

# Doctorate Recipients from U.S. Universities 2018

National Center for Science and Engineering Statistics  
Directorate for Social, Behavioral and Economic Sciences

NATIONAL SCIENCE FOUNDATION  
DECEMBER 2019



## ABOUT THIS REPORT

The Survey of Earned Doctorates (SED), the data source for this report, is an annual census of individuals who receive research doctoral degrees from accredited U.S. academic institutions. The survey is sponsored by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) and by three other federal agencies: the National Institutes of Health, the Department of Education, and the National Endowment for the Humanities. These data are reported in several NCSES publications. The most comprehensive and widely cited publication is this report, *Doctorate Recipients from U.S. Universities*.

This report calls attention to major trends in doctoral education, organized into themes highlighting important questions about doctorate recipients. Online, the reader is invited to explore trends in greater depth through detailed data tables and interactive graphics (<https://nces.nsf.gov/sed/>). Technical notes and related resources are provided to aid in interpreting the data, and report content is available for downloading. An interactive data tool with data from the SED and other NCSES surveys is also available at <https://ncesdata.nsf.gov/ids/sed>.

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## WHY IS THIS IMPORTANT?

The American system of doctoral education is widely considered to be among the world's best, as evidenced by the large number of international students—many of them among the top students in their countries—who choose to pursue doctoral degrees at U.S. universities. Doctorate recipients begin careers in large and small organizations, teach in universities, and start new businesses. Doctoral education develops human resources that are critical to a nation's progress—scientists, engineers, researchers, and scholars who create and share new knowledge and new ways of thinking that lead, directly and indirectly, to innovative products, services, and works of art. In doing so, they contribute to a nation's economic growth, cultural development, and rising standard of living.

Annual counts of doctorate recipients from U.S. universities are measures of the incremental investment in human resources devoted to science, engineering, research, and scholarship, and they can serve as leading indicators of the capacity for knowledge creation and innovation in various domains. Changes in this population over time—including increased representation of women, minorities,

and foreign nationals; emergence of new fields of study; time it takes to complete doctoral study; expansion of the postdoctoral pool; academic employment opportunities after graduation; and education-related debt—reflect political, economic, social, technological, and demographic trends. Understanding these connections is necessary to make informed improvements in this country's doctoral education system.

The continued preeminence of U.S. doctoral education is not assured. Other nations, recognizing the contributions doctorate recipients make to economies and cultures, are investing heavily in doctoral education. The world's brightest students, including U.S. citizens, may go elsewhere for the doctoral degree, and they may begin careers elsewhere as well. Monitoring the number of degrees awarded in science and engineering fields is an important part of the mission of the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF). The Survey of Earned Doctorates (SED) and this report contribute toward that goal.

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# U.S. DOCTORATE AWARDS

Each new cohort of doctorate recipients augments the supply of prospective scientists, engineers, researchers, and scholars. Data on the composition of these cohorts reveal changes in the presence of different demographic groups.

## Overall trends

The number of research doctorate degrees awarded by U.S. institutions in 2018 increased to 55,195, according to the Survey of Earned Doctorates (SED) (figure 1). Since the survey's inception, the number of doctorates awarded shows a strong upward trend—average annual growth of 3.2%—punctuated by periods of slow growth and even decline.

Since the SED began collecting data in 1957, the number of research doctorates awarded in science and engineering (S&E) fields has exceeded the number of non-S&E doctorates, and the gap has widened. From 1979 to 2018, the number of S&E doctorate recipients has more than doubled, while the number of non-S&E doctorates awarded in 2018 was just below the 1979 count. As a result, the proportion of S&E doctorates climbed from 58% in 1979 to 77% in 2018.

## Citizenship

### Overview

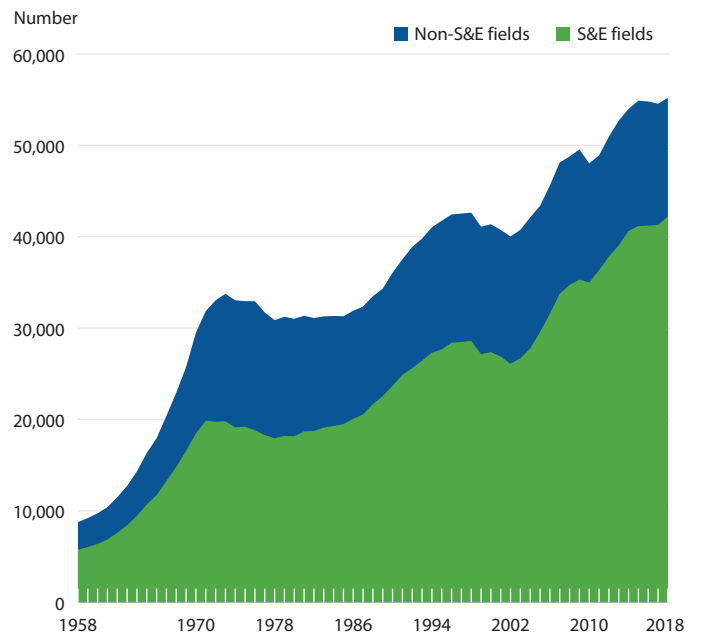
In 2018, the number of doctorates in S&E fields awarded to temporary visa holders was 15,223, an increase of 1,099 from 2017 (figure 2). Overall growth was up 103% since 1999 and 21% since 2009. The proportion of S&E doctorates awarded to temporary visa holders peaked at 41% in 2007, but overall it has held steady at around 36% since 2011.

In comparison, the number of S&E doctorates awarded to U.S. citizens and permanent residents increased by only 27 doctorates from 2017 to 2018 and experienced a slower growth overall (38% since 1999 and 21% since 2009), though from a larger base.

### Countries or economies of foreign citizenship

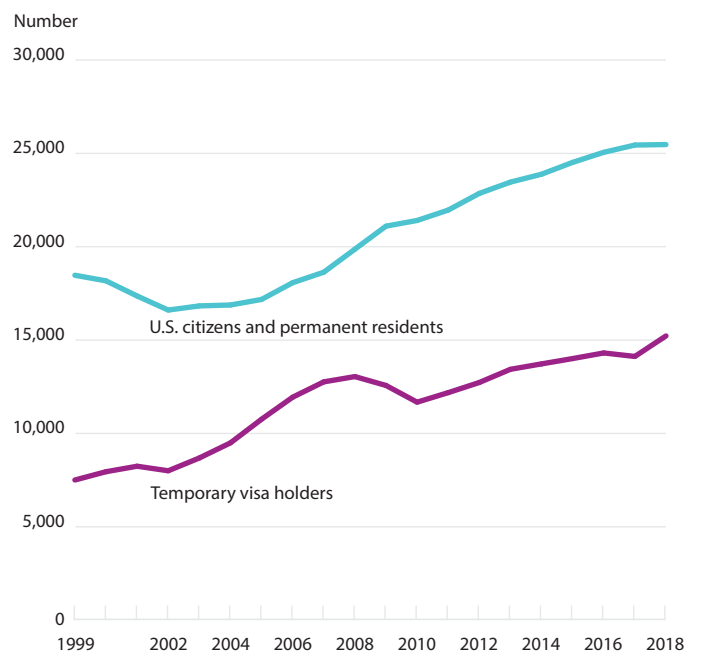
The number of doctorate recipients on temporary visas is highly concentrated in a few places of origin. In the past decade, 10 countries accounted for 71% of the 155,401 doctorates awarded to temporary visa holders, and the top three countries—China, India, and South Korea—accounted for over half (54%) (figure 3).

Figure 1. Doctorates awarded by U.S. colleges and universities: 1958–2018



SOURCE: NCSES, Survey of Earned Doctorates, 2018.

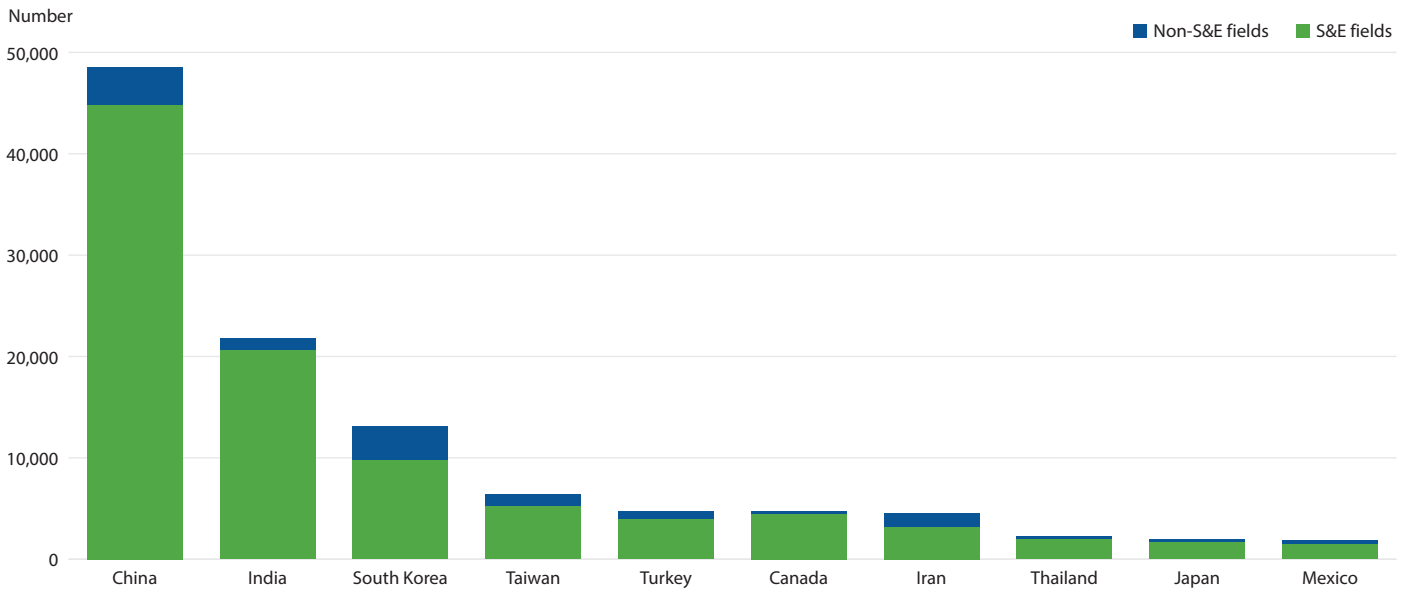
Figure 2. Doctorates awarded in S&E fields, by citizenship: 1999–2018



NOTE: Excludes respondents who did not report citizenship.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 3. Top 10 countries or economies of foreign citizenship for doctorate recipients with temporary visas: 2009–18**



NOTES: China includes Hong Kong. Ranking based on total number of doctorate recipients.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Sex

### Citizenship

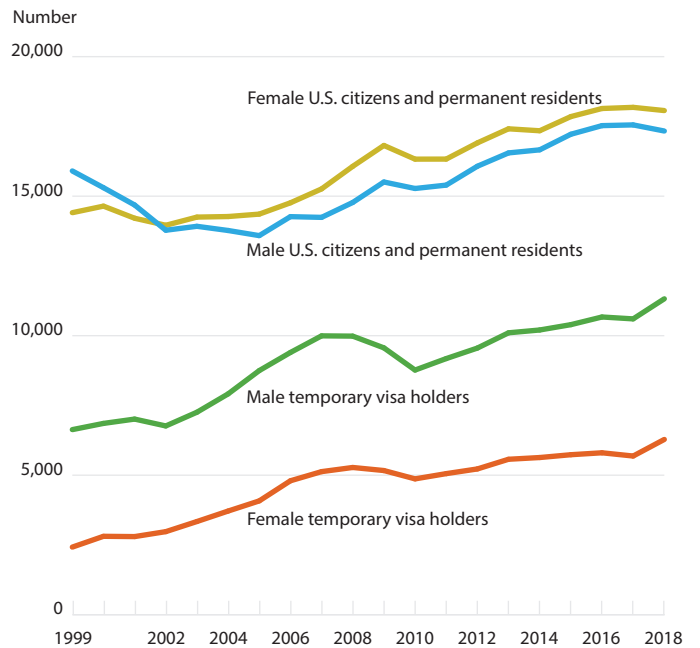
Since 2002, women have earned a slim majority of all doctorates awarded to U.S. citizens and permanent residents and more than 31% of doctorates awarded to temporary visa holders (figure 4). From 1999 to 2008, the share of female doctorate recipients grew from 48% to 52% among U.S. citizens and permanent residents and from 27% to 35% among temporary visa holders. Since 2008, the shares of female doctorates in both citizenship categories have changed little. Overall, 46% of all doctorates in 2018 were awarded to women.

### Field of study

Most of the growth in the number of doctorates earned by both men and women has been in S&E fields (figure 5). From 1999 to 2018, the number of female doctorate recipients in S&E fields increased by 81%, though starting from a small base, compared with 42% growth in the number of male S&E doctorates. Women’s share of S&E doctorates awarded increased from 37% in 1999 to 42% in 2009, and it has remained stable since then.

