STATS IN BRIEF

Participants in Subbaccalaureate Occupational Education: 2012

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Statistics in Brief publications present descriptive data in tabular formats to provide useful information to a broad audience, including members of the general public. They address simple and topical issues and questions. They do not investigate more complex hypotheses, account for inter-relationships among variables, or support causal inferences. We encourage readers who are interested in more complex questions and in-depth analysis to explore other NCES resources, including publications, online data tools, and public- and restricted-use datasets. See nces.ed.gov and references noted in the body of this document for more information.

Subbaccalaureate credentials, including associate's degrees and postsecondary certificates below the bachelor's level, are a large and growing part of the postsecondary education enterprise. For example, in 2015, fully 51 percent of all undergraduate credentials were awarded at the subbaccalaureate level, up from 48 percent in 2003.[1] Horn and Li (2009) found a 25 percent growth in subbaccalaureate credentials from 2002 to 2007, compared to an 18 percent growth rate for bachelor's degrees. Finally, Hussar and Bailey (2018) examined trends in associate's and bachelor's degrees, and found that the number of associate's degrees awarded increased 70 percent from 2001–02 to 2014–15, and was projected to increase 34 percent from 2014–15 to 2026–27, while the corresponding increases for bachelor's degrees were 47 percent and 10 percent. Most of these subbaccalaureate credentials (74 percent in 2015) are awarded in occupational, rather than in academic, fields of study, which corresponds to 38 percent of undergraduate education (Hudson 2018).

Subbaccalaureate credentials in general, and those in occupational fields in particular, have been found to offer employment opportunities and

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economic benefits beyond a high school credential alone (see summary in Bahr et al. 2015). However, these benefits vary widely by the level of the credential, field of study, and characteristics of the recipients (Carnevale, Rose, and Hanson 2012; Xu and Trimble 2016). Specifically, the benefits of earning an associate's degree are greater than those of earning a certificate, and credentials earned in health care or in technical fields are more lucrative than those earned in other fields. For example, a California study found a positive association between subbaccalaureate credentials in health care and earnings and a negative association between subbaccalaureate credentials in consumer services (e.g., cosmetology) and earnings (Bahr 2016). In addition, men who earn a subbaccalaureate credential experience greater economic returns than do women, although this finding may be at least partially explained by sex differences in field of study (Carnevale, Rose, and Hanson 2012).

Another potential benefit of subbaccalaureate occupational education programs is that they can provide a pathway to higher education and career advancement for adults from low socioeconomic backgrounds. This population, underrepresented in higher education, has been shown to benefit from the more flexible schedule, lower cost, and less restrictive admissions policies offered by many occupational programs in comparison to 4-year degree programs

(Symonds, Schwartz, and Ferguson 2011; Marcotte et al. 2005).

Given the important role of subbaccalaureate occupational education within the larger education enterprise, it is useful to monitor its size and scope, identify who participates in it, and examine what and where these students study. Hudson (2018) used data on credential awards to examine trends in the size and scope of subbaccalaureate occupational education. This study found that subbaccalaureate occupational education has remained a relatively constant, roughly 40 percent of undergraduate credentials, with fluctuating growth and shrinkage in the for-profit sector. The study also found growth in some subbaccalaureate occupational fields (such as health care) and declines in other fields (such as business support). This Brief in some ways complements that report, as it also looks at size, sector, and field of study. However, this Brief focuses on subbaccalaureate occupational students, including who these students are and what and where they study. It builds on earlier National Center for Education Statistics (NCES) studies that also examined these students. For example, Hudson, Kienzl, and Diehl (2007) and Levesque et al. (2008) found that past cohorts of subbaccalaureate occupational students (in 1996 and 2004) were more likely than other postsecondary students to be female, Black, and older in age and to have parents with lower levels of educational attainment. This

Brief provides a more current view of participation in subbaccalaureate occupational education as of the 2011–12 academic year, finding similar patterns of participation.

It should be noted that this report focuses on students who intend to earn a subbaccalaureate occupational credential, rather than on actual credential awards, as have been examined in some other studies (e.g., Hudson 2018; Hussar and Bailey 2018; Horn and Li 2009). Because students can change majors, transfer from subbaccalaureate to baccalaureate programs, or leave school without a credential, the two types of analyses are somewhat different. This study is also based on cross-sectional data (described below) and so does not examine students' paths through school; other studies (e.g., see list in the "Find Out More" section of this report) analyze these issues.

DATA AND KEY DEFINITIONS

This Statistics in Brief uses data from the 2011–12 National Postsecondary Student Aid Study (NPSAS:12) to examine participation in subbaccalaureate occupational education. NPSAS:12 provides information on a nationally representative sample of students enrolled in postsecondary institutions that participate in Title IV federal financial aid programs. The NPSAS:12 sample includes about 95,000 undergraduate and 16,000 graduate students who were enrolled in about 1,500 institutions at any time between July 1, 2011, and June 30, 2012.

For the analysis in this Brief, the sample was restricted to NPSAS:12 undergraduates who were enrolled in a certificate, associate's degree, or bachelor's degree program: the sample excludes graduate students and students not seeking a postsecondary credential.[2] More information on NPSAS:12 is available in the Technical Notes at the end of this Brief and in *2011–12 National Postsecondary Student Aid Study (NPSAS:12) Data File Documentation* (Wine, Bryan, and Siegel 2013).

All comparisons of estimates were tested for statistical significance using the Student's *t* statistic, and all differences cited in the text are statistically significant at the *p* < .05 level. (No adjustments were made for multiple comparisons.)

KEY TERMS USED IN THE REPORT

The Brief defines occupational education as subbaccalaureate programs—those leading to certificates or associate's degrees—within any of the following 11 broad fields of study: *agriculture and natural resources; business and marketing; communications and design; computer and information sciences; consumer services; education; engineering and architecture; health sciences; manufacturing, construction, repair, and transportation; protective services;* and *public, legal, and social services.* The focus on these subbaccalaureate programs derives from the 2006 Carl D. Perkins Act (P.L. 109-270), which funds career and technical education at the secondary and subbaccalaureate postsecondary levels. All other fields of study (e.g., arts, languages, mathematics, science) are classified as academic fields.

