

STATS IN BRIEF

U.S. DEPARTMENT OF EDUCATION

NOVEMBER 2018

NCES 2019-427

Military Service and Educational Attainment of High School Sophomores After 9/11

Experiences of 2002 High School Sophomores as of 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.

Approximately 4 million

individuals served in the active-duty

U.S. armed forces during the decade

following the terrorist attacks of

September 11, 2001 (Taylor 2011).

In 2014, there were about 20 million

veterans in the United States, accounting

for 9 percent of the U.S. civilian

population age 18 and older, and

13 percent of them were post-9/11

veterans (U.S. Census Bureau n.d.). Service

members reported that education

benefits were important incentives for

joining the military (Gonzalez et al. 2015),

and increasing numbers of service

members and their families are taking

advantage of education benefits available

through military service. Between 2001

and 2013, for example, the total number

of veterans' education beneficiaries per

year—including active-duty service

members, veterans, and their families—

rose from 421,000 to 1,091,000

(U.S. Department of Veterans Affairs

2013). Veterans and military service

members made up about 5 percent of

U.S. undergraduates in 2011–12 (Henke

and Paslov 2016), a percentage that is

expected to increase as service members

return home from Iraq and Afghanistan.

This Statistics in Brief was prepared for the National Center for Education Statistics under Contract No. ED-IES-12-C-0095 with RTI International. Mention of trade names, commercial products, or organizations does not imply endorsement by the U.S. Government.

Using data from the Education Longitudinal Study of 2002 (ELS:2002), this Statistics in Brief examines military service among 2002 high school sophomores and the postsecondary enrollment outcomes of those who had served in the military as of 2012, some 8 years after most completed high school in 2004. This cohort had just begun 10th grade when the terrorist attacks of September 11, 2001, occurred. In response to those attacks, the United States and its allies initiated military action in Afghanistan in 2001 and then in Iraq in 2003. Both wars continued into the next decade, more than 50,000 U.S. casualties resulted, and over 2 million U.S. children had parents deployed to combat zones (Holmes, Rauch, and Cozza 2013). As of 2012, some 6 percent of 2002 high school sophomores had entered the military (Chen et al. 2017). This report examines the characteristics of these students and the timing of their military service, compares their postsecondary experiences with those of their contemporaries who did not serve, and looks at how they financed their postsecondary education.¹

Several previous reports have provided one-time snapshots of the demographic, enrollment, and financial aid profiles of veterans and military service members enrolled in postsecondary institutions (Henke and Paslov 2016; Queen and

Lewis 2014; Radford 2011; Radford and Wun 2009; Radford et al. 2016).

These reports focused on students who were already enrolled in postsecondary institutions and did not examine the percentage of students entering the military before enrolling in postsecondary education, the timing of students' military service, or their longer term postsecondary outcomes. Although Chen et al. (2017) examined military-service rates among various student groups, they did not examine other experiences of students with military service, such as the types of postsecondary institutions they attended, the fields of study they pursued, or the amount of financial aid they received.

This report both fills these gaps and addresses additional topics such as the timing of military service, the relationship between 10th-graders' expectations for a military occupation and subsequent military service, and the relationship between students' military service and that of their parents. Finally, although existing research has examined post-high school military enlistment (Bachman et al. 2000; Kilburn and Asch 2003), it was based on data that were collected before 2001. In contrast, this report examines military service among a high school cohort who came of age after September 11, 2001.

BACKGROUND ON U.S. MILITARY SERVICE

The U.S. military consists of five major branches: Army, Marine Corps, Navy, Air Force, and Coast Guard (U.S. Department of Defense 2016). Each branch allows service on active duty or in the reserves; the Army and the Air Force also offer the option of serving in the National Guard. Active-duty service members are full-time members of the military and can be deployed at any time. Reserve service members receive the same training as active-duty service members, but they train close to home until they are needed to deploy. Although some reservists serve full time, many serve part time, train one weekend per month, and perform an additional 2 weeks of field exercises each year. Reservists usually hold a full-time civilian job in addition to serving. Members of the National Guard are similar to reservists in terms of training; however, the National Guard is under both state and federal control, whereas reservists are strictly under the control of the federal government.²

The eligibility requirements for joining the military differ across branches, but recruits must meet the following basic requirements to enlist:

- U.S. citizenship or permanent residency (noncitizens must speak, read, and write English fluently and live in the United States at the time of enlistment);

¹ Because this report is descriptive in nature, readers are cautioned not to draw causal inferences based on the bivariate results it presents. It is important to note that many of the variables examined in this report may be related to one another, and complex relationships among variables have not been explored. For example, differences in outcomes between students who served in the military and those who did not serve may be related to factors other than military service.

² More information on U.S. military branches is available at <http://todaysmilitary.com/joining/types-of-military-service>.

- minimum enlistment age of 17 (each branch also has its own maximum enlistment age);
- high school diploma (although some branches accept recruits with a high school equivalency such as a GED³);
- passing score on the Armed Services Vocational Aptitude Battery (ASVAB);⁴ and
- completion of a bachelor's degree program to become a commissioned officer (although recruits may join the military as cadets before completing a bachelor's degree program).

People who join the military are disproportionately men (Taylor 2011). In 2001, men made up 78 percent of active-duty Army recruits, and by 2012, they made up 85 percent (U.S. Army Recruiting Command 2013). The majority of military service members are young adults who hold a high school diploma, and most enter the military directly after high school or before attending college (Kane 2006; Rostker, Klerman, and Zander-Cotugno 2014;

U.S. Army Recruiting Command 2013; Watkins and Sherk 2008). The proportions of recruits who are White and Black are similar to corresponding proportions in the national population, but Asians are underrepresented and Native Hawaiian and Pacific Islanders overrepresented (Kane 2006).⁵ In addition, people who join the military tend to come from rural areas and the South (Kane 2006; Watkins and Sherk 2008).

People commonly join the military for such reasons as family tradition and benefits (Hall 2008). Based on a survey of over 5,000 recruits in 2008–09, researchers found that 83 percent had a close family member with military service experience, and nearly half reported a close family member who had retired from a military career (Rostker, Klerman, and Zander-Cotugno 2014). Military service members are offered not only salaries but also housing, health care, and financial aid for college. Many military service members cite veterans' education benefits as their primary reason for enlisting (Gonzalez et al. 2015; Hall 2008; Kane 2006).

The Post-9/11 Veterans Educational Assistance Act of 2008, also called the Post-9/11 GI Bill, went into effect on August 1, 2009. This law provides financial support for postsecondary education for U.S. service members who meet minimum active-duty requirements.⁶ Financial support includes a housing allowance, a stipend for books and supplies, and full payment of tuition and fees at any public institutions in service members' states of residence or up to \$17,500 annually toward a private or foreign institution⁷ (U.S. Department of Veterans Affairs 2011). Degree-granting institutions may elect to participate in the Post-9/11 GI Bill Yellow Ribbon Program, in which institutions make additional funds available for students' education programs without additional charges to students' GI Bill entitlement.⁸ Before this new law, military service members and veterans enrolled in postsecondary education received less generous education benefits: in 2004, for example, the Montgomery GI Bill⁹ offered veterans who were enrolled full time \$1,004 per month¹⁰ for both living and education expenses (U.S. Department of Veterans Affairs 2008).

³ The GED® credential is a high school equivalency credential earned through passing the GED® test, which is administered by GED Testing Service. See https://ged.com/about_us/c for more information on the GED® test and credential.

⁴ The ASVAB is an aptitude test that measures four domains: verbal, math, science and technical, and spatial. More information is available at <http://official-asvab.com>.

⁵ Adequate information assessing the representation of Hispanics was not available in Kane's report (2006), but other sources (e.g., Watkins and Sherk 2008) suggest that Hispanic recruits may be underrepresented.

⁶ To be eligible for the Post-9/11 GI Bill, veterans and service members must have served at least 90 days of active duty after September 10, 2001, and be discharged honorably or discharged with a service-connected disability. To qualify for the full benefit, veterans and service members must have served at least 3 years of active duty after September 10, 2001 (https://gibill.custhelp.com/app/answers/detail/a_id/947).

⁷ As of the 2011 academic year, the maximum annual tuition and fee reimbursement for enrollment at private or foreign schools was \$17,500. See also https://www.benefits.va.gov/gibill/resources/benefits_resources/rates/ch33/Ch33rates080111.asp.