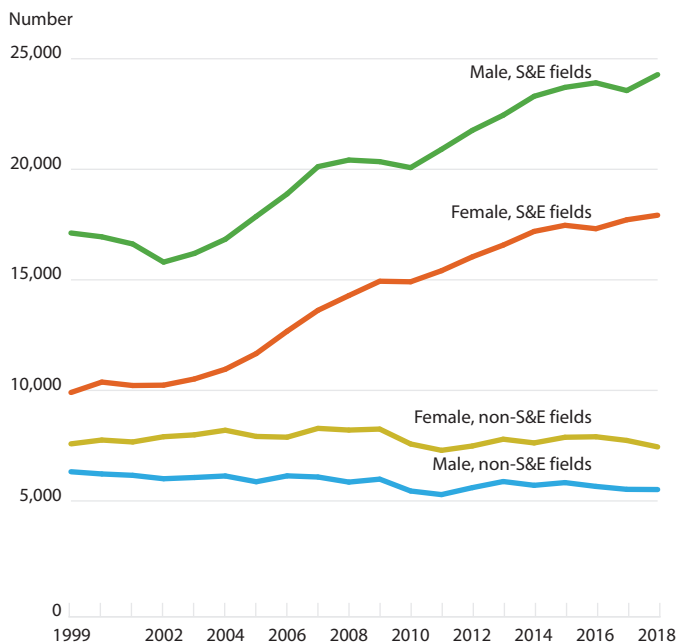
In non-S&E fields, 57% of doctorates were awarded to women in 2018, a share that has changed little since the early 2000s. The number of female non-S&E doctorate recipients declined by 2% between 1999 and 2018, whereas the number of male doctorates in those fields declined by 13%.

**Figure 4. Sex and citizenship of doctorate recipients: 1999–2018**



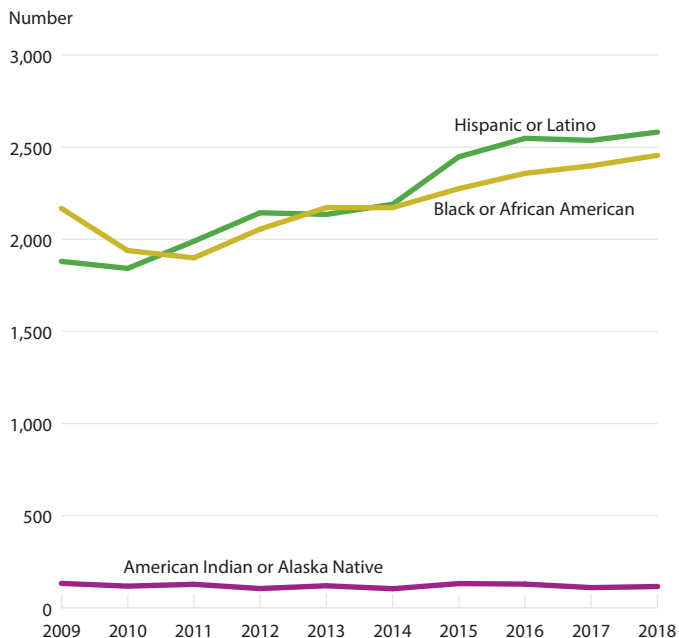
NOTE: Excludes respondents who did not report sex or citizenship.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 5. Sex and field of study of doctorate recipients: 1999–2018**



NOTE: Excludes respondents who did not report sex.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 6. Doctorates earned by underrepresented minority U.S. citizens and permanent residents: 2009–18**



NOTES: Excludes U.S. citizen and permanent resident respondents who did not report race or ethnicity. Hispanic may be any race; race categories exclude Hispanic origin.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Race and ethnicity

Participation in doctoral education by underrepresented minorities who are U.S. citizens or permanent residents has been increasing, though starting from a small number. From 2009 to 2018, the number of Hispanic or Latino doctorate recipients increased from 1,880 to 2,582. As a result, the proportion of doctorates earned by this group grew from

6% to 7% during this period. Also during this period, the number of black or African American doctorate recipients increased from 2,168 to 2,456, and the proportion of doctorates they earned remained stable at 7%. The number of American Indian or Alaska Native doctorate recipients declined from 132 in 2009 to 115 in 2018, remaining under 1% (figure 6).



# FIELDS OF STUDY

As researchers expand their understanding of the world, new fields of study emerge and existing fields change. Observing which fields of study are attracting growing proportions of students can provide early insight into where future research breakthroughs may occur.

## Field of study trends

### S&E

Doctorates in science and engineering (S&E) fields are a growing share of all doctorates awarded. Every broad S&E field except for psychology and social sciences increased both its number and share of all doctorates over the past 2 decades. Psychology and social sciences increased in the number of doctorate recipients, but its share of all doctorates declined. Engineering had the largest growth among S&E fields in the past 20 years, from 13% of all doctorates in 1999 to 18% in 2018 (figure 7).

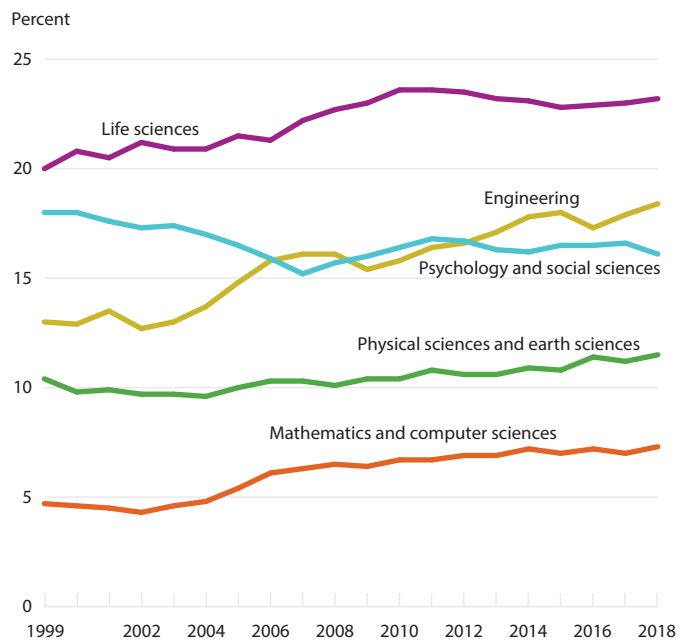
### Non-S&E

Within non-S&E fields, the number of doctorates awarded in education has declined over the past 2 decades, leading to a large, steady drop in the relative share of doctorates in that field. The number of humanities and arts doctorates increased during this period, but the field's relative share of doctorates fell almost 3 percentage points to 9% of all doctoral degrees awarded in 2018. The number of doctorates in other non-S&E fields—such as business management and communication—increased, but their share remained fairly level (figure 8).

## Temporary visa holders

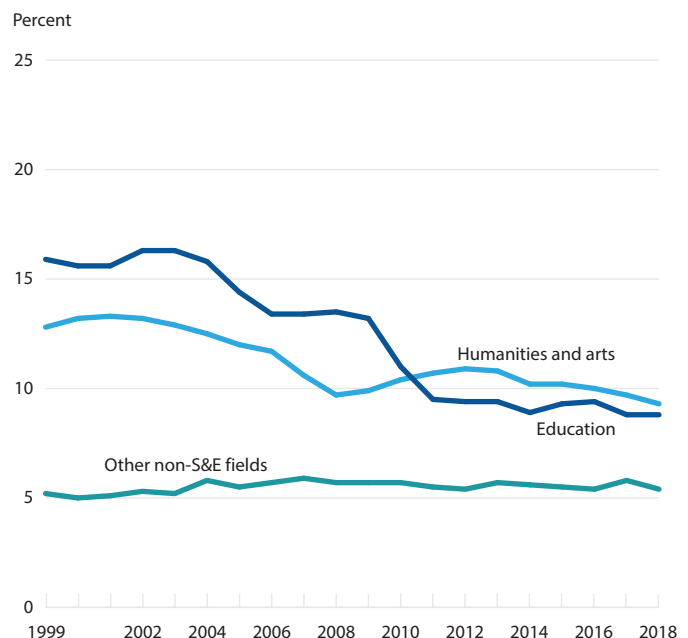
Though the number of doctorate recipients who are U.S. citizens and permanent residents has increased in every broad field of study except education over the past 2 decades, the share of doctorates awarded to temporary visa holders increased in every broad field of study during this period. In 2018, temporary visa holders earned the majority of doctorates awarded in engineering (57%) and in mathematics and computer sciences (55%). Since 1999, the proportion of temporary visa holders increased the most in those two broad fields and in the category of other non-S&E fields (figure 9).

Figure 7. Doctorates awarded in S&E broad fields of study: 1999–2018



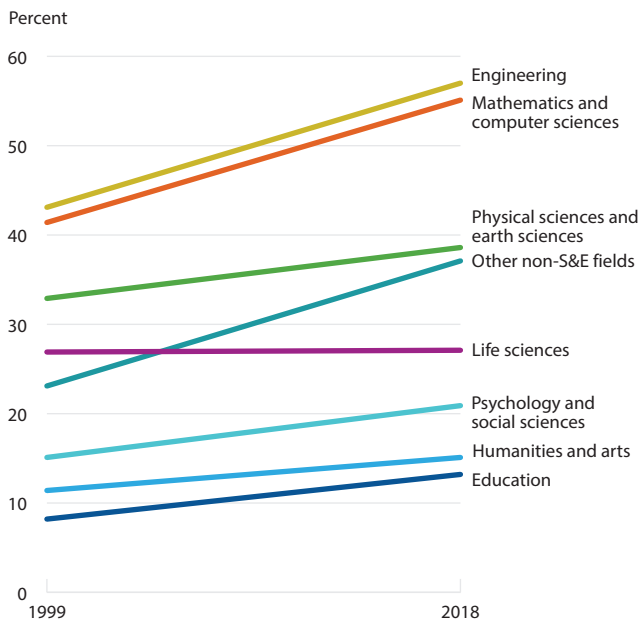
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

Figure 8. Doctorates awarded in non-S&E broad fields of study: 1999–2018



SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 9. Doctorate recipients on temporary visas: 1999 and 2018**



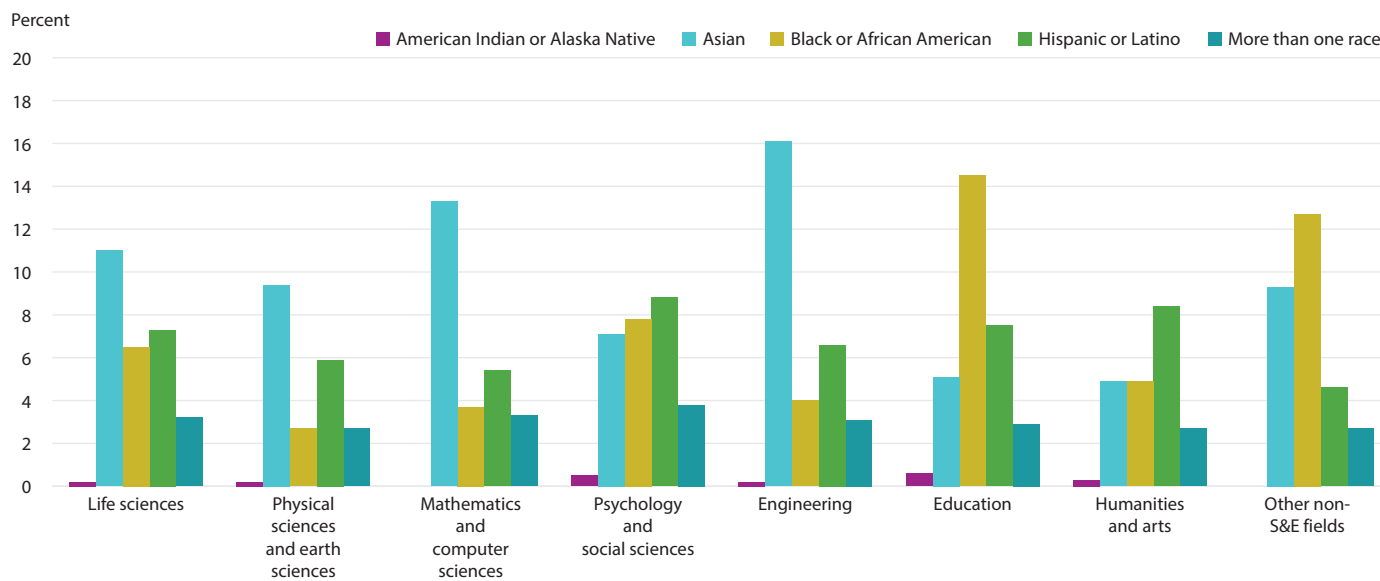
NOTE: Percentages are based on the number of doctorate recipients who reported citizenship.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Minority U.S. citizens and permanent residents

In 2018, 70% of the 35,404 doctorate recipients who were U.S. citizens and permanent residents were white; 9% were Asian, 7% were Hispanic or Latino, another 7% were black or African American, and 3% identified as more than one race. The remaining doctorate recipients were either American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or did not report their race or ethnicity.

Among minority U.S. citizens and permanent residents, doctorate recipients of different racial or ethnic backgrounds are more heavily represented in some fields of study than in others. In 2018, Asians earned a larger proportion of doctorates than other racial and ethnic minority groups in life sciences, physical sciences and earth sciences, mathematics and computer sciences, and engineering. Blacks or African Americans were the largest U.S. minority population in education and in other non-S&E fields. Hispanics or Latinos earned a larger proportion of doctorates in psychology and social sciences and in humanities and arts than did any other minority group (figure 10).