Students seeking a subbaccalaureate credential in any of the 11 occupational fields of study are defined in this Brief as "subbaccalaureate occupational students." These students are sometimes compared to students seeking a subbaccalaureate credential in an academic field of study and to students seeking a bachelor's degree in any field of study.[3]

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[2] The analysis sample included 93,460 credential-seeking undergraduates, who made up approximately 98 percent of the total NPSAS:12 undergraduate sample.

[3] These comparisons exclude subbaccalaureate students who have not declared a major or field of study; this undeclared group makes up 1 percent of credential-seeking undergraduates (see figure 1 on page 5).

STUDY QUESTIONS

1 How prevalent is subbaccalaureate occupational education?

2 What are the most common subbaccalaureate occupational fields of study?

3 Who majors in subbaccalaureate occupational education?

4 Where do subbaccalaureate occupational students enroll?

KEY FINDINGS

- In 2011–12, some 38 percent of all credential-seeking undergraduates were pursuing an associate's degree or certificate in an occupational field of study— that is, 38 percent were subbaccalaureate occupational students as defined in this Brief.

- Health sciences was the most common field of study pursued by subbaccalaureate occupational students (36 percent), followed by business and marketing (17 percent).

- The majority of subbaccalaureate occupational students were White (54 percent), while Black and Hispanic students each made up 19 percent of subbaccalaureate occupational students. The percentage of Black students was larger in subbaccalaureate occupational programs than in subbaccalaureate academic programs (16 percent) or bachelor's degree programs (14 percent), and the percentage of Hispanic students was larger in subbaccalaureate occupational programs than in bachelor's degree programs (13 percent).

- The majority of subbaccalaureate occupational students were female (60 percent), and they constituted a larger percentage of the students in these programs than in either subbaccalaureate academic programs (56 percent) or bachelor's degree programs (55 percent). However, the percentage of females in subbaccalaureate occupational programs varied by field of study, with larger percentages in service-related fields, such as education, than in more technical fields, such as computer and information sciences.

- Subbaccalaureate occupational students were older (age 28), on average, than both subbaccalaureate academic students (age 26) and bachelor's degree students (age 25).

- Subbaccalaureate occupational students were more often first-generation college students (48 percent) than were subbaccalaureate academic students (43 percent) or bachelor's degree students (31 percent).

- Subbaccalaureate occupational students most often enrolled in public 2-year institutions (65 percent), followed by for-profit institutions (20 percent).
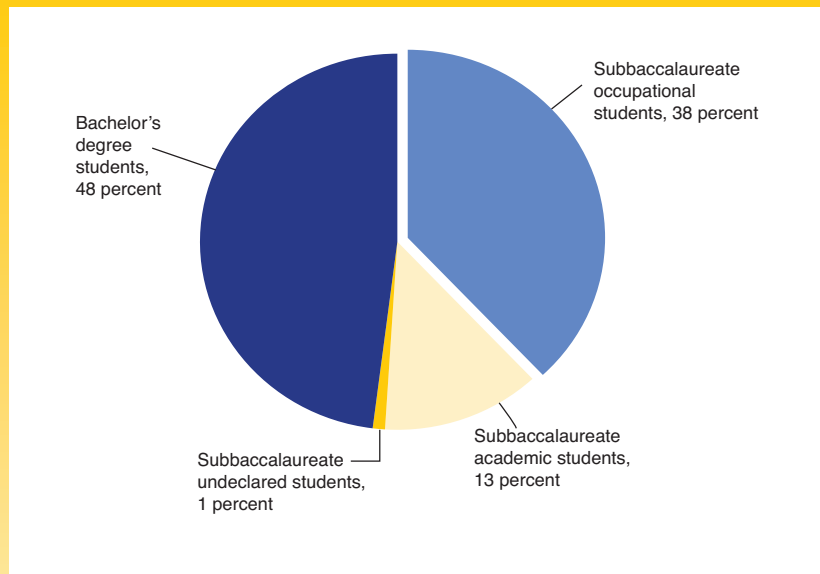
1

How prevalent is subbaccalaureate occupational education?

In 2011–12, among all credential-seeking undergraduates, 38 percent were pursuing a subbaccalaureate credential in an occupational field of study, while 13 percent were pursuing a subbaccalaureate credential in an academic field of study and 48 percent were seeking a bachelor's degree (figure 1). The 38 percent of subbaccalaureate occupational students consisted of 30 percent pursuing an occupational associate's degree and 8 percent pursuing an occupational certificate.[4]

FIGURE 1.

PREVALENCE OF SUBBACCALAUREATE OCCUPATIONAL EDUCATION
Percentage distribution of credential-seeking undergraduates, by credential goal and curriculum area: 2011–12

Bachelor's degree students, 48 percent

Subbaccalaureate occupational students, 38 percent

Subbaccalaureate academic students, 13 percent

Subbaccalaureate undeclared students, 1 percent

NOTE: Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p125.asp.

[4] Statistics not shown in figures; see https://nces.ed.gov/surveys/ctes/tables/p125.asp.
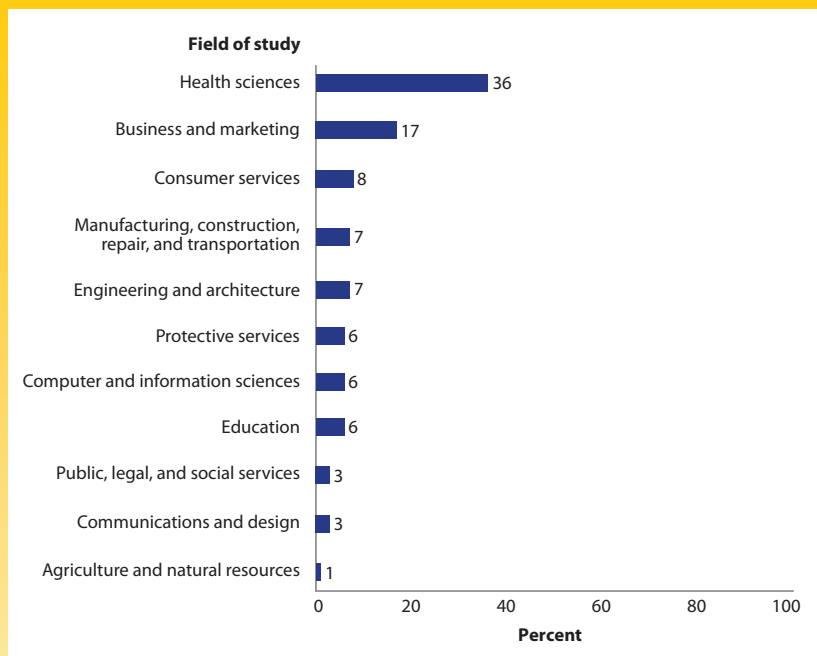
2

What are the most common subbaccalaureate occupational fields of study?