⁸ See https://www.benefits.va.gov/gibill/yellow_ribbon.asp for further information on the Post-9/11 GI Bill Yellow Ribbon Program.

⁹ To be eligible for the Montgomery GI Bill, veterans and service members must have served 3 years of active duty or 2 years of active duty and 4 years of reserves, be discharged honorably, and have completed high school (<https://www.military.com/education/gi-bill/gi-bill-eligibility-details.html>).

¹⁰ The dollar amount cited here reflects the Montgomery GI Bill's monthly education benefit for full-time students as of October 1, 2004 (https://www.benefits.va.gov/gibill/resources/benefits_resources/rates/ch30/ch30rates100104.asp). The monthly education benefit in other years is available at https://www.benefits.va.gov/GIBILL/resources/benefits_resources/rate_tables.asp#ch30.

The increase in education benefits may have generated new interest in military service among young people and encouraged more veterans to enter postsecondary education after their service (Cook and Kim 2009; Steele, Salcedo, and Coley 2010). From 2009 to 2010, the use of education benefits rose 42 percent, which was partly attributed to the Post-9/11 GI Bill (National Conference of State Legislatures 2014). Between 2007–08 and 2011–12, use of veterans' education benefits by military students increased among both undergraduates (36 percent to 55 percent) and graduate students (22 percent to 46 percent) (Radford et al. 2016). The average amounts awarded to these recipients also increased, rising from \$5,800 to \$7,900 for undergraduates and from \$5,600 to \$8,200 for graduate students in constant 2012 dollars (Radford et al. 2016). These increases may be partly due to the increasing education benefits available to eligible military service members via the Post-9/11 GI Bill starting in 2009. Moreover, these increased Post-9/11 GI Bill benefits have not only resulted in getting additional veterans into postsecondary school but also increased the likelihood of veterans persisting in postsecondary education (Barr 2015).

DATA AND STUDY SAMPLE

This Statistics in Brief uses data from ELS:2002, an integrated, multilevel data collection designed to provide data about students' transitions from high school to postsecondary education or early careers. The ELS:2002 base-year data collection started in the spring term of the 2001–02 school year with a nationally representative sample of about 15,400 high school sophomores in approximately 750 public and private schools across the United States. These sample members represent about 3.4 million high school sophomores in spring 2002. Over the next 10 years, sample members were resurveyed in three follow-ups: in 2004 (when most members were seniors in high school), in 2006 (approximately 2 years after the sample's modal high school completion date), and in 2012 (when the majority of sample members were 26 years old).

This report focuses on the 13,130 ELS:2002 sophomore cohort members who responded in the third follow-up (2012) and, more specifically, on the 650 of these 13,130 who reported ever serving in the military as of 2012.¹¹ Using the ELS:2002 third follow-up cross-sectional weight (F3QWT) in conjunction with the 10th-grade cohort flag (G10COHRT), these 650 sample members represent about 175,000 of the 2.9 million students

who were high school sophomores in spring 2002 and whose military service status as of 2012 was known.

Although this report addresses the postsecondary education experiences of 2002 high school sophomores who served in the military, it does not examine participation in a Reserve Officer Training Corps (ROTC) program or attendance at military service academies or other military-oriented postsecondary institutions. ELS:2002 did not collect data on students' participation in ROTC programs. Among the 650 sample members who served, fewer than 30 sample members attended any one of the five federal service academies or other military institutions, an insufficient number to yield reliable estimates. These students, as well as those who participated in ROTC programs, were included in the military service sample for this report as long as they reported that they had served in the military as of 2012. More information on data collected in ELS:2002 is available at <https://nces.ed.gov/surveys/els2002>.

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

¹¹ Due to the relatively small size of this subsample, certain estimates have large standard errors and are therefore unstable. In the tables and figures of this report, estimates with standard errors between 30 and 50 percent of the estimates are noted with the "!" symbol, reminding the reader to interpret those data with caution; estimates with standard errors greater than 50 percent of the estimates are considered unstable and thus suppressed.

STUDY QUESTIONS

1

What percentage of 2002 high school sophomores had entered the military by 2012? When did they enter?

2

How did the student, family, and high school academic characteristics of those who served in the military compare with those of students who did not serve in the military?

3

How did the postsecondary enrollment, fields of study, and attainment rates of students who served in the military compare with those of students who did not serve in the military?

4

How did students who served in the military compare with those who did not serve in terms of financial aid, including whether they borrowed for postsecondary education and the total amount borrowed?

KEY FINDINGS

- As of 2012, some 6 percent of 2002 high school sophomores had served in the military (figure 1).
- The majority of military service members had at most a high school credential when starting their military service—56 percent had a high school education or less, and an additional 30 percent had some college education but no postsecondary credential. Smaller proportions of students who joined the military did so after earning a postsecondary credential: 4 percent already had an undergraduate certificate or an associate's degree when they joined the military, and 9 percent had a bachelor's or higher degree (figure 1).
- Students who had the strongest academic preparation in high school entered the military at a lower rate than did other students: specifically, 3 percent of students who completed the most rigorous high school curriculum joined the military, compared with 6 percent of those who completed a moderately rigorous, standard, or below-standard curriculum (figure 3).
- The majority of 2002 high school sophomores had enrolled in postsecondary education as of 2012, regardless of whether they had served in the military (88 percent and 85 percent for students with and without military service, respectively) (figure 4).
- Among students who completed their military service before beginning postsecondary education, 28 percent began their postsecondary education at a for-profit institution. In comparison, among students who did not serve in the military, 8 percent began their postsecondary education at a for-profit institution (figure 5).
- As of 2012, a smaller proportion of students with military service¹² had earned a bachelor's or higher degree (17 percent), compared with those without military service (36 percent) (figure 6). On the other hand, a larger proportion of students with military service had no postsecondary credential but were currently enrolled in postsecondary education (25 percent), as compared with those without military service (11 percent).
- Proportionally fewer students with military service took out a federal student loan than did students without military service (46 percent vs. 60 percent); students with military service also borrowed smaller amounts (\$9,800 vs. \$16,800) (figure 7).

¹² In this report, "students with military service" refers to 2002 high school sophomores who reported ever serving in the military as of 2012. For any such students who also went on to enroll in postsecondary education, readers should note that students' military service may have occurred before, after, or during their postsecondary education.

1

What percentage of 2002 high school sophomores had entered the military by 2012? When did they enter?

Six percent of the 2002 high school sophomore cohort had served in the military as of 2012 (figure 1). About half of military service members in the 2002 high school sophomore cohort (54 percent) joined the military at age 19 or younger, 19 percent joined at age 20 or 21, and 27 percent joined at age 22 or older. On average, students in

this cohort started their military service when they were about 20.5 years old.

Nearly half of the military service members in this cohort (about 48 percent) began their service within 12 months of receiving their high school credential.

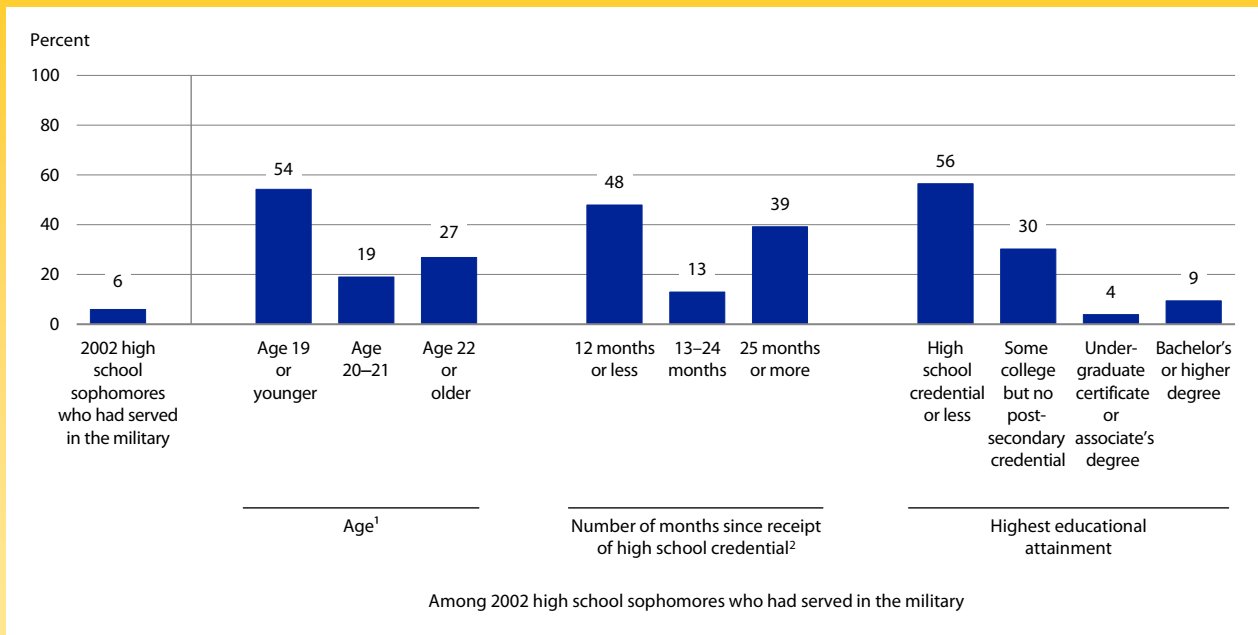
About 56 percent had a high school credential or less when starting their