**Figure 10. Doctorates awarded to minority U.S. citizens and permanent residents, by race, ethnicity, and broad field of study: 2018**



NOTES: Excludes U.S. citizen and permanent resident respondents who did not report race or ethnicity. Hispanic may be any race; race categories exclude Hispanic origin. Missing data have been suppressed for reasons of confidentiality.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

# Women

## Overview

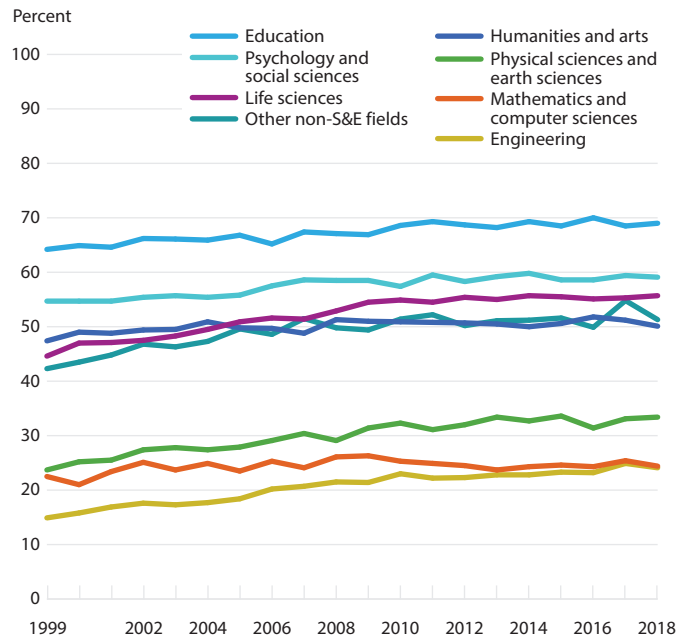
Women’s share of doctorates awarded has grown over the past 2 decades in all broad fields of study. In 2018, women earned half or more of the doctorates awarded in life sciences, psychology and social sciences, education, humanities and arts, and other non-S&E fields.

Though women earned nearly a quarter of the 2018 doctorates awarded in engineering and in mathematics and computer sciences and a third of the doctorates in physical sciences and earth sciences, their relative shares of doctorates awarded in those fields grew over the past 20 years. From 1999 to 2018, women’s share grew considerably in life sciences (from 45% to 56%), in engineering (from 15% to 24%), in physical sciences and earth sciences (from 24% to 33%), and in psychology and social sciences (from 55% to 59%). Women’s growth in mathematics and computer sciences has been modest, from 23% to 24% during this period (figure 11).

## Growing fields

The largest relative growth of female doctorate recipients over the past decade has been in the fields of other engineering and materials science and engineering; geosciences, atmospheric sciences, and ocean sciences; physics and astronomy; and other social sciences. Over the same period, the number of women doctorate recipients declined in education research and history (figure 12).

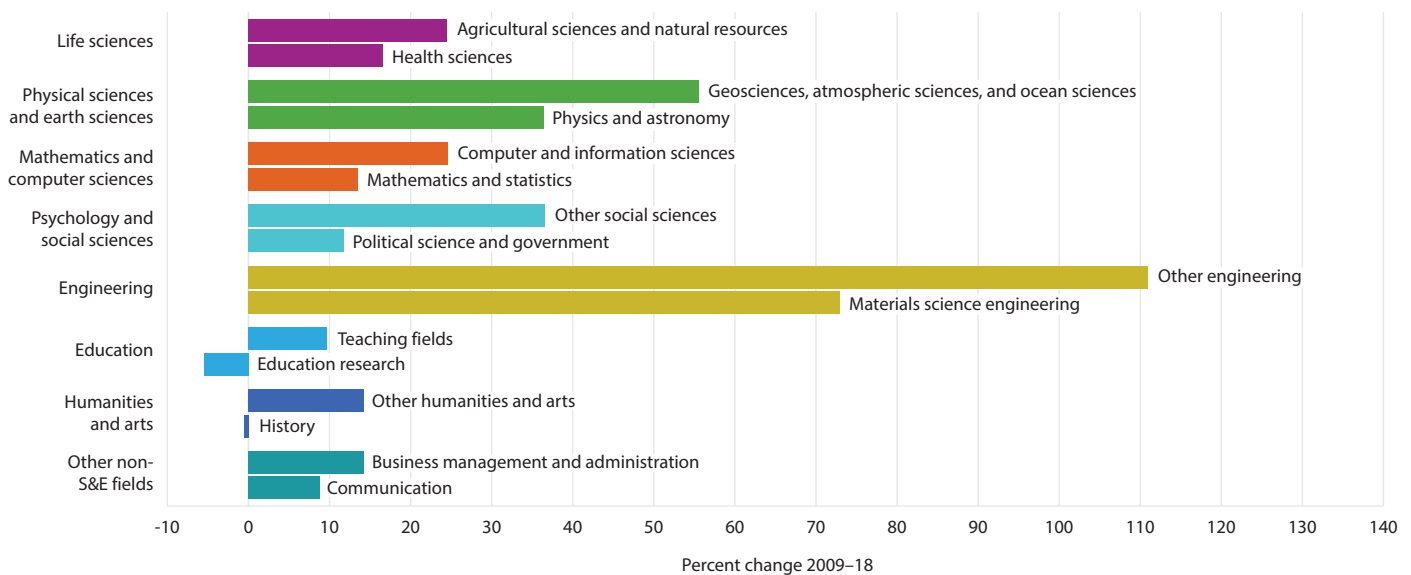
**Figure 11. Share of doctorates awarded to women, by broad field of study: 1999–2018**



NOTE: Percentages are based on the number of doctorate recipients who reported sex.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 12. Fastest changing fields of study for female doctorate recipients, by broad field of study: 2009–18**



SOURCE: NCSES, Survey of Earned Doctorates, 2018.

# PATH TO THE DOCTORATE

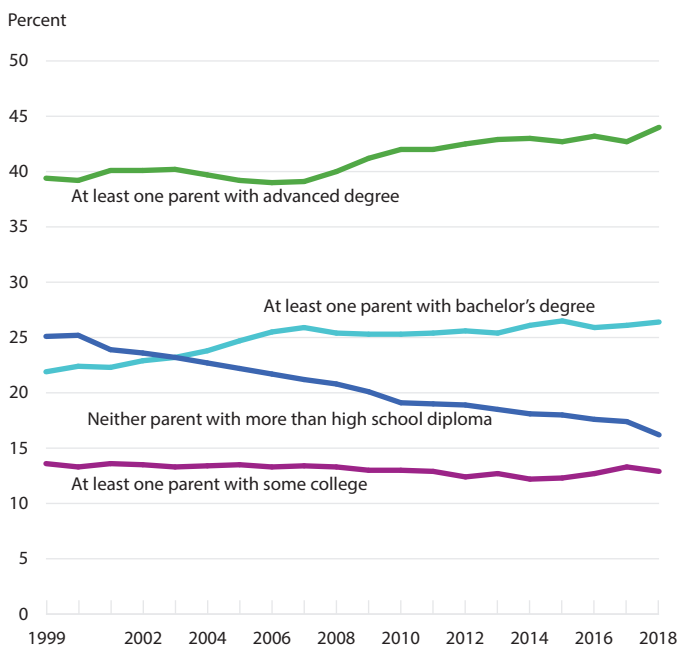
Some paths to the doctoral degree are less traveled and some are more difficult to navigate, owing to a variety of influences that shape doctoral study. These paths may lead to different postgraduate destinations.

## Parental education

### Overview

The parents of recent doctorate recipients are better educated than the parents of earlier cohorts of doctorate recipients. The share of doctorate recipients from families in which neither parent has earned more than a high school diploma declined in the past 20 years. Meanwhile, the shares from families in which at least one parent has earned a bachelor's degree or at least one parent has an advanced degree increased (figure 13).

**Figure 13. Doctorates awarded, by highest parental educational attainment: 1999–2018**



NOTES: Percentages are based on the number of doctorate recipients responding to the item on the highest educational attainment for either parent. Percentages may not sum to 100% because of rounding and because of doctorate recipients who reported "not applicable" for both father's and mother's education beginning in 2004.

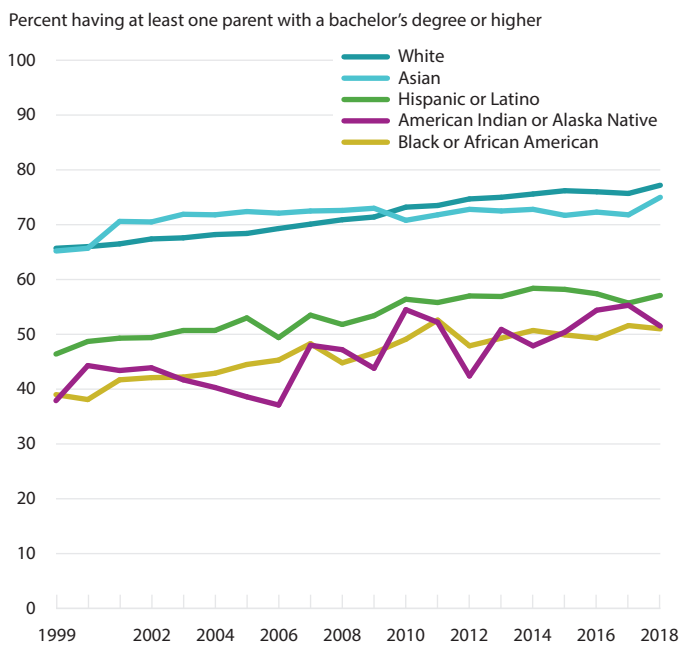
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Race and ethnicity

The pattern of rising parental educational attainment is visible among all races and ethnicities for doctorate recipients who are U.S. citizens and permanent residents. Nonetheless, doctorate recipients from underrepresented minority groups are less likely to have at least one parent with a bachelor's degree than are Asian or white doctorate recipients.

In 2018, about 75% of doctorate recipients who were Asian or white came from families having at least one parent who had a bachelor's degree or higher, compared to between 51% and 57% of doctorate recipients who were black or African American, American Indian or Alaska Native, or Hispanic or Latino (figure 14).

**Figure 14. Parental educational attainment of U.S. citizen and permanent resident doctorate recipients, by race and ethnicity: 1999–2018**



NOTES: Percentages are based on the number of doctorate recipients who are U.S. citizens or permanent residents. Hispanic may be any race; race categories exclude Hispanic origin.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Sources of financial support

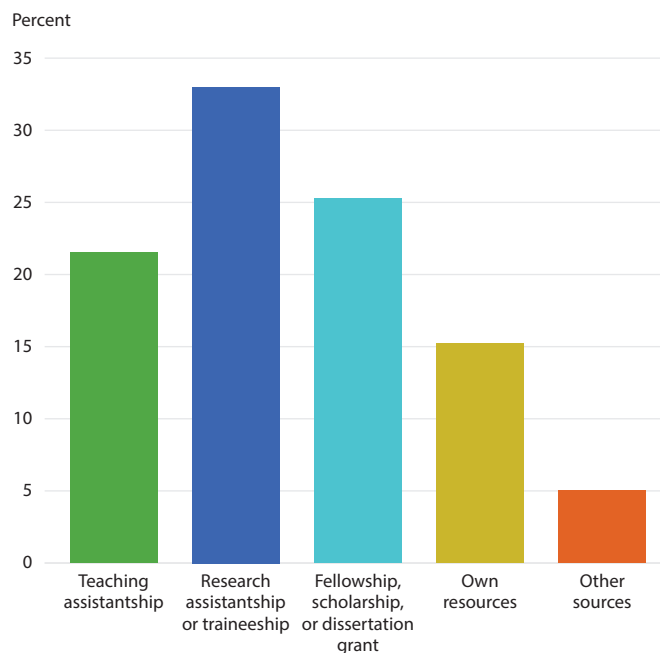
### Overview

In 2018, doctorate recipients reported research assistantships or traineeships as the most frequent primary source of financial support, followed by fellowships, scholarships, or dissertation grants and teaching assistantships. A third of doctorate recipients were primarily supported by research assistantships or traineeships; 25% by fellowships, scholarships, or dissertation grants; and 22% by teaching assistantships. About 15% of doctorate recipients relied primarily on their own resources—loans, personal savings, personal earnings, and the earnings or savings of their spouse, partner, or family—to finance their graduate studies, and 5% relied on such other sources as employer reimbursement and foreign support (figure 15).

### Field of study

The primary sources of financial support used by doctorate recipients vary by field of study. In 2018, research assistantships were the most common primary source of financial support for doctorate recipients in engineering, physical sciences and earth sciences, and life sciences. In mathematics and computer sciences, teaching assistantships were slightly more frequent than

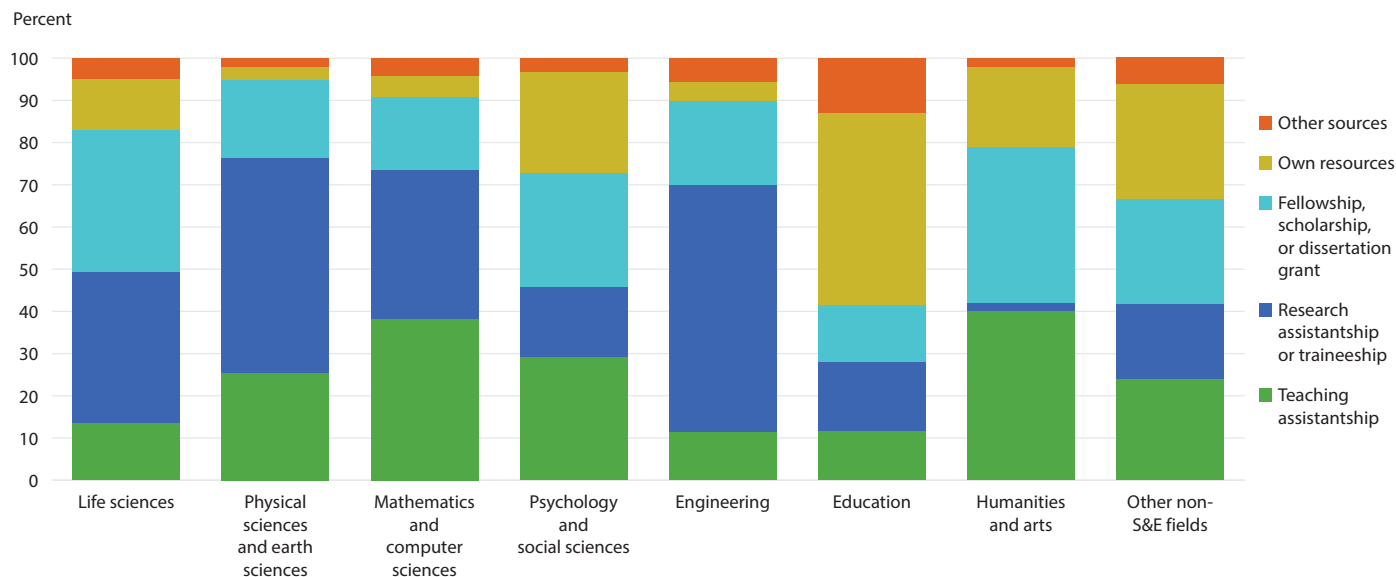
**Figure 15. Primary source of financial support for doctorate recipients: 2018**