In 2011–12, *health sciences* was the most common field of study among subbaccalaureate occupational students (36 percent) (figure 2). The second most common field of study was *business and marketing* (17 percent). Among occupational students seeking associate's degrees, *health sciences* and *business and marketing* were also the two most common fields of study (figure 3). However, among occupational students seeking a certificate, the two most common fields of study were *health sciences* and *consumer services* (followed by the broad field of *manufacturing, construction, repair, and transportation*).

FIGURE 2.

SUBBACCALAUREATE OCCUPATIONAL FIELDS OF STUDY
Percentage distribution of students seeking a subbaccalaureate occupational credential, by field of study: 2011–12

Field of study

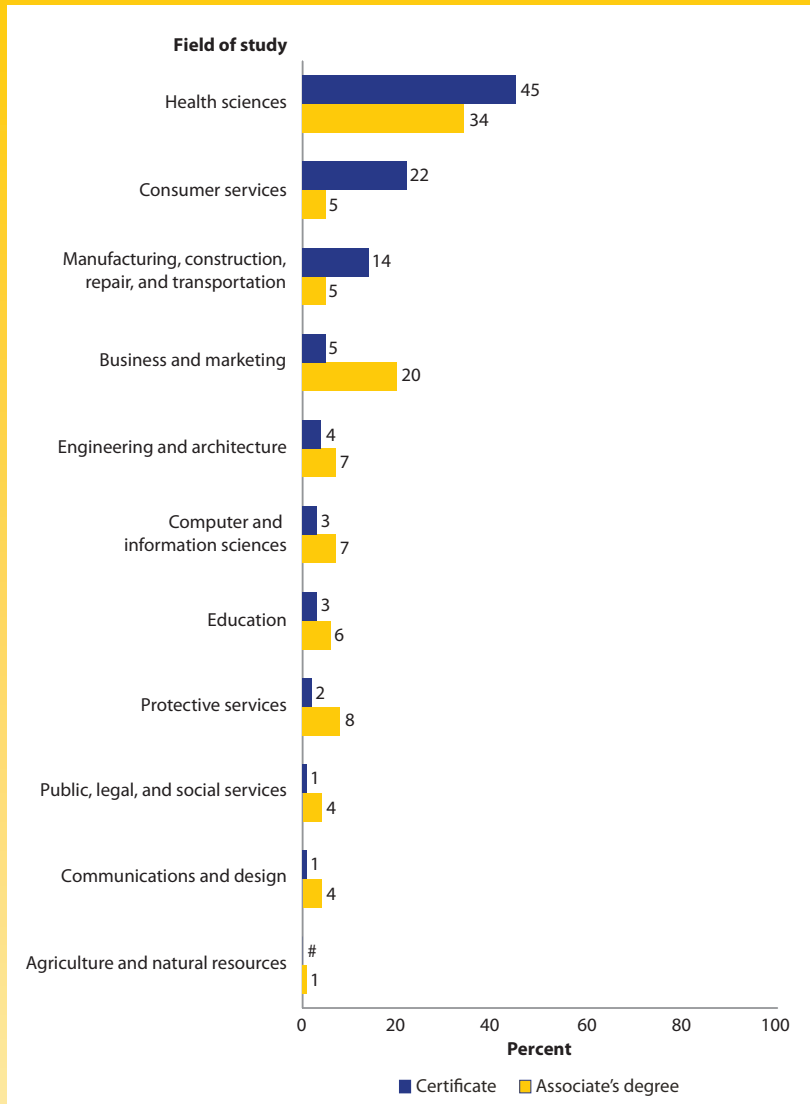| Field of study	Percent
Health sciences	36
Business and marketing	17
Consumer services	8
Manufacturing, construction, repair, and transportation	7
Engineering and architecture	7
Protective services	6
Computer and information sciences	6
Education	6
Public, legal, and social services	3
Communications and design	3
Agriculture and natural resources	1

Percent

NOTE: Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p139.asp.

FIGURE 3.

Field of study

Field of study	Certificate	Associate's degree
Health sciences	45	34
Consumer services	22	5
Manufacturing, construction, repair, and transportation	14	5
Business and marketing	5	20
Engineering and architecture	4	7
Computer and information sciences	3	7
Education	3	6
Protective services	2	8
Public, legal, and social services	1	4
Communications and design	1	4
Agriculture and natural resources	#	1

Percent

■ Certificate ■ Associate's degree

Rounds to zero.
NOTE: Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p139.asp.

3 Who majors in subbaccalaureate occupational education?

Race/Ethnicity. Looking at the three largest race/ethnicity groups, White students made up the largest share (54 percent) of subbaccalaureate occupational students in 2011–12, while Black and Hispanic students accounted for 19 percent each (figure 4).

Subbaccalaureate occupational students, compared to subbaccalaureate academic students, were more often Black (19 percent versus 16 percent), but there were no measureable differences between these subbaccalaureate students in terms of the proportion who were Hispanic (19 percent versus 20 percent) or White (54 percent each). Subbaccalaureate occupational students, compared to bachelor's degree students, were more often Black (19 percent versus 14 percent) and Hispanic (19 percent versus 13 percent), and less often White (54 percent versus 62 percent).

Sex. Overall, females made up the majority (60 percent) of subbaccalaureate occupational students (figure 5). This is a larger proportion of females than was found among subbaccalaureate academic students (56 percent) or bachelor's degree students (55 percent).

The percentage of females in subbaccalaureate occupational programs varied by field of study. Females accounted for larger

FIGURE 4.