military service, and 30 percent had some postsecondary education but had not earned a postsecondary credential. Fewer students joined the military after earning a postsecondary credential: 4 percent already had an undergraduate certificate or an associate's degree when they joined the military, and 9 percent had a bachelor's or higher degree.

FIGURE 1.

TIMING OF FIRST MILITARY SERVICE

Percentage of 2002 high school sophomores who had served in the military, and of those, the percentage distribution of age, number of months since receipt of high school credential, and highest educational attainment upon starting their military service: 2012



¹ Among 2002 high school sophomores who had served in the military as of 2012, the average age at which they started their military service was about 20.5 years old.

² Among 2002 high school sophomores who had served in the military as of 2012, the average number of months between receipt of high school credential and start of military service was about 26 months.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

2 How did the student, family, and high school academic characteristics of those who served in the military compare with those of students who did not serve in the military?

Student and Family Characteristics

Overall, the U.S. military is predominantly male, and this composition is reflected among military service members in the 2002 high school sophomore cohort: males made up 82 percent of students who served in the military but 46 percent of students who did not serve in the military (table 1). In addition, the rate at which male students entered the military was five times that of female students (10 percent vs. 2 percent) (figure 2).

The rate of entering the military also varied with students' race/ethnicity. Asian students entered the military at a lower rate than did White students (3 percent vs. 6 percent). The rates for Black and Hispanic students (6 percent and 5 percent, respectively) were not significantly different from that of White students. About 10 percent of students whose race/ethnicity was categorized as "Other" entered the military (these individuals consisted of American Indians, Alaska Natives, Native Hawaiians, other Pacific Islanders, and individuals who indicated two or more races), a rate that was higher than the corresponding rates for Asian, Black, Hispanic, and White students.

Students' occupational expectations while in 10th grade also appear to be related to their military-service rates. Among 10th-graders who expected a

TABLE 1.

STUDENT AND FAMILY CHARACTERISTICS BY MILITARY SERVICE
Percentage distribution of selected student and family characteristics among 2002 high school sophomores, by whether students had served in the military: 2012

Selected student and family characteristics	Students without military service	Students with military service
Total	100.0	100.0
Sex		
Male	46.0	81.9
Female	54.0	18.1
Race/ethnicity ¹		
White	61.8	62.7
Black	13.8	13.4
Hispanic	15.5	12.7
Asian	4.0	2.1
Other	4.9	9.0
Highest education of parents		
High school diploma or less	27.1	23.1
Some college	33.4	39.8
Bachelor's or higher degree	39.5	37.1
At least one parent's job was a military-specific job when student was in 10th grade ²		
Yes	1.0	3.5
No	99.0	96.5
Family socioeconomic status (SES) when student was in 10th grade ³		
Lowest quarter	23.9	19.3
Middle two quarters	49.5	58.9
Highest quarter	26.6	21.8
Family type when student was in 10th grade		
Two-parent family	76.9	79.5
Single-parent family	23.1	20.5
Language student first learned to speak		
English	86.3	91.0
Not English	13.7	9.0
Expected occupation of 10th-graders at age 30		
Military-specific	0.6	9.9
Nonmilitary	64.9	63.8
Do not know	34.5	26.3

¹ Black includes African American, and Hispanic includes Latino. Other includes American Indian, Alaska Native, Native Hawaiian, Other Pacific Islander, and individuals who indicated Two or more races. All race categories exclude persons of Hispanic or Latino origin.

² Base-year parent respondents provided job titles and duties for their current or most recent job. Parents' occupations were further augmented by data collected in the first follow-up survey.

³ SES is a measure of a family's relative social position. The measure is derived from five equally weighted, standardized components: family income, father's/guardian's education, mother's/guardian's education, father's/guardian's prestige of occupation, and mother's/guardian's prestige of occupation. High-SES families refers to families in the highest quarter of the overall SES distribution, middle-SES families refers to families in the middle two quarters of the overall SES distribution, and low-SES families refers to families in the lowest quarter of the overall SES distribution.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the table. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

military-specific occupation at age 30, some 51 percent had entered the military as of 2012.¹³ In comparison, 6 percent of students who expected a nonmilitary occupation had joined the military as of 2012.

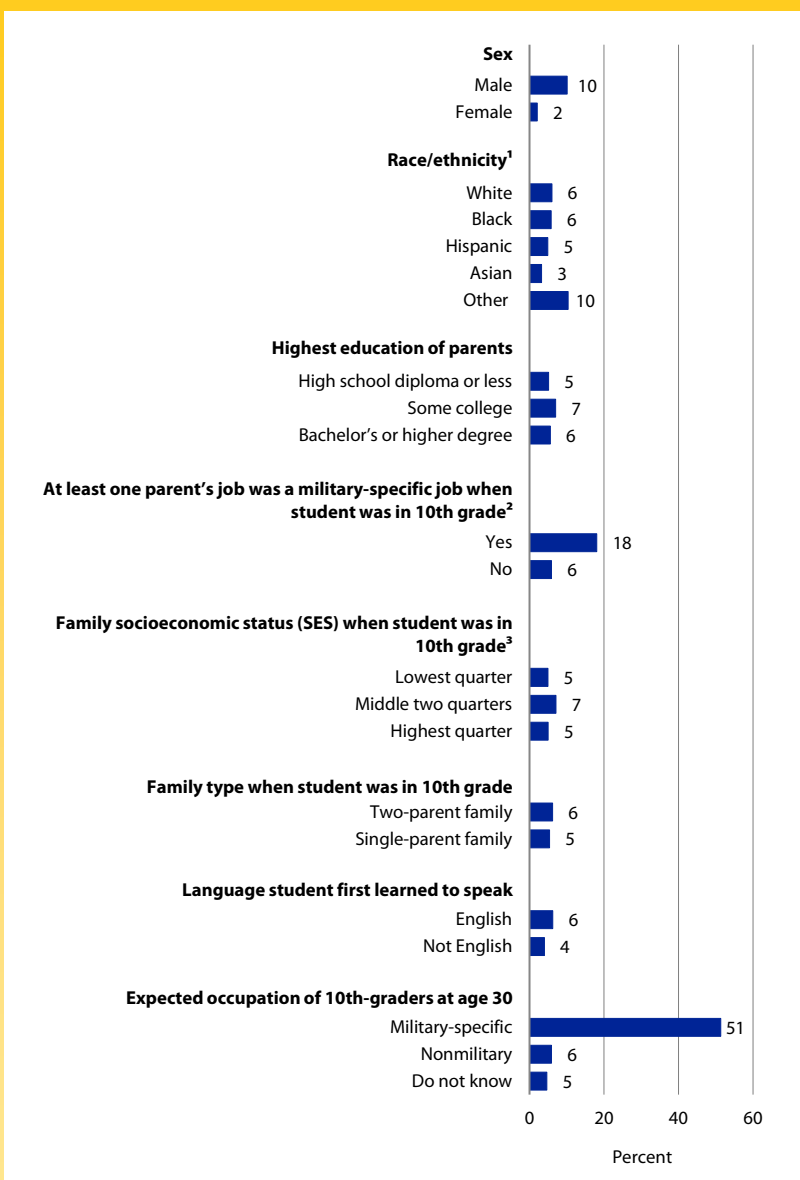
The rates at which students in the 2002 high school sophomore cohort entered the military also varied by students' family characteristics. Students who came from families where at least one parent had a military-specific job entered the military at a higher rate (18 percent) than did students who came from families where neither parent had a military-specific job (6 percent). The military service rate was also higher among students from middle-socioeconomic status (SES) families (7 percent), compared with the corresponding rates among students from low-SES families (5 percent) or high-SES families (5 percent).¹⁴ From another angle, 59 percent of students in this cohort who served in the military were from middle-SES families, while 49 percent of students who did not serve in the military were from middle-SES families (table 1).