NOTES: Percentages are based on the number of doctorate recipients responding to the primary source of financial support item. Research assistantship or traineeship includes other assistantships and internships or clinical residencies. Own resources includes loans, personal savings, personal earnings outside the institution sources listed, and earnings or savings of spouse, partner, or family. Other sources includes employer reimbursement or assistance and foreign support.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

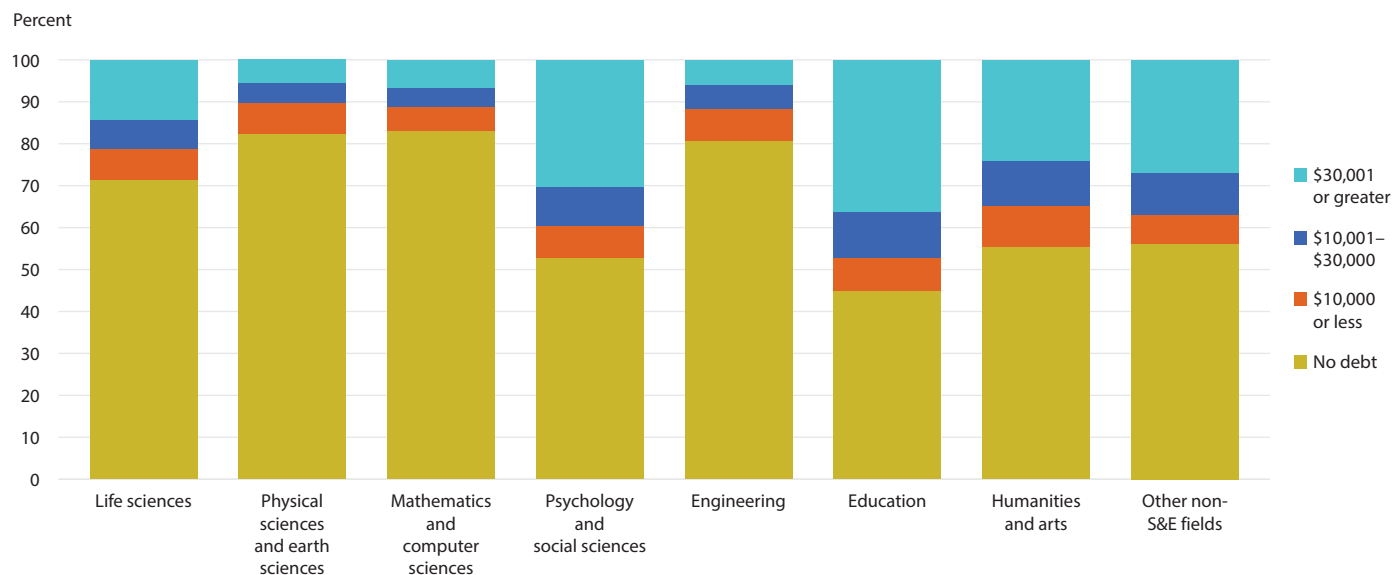
**Figure 16. Primary source of financial support for doctorate recipients, by broad field of study: 2018**



NOTES: Percentages are based on the number of doctorate recipients responding to the primary source of financial support item. Research assistantship or traineeship includes other assistantships and internships or clinical residencies. Own resources includes loans, personal savings, personal earnings outside the institution sources listed, and earnings or savings of spouse, partner, or family. Other sources includes employer reimbursement or assistance and foreign support.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 17. Graduate debt of doctorate recipients, by broad field of study: 2018**



NOTE: Percentages are based on the number of doctorate recipients responding to the graduate debt item.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

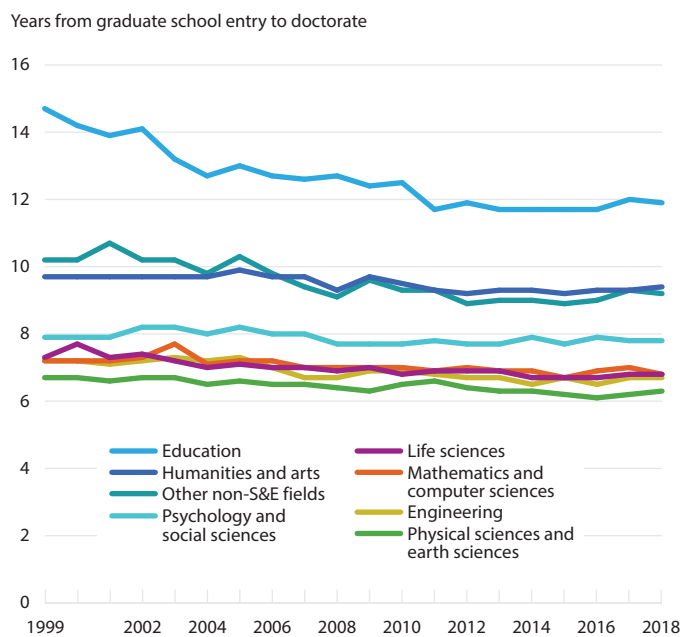
research assistantships. Fellowships or grants and teaching assistantships were the most common source of support for comparable shares of doctoral students in humanities and arts. Nearly half of the doctorate recipients in education relied on their own resources as their primary source of support. In psychology and social sciences, similar proportions of doctorate recipients reported fellowships or grants, teaching assistantships, and their own resources as their primary source of financial support (figure 16).

### Graduate debt

The amount of education-related debt incurred by doctorate recipients during graduate school is an indicator of the availability of financial support. In 2018, large majorities (71% and above) of doctorate recipients in physical sciences and earth sciences, mathematics and computer sciences, engineering, and life sciences reported holding no debt related to their graduate education when they were awarded the doctorate. In psychology and social sciences, humanities and arts, and other non-S&E fields, that proportion dropped to just about half.

Within each broad field of study, 6% to 10% of doctorate recipients had incurred low levels (\$10,000 or less) of graduate debt. The shares of doctoral graduates with graduate debt burdens over \$30,000 were greatest in education (36%), psychology and social sciences (30%), other non-S&E fields (27%), and humanities and arts (24%) (figure 17). For more details on debt levels of doctorate recipients, see the section Education-related debt on page 14.

**Figure 18. Median time to degree of doctorate recipients, by broad field of study: 1999–2018**



SOURCE: NCSES, Survey of Earned Doctorates, 2018.

### Time to degree

Over the past 20 years, the time between entering graduate school and earning the doctorate has fallen in all fields of study, particularly in education. However, in general, it still takes years longer to earn a doctorate in non-S&E fields than it does to complete an S&E doctorate (figure 18).

# POSTGRADUATION TRENDS

A graduate's first position after earning the doctoral degree may reflect broad economic conditions and can shape later career opportunities, earnings, and choices. Over the longer term, the early career patterns of doctorate recipients may influence the decisions of future generations of students considering careers as scientists, engineers, scholars, and researchers.

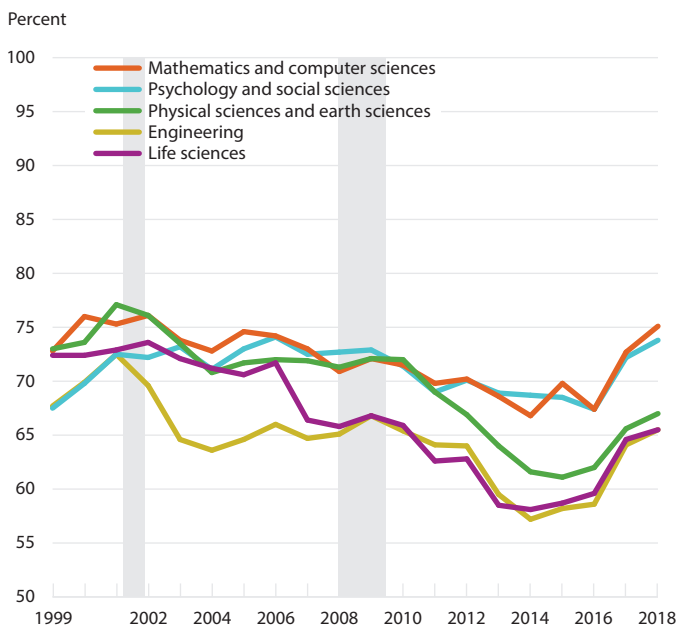
## Job market

At any given time, the job market for new doctorate recipients will be better in some fields of study than in others. Though all fields tend to follow a similar cyclical pattern that generally reflects overall trends in economic conditions, definite commitments at graduation are likely to be influenced by many factors.

In life sciences, physical sciences and earth sciences, and engineering, the proportions of doctorate recipients

reporting definite commitments, including postdoctoral positions (postdocs), have declined since 1999. These fields hit low points from 2014 to 2016 but have rebounded. In 2018, the proportions of doctorate recipients in mathematics and computer sciences and in psychology and social sciences who had definite commitments (75% and 74%, respectively) nearly reached their highest points in the last 20 years (figure 19). Non-S&E fields similarly have recovered from lows in 2014–16 (figure 20).

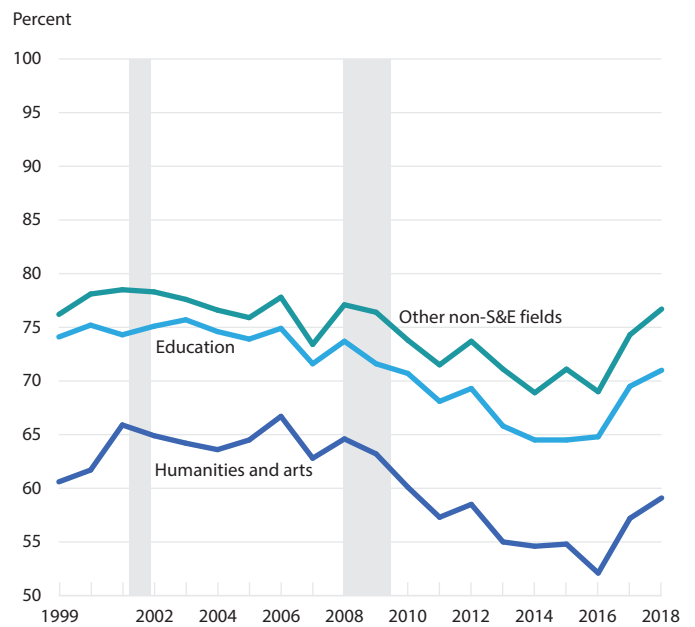
**Figure 19. Definite commitments among doctorate recipients, by S&E broad field of study: 1999–2018**



NOTES: Shaded areas reflect recessions that occurred between March 2001 and November 2001 and between December 2007 and June 2009. Definite commitment refers to a doctorate recipient who is either returning to predoctoral employment or has signed a contract (or otherwise made a definite commitment) for employment, including postdoctoral study, in the coming year. Percentages are based on the number of doctorate recipients responding to the postgraduation status item.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 20. Definite commitments among doctorate recipients, by non-S&E broad field of study: 1999–2018**



NOTES: Shaded areas reflect recessions that occurred between March 2001 and November 2001 and between December 2007 and June 2009. Definite commitment refers to a doctorate recipient who is either returning to predoctoral employment or has signed a contract (or otherwise made a definite commitment) for employment, including postdoctoral study, in the coming year. Percentages are based on the number of doctorate recipients responding to the postgraduation status item.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## First postgraduate position

### Academic employment

In 2018, 43% of all doctorate recipients with definite employment commitments (excluding postdoc positions) in the United States reported that their principal job would be in academe.

The highest rates of academic employment commitments were reported by doctorate recipients in humanities and arts and in other non-S&E fields (75% in each); the lowest rates were in engineering (13%) and in physical sciences and earth sciences (19%). In the past 10 years, the overall rate of academic employment commitments by doctorate recipients in S&E fields has declined, while that of doctorate recipients in non-S&E fields has risen due to the increase in academic commitments in education (figure 21).

### Postdoc positions

Historically, postdoc study positions have been a customary part of the early career paths of doctorate recipients in life sciences and in physical sciences and earth sciences, making up over half of definite commitments. Since 1999, they also have become more prevalent in mathematics and computer sciences, psychology and social sciences, engineering, and non-S&E fields, though their rates in these fields are not as high.