STUDENTS' RACE/ETHNICITY
Percentage distribution of the race/ethnicity of credential-seeking undergraduates, by credential goal and curriculum area: 2011–12
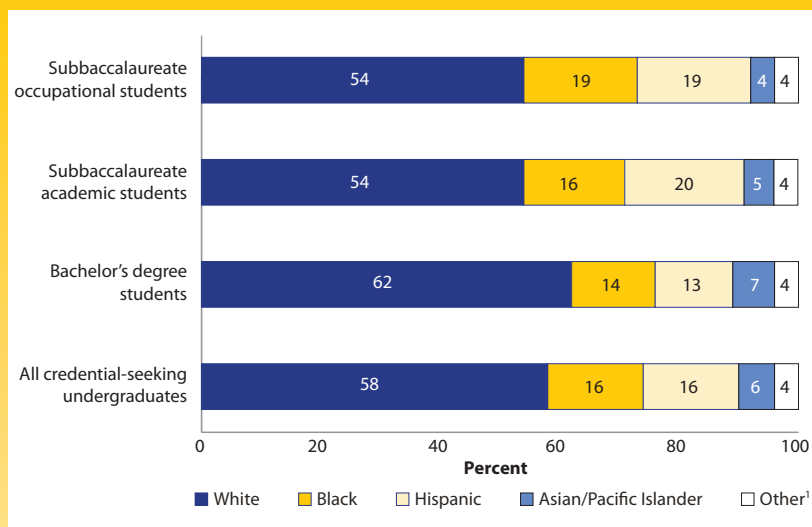
[1] "Other" includes *American Indian, Alaska Native, Two or more races,* and *Other* (unspecified) race. Race categories exclude those of Hispanic origin.
NOTE: Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p132.asp.

percentages of students in service-related fields than in more technical fields (figure 6). Overall, females were more highly represented[5] in *education* (83 percent); *public, legal, and social services* (83 percent); *health sciences* (82 percent); and *consumer services* (77 percent). Males were more highly represented in *manufacturing, construction, repair, and transportation*

(95 percent); *engineering and architecture* (86 percent); and *computer and information sciences* (77 percent).

Age. In 2011–12, the average age of subbaccalaureate occupational students was 28 years old (figure 7). On average, subbaccalaureate occupational students were older than both subbaccalaureate academic students (26 years old) and bachelor's degree students (25 years old).

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[5] "More highly represented" was defined for this analysis as a subject field in which more than 60 percent of the students in that field were of one sex or the other. No standard definition of over-representation was found in a review of the literature.
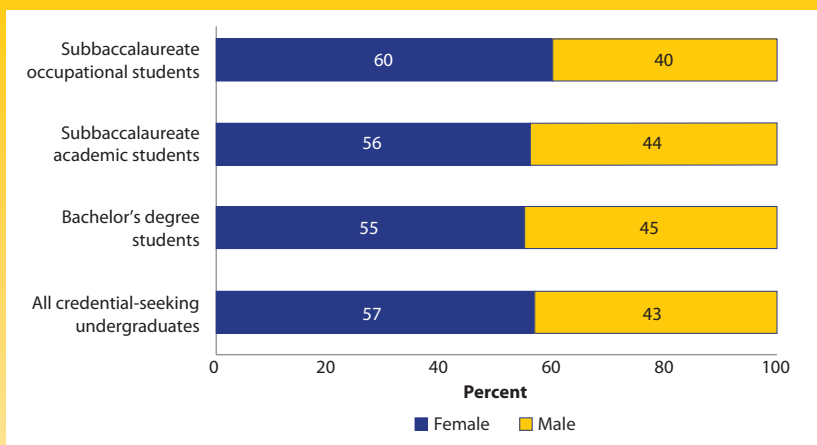
Parents' highest level of education. In 2011–12, some 48 percent of subbaccalaureate occupational students had parents with no college experience, 25 percent had a parent with some college experience but no degree, and 27 percent had a parent with a bachelor's or higher degree (figure 8). Overall, the parents of subbaccalaureate occupational students had lower levels of education than the parents of subbaccalaureate academic students and bachelor's degree students. More subbaccalaureate occupational students had parents with no college experience than either subbaccalaureate academic students or bachelor's degree students (48 percent versus 43 and 31 percent, respectively), while fewer subbaccalaureate occupational students had parents with a bachelor's or higher degree than either subbaccalaureate academic students or bachelor's degree students (27 percent versus 32 and 48 percent, respectively).

FIGURE 5.

STUDENTS' SEX
Percentage distribution of the sex of credential-seeking undergraduates, by credential goal and curriculum area: 2011–12