¹³ Occupations included in the ELS:2002 data (e.g., students' expected occupations, parents' actual occupations) are coded using the U.S. Department of Labor's Occupation Information Network/Standard Occupational Classification (O*NET/SOC) taxonomy; "military-specific" is a job family within the O*NET/SOC taxonomy. See <https://www.onetonline.org/> for more information on the O*NET/SOC taxonomy.

¹⁴ SES is a measure of a family's relative social position. The SES composite measure in ELS:2002 is derived from five equally weighted, standardized components: family income, father's/guardian's education, mother's/guardian's education, father's/guardian's prestige of occupation, and mother's/guardian's prestige of occupation. High-SES families refers to families in the highest quarter of the overall SES distribution, middle-SES families refers to families in the middle two quarters of the overall SES distribution, and low-SES families refers to families in the lowest quarter of the overall SES distribution.

FIGURE 2.

MILITARY SERVICE BY STUDENT AND FAMILY CHARACTERISTICS
Percentage of 2002 high school sophomores who had served in the military, by selected student and family characteristics: 2012



¹ Black includes African American, and Hispanic includes Latino. Other includes American Indian, Alaska Native, Native Hawaiian, Other Pacific Islander, and individuals who indicated Two or more races. All race categories exclude persons of Hispanic or Latino origin.

² Base-year parent respondents provided job titles and duties for their current or most recent job. Parents' occupations were further augmented by data collected in the first follow-up survey.

³ SES is a measure of a family's relative social position. The measure is derived from five equally weighted, standardized components: family income, father's/guardian's education, mother's/guardian's education, father's/guardian's prestige of occupation, and mother's/guardian's prestige of occupation. High-SES families refers to families in the highest quarter of the overall SES distribution, middle-SES families refers to families in the middle two quarters of the overall SES distribution, and low-SES families refers to families in the lowest quarter of the overall SES distribution.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Academic and High School Characteristics

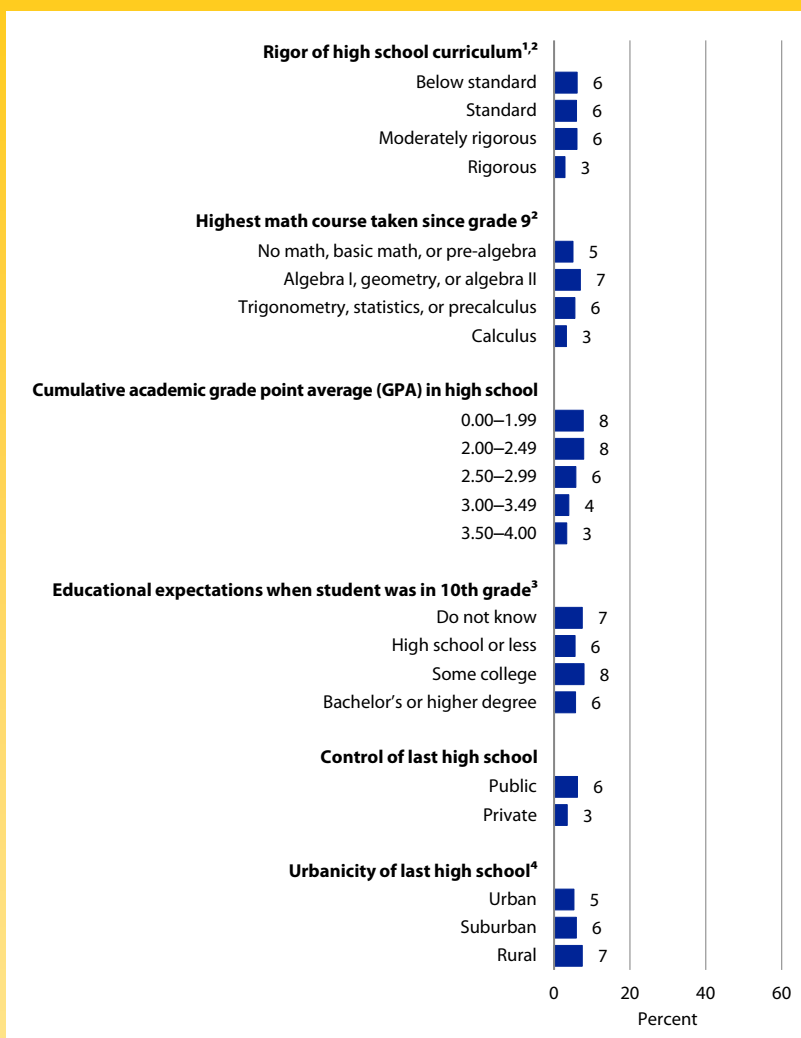
Students who had the strongest academic preparation in high school tended to enter the military at lower rates. For example, 3 percent of those who completed the most rigorous high school curriculum entered the military, compared with 6 percent of those who completed a moderately rigorous, standard, or below-standard curriculum (figure 3).¹⁵ Three percent of students who took calculus in high school joined the military, compared with 6–7 percent of those whose highest math course while in high school was algebra I/ geometry/algebra II or trigonometry/ statistics/precalculus.¹⁶ Rates at which high school students entered the military were also associated with students' academic performance: 3–4 percent of those who earned a grade point average (GPA) of 3.00 or above joined the military, compared with 6–8 percent of those who earned a GPA below 3.00.

¹⁵ This measure is based on information collected from high school transcripts and is aligned with the four curriculum levels (below-standard, standard, moderately rigorous, and rigorous) developed for the National Assessment of Educational Progress High School Transcript Studies (Nord et al. 2011). Students who complete a standard curriculum must earn 4 credits in English and 3 credits each in social studies, math, and science. Students who do not meet these requirements complete a below-standard curriculum. Students who complete a moderately rigorous curriculum must meet the standard curriculum requirements plus three additional requirements: math credits earned must include algebra and geometry; science courses completed must cover two subjects among biology, chemistry, and physics; and 1 credit must be earned in foreign language courses. Students who complete a rigorous curriculum must meet the moderately rigorous curriculum requirements plus three additional requirements: 4 credits must be earned in math, of which one course must be precalculus or a higher level; science courses completed must cover all three subjects of biology, chemistry, and physics; and 3 credits must be earned in foreign language courses.

¹⁶ The "rigor of high school curriculum" and "highest math course" measures that were derived for this report exclude students with no or partial transcript information. These measures were missing for about 16 percent of students with military service and for about 14 percent of students without military service.

FIGURE 3.

MILITARY SERVICE BY ACADEMIC AND HIGH SCHOOL CHARACTERISTICS Percentage of 2002 high school sophomores who had served in the military, by selected academic and high school characteristics: 2012



¹ This measure is based on information collected from high school transcripts and is aligned with the four curriculum levels (below-standard, standard, moderately rigorous, and rigorous) developed for the National Assessment of Educational Progress High School Transcript Studies. Students who attain a standard curriculum must earn 4 credits in English and 3 credits each in social studies, math, and science. Students who do not meet these requirements complete a below-standard curriculum. Students who attain a moderately rigorous curriculum must meet the standard curriculum requirements plus three additional requirements: math credits earned must include algebra and geometry; science courses completed must cover two subjects among biology, chemistry, and physics; and 1 credit must be earned in foreign language courses. Students who attain a rigorous curriculum must meet the moderately rigorous curriculum requirements plus three additional requirements: 4 credits must be earned in math, of which one course must be precalculus or a higher level; science courses completed must cover all three subjects of biology, chemistry, and physics; and 3 credits must be earned in foreign language courses.