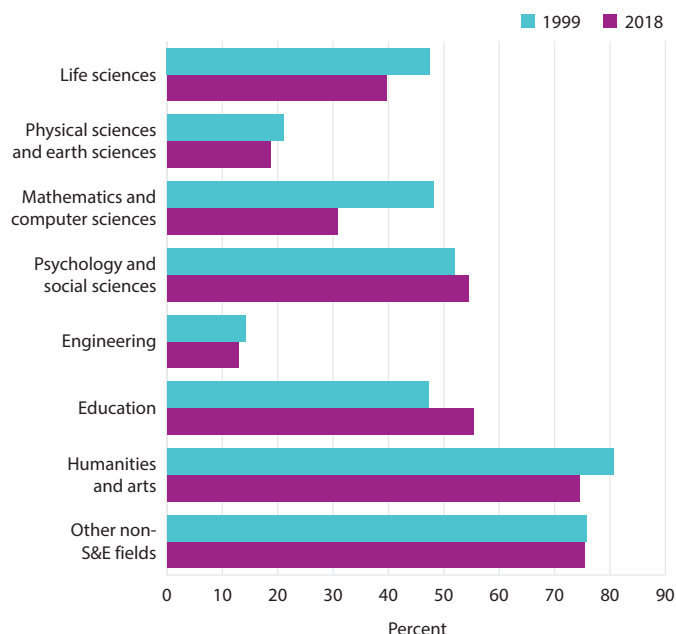
In the past 10 years, the overall proportion of S&E doctorate recipients taking postdoc positions in the United States immediately after graduation declined from 50% to 46%. The proportions of doctorate recipients taking postdoc positions in life sciences, physical sciences and earth sciences, mathematics and computer sciences, and engineering declined during this period, while the proportion in psychology and social sciences and in non-S&E fields increased (figure 22).

## Median salaries

In 2018, doctorate recipients who had definite commitments for a postdoc or other employed position in the United States in the coming year reported basic annual salaries that varied by their field of study and the type of position to which they committed.

In every field except for humanities and arts, median expected salaries for doctorate recipients committing to jobs in industry were higher than those in postdocs and academe; in humanities and arts, salaries were similar

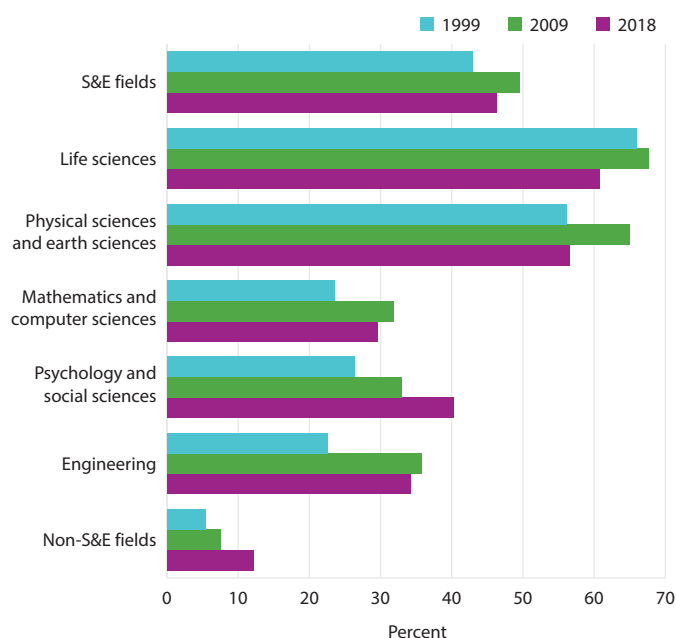
**Figure 21. Definite employment commitments in academe in the United States, by broad field of study: 1999 and 2018**



NOTES: Definite employment commitment excludes postdoctoral study. Percentages are based on the number of doctorate recipients who reported definite commitments (including those missing employer type) and plans to stay in the United States.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 22. U.S. postdoctorate rate for doctorate recipients, by broad field of study: Selected years, 1999–2018**



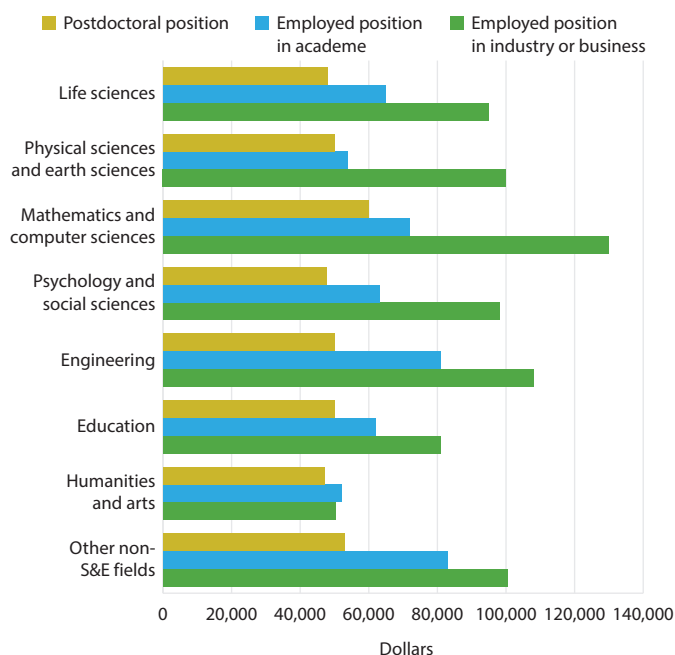
NOTE: Percentages are based on the number of doctorate recipients who reported definite commitments in the coming year, who reported whether their commitment was for postdoctoral study or other employment, and who plan to live in the United States.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.



regardless of sector. The median salaries for postdocs in all broad fields were relatively similar, ranging from \$47,000 to \$53,000, except for postdocs in mathematics and computer sciences, who had a median salary of \$60,000. Doctorate recipients in engineering and those in other non-S&E fields, such as business, reported the highest median academic salaries (\$81,000 and \$83,000, respectively). Those in mathematics and computer sciences and those in engineering reported the highest median salaries in industry positions (\$130,000 and \$108,000, respectively) (figure 23).

**Figure 23. Median expected basic annual salary of doctorate recipients with definite commitments in the United States, by position type and broad field of study: 2018**



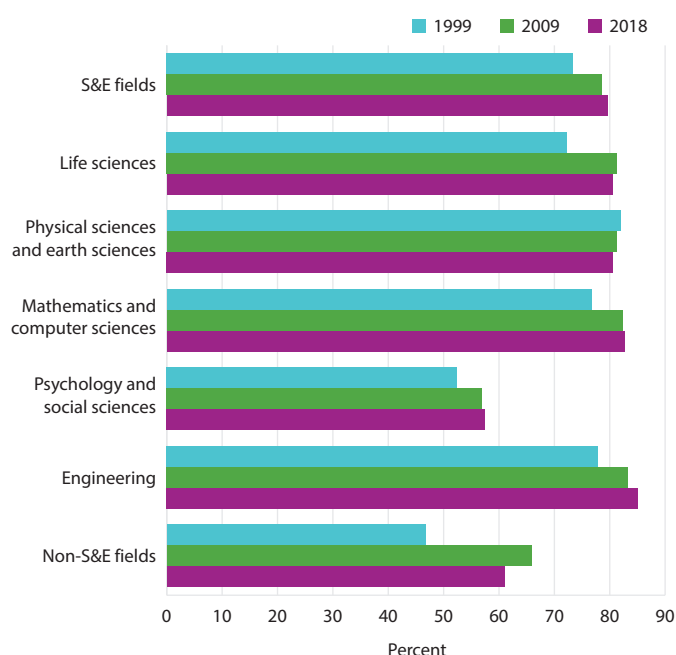
NOTES: Other non-S&E fields includes business management and administration. Industry includes all nonacademic sectors, including self-employment, private for-profit and private nonprofit, and government.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Temporary visa holders and postgraduation

In 2018, 80% of temporary visa holder doctorate recipients in S&E fields with definite commitments reported that the location of their postdoc or other employment position was in the United States, up from 73% in 1999. Shares were highest in fields where temporary visa holders were more heavily represented: life sciences, physical sciences and earth sciences, mathematics and computer sciences, and engineering (figure 24).

**Figure 24. Temporary visa holder doctorate recipients with definite commitments in the United States, by broad field of study: Selected years, 1999–2018**



NOTE: Percentages are based on the number of temporary visa holders who reported definite commitments and plans to stay in the United States.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

# EDUCATION-RELATED DEBT

Student debt is an important issue in the path to the doctorate and the transition to the workforce. At the doctorate level, students have a range of financial support options available depending on their field of study and the type of institution they attend. Their choices may influence how much they pay out of pocket and how much education-related debt they incur.

## Overall debt levels

The Survey of Earned Doctorates asks doctorate recipients to indicate the amount of money they owe that is directly tied to their undergraduate and to their graduate educations, from no debt to debt of \$90,000 or more, in \$10,000 increments. In 2018, 57% of doctorate recipients reported no education-related debt versus 43% with debt (17% reported cumulative debt—both undergraduate and graduate debt—15% only graduate debt, and 11% only undergraduate debt). The amount of debt was highest, as expected, among those reporting cumulative debt, with a mean debt of \$78,757. Graduate-only debt was higher than undergraduate-only debt (\$39,803 versus \$24,899) (table A).

## Undergraduate, graduate, and cumulative debt

Debt varies by field of study, particularly at the graduate level. Doctorate recipients in S&E fields were less likely than those in non-S&E fields to have incurred debt and less likely to have debt over \$60,000, both at the undergraduate and graduate levels (figure 25).

Doctorate recipients in psychology and social sciences, in education, and in other non-S&E fields were the most likely to have graduate debt and undergraduate debt. In addition, nearly half of those in communication and in humanities and arts had graduate debt (figure 26).

Among doctorate recipients with debt, the amount of mean debt varied greatly by field of study at the graduate level, but much less so at the undergraduate level (figure 27). Mean debt at the undergraduate level was lowest among doctorate recipients in mathematics and computer sciences (\$25,483) and highest among those in education (\$33,901) and other non-S&E fields (\$36,245). Mean graduate debt was lowest in physical sciences and earth sciences (\$26,815) but nearly double that amount in psychology and social

**Table A. Education-related debt of doctorate recipients, by debt status and type: 2018**

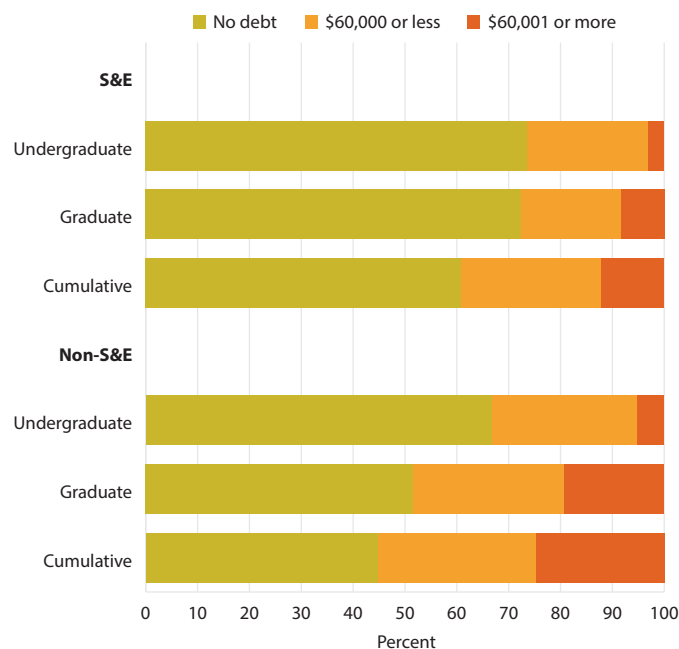
(Number; mean and median debt in dollars)

Debt status and type	Number reporting debt	Mean debt (\$)	Median debt (\$)
No education-related debt	28,499	0	0
Both undergraduate and graduate debt	8,681	78,757	80,000
Only graduate debt	7,499	39,803	25,000
Only undergraduate debt	5,343	24,899	15,000

NOTES: There were 4,818 doctorate recipients who did not respond to the debt questions. Calculation of mean and median debt excludes doctorate recipients reporting no debt.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

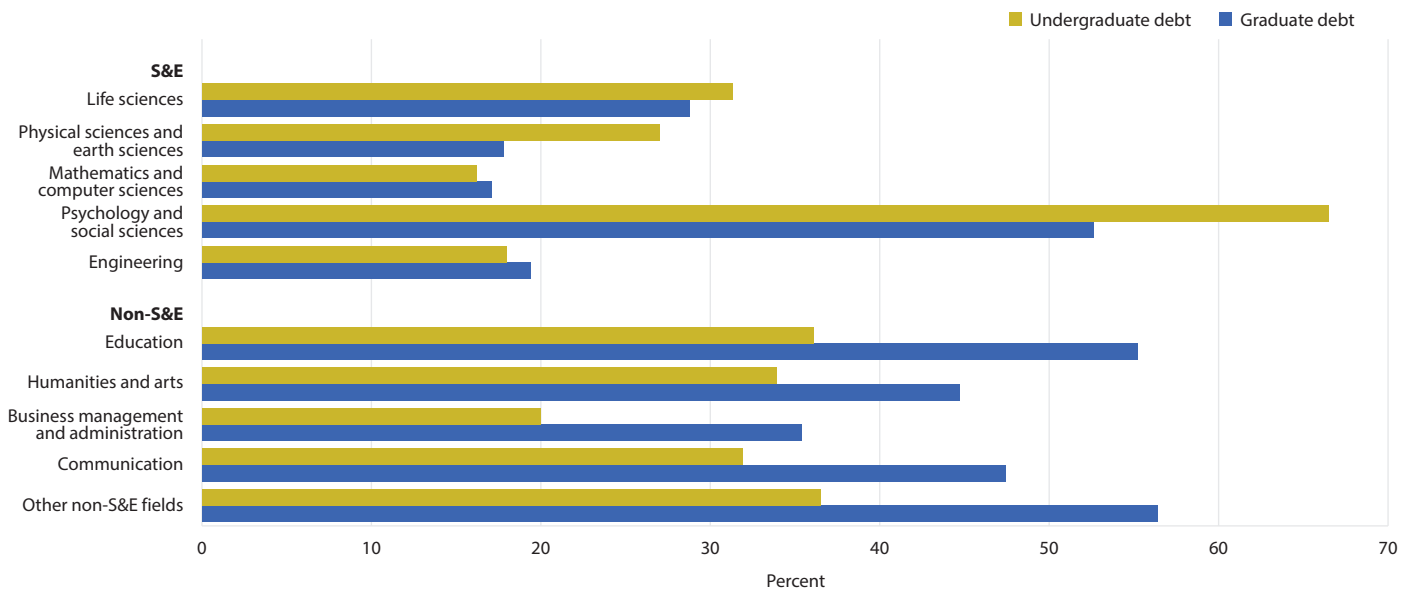
**Figure 25. Education-related debt of doctorate recipients, by field of doctoral study and debt type: 2018**



NOTE: Percentages include only individuals who responded to the respective debt questions.