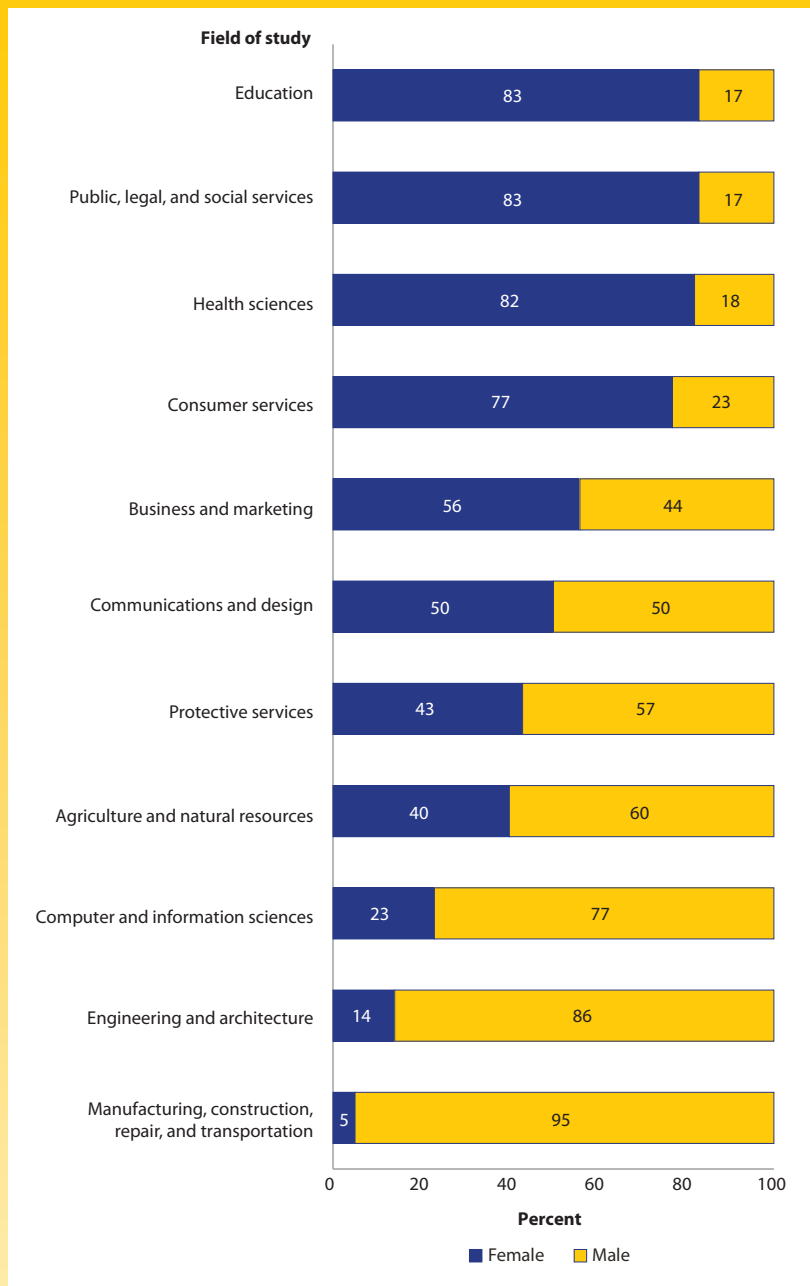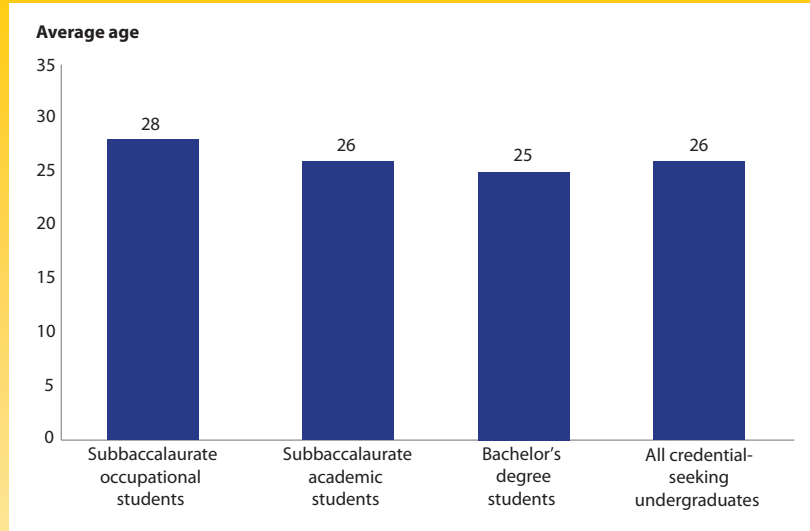|	Female	Male
Subbaccalaureate occupational students	60	40
Subbaccalaureate academic students	56	44
Bachelor's degree students	55	45
All credential-seeking undergraduates	57	43

NOTE: Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p130.asp.

FIGURE 6.

STUDENTS' SEX BY OCCUPATIONAL FIELD OF STUDY
Percentage distribution of the sex of subbaccalaureate occupational students, by field of study: 2011–12

Field of study

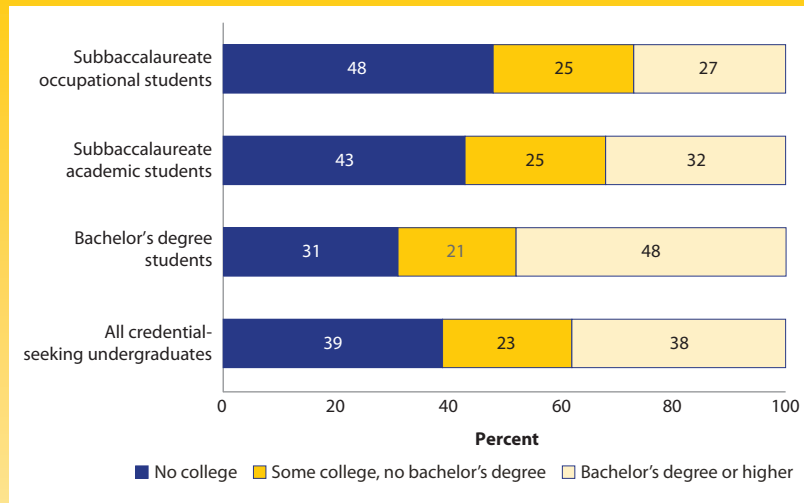| Field of study	Female	Male
Education	83	17
Public, legal, and social services	83	17
Health sciences	82	18
Consumer services	77	23
Business and marketing	56	44
Communications and design	50	50
Protective services	43	57
Agriculture and natural resources	40	60
Computer and information sciences	23	77
Engineering and architecture	14	86
Manufacturing, construction, repair, and transportation	5	95

Percent

■ Female   □ Male

NOTE: Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p131.asp.

FIGURE 7.

Average age

Category	Average age
Subbaccalaurate occupational students	28
Subbaccalaurate academic students	26
Bachelor's degree students	25
All credential-seeking undergraduates	26

NOTE: Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p130.asp.

FIGURE 8.

EDUCATIONAL ATTAINMENT OF STUDENTS' PARENTS
Percentage distribution of the highest level of education attained by the parents of credential-seeking undergraduates, by undergraduates' credential goal and curriculum area: 2011–12

Category	No college	Some college, no bachelor's degree	Bachelor's degree or higher
Subbaccalaureate occupational students	48	25	27
Subbaccalaureate academic students	43	25	32
Bachelor's degree students	31	21	48
All credential-seeking undergraduates	39	23	38

Percent

■ No college ■ Some college, no bachelor's degree □ Bachelor's degree or higher

NOTE: Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia. Estimates exclude the 3.6 percent of credential-seeking undergraduates who did not know their parents' highest level of education.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p130.asp.

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Where do subbaccalaureate occupational students enroll?

In 2011–12, the majority of subbaccalaureate occupational students (65 percent) were enrolled in public 2-year institutions, followed by private for-profit institutions (20 percent) (figure 9). Fewer subbaccalaureate occupational students were enrolled in all other types of institutions (8 percent) or in more than one institution (6 percent).