² Excludes about 15 percent of students with no or partial transcript information. About 16 percent of students with military service and about 14 percent of those without military service had no or partial transcript information.

³ Base-year student survey respondents were asked "As things stand now, how far in school do you think you will get?"

⁴ Following U.S. Census Bureau definitions, ELS:2002 classifies a school as urban if it is in a large or midsize central city, suburban if it is in a large or small town or on the urban fringe of a large or midsize city, and rural if it is in a rural area. NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

The rates at which students entered the military also varied with the type of high school they last attended. For example, students who last attended a public high school entered the military at a higher rate than did students who last attended a private high school (6 percent vs. 3 percent). Likewise, students from rural high schools entered the military at a higher rate than did students from urban high schools (7 percent vs. 5 percent). Among students in this cohort who served in the military, 23 percent had last attended a rural high school; among those who did not serve in the military, 19 percent had last attended a rural high school (table 2).

TABLE 2.

ACADEMIC AND HIGH SCHOOL CHARACTERISTICS BY MILITARY SERVICE Percentage distribution of selected academic and high school characteristics among 2002 high school sophomores, by whether students had served in the military: 2012

Selected academic and high school characteristics	Students without military service	Students with military service
Total	100.0	100.0
Rigor of high school curriculum ^{1,2}		
Below standard	47.6	49.9
Standard	16.9	17.3
Moderately rigorous	28.3	29.4
Rigorous	7.1	3.4
Highest math course taken since grade 9 ²		
No math, basic math, or pre-algebra	7.9	6.8
Algebra I, geometry, or algebra II	44.6	54.0
Trigonometry, statistics, or precalculus	33.1	31.4
Calculus	14.4	7.9
Cumulative academic grade point average (GPA)		
0.00–1.99	24.4	32.8
2.00–2.49	18.3	24.9
2.50–2.99	20.2	19.8
3.00–3.49	19.7	12.8
3.50–4.00	17.4	9.7
Educational expectations when student was in 10th grade ³		
Do not know	8.8	11.0
High school or less	7.5	6.8
Some college	9.7	12.9
Bachelor's or higher degree	73.9	69.2
Control of last high school		
Public	92.1	95.5
Private	7.9	4.5
Urbanicity of last high school ⁴		
Urban	34.5	30.1
Suburban	47.0	46.4
Rural	18.5	23.4

¹ This measure is based on information collected from high school transcripts and is aligned with the four curriculum levels (below-standard, standard, moderately rigorous, and rigorous) developed for the National Assessment of Educational Progress High School Transcript Studies. Students who attain a standard curriculum must earn 4 credits in English and 3 credits each in social studies, math, and science. Students who do not meet these requirements complete a below-standard curriculum. Students who attain a moderately rigorous curriculum must meet the standard curriculum requirements plus three additional requirements: math credits earned must include algebra and geometry; science courses completed must cover two subjects among biology, chemistry, and physics; and 1 credit must be earned in foreign language courses. Students who attain a rigorous curriculum must meet the moderately rigorous curriculum requirements plus three additional requirements: 4 credits must be earned in math, of which one course must be precalculus or a higher level; science courses completed must cover all three subjects of biology, chemistry, and physics; and 3 credits must be earned in foreign language courses.

² Excludes about 15 percent of students with no or partial transcript information. About 16 percent of students with military service and about 14 percent of students without military service had no or partial transcript information.

³ Base-year student survey respondents were asked "As things stand now, how far in school do you think you will get?"

⁴ Following U.S. Census Bureau definitions, ELS:2002 classifies a school as urban if it is in a large or midsize central city, suburban if it is in a large or small town or on the urban fringe of a large or midsize city, and rural if it is in a rural area.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the table. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

3 How did the postsecondary enrollment, fields of study, and attainment rates of students who served in the military compare with those of students who did not serve in the military?

Postsecondary Enrollment

As of 2012, the majority of 2002 high school sophomores had enrolled in some type of postsecondary education, regardless of whether they had served in the military (88 percent of students with military service and 85 percent of students without

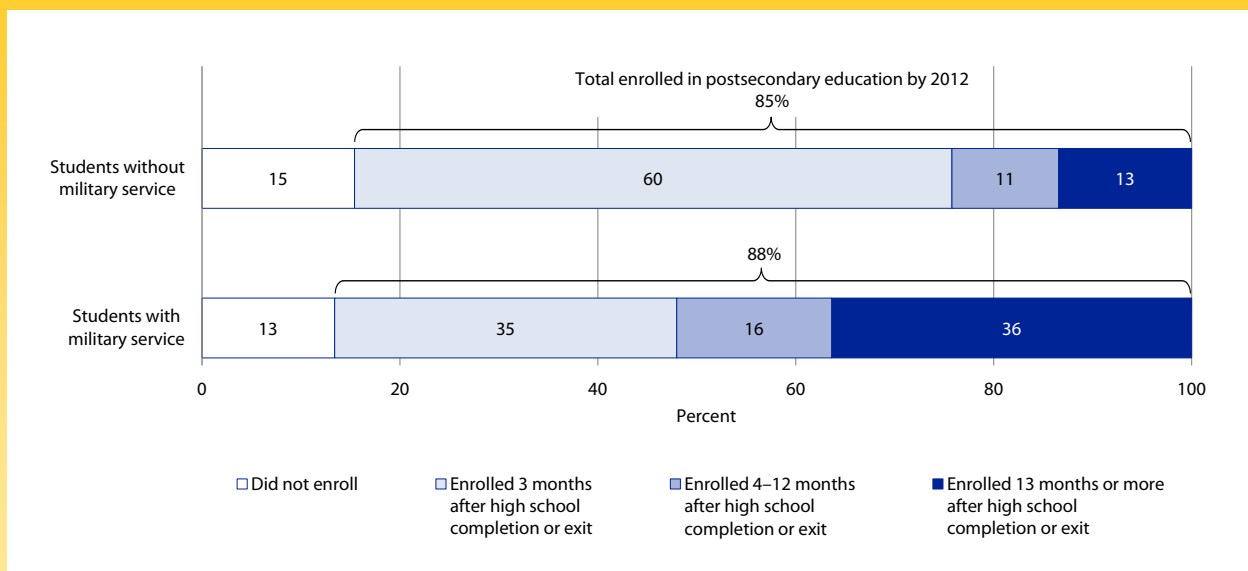
military service) (figure 4). Students with military service tended to delay the start of their postsecondary education relative to students who did not serve in the military. Among students who, by 2012, had both served in the military and enrolled in postsecondary education, some

36 percent began postsecondary education more than a year after high school. In comparison, among students who did not serve in the military but had enrolled in postsecondary education by 2012, some 13 percent began their postsecondary education more than a year after high school.

FIGURE 4.

POSTSECONDARY ENROLLMENT AND TIMING BY MILITARY SERVICE

Percentage distribution of 2002 high school sophomores' postsecondary enrollment and timing of enrollment, by whether students had served in the military: 2012



NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students are referred to as "students with military service" in the figure. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Students with and without military service also enrolled in different types of postsecondary institutions. In addition, among students with military service, the types of postsecondary institutions differed by the timing of their service. Compared with students

