salary workers are defined as those who receive wages, salaries, commissions, tips, payment in kind, or piece rates. This excludes all self-employed persons, regardless of whether their business is incorporated or unincorporated. Full-time workers are those who usually work 35 hours or more per week at their main job. BLS computes medians by ranking each reported or calculated weekly earnings value and placing them into a $50-wide interval or bin. Each of these bins is centered on a multiple of $50 ($25 or less, $25.01 to $75, $75.01 to $125, etc.). The procedure determines the bin in which the median falls and calculates the median through a linear interpolation. For more information, see the technical note in the news release, *Usual Weekly Earnings of Wage and Salary Workers*, at https://www.bls.gov/news.release/pdf/wkyeng.pdf.

[16] While no formal regression analysis is presented in this article, Kleiner and Kruger and Gittleman, Klee, and Kleiner, using other data sources, find a licensing wage premium even when they control for age, sex, race and ethnicity, educational attainment, and occupation. See Kleiner and Kruger, "Analyzing the extent and influence of occupational licensing on the labor market"; and Maury Gittleman, Mark A. Klee, and Morris M. Kleiner, "Analyzing the labor market outcomes of occupational licensing," *Industrial Relations*, Vol. 57, No. 1, 2018, pp. 57–100.

[17] In 2018, the median earnings for full-time wage and salary workers employed in computer and mathematical occupations was $1,539, compared with $886 for all full-time wage and salary workers.

[18] In a 2017 working paper, Peter Q. Blair and Bobby W. Chung, using data from the 2008 panel of the SIPP, found that occupational licensing reduces the racial wage gap between White and Black men and the gender wage gap between women and White men. Replicating their results using CPS data, however, is beyond the scope of this article. See Peter Q. Blair and Bobby W. Chung, "Occupational licensing reduces racial and gender wage gaps: evidence from the survey of income and program participation," Human capital and economic opportunity global working group, working paper series, Working paper No. 2017-050 (University of Chicago, June 2017), http://humcap.uchicago.edu/RePEc/hka/wpaper/Blair_Chung_2017_licensing_gender_racial_wage_gaps.pdf. Also see, Nunn, "How occupational licensing matters for wages and careers."

[19] These patterns were also present in 2012 data from the Survey of Income and Program Participation. See, "The relationship between education and work credentials," *Data Point* (Washington, DC: National Center for Education Statistics June 2015), https://nces.ed.gov/pubs2015/2015556.pdf.

[20] Sylia A. Allegretto and Ilan Tojerow, "Teacher staffing and pay differences: public and private schools," *Monthly Labor Review*, September 2014, pp. 12 and 15, https://www.bls.gov/opub/mlr/2014/article/teacher-staffing-and-pay-differences.htm. See table 2, "Regression-adjusted relative wages, public and private school teachers, 1996–2012."

[21] In the United States, public preschools, elementary schools, middle schools, and high schools almost always require teachers to have a government-issued license in order to teach. While the exact licensing criteria and process are determined at the state level, common requirements include having at least a bachelor's degree, completing a state-approved teacher preparation program (TPP), and passing a basic skills test. TPPs are typically either components of a bachelor's or master's degree in education or take the form of residency programs that combine professional development and supervised teaching experience in the classroom. Some states also issue preliminary credentials to entry-level teachers, who must then gain classroom experience and participate in formal mentorship programs in order to upgrade their license. After the upgrade, licenses are renewed automatically, as long as the teacher completes a required amount of professional development. Those who wish to teach in high school typically must pass a test in their desired subject (mathematics, science, history, etc.), and aspiring special education teachers must undergo additional training. Private school teachers and substitutes are generally not subject to these employment restrictions. For examples, see documentation on how to obtain a teaching license in California (https://www.ctc.ca.gov/credentials/teach) and New York (http://www.highered.nysed.gov/tcert/certificate/certprocess.html#one).

[22] As discussed in the "Occupation" section, physicians and surgeons who did not have a certification or license were likely completing their residencies. These unlicensed physicians and surgeons would be younger, on average, than their licensed colleagues, which could partly explain the large difference in earnings.

[23] Registered nurses (R.N.s) and licensed practical nurses (L.P.N.s) and licensed vocational nurses L.V.N.s usually perform similar duties. However, entry-level R.N.s typically need an associate's degree in nursing (A.D.N.) or a Bachelor of Science degree in nursing (B.S.N.), while entry-level L.P.N.s and L.V.N.s only need to complete a 1-year state-approved educational program. R.N.s often supervise L.P.N.s and L.V.N.s, and receive higher pay on average. See BLS *Occupational Outlook Handbook*, "Registered nurses," 2017, https://www.bls.gov/ooh/healthcare/registered-nurses.htm, and "Licensed practical and licensed vocational nurses," 2017, https://www.bls.gov/ooh/healthcare/licensed-practical-and-licensed-vocational-nurses.htm.

[24] In order to obtain a license, aspiring registered nurses (R.N.s) must complete and pass the National Council Licensure Examination for Registered Nurses (NCLEX-RN) and licensed practical and licensed vocational nurses (L.P.N.s and L.V.N.s) must complete and pass the NCLEX-RN or the NCLEX-PN, respectively. Testing is overseen by the National Council of State Boards of Nursing. For examples of states that allow interim or limited nursing permits, see New York (http://www.op.nysed.gov/prof/nurse/nursing.htm) and California (https://www.rn.ca.gov/careers/steps.shtml).

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