A larger proportion of subbaccalaureate occupational students than subbaccalaureate academic students were enrolled in private for-profit institutions (20 percent versus 2 percent), and a smaller proportion of subbaccalaureate occupational students than subbaccalaureate academic students were enrolled in public 2-year institutions (65 percent versus 82 percent).

Enrollment patterns differed for occupational certificate and occupational associate's degree students (figure 10). Occupational students seeking an associate's degree enrolled in public 2-year institutions (72 percent) more often than in for-profit institutions (13 percent). In contrast, occupational students seeking a certificate enrolled in for-profit institutions (49 percent) more often than in 2-year public institutions (36 percent).

FIGURE 9.

INSTITUTION TYPE
Percentage distribution of the institution type attended by credential-seeking undergraduates, by credential goal and curriculum area: 2011–12
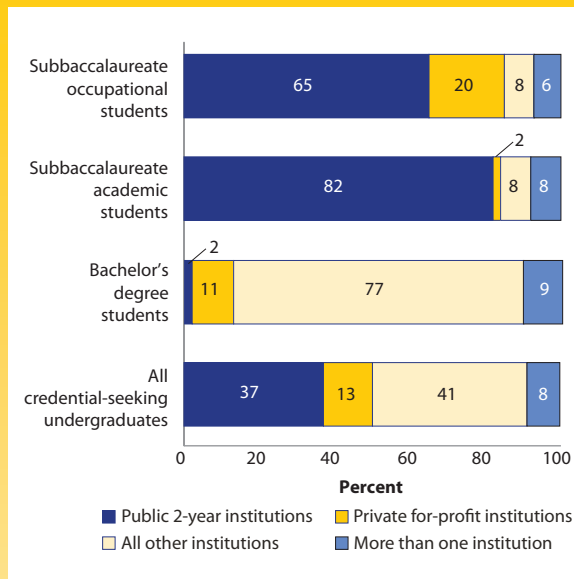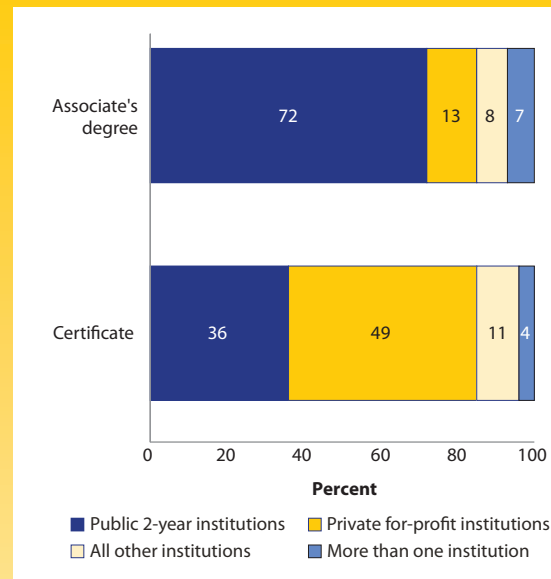
NOTE: "All other institutions" includes public, 4-year institutions; public, less-than-2-year institutions; and all private, not-for-profit institutions. Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p125.asp.

FIGURE 10.

INSTITUTION TYPE BY CREDENTIAL LEVEL
Percentage distribution of the institution type attended by subbaccalaureate occupational students, by credential goal: 2011–12

NOTE: "All other institutions" includes public, 4-year institutions; public, less-than-2-year institutions; and all private, not-for-profit institutions. Estimates include undergraduate credential-seeking students who were enrolled in Title IV eligible postsecondary institutions in the 50 states and the District of Columbia. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *2011–12 National Postsecondary Student Aid Study (NPSAS:12)*. Estimates and standard errors available at https://nces.ed.gov/surveys/ctes/tables/p125.asp.

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For questions about content or to view this report online, go to:

https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2018149

Additional information on subbaccalaureate occupational students can be found in the following publications produced by the National Center for Education Statistics (NCES):

Career and Technical Education Coursetaking and Postsecondary Enrollment and Attainment: High School Classes of 1992 and 2004 (NCES 2016-109). https://nces.ed.gov/pubs2016/2016109.pdf

Employment Status of Postsecondary Completers in 2009: Examination of Credential Level and Occupational Credentials (NCES 2016-107). https://nces.ed.gov/pubs2016/2016107.pdf

Persistence and Attainment Among Postsecondary Subbaccalaureate Students (NCES 2016-083). https://nces.ed.gov/pubs2016/2016083.pdf

The Relationship Between Education and Work Credentials (NCES 2015-556). https://nces.ed.gov/pubs2015/2015556.pdf

Additional information on postsecondary enrollments can be found in the following NCES publications:

A Profile of the Enrollment Patterns and Demographic Characteristics of Undergraduates at For-Profit Institutions (NCES 2017-416). https://nces.ed.gov/pubs2017/2017416.pdf

Enrollment and Employees in Postsecondary Institutions, Fall 2015; and Financial Statistics and Academic Libraries, Fiscal Year 2015: First Look (Provisional Data) (NCES 2017-024). https://nces.ed.gov/pubs2017/2017024.pdf

Web Tables—First-Time Postsecondary Students in 2011–12: A Profile (NCES 2016-136). https://nces.ed.gov/pubs2016/2016136.pdf

TECHNICAL NOTES

The estimates provided in this Statistics in Brief are based on data collected in the 2011–12 National Postsecondary Student Aid Study (NPSAS:12). This section describes the NPSAS:12 survey methodology and response rates; more detailed information on these survey features is available in *2011–12 National Postsecondary Student Aid Study (NPSAS:12) Data File Documentation* (Wine, Bryan, and Siegel 2013). This section also describes the statistical testing procedures and variables used in the Brief.

Survey Methodology

NPSAS:12 covers a broad range of topics concerning student enrollment in postsecondary education and how students and their families finance their education. Students provided data through questionnaires administered over the Internet and by telephone. In addition, data were collected from the postsecondary institutions that the sampled students attended, through the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS), and from other relevant databases, including U.S. Department of Education records on student loan and grant programs and student financial aid applications. The estimates reported in this Brief are based on both student interviews and records provided by institutions. NPSAS:12 is the eighth administration of NPSAS, which has been conducted every 3 to 4 years since 1986–87. The NPSAS:12 target population included

students enrolled in Title IV institutions in the United States at any time between July 1, 2011, and June 30, 2012.[6] This population included about 23 million undergraduate and 4 million graduate students enrolled in over 6,000 institutions.