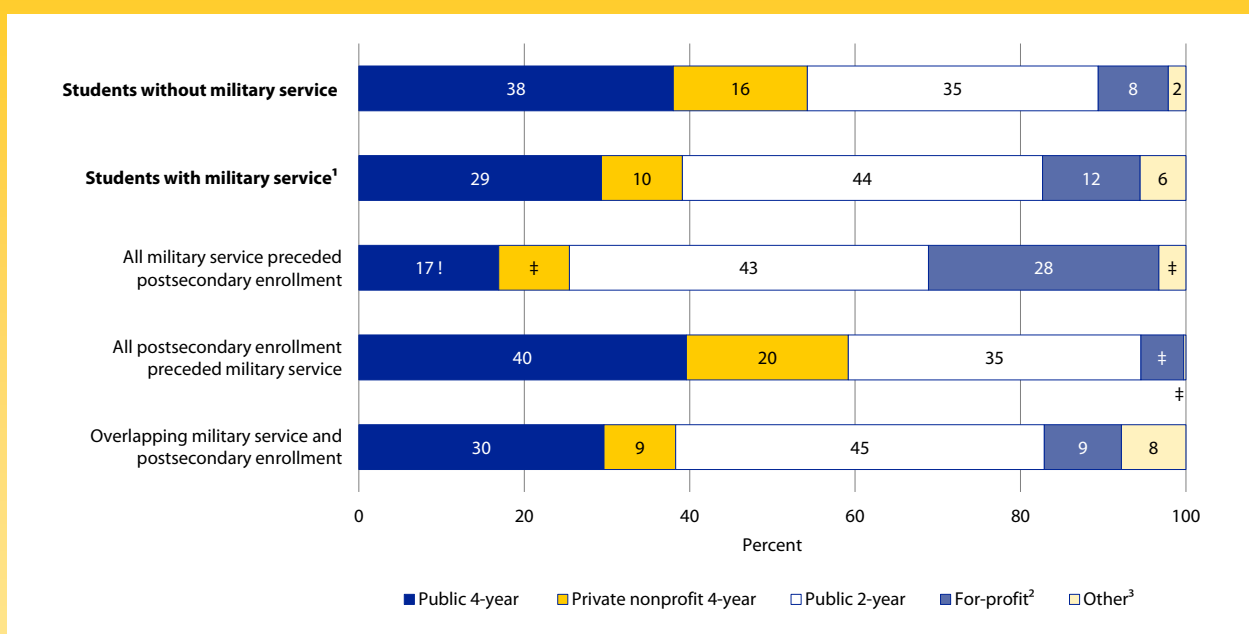
who did not serve in the military, a higher proportion of those who served began postsecondary education at public 2-year institutions (35 percent vs. 44 percent¹⁷), and lower proportions began at public 4-year institutions (38 percent vs. 29 percent) or private

nonprofit 4-year institutions (16 percent vs. 10 percent) (figure 5). Students who completed their military service prior to postsecondary education attended for-profit institutions at a higher rate (28 percent) than did those without military service (8 percent).

FIGURE 5.

SECTOR OF FIRST-ATTENDED POSTSECONDARY INSTITUTION BY MILITARY SERVICE

Among 2002 high school sophomores who had enrolled in postsecondary education, percentage distribution of sector of first-attended postsecondary institution, by whether students had served in the military and the timing of military service relative to first postsecondary enrollment: 2012



[!] Interpret data with caution. Estimate is unstable because the standard error is between 30 and 50 percent of the estimate.

[‡] Reporting standards not met.

¹ Approximately 2 percent of 2002 high school sophomores who had enrolled in postsecondary education and served in the military as of 2012 began their postsecondary education at the Community College of the Air Force, an institution established to encourage enlisted service members to enroll in college classes. These students are included in the public 2-year institution category.

² Includes for-profit institutions at all levels.

³ Includes private nonprofit 2-year, public less-than-2-year, and private nonprofit less-than-2-year institutions.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the figure. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

¹⁷ Among 2002 high school sophomores who both (1) served in the military by 2012 and (2) enrolled in postsecondary education by 2012, approximately 2 percent began their postsecondary education at the Community College of the Air Force, an institution established to encourage enlisted service members to enroll in college classes. These students are included in the public 2-year institution category.

Highest Educational Attainment

As of 2012, approximately 8 years after most cohort members had completed high school, proportionally fewer students with military service had earned a bachelor's or higher degree

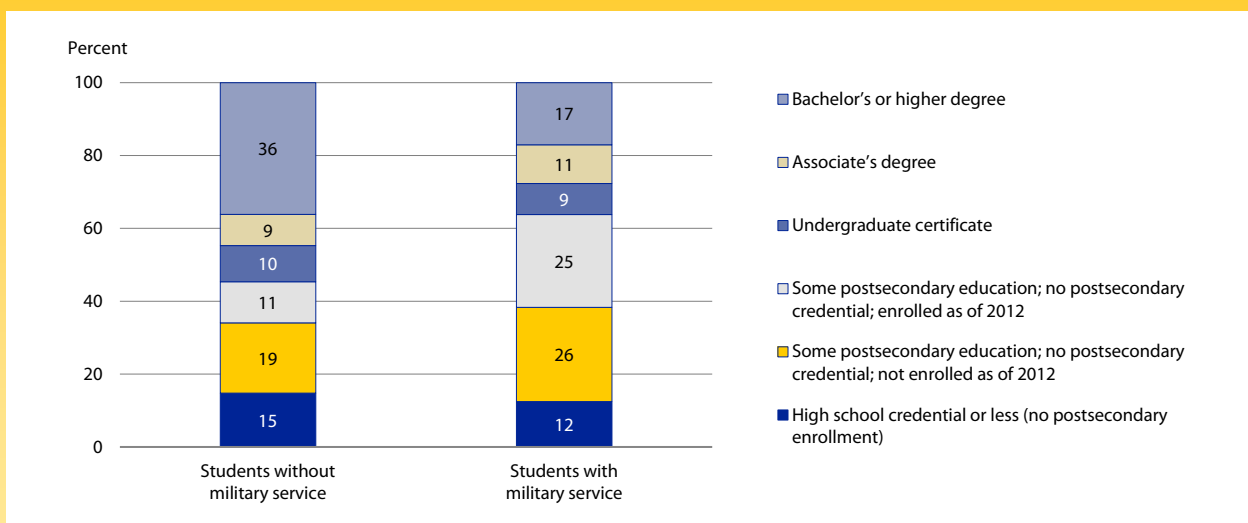
(17 percent) than had those without military service (36 percent) (figure 6). This difference may stem from the fact that some students joined the military before postsecondary enrollment and had not completed their postsecondary

education as of 2012. Indeed, 25 percent of students with military service had not earned a postsecondary credential but were still enrolled in postsecondary school as of 2012, proportionally more than the 11 percent of students who had not served in the military.

FIGURE 6.

HIGHEST EDUCATIONAL ATTAINMENT BY MILITARY SERVICE

Percentage distribution of 2002 high school sophomores' highest educational attainment, by whether students had served in the military: 2012



NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the figure. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Highest Degree Field

Among students who had served in the military and had earned a postsecondary credential as of 2012, some 16 percent earned their highest degree in the field of public, legal, social, and protective services, compared with 7 percent of students who had not served in the military; 11 percent had earned their highest degree in the field of manufacturing, construction, repair, and transportation, compared with 4 percent of students who had not served in the military (table 3). No significant difference was found between those with and without military service in terms of the proportion of students who earned their highest degree in the field of science, technology, engineering, and mathematics (about 14 percent for both groups).

TABLE 3.

MAJOR FIELD FOR HIGHEST DEGREE BY MILITARY SERVICE Among 2002 high school sophomores who earned a postsecondary credential, percentage distribution of major field for highest postsecondary degree attainment, by whether students had served in the military: 2012

Major field for highest postsecondary degree attained as of 2012	Students without military service	Students with military service
Total	100.0	100.0
Business and marketing	17.7	13.3
Communications and arts	8.5	4.8 !
Education	8.7	‡
General and interdisciplinary studies	4.0	6.8 !
Health care and health sciences	18.8	13.5
Humanities	4.2	4.7 !
Manufacturing, construction, repair, and transportation	3.6	11.2
Personal services	4.5	3.6 !
Public, legal, social, and protective services	6.6	16.3
Social and behavioral sciences	8.8	9.1
Science, technology, engineering, and mathematics (STEM)	14.0	13.6
Other	0.6	‡

! Interpret data with caution. Estimate is unstable because the standard error is between 30 and 50 percent of the estimate.
‡ Reporting standards not met.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the table. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

4 How did students who served in the military compare with those who did not serve in terms of financial aid, including whether they borrowed for postsecondary education and the total amount borrowed?

Proportionally fewer students with military service than students without military service took out a federal student loan (46 percent vs. 60 percent). Among students who took out a federal student loan, students with military service borrowed a median amount of \$9,800, compared with \$16,800 among students without military service (figure 7). These differences may reflect both the financial support provided by the Post-9/11 GI Bill and other benefits to students with military service and the significant portion of military students who were still enrolled in postsecondary education as of 2012 (figure 6 shows that 25 percent of students with military service had no postsecondary credential but were still enrolled in postsecondary education as of 2012, compared with only 11 percent of students without military service).