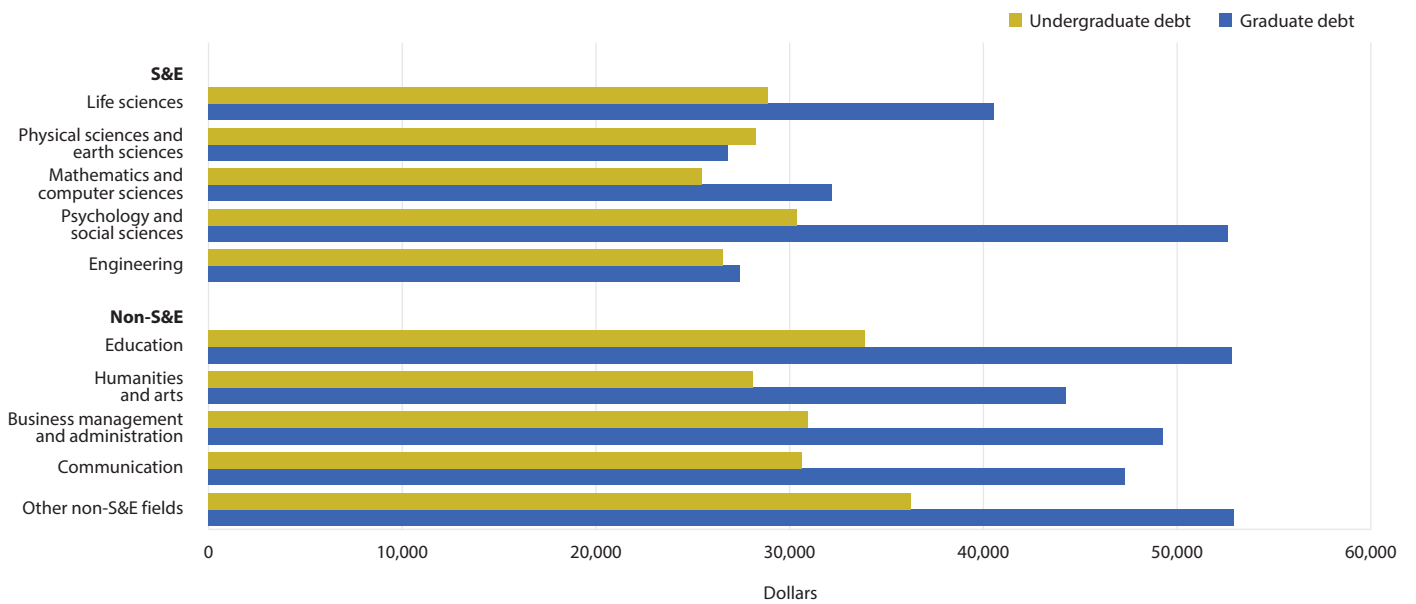
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 26. Debt status of doctorate recipients, by debt type and broad field of study: 2018**



SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 27. Mean debt of doctorate recipients who reported education-related debt, by type of debt and broad field of study: 2018**



NOTE: Calculation of mean debt excludes doctorate recipients reporting no debt.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

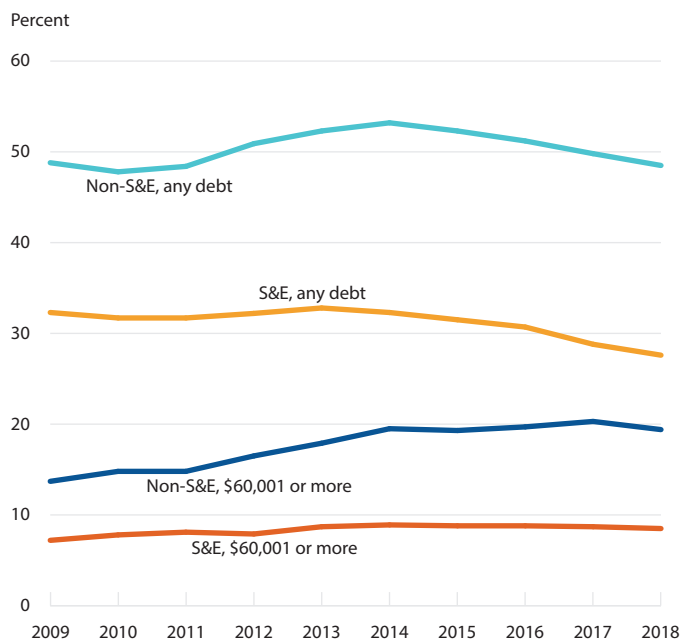
sciences (\$52,612), education (\$52,817), and other non-S&E fields (\$52,915). Differences in mean graduate debt by field reflect the influence of several factors that vary across fields of study, including the sources of financial support and the median time to complete the doctoral degree (see section Path to the doctorate, figure 16 and figure 18, respectively).

## Trends in graduate debt: 2009–18

The proportion of S&E doctorate recipients who reported graduate debt was 32% between 2009 and 2015 and declined to 28% by 2018 (figure 28). The percentage of S&E doctorate recipients reporting graduate debt of more than \$60,000 increased from 7% to 9% between 2009 and 2013 and has remained stable since then. Among non-S&E doctorate recipients, the proportion reporting graduate debt increased from 49% to 53% between 2009 and 2014 and then declined back to 49% by 2018. The proportion of non-S&E doctorate recipients with more than \$60,000 in graduate debt increased 5 percentage points between 2009 and 2014 (from 14% to 19%) but has remained stable since then. Some of these changes over time may be due to inflation. A debt of \$60,000 in 2009 was equivalent to \$70,228 in 2018.<sup>1</sup>

In 2018, the proportion of doctorate recipients with graduate debt was highest in education and other non-S&E fields; in these fields, 55% or more had graduate education-related debt. In addition, between 2009 and 2018, the

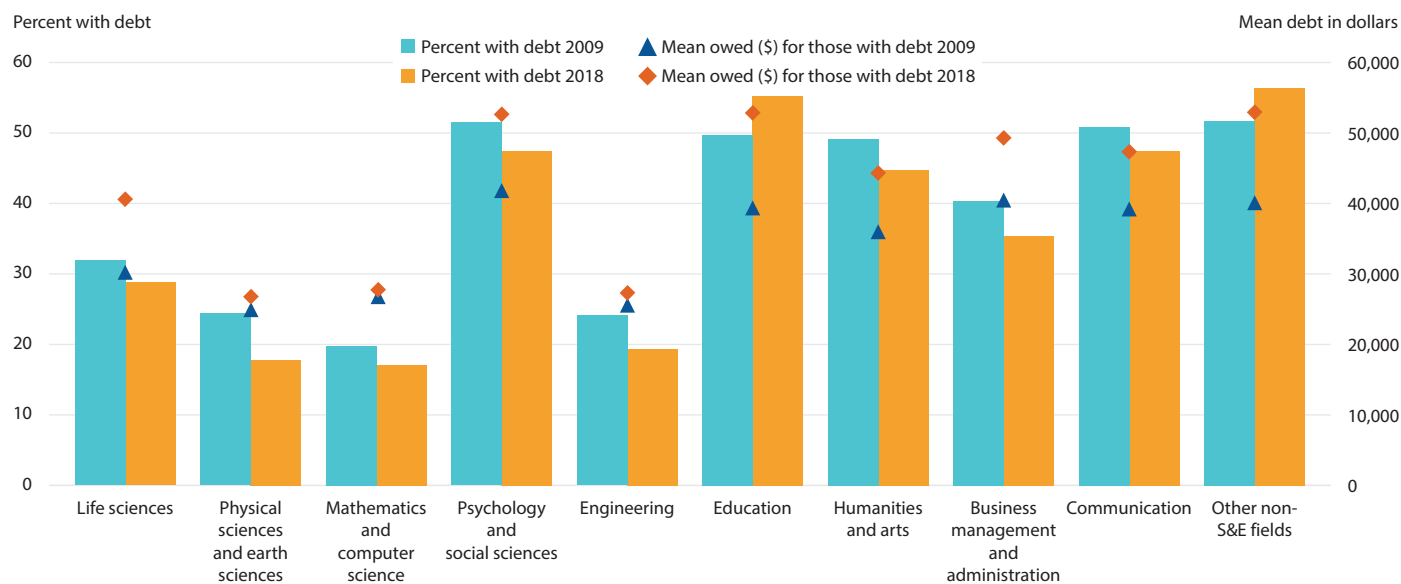
**Figure 28. Graduate debt of doctorate recipients, by field of study: 2009–18**



NOTES: Percentages include only individuals who responded to the graduate debt question. Debt is not adjusted for inflation.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 29. Changes in graduate debt, by broad field of study: 2009 and 2018**



NOTES: Percentages include only individuals who responded to the graduate debt question. Calculation of mean debt excludes doctorate recipients reporting no debt.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

proportion of doctorate recipients with graduate debt in these two broad fields increased while it declined in all other broad fields. Among doctorate recipients with debt, mean graduate debt increased by more than \$10,000 in life sciences, psychology and social sciences, education, and in other non-S&E fields (figure 29).

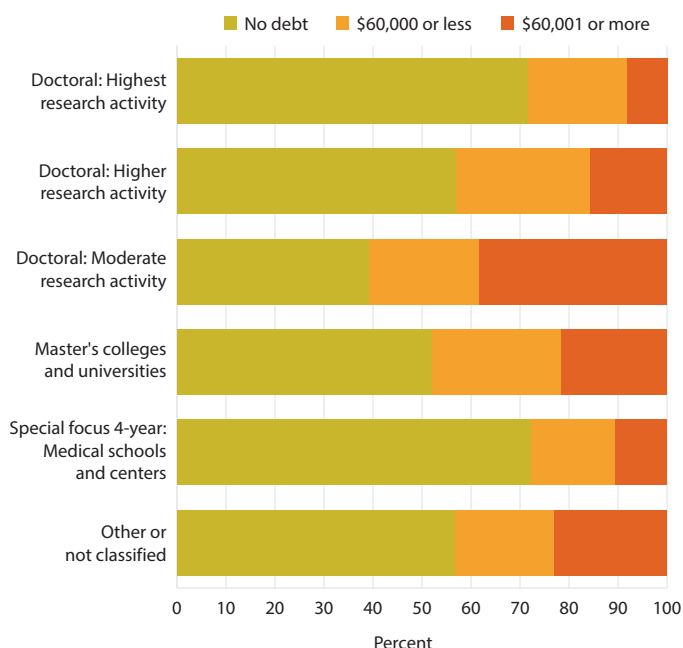
## Role of type of institution and source of financial support

Doctorate recipients with degrees from institutions with the highest research activity (75% of all doctorates in 2018) and from special focus 4-year medical schools and centers (about 2% of all doctorates in 2018) were the least likely to have graduate debt and to have high levels of debt (figure 30). (See *Carnegie Classification* in the Glossary section for types of institutions.) More than 70% of doctorate recipients in these institutions had no graduate debt, and only between 8% and 11% of them owed more than \$60,000. In contrast, doctorate recipients at doctoral institutions with moderate research activity (about 4% of all doctorates in 2018) and those at master’s colleges and universities (about 1% of all doctorates in 2018) were the most likely to have graduate debt and owe more than \$60,000.

The availability of financial support provided by institutions is associated with the likelihood and level of graduate debt. Doctoral institutions with the highest research activity and medical schools and centers were the most likely to provide financial support, such as research and teaching assistantships, traineeships, fellowships, scholarships, or dissertation grants (figure 31). In contrast, about two-thirds (64%) of doctorate recipients in doctoral universities with moderate research activity and almost half (45%) in master’s colleges and universities used their own resources as the primary source of financial support.

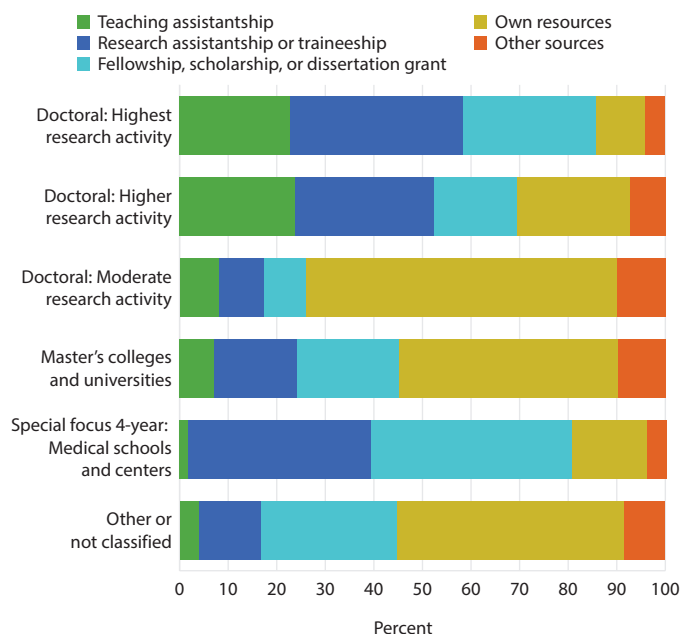
Doctorate recipients who received research assistantships or traineeships; fellowships, scholarships, or dissertation grants; and teaching assistantships as their primary source of financial support were the most likely to have no graduate debt. Those who used their own resources were the most likely to have graduate debt and most likely to owe more than \$60,000 (figure 32). Overall, the analyses reported in this section support the claim that doctorate recipients from institutions that are less likely to provide financial support are more likely to incur graduate debt.