The institutional sampling frame for NPSAS:12 was initially constructed from the 2008–09 IPEDS Institutional Characteristics, Fall Enrollment, and Completions files and was later freshened using the 2009–10 IPEDS files. These files include all U.S. postsecondary institutions that are eligible to participate in Title IV federal financial aid programs. NPSAS:12 used a two-stage sampling design. In the first stage, eligible institutions were sampled to obtain student records and enrollment lists. Institutions were selected with a probability proportional to a composite measure of size based on their expected 2011–12 enrollment. A total of 1,690 institutions were selected for the study, and 1,480 of these institutions participated, for a weighted response rate of 87 percent.

In the second stage, eligible students were selected from the enrollment lists that the institutions provided. Eligible students were identified as

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[6] The target population of students was limited to those enrolled in an academic program, at least one course for credit that could be applied toward an academic degree, or an occupational or vocational program requiring at least 3 months or 300 clock hours of instruction to receive a degree, certificate, or other formal award. The target population excluded students who were also enrolled in high school or a high school completion (e.g., GED® preparation) program. "Title IV institutions" refers to institutions eligible to participate in federal financial aid programs under Title IV of the Higher Education Act.

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study members if at least 11 key data elements were available from any of the available data sources. The 11 key data elements were student type (undergraduate or graduate), age, gender, and 8 of the following 15 variables: dependency status, marital status, number of dependents, income, expected family contribution, degree program, class level, first-time beginning student status, months enrolled, tuition, receipt of federal aid, receipt of nonfederal aid, student budget, race, and parent education. The final sample numbered 128,120 students. Approximately 96 percent of the final sample ($N = 123,600$) was eligible for NPSAS.

Estimates generated by sample surveys are subject to two broad categories of error: sampling errors and nonsampling errors. Sampling errors occur when observations are based on samples rather than on entire populations. The standard error of a sample statistic is a measure of the variation due to sampling and indicates the precision of the statistic. The complex sampling design used in NPSAS:12 must be taken into account when calculating variance estimates such as standard errors. The analysis in this report used balanced repeated replication to adjust variance estimation for the complex survey design.

Nonsampling errors can be attributed to several sources: incomplete information about all respondents (e.g., some students or institutions refuse to participate or some students

participate but answer only certain items); differences among respondents in question interpretation; the inability or unwillingness of respondents to give the correct information; mistakes in recording or coding data; and other errors of collecting, processing, and imputing missing data. In all NCES surveys, efforts are made to minimize the sources of nonsampling error.

Response Rates

NCES Statistical Standard 4-4-1 states that "[a]ny survey stage of data collection with a unit or item response rate less than 85 percent must be evaluated for the potential magnitude of nonresponse bias before the data or any analysis using the data may be released" (U.S. Department of Education 2012). For NPSAS:12, this means that a nonresponse bias analysis could be required at any of four levels: institutions, study members, student interviews, and items. The NPSAS:12 institutional and study member response rates were 87 and 91 percent, respectively (exhibit 1). Therefore, a nonresponse bias analysis was not required at those levels.

The NPSAS:12 student interview response rate was 73 percent. Due to this low interview response rate, a nonresponse bias analysis was conducted in which interview respondents and interview nonrespondents were compared. This analysis determined that the nonresponse weighting adjustment eliminated some, but not all, significant bias in the student interview. Because study members, not interview

respondents, are the unit of analysis in NPSAS:12, only a study member weight was created. As a result, analysts could not compare nonresponse bias analyses after weight adjustments.

Among the student interview items used in this Brief, only one had a response rate below 85 percent: PAREDUC (highest parental education) had an item response rate of 78 percent. For this item, a nonresponse bias analysis was conducted to determine whether respondents and nonrespondents differed on the following characteristics: institution sector, region, and total enrollment; student type, first-time beginner status, and age group; and a variety of student aid measures.

Nonresponse bias analyses of the PAREDUC item found that respondents differed from nonrespondents on 65 percent of the characteristics analyzed, indicating that there may be bias in this estimate. Any bias due

to nonresponse, however, is based upon responses prior to stochastic imputation in which missing data were replaced with valid data from the records of donor cases that matched the recipients on selected demographic, enrollment, institution, and financial aid-related variables.

Because imputation procedures are designed specifically to identify donors with characteristics similar to those with missing data, the imputation is assumed to reduce bias (Krotki, Black, and Creel 2005). While the amount of item-level bias before imputation is measurable, the same measurement cannot be made after imputation. Although the magnitude of any change in item-level bias cannot be determined, the item estimates before and after imputation were compared to determine whether the imputation changed the biased estimate, as an indication of a possible reduction in bias. For PAREDUC, the estimated difference was computed

Exhibit 1. Weighted response rates at the unit and item levels

Level of analysis	Response rate	Overall[1]
Unit level		
Institution	87	†
Study member	91	79
Student interview	73	64
Item level (below 85 percent)		
PAREDUC	78	†

† Not applicable.
[1] Institution list participation rate times study or student response rate.

for each of the response categories as the percentage of students in that category before imputation, minus the percentage of students in that category after imputation. These estimated differences were tested for statistical significance at the 5 percent level. A significant difference between the item estimates after imputation implies a reduction in bias due to imputation. A nonsignificant difference suggests that imputation may not have reduced bias, that the sample size was too small to detect a significant difference, or that there was little bias to be reduced. Statistical tests of the differences between estimates before and after imputation of PAREDUC were significant, indicating that the nonresponse bias was reduced through imputation.