To control for differences in borrowing rates and amounts that are due to differential postsecondary progress among students, the borrowing rates

and amounts of students with and without military service were compared within each educational attainment category. Although this further disaggregation yielded smaller samples and larger standard errors, the following two differences were statistically significant:

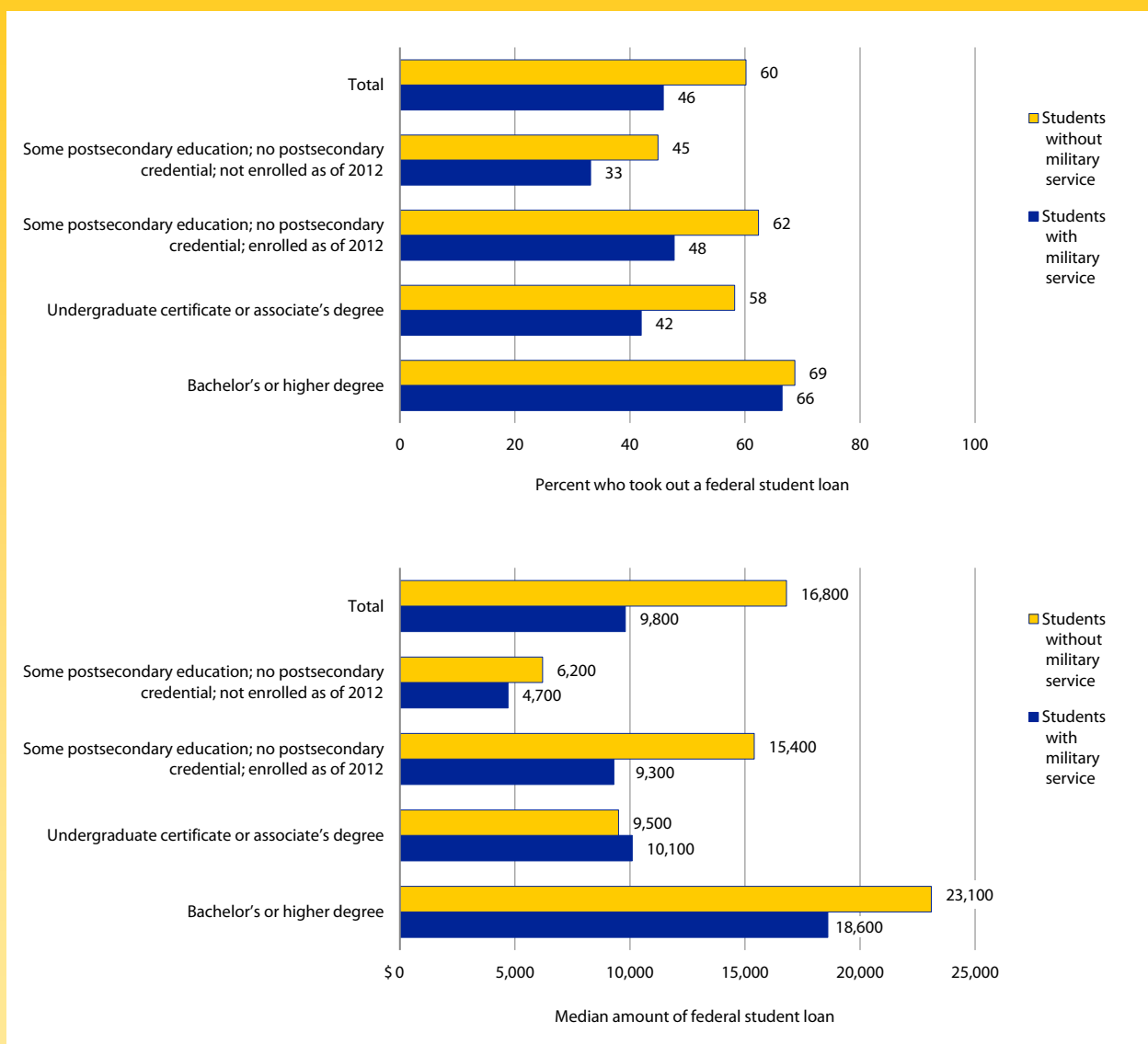
- Among students who had not earned a degree or certificate and were still enrolled in 2012, proportionally fewer students with military service than those without military service borrowed through federal loan programs (48 percent vs. 62 percent). Students with military service also borrowed smaller amounts (\$9,300 vs. \$15,400).
- Among students who earned an undergraduate certificate or an associate's degree but no higher degree, proportionally fewer students with military service than students without military service borrowed through federal loan programs (42 percent vs. 58 percent). The loan amounts of these two groups of borrowers did not differ, however.

Although the Post-9/11 GI Bill provides financial support to eligible military service members and veterans who want to pursue postsecondary education, 46 percent of students with military service took out a federal student loan with a median amount of \$9,800 to finance their postsecondary education. Military students may borrow for postsecondary education for any of at least four reasons: (1) some service members attended postsecondary school prior to enlisting in the military, (2) some service members from the 2002 high school sophomore cohort may not yet have been eligible for full GI Bill education benefits as of 2012, (3) some service members from the 2002 high school sophomore cohort may not have taken full advantage of their GI Bill education benefits, and (4) GI Bill education benefits may not have been sufficient to cover the entire postsecondary education for some service members.

FIGURE 7.

FEDERAL STUDENT LOANS BY MILITARY SERVICE AND HIGHEST CREDENTIAL

Among 2002 high school sophomores who had enrolled in postsecondary education, percentage who took out a federal student loan and, of those, median amount of federal student loan, by whether students had served in the military and their highest postsecondary credential: 2012



NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the figure. Estimates in the figure are based on data from the National Student Loan Data System, a federal government database that contains records of all federal loan information for anyone who has such a loan. Estimates for "Percent who took out a federal student loan" are based on all 2002 high school sophomores who had enrolled in postsecondary education as of 2012; estimates for "Median amount of federal student loan" are based on postsecondary enrollees who had taken out a federal student loan.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

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Web Tables—*A Profile of Military Undergraduates: 2011–12* (NCES 2016-415).

<https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2016415>

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TECHNICAL NOTES

Survey Methodology

The estimates provided in this Statistics in Brief are based on data collected through ELS:2002. ELS:2002 is an integrated, multilevel survey involving multiple respondent populations. The base-year survey was administered in spring 2002, with the sampling frame targeted at two populations: (1) U.S. schools with 10th grades and (2) 10th-graders in those schools in the spring term of the 2001–02 school year. Schools were sampled first, and 10th-grade students were then sampled from sampled schools. Approximately 15,400 high school sophomores in about 750 public and private schools across the United States participated in the base-year survey, representing approximately 3.4 million high school sophomores in spring 2002. Data were collected from students, their parents, their teachers, school administrators, and school librarians. In addition to surveys, math and reading assessments were administered to sampled students.

The first follow-up was conducted in 2004, when most base-year sample members were seniors in high school. The sample was freshened so that it represented the 12th-grade population in the nation in 2004. High school-based

data collections concluded in 2005, when high school transcripts were requested from schools and processed for each sample member, regardless of the sample member's high school completion status.

In addition to the high school survey components, follow-up surveys were also administered during the sample members' postsecondary years: the second follow-up was conducted in 2006, approximately 2 years after the sample's modal high school graduation date; and the third follow-up was conducted in 2012, when the majority of the sample was approximately 26 years old. Additional information about cohort members was also collected from such data sources as the American Council on Education (GED data), the U.S. Department of Education's Central Processing System and National Student Loan Data System (financial aid data), and the College Board and ACT (postsecondary entrance exam scores). Finally, students' postsecondary transcripts were collected during 2013–14.

For more information on the ELS:2002 methodology, see Ingels et al. (2014).

Sources of Error in Estimates

Two broad categories of error occur in estimates generated from surveys:

sampling 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 ELS:2002 must be taken into account when calculating variance estimates such as standard errors. The standard errors presented in this Statistics in Brief were generated using the balanced repeated replication method to adjust variance estimation for the complex sample design used for ELS:2002.

Nonsampling errors can be attributed to several sources: incomplete information about all respondents (e.g., some students or institutions refused to participate, or students participated but answered only certain items); differences among respondents in question interpretation; inability or unwillingness to give correct information; mistakes in recording or coding data; and other errors of collecting, processing, and imputing missing data. More information on sampling and nonsampling error is available in the ELS:2002 methodology report or data file documentation report available at <https://nces.ed.gov/pubsearch/getpubcats.asp?sid=107>.