**Figure 30. Graduate debt of doctorate recipients, by 2015 Carnegie Classification of institutions: 2018**



NOTE: Percentages include only individuals who responded to the graduate debt question.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 31. Primary source of financial support of doctorate recipients, by 2015 Carnegie Classification of institutions: 2018**



NOTES: Percentages include only individuals who responded to the financial support questions. Research assistantships or traineeships includes other assistantships and internships or clinical residencies. Own resources includes loans, personal savings, personal earnings outside the institution sources listed, and earnings or savings of spouse, partner, or family. Other sources includes employer reimbursement or assistance and foreign support.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Demographics of graduate debt

### Sex

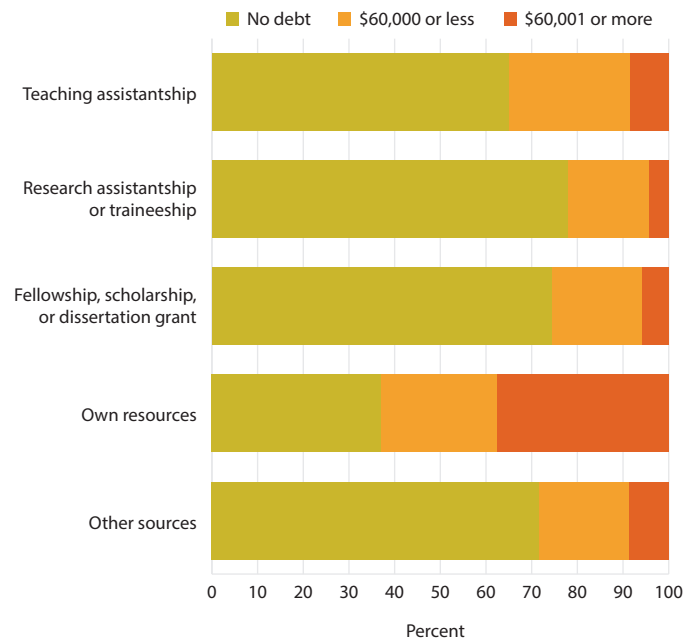
In psychology and social sciences—a broad field with high levels of graduate debt and with high proportions of women—female doctorate recipients were more likely than their male counterparts to have graduate debt. In contrast, in engineering, business management and administration, and communication, women were less likely than men to incur graduate debt (figure 33). In other fields, the proportions of women and men with graduate debt were similar.

Among doctorate recipients with graduate debt, the amount of mean debt across fields was similar for men and women. The largest differences were in other non-S&E fields, where women had \$7,179 more graduate debt than men; life sciences, where women had \$4,147 more; and in psychology and social sciences, where women had \$3,331 more.

### Citizenship

Doctorate recipients who were U.S. citizens and permanent residents were more likely to incur graduate debt than temporary visa holders and, among those with debt, to have higher mean debt, regardless of field of study. The graduate debt gap between doctorate recipients who were U.S. citizens and permanent residents and those who were temporary visa holders was smaller in the natural sciences (life sciences, physical sciences and earth sciences, and mathematics and computer sciences) and engineering than in psychology and social sciences and in non-S&E fields (figure 34).

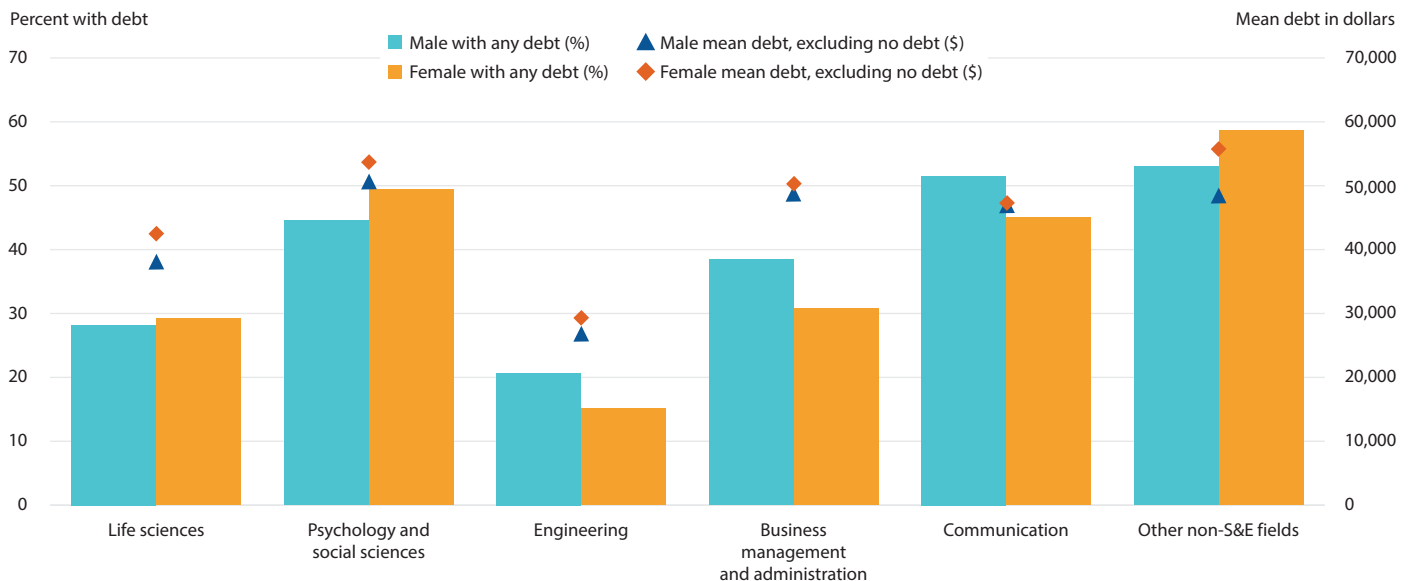
**Figure 32. Graduate debt of doctorate recipients, by primary source of financial support: 2018**



NOTES: Percentages include only individuals who responded to the graduate debt question. Research assistantship or traineeship includes other assistantships and internships or clinical residencies. Own resources includes loans, personal savings, personal earnings outside the institution sources listed, and earnings or savings of spouse, partner, or family. Other sources includes employer reimbursement or assistance and foreign support.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 33. Graduate debt status and mean debt of doctorate recipients, by selected broad field of study and sex: 2018**



NOTES: Percentages include only individuals who responded to the graduate debt question. Calculation of mean debt excludes doctorate recipients reporting no debt.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Race and ethnicity

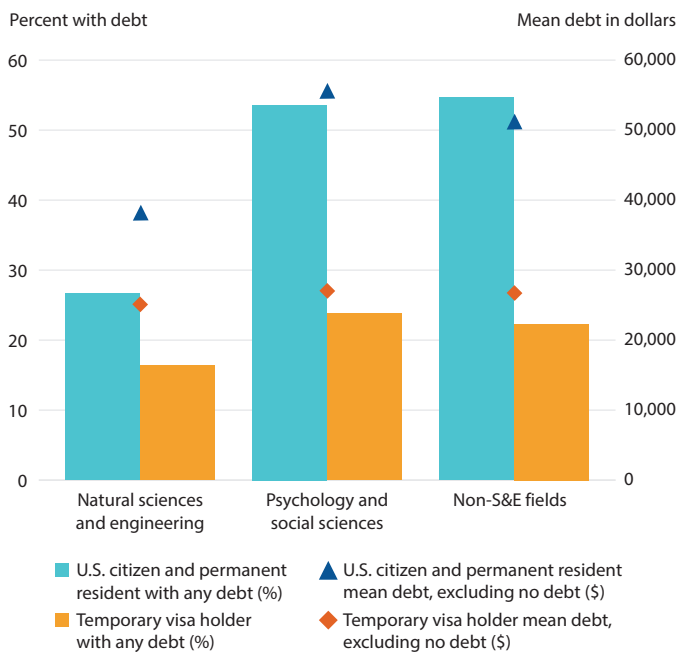
In natural sciences and engineering, American Indian or Alaska Native doctorate recipients were as likely as their black or African American counterparts to incur graduate debt (57% and 56%, respectively), higher than any other racial or ethnic group. However, the mean amount owed among those with debt was higher among American Indians or Alaska Natives than among blacks or African Americans (\$62,143 versus \$51,914) (figure 35). In psychology and social sciences and in non-S&E fields, black or African American doctorate recipients were the most likely to have graduate debt as well as a higher mean debt.

Asian and white doctorate recipients were the least likely to have graduate debt, particularly in natural sciences and engineering. In addition, among Asian and white doctorate recipients with graduate debt, the mean amount owed was lower than that of underrepresented minorities.

## Parental education

Doctorate recipients whose parents had a high school education or lower or some college were the most likely to have graduate debt and higher levels of graduate debt. Those whose parents had a research doctoral degree were the least likely to have graduate debt and the least likely to owe more than \$60,000 (figure 36).

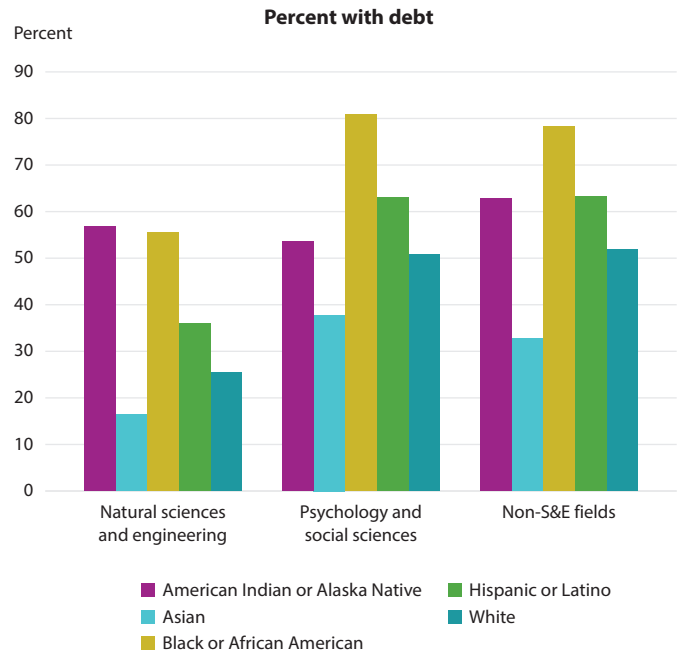
**Figure 34. Graduate debt of doctorate recipients, by area of study and citizenship: 2018**



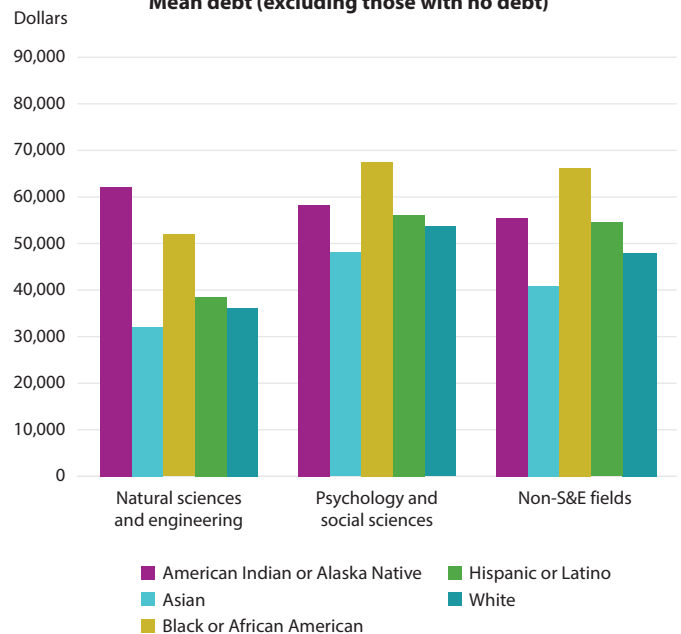
NOTES: Percentages include only individuals who responded to the graduate debt question. Calculation of mean debt excludes doctorate recipients reporting no debt.

SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 35. Graduate debt of U.S. citizen and permanent resident doctorate recipients, by race, ethnicity, and area of study: 2018**



**Mean debt (excluding those with no debt)**



NOTES: Percentages include only individuals who responded to the graduate debt question. Excludes U.S. citizen and permanent resident respondents who did not report race or ethnicity. Hispanic may be any race; race categories exclude Hispanic origin. Calculation of mean debt excludes doctorate recipients reporting no debt.

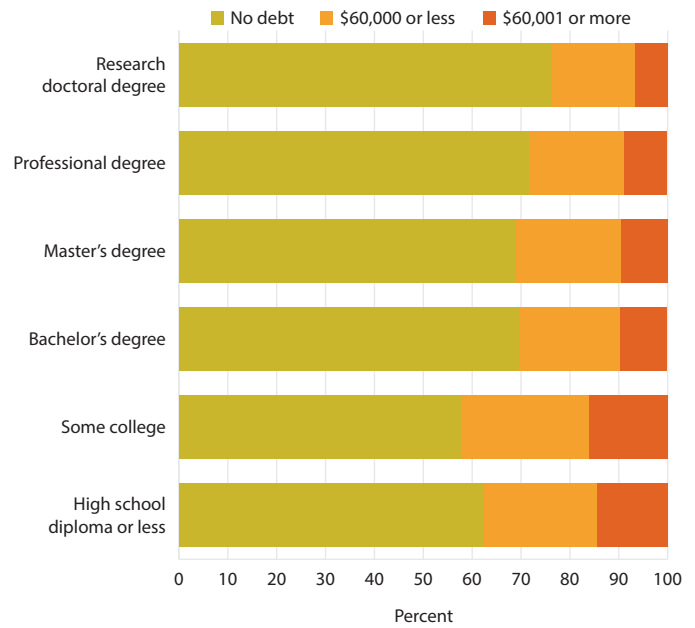
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

## Expected salary versus cumulative debt

In 2018, doctorate recipients in the fields with the lowest median cumulative debt (physical sciences and earth sciences, engineering, and mathematics and computer sciences) had among the highest median expected annual salaries.<sup>2</sup> In these fields, median expected salaries at graduation were more than triple the median cumulative debt. Median debt among those in business management and administration was higher (\$42,500) but their median expected salary was nearly triple their median debt as well (figure 37).