Statistical Procedures

Comparisons of means and proportions were tested using Student's t statistic. Differences between estimates were tested against the probability of a Type I error[7] or significance level. The statistical significance of each comparison was determined by calculating the Student's t value for the difference between each pair of means or proportions and comparing the t value with published tables of significance levels for two-tailed hypothesis testing. Student's t values were computed to test differences between independent estimates using the following formula:

$$ t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}} $$

where E_1 and E_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors. This formula is valid only for independent estimates. When estimates are not independent, the covariance must be accounted for in the formula. The t value computed to test differences between dependent estimates in this Brief is conservative in that it assumes a perfect correlation between the estimates being compared:

$$ t = \frac{E_1 - E_2}{\sqrt{(se_1^2 + se_2^2) + (2[se_1 * se_2])}} $$

This formula was used when comparing two percentages from a distribution that adds to 100. For all statistical tests, no adjustments were made for multiple comparisons.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large t statistics may appear to merit special attention. This can be misleading, since the magnitude of the t statistic is related not only to the observed differences in means or percentages but also to the number of respondents in the specific categories used for comparison. Hence, a small difference compared across a large number of respondents would produce a

large (and thus possibly statistically significant) t statistic.

A second hazard in reporting statistical tests is the possibility that one can report a "false positive," or Type I, error. Statistical tests are designed to limit the risk of this type of error using a value denoted by alpha. The alpha level of .05 was selected for the findings in this report and ensures that a difference of a certain magnitude or larger would be produced when there was no actual difference between the quantities in the underlying population no more than 1 time out of 20. When analysts test hypotheses that show alpha values at the .05 level or smaller, they reject the null hypothesis that there is no difference between the two quantities. Failing to reject a null hypothesis (i.e., detecting a difference), however, does not imply the values are the same or equivalent.

It is important to note that many of the variables examined in this report may be related to one another and to other variables not included in the analysis. The complex interactions and relationships among the variables were not explored. Furthermore, the variables examined in this report are just a few of those that could be examined. Thus, readers are cautioned not to draw causal inferences based on the results presented here.

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[7] A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.

Variable List

Student Interview

Average student age (AGE)
This variable indicates the student's age as of December 31, 2011.

Student sex (GENDER)

This variable includes the categories 1=Male; 2=Female, based on the question "Are you male or female?"

Parents' highest level of education (PAREDUC)

This variable indicates the highest education level of the student's father (PDADED) or mother (PMOMED). The answers for each of these variables were coded as: 1=Did not complete high school, 2=High school diploma or equivalent, 3=Vocational/technical training, 4=Less than 2 years of college, 5=Associate's degree, 6=2 or more years of college but no degree, 7=Bachelor's degree, 8=Master's degree or equivalent, 9=Professional degree (Ph.D., Ed.D., etc.), and 11=Don't know.

Parents' highest level of education is based on the highest education level attained by either parent. If one parent's education level was unknown, then the known level was used. In this Brief, the categories for parents who "Did not complete high school" or attained a "High school diploma or equivalent" were combined as "No college." The categories for "Vocational/technical training," "Less than 2 years of college," "Associate's degree," and "2 or more years of college but no degree" were combined as "Some college, no

bachelor's degree." The categories for "Professional degree," "Master's degree or equivalent," and "Bachelor's degree" were combined as "Bachelor's degree or higher."

Student major (DERMJRNM)

This variable indicates each student's major or field of study during the 2011–12 academic year, and was derived from student interview and institution records data. Students were asked to report their major with the following question: "What is your [intended] major or field of study at [NPSAS institution]?" In addition, institutions reported students' majors using Classification of Instructional Programs (CIP) codes or verbatim strings. DERMJRNM was derived by converting verbatim strings and the student interview major codes into a common set of 4-digit CIP codes. The resulting CIP-coded variable was then mapped onto the *Career and Technical (CTE) Statistics* postsecondary taxonomy (https://nces.ed.gov/surveys/ctes/tables/postsec_tax.asp) to classify fields of study into two main categories, "Occupational education" or "Academic education." These categories were further divided into more detailed classifications, using the *CTE Statistics* postsecondary taxonomy. Based on that taxonomy, the following majors were reported as "occupational" fields of study: *agriculture and natural resources*; *business and marketing* (a combination of the business management, business support, and marketing taxonomy categories); *communications and*

design; *computer and information sciences*; *consumer services*; *education*; *engineering and architecture*; *health sciences*; *manufacturing, construction, repair, and transportation*; *protective services*; and *public, legal, and social services*. Academic fields of study are those in *arts, biological and physical sciences, English, foreign languages, liberal arts/general studies, mathematics, philosophy and religion, social and behavioral sciences,* and *interdisciplinary studies*. The "Undeclared" field of study category was formed using DERMJRNM=9999.

Student race/ethnicity (RACE)

Students were asked to indicate their race by choosing one of the following categories: White, Black or African American, Asian, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander. They were asked separately to indicate whether they were of Hispanic or Latino origin. The derived RACE variable included the following categories: 1=White, 2=Black or African American, 3=Hispanic or Latino, 4=Asian, 5=American Indian or Alaska Native, 6=Native Hawaiian/other Pacific Islander, and 7=More than one race. In this Brief, any student who did not belong in the racial/ethnic categories White, Black or African American, Hispanic or Latino, or Asian were reported as "Other."

Type of degree program (UGDEG)

This variable was used to determine the undergraduate program in which the student was enrolled, and was coded as: 1=Certificate, 2=Associate's degree,

3=Bachelor's degree, and 4=Not in a degree program. In this Brief, "credential-seeking undergraduates" are defined as UGDEG=1, 2, or 3.

Institution type (SECTOR10 and STUDMULT)
SECTOR10 indicates the type of institution(s) the student attended during the 2011–12 academic year. SECTOR10 was coded as: 1=Public less-than-2-year; 2=Public 2-year; 3=Public 4-year non-doctorate-granting; 4=Public 4-year doctorate-granting; 5=Private nonprofit less-than-4-year; 6=Private nonprofit 4-year non-doctorate-granting; 7=Private nonprofit 4-year doctorate-granting; 8=Private for-profit less-than-2-year; 9=Private for profit 2-year; and 10=Private for-profit 4-year. The STUDMULT variable indicates the number of postsecondary institutions attended by the student during the 2011–12 academic year.

In this Brief, SECTOR10=2 was used for the "Public 2-year institutions" category; SECTOR=8, 9, and 10 were used for the "Private for-profit institutions" category; and SECTOR=1, 3, 4, 5, 6, and 7 were used for the "All other institutions" category. The "More than one institution" category included any students for whom STUDMULT was greater than 1.

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