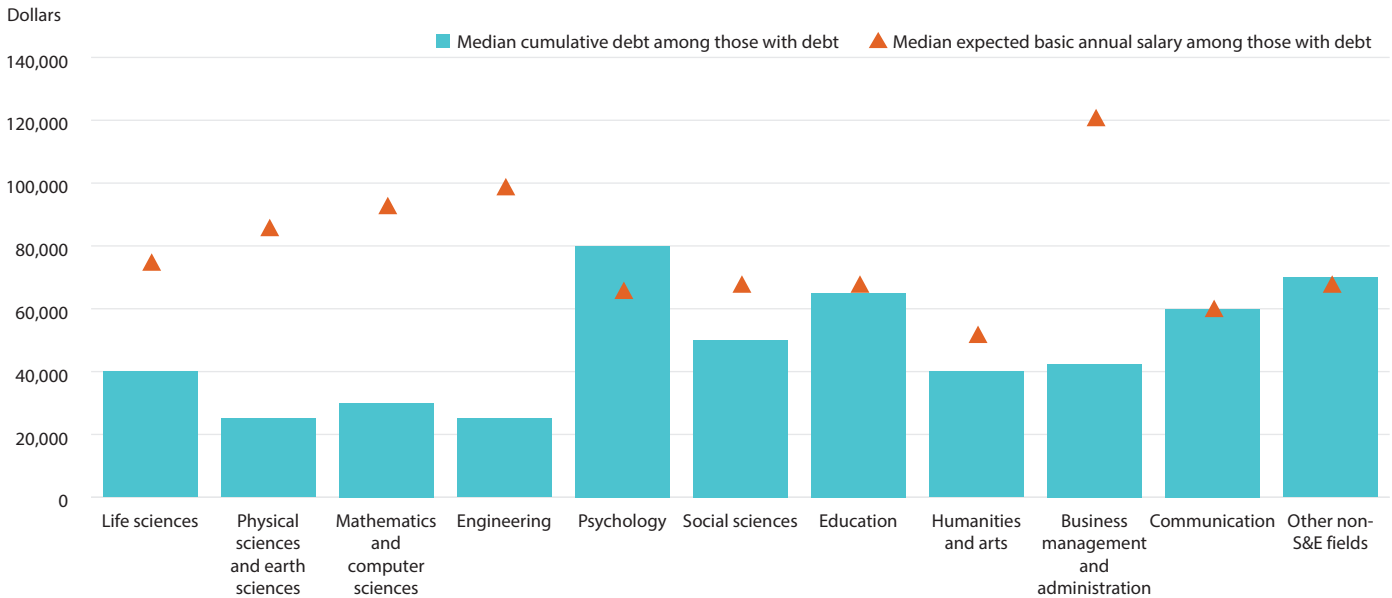
In contrast, doctorate recipients in the fields with the highest median cumulative debt (psychology, education, communication, and other non-S&E fields) reported among the lowest median expected annual salaries. In psychology, median cumulative debt was \$15,000 higher than median expected salary at graduation. In education, communication, and other non-S&E fields, doctorate recipients' median expected salary was about the same as their median cumulative debt.

**Figure 36. Graduate debt of doctorate recipients, by highest parental educational attainment: 2018**



NOTE: Percentages include only individuals who responded to the graduate debt question.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

**Figure 37. Median expected basic annual salary and median cumulative debt for debt-holding doctorate recipients with definite employment commitments in the United States, by broad field of study: 2018**



NOTES: Definite employment commitment excludes postdoctoral study. Calculation of median debt excludes doctorate recipients reporting no debt.  
SOURCE: NCSES, Survey of Earned Doctorates, 2018.

### Notes

<sup>1</sup> To calculate these values, the Consumer Index Price (CPI) of 214.537 was used for 2009 and CPI of 251.107 for 2018 (for CPI data, see <https://www.bls.gov/cpi/tables/supplemental-files/home.htm>).

<sup>2</sup> Median cumulative debt excludes doctorate recipients with no debt. Median expected annual salary corresponds to debt-holding doctorate recipients who reported definite employment commitments (which excludes postdoctoral study) in the United States.



# GLOSSARY

**Area of study:** See *Field of study*.

**Basic annual salary.** Annual salary to be earned from the doctorate recipient's principal job in the next year, not including bonuses or additional compensation for summertime teaching or research.

**Cumulative debt.** The amount of debt, incurred both at the undergraduate level and the graduate level, owed by a doctorate recipient at the time the doctorate is awarded.

**Carnegie Classification.** The Carnegie Classification of Institutions of Higher Education is a commonly used classification of postsecondary institutions based on level of degree awarded, fields in which degrees are conferred, and, in some cases, enrollment, federal research support, and selectivity of admissions criteria. The categories used here are from the 2015 version of the classification and include doctoral universities: highest research activity, doctoral universities: higher research activity, doctoral universities: moderate research activity, master's colleges and universities, and special focus 4-year institutions: medical schools and centers. For details, see <http://carnegieclassifications.iu.edu/>.

**Definite commitment.** A commitment, through a contract or other method, by doctorate recipients to accept employment, including a postdoc study position, in the coming year or to return to predoctoral employment.

**Definite employment commitment.** A definite commitment by doctorate recipients for employment in a non-postdoc position in the coming year.

**Field of study.** The Survey of Earned Doctorates (SED) collects data on 331 fields of doctoral study. For reporting purposes, these fields are typically grouped into 35 major fields and further aggregated into eight broad fields: life sciences; physical sciences and earth sciences; mathematics and computer sciences; psychology and social sciences; engineering; education; humanities and arts; and other non-science and engineering fields. For comparative purposes in the section Education-related debt, this report uses an additional area of study grouping for natural sciences, which includes life sciences, physical sciences and earth sciences, and mathematics and computer sciences.

See technical table A-6 in the online resources of this report for a listing of the major fields within each broad field category. See the survey questionnaire for a full listing of the fine fields of study in 2018 (<https://nces.nsf.gov/sed/>).

**Graduate debt.** The amount of debt from graduate-level education owed by a doctorate recipient at the time the doctorate is awarded.

**NCSES.** National Center for Science and Engineering Statistics.

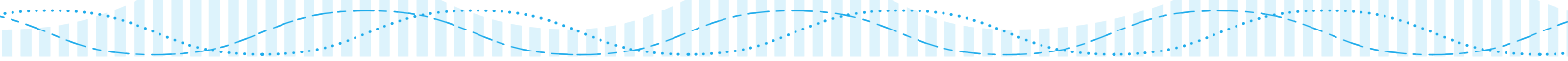
**Non-S&E.** Non-science and engineering: A grouping of broad fields of study that includes education, humanities and arts, and other non-S&E fields, such as business.

**Parental educational attainment.** The highest level of education attained by either parent of a doctorate recipient.

**Postdoctoral (postdoc) position.** As defined in the questionnaire, a temporary position primarily for gaining additional education and training in research, usually awarded in academe, industry, government, or a nonprofit organization.

**Postdoctorate rate.** The proportion of doctorate recipients who have definite commitments for a postdoc position among all doctorate recipients with definite commitments in the coming year, who reported whether their commitment was for postdoc study or other employment, and who plan to live in the United States.

**Race and ethnicity.** Doctorate recipients who report Hispanic or Latino heritage, regardless of racial designation, are counted as Hispanic or Latino, and as of 2013, those who do not answer the Hispanic or Latino ethnicity question are counted as "ethnicity not reported." Respondents who indicate that they are not Hispanic or Latino and indicate a single race are reported in their respective racial groups, except for those indicating Native Hawaiian or Other Pacific Islander, who are included in "other race or race not reported." Beginning in 2001, respondents who are not Hispanic or Latino and who indicate more than one race are reported in the category "more than one race." Data for this category were not collected before 2001. Before 2001, respondents who are not Hispanic or Latino and who indicate more than one race were categorized as "other or unknown." For 2001 and later data, the "other or unknown" category includes doctorate recipients who indicated that they were not Hispanic or Latino and either did not respond to the race item or reported their race as Native Hawaiian or Other Pacific Islander. For 2000 and earlier data, Native Hawaiians or Other Pacific Islanders are counted in the Asian group.



**Research doctorate.** A doctoral degree that is oriented toward preparing students to make original intellectual contributions in a field of study and that is not primarily intended for the practice of a profession. Research doctorates require the completion of a dissertation or equivalent project. In this report, the terms “doctorate” and “doctoral degree” are used to represent any of the research doctoral degrees covered by the survey. Professional doctorates, such as the MD, DDS, JD, and PsyD, are not covered by the Survey of Earned Doctorates.

**S&E.** Science and engineering: A grouping of broad fields of study that includes science (life sciences, physical sciences and earth sciences, mathematics and computer sciences, psychology and social sciences) and engineering fields.

**Sources of financial support.** Sources of financial support are grouped into the following five categories: fellowships (includes scholarships and grants); teaching assistantships; research assistantships (includes traineeships, internships, clinical residencies, and other assistantships); own resources (includes loans, personal savings, personal earnings, and earnings or savings of spouse, partner, or family); and other (includes employer reimbursements and support from non-U.S. sources).

**Time to degree.** The time elapsed from the start of any graduate school program to completion of the doctoral degree.

**Underrepresented minority.** The following groups are underrepresented in science and engineering, relative to their numbers in the U.S. population: American Indian or Alaska Native, black or African American, and Hispanic or Latino.

# DATA SOURCE

The Survey of Earned Doctorates (SED) is the sole data source for *Doctorate Recipients from U.S. Universities: 2018*. The principal elements of the 2018 SED data collection are described in the sections that follow. More detailed information and related technical tables are available at <https://nces.nsf.gov/sed/>.

**Survey eligibility.** The SED collects information on research doctorate recipients only. Research doctorates require the completion of a dissertation or equivalent project, are oriented toward preparing students to make original intellectual contributions in a field of study, and are not primarily intended for the practice of a profession. The 2018 SED recognized 18 distinct types of research doctorates. In 2018, 98% of research doctorate recipients earned the PhD.

**Survey universe.** The population eligible for the 2018 survey consisted of all individuals who received a research doctorate from an accredited U.S. academic institution in the 12-month period from 1 July 2017 to 30 June 2018. The total universe consisted of 55,195 persons in 431 institutions that conferred research doctorates in academic year 2018.

**Data collection.** Institutional coordinators at each doctorate awarding institution distributed the SED Web survey link (or paper survey form) to individuals receiving a research doctorate. Nonresponding graduates were contacted by e-mail, mail, or phone to request response to the survey. RTI International served as the 2018 SED data collection contractor on behalf of NCSES.

**Survey response rates.** In 2018, 92.1% of research doctorate recipients completed the survey. Limited records (field of study, doctoral institution, and sex) are constructed for nonrespondents from administrative records of the university—commencement programs, graduation lists, and other public records—and are included in the reported total of doctorate recipients. The survey response rates for 1979–2018 and the item response rates for 2009–18 are provided in the technical tables.

**Time series data changes.** After a multiyear review of Doctor of Education (EdD) degree programs participating in the SED, 143 programs were reclassified from research doctorate to professional doctorate over the 2010–11 period. No additional reclassifications of EdD degree programs are planned. SED data are no longer being collected from graduates earning degrees from the reclassified EdD programs, and this has affected the reporting of the number of doctorates awarded by sex, citizenship, race, and ethnicity. Several figures in this report show the impact of the decline in number of education doctoral degrees awarded from 2009 to 2011 (see figure 8 and figure 12 in the section Fields of study, and figure 21 in the section Postgraduation trends). Readers should note that the declines from 2009 to 2010 and from 2010 to 2011 are at least partly attributable to the EdD reclassification.

**Data license.** Microdata from the SED may be obtained through a restricted-use data license (see <https://nces.nsf.gov/statistics/license/index.cfm>).

## ONLINE RESOURCES

An interactive version of the printed report and its related resources, described below, are available at <https://nces.nsf.gov/sed/>. Data from the Survey of Earned Doctorates (SED) also can be further explored in an interactive data tool at <https://ncesdata.nsf.gov/ids/sed>.

**Data tables.** Data on the full range of survey items collected by the 2018 SED are presented in 72 detailed statistical tables. These tables present detailed data on the demographic characteristics, educational history, sources of financial support, and postgraduation plans of doctorate recipients. The full set of tables is available for download, either as PDF or Excel files.

**Figures.** The figures illustrating each theme are presented as interactive graphics and are available for download as image files, accompanied by the supporting source data in Excel format.

**Survey questionnaire.** A link to the questionnaire for the 2018 SED appears in the How Do I... section of the online report.

**Technical notes and tables.** The technical notes provide more detail on how the SED collects data about recipients of research doctorates. The technical tables provide such information as the types of research doctoral degrees included in the SED, survey response rates over time, and details on field aggregations.

# ACKNOWLEDGMENTS, CITATION, AND CONTACT

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## Contact report author

Jaquelina Falkenheim  
703-292-7798  
[jfalkenh@nsf.gov](mailto:jfalkenh@nsf.gov)



<https://nces.nsf.gov/pubs/nsf20301/>



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ENDOWMENT  
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HUMANITIES



NSF 20-301