Response Rates and Nonresponse Bias Analysis

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” (Seastrom 2014). Unit nonresponse causes bias in survey estimates when the outcomes of respondents and nonrespondents are different. For the ELS:2002 third follow-up, the weighted student response rate was 78 percent overall (Ingels et al. 2014). Therefore, a unit nonresponse bias analysis was conducted to compare the characteristics of interview respondents with those of interview nonrespondents. The results of this analysis show that, after nonresponse weighting adjustments, the percentage of characteristics with significant bias rounded to zero (Ingels et al. 2014, pp. 108–114).

In terms of item nonresponse, seven variables used in this report have an item-level response rate below 85 percent (exhibit 1). For each of these variables, nonresponse bias analyses were conducted to determine whether respondents and nonrespondents differed on the following characteristics: student’s race/ethnicity, student’s sex, student’s 10th-grade school control, and whether the student had ever attended postsecondary school. Differences between respondents and nonrespondents on these variables were tested for statistical significance at the 5-percent level.

VARIABLES USED

The variables used in this Statistics in Brief are listed below. Detailed information about these variables can be obtained from the ELS:2002 Third Follow-up Restricted-use Data File (<https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014362>). In addition, visit the NCES DataLab website at <https://nces.ed.gov/datalab> to view detailed information on question wording for variables coming directly from an interview, how variables were constructed, and their sources. Information is available through DataLab’s analysis applications—PowerStats, QuickStats, and TrendStats—and from downloadable codebooks available for each dataset (<https://nces.ed.gov/datalab>).

Label	Name
10th-grader’s expected occupation at age 30	F3BYONET302
Age at first military service	MIL_AGE*
Control of student’s last high school	F1RSLCTR
Cumulative academic grade point average in high school	F1RAGP
Cumulative federal loan amount for undergraduate and graduate education as of 2012	F3FEDCUM3
Educational attainment at time of first military service	ATTAIN_ASOF_MIL*
Ever attended a postsecondary institution as of 2012	F3EVRATT
Ever took out a federal school loan as of 2012	FED_EVER_R*
Family composition in 2002	BYFCOMP
Family socioeconomic status in 2002	BYSES1QU
Field of highest postsecondary credential	FIELD*
Highest educational attainment as of 2012	F3ATTAINMENT
Highest level of math course completed in high school	HI_MATH*
Number of months between high school exit and military start	HS_TO_MIL*
Number of months between high school exit and postsecondary entry	PSTIMING*
Parents’ highest education	F1PARED
Rigor of high school curriculum	HSCURR_NEW*
Sector of first-attended postsecondary institution	F3PS1SEC
Sophomore cohort member status in 2001–02 school year	G10COHRT
Student’s educational expectations in 2002	BYSTEXP
Student’s race/ethnicity	F1RACE_R
Student’s sex	F1SEX
Timing of military service relative to postsecondary education	TIMING*
Urbanicity of student’s last high school	F1RSLURB
Whether English is student’s native language	F1STLANG
Whether parent(s) had military job	PAR_MIL*
Whether student had ever served in the military as of 2012	F3B01

* This variable is not directly available in the ELS:2002 data file. It was derived from ELS:2002 variables to be used in this report.

Respondents differed from nonrespondents on 62 percent to 79 percent of the characteristics analyzed, indicating that there may be bias in these estimates (exhibit 1). Any bias due to nonresponse, however, is based upon responses prior to statistical imputation in which missing data were replaced with valid data from the records of donor cases that matched the recipients on selected characteristics (Krotki, Black, and Creel 2005). The potential for bias in these estimates may be reduced by imputation because imputation procedures are designed specifically to identify donors with similar characteristics to those with missing data. 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.

Of the seven variables used in this report with item-level response rates below 85 percent, two were imputed (BYSES1QU and BYFCOMP). For these two variables, the estimated percentage difference was computed for each of the categories as the percentage of students in that category before imputation minus the percentage of students in that category after

imputation. These differences were tested for statistical significance at the 5-percent level. A significant difference implies a reduction in bias due to imputation, while 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 for these two variables were significant, indicating that the nonresponse bias was reduced through imputation.

The four military-specific variables included in exhibit 1 (i.e., ATTAIN_ASOF_MIL, MIL_AGE, TIMING, and HS_TO_MIL) were

Exhibit 1. Bias analysis results

Variable name	Preimputation				Percent difference in means or average percent difference across all categories pre- and postimputation
	Weighted response rate	Median percent relative bias across characteristics	Percent of characteristics with significant bias	Characteristic with greatest significant absolute bias	
ATTAIN_ASOF_MIL	31.6	38.3	69.2	Whether student has attended postsecondary school	†
MIL_AGE	32.8	34.0	69.2	Whether student has attended postsecondary school	†
TIMING	33.0	37.9	69.2	Whether student has attended postsecondary school	†
HS_TO_MIL	34.1	37.3	69.2	Whether student has attended postsecondary school	†
F3BYONET302	58.0	12.4	71.4	Whether student has attended postsecondary school	†
BYSES1QU	63.6	11.7	78.6	Whether student has attended postsecondary school	12.3 *
BYFCOMP	83.4	3.4	61.5	Race—White	5.5 *

* $p < .05$.

† Not applicable (variable was not imputed).

NOTE: Relative bias is computed by dividing a variable's estimated bias for a given characteristic by the variable's mean. Relative bias is defined as significant if its difference from zero is statistically significant at $p < .05$. ATTAIN_ASOF_MIL is the student's educational attainment as of their first military service; MIL_AGE is the student's age as of their first military service; TIMING is the timing of the student's first military service relative to their postsecondary education; HS_TO_MIL is the number of months between receipt of high school credential and first military service; F3BYONET302 is the 2-digit O*NET code for student's expected occupation at age 30 as of the base-year interview; BYSES1QU is the quartile coding of the student's family's socioeconomic status; and BYFCOMP is the student's family composition as of the base-year interview. A complete list of variables used in this analysis is available in the "Variables Used" section of this report.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

not imputed, and their particularly low response rates warrant some discussion. These low response rates are rooted in the fact that the ELS:2002 third follow-up (the primary data source for these variables) employed both a full-length questionnaire and an abbreviated questionnaire. While a few military-related questions were included in both questionnaires, the vast majority were included only in the full-length questionnaire. For example, abbreviated-questionnaire respondents were not asked about specific military-related experiences (e.g., the branch in which they served). Moreover, although both the full-length and the abbreviated questionnaires asked whether respondents were currently in the military, only the full-length questionnaire asked whether respondents had *ever* served in the military. As a result, for those abbreviated-questionnaire respondents who said that they were not currently serving in the military (97 percent of abbreviated-questionnaire respondents indicated they were not currently serving in the military), their “ever served in the military” status is unknown. These abbreviated-questionnaire respondents were counted as item nonrespondents when calculating response rates for the four military-related items in exhibit 1. That is, because it is not known whether these respondents had ever served in the military, we cannot definitively claim that the set of military-related items do not apply to them; as such, these cases are instead classified as item nonrespondents.

This approach to classifying item nonrespondents may overestimate bias to some degree; nevertheless, readers should be cautious when interpreting results related to these military items.

For more detailed information on nonresponse bias analysis and an overview of the survey methodology for the third follow-up of ELS:2002, see *Education Longitudinal Study of 2002 (ELS:2002) Third Follow-Up Data File Documentation* (NCES 2014-364) (<https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014364>).

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 error¹⁸ 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.

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 because 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 findings in this Statistics in Brief 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 20.¹⁹ 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., detect a difference), however, does not imply the values are the same or equivalent.

¹⁸ 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.

¹⁹ No adjustments were made for multiple comparisons.

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APPENDIX A. ESTIMATES AND STANDARD ERRORS

Table A-1. Estimates and standard errors for figure 1. TIMING OF FIRST MILITARY SERVICE
Percentage of 2002 high school sophomores who had served in the military, and of those, the percentage distribution of age, number of months since receipt of high school credential, and highest educational attainment upon starting their military service: 2012

Timing of first military service	Percent
Estimates	
2002 high school sophomores who had served in the military	5.9
Among 2002 high school sophomores who had served in the military	
Age ¹	
Age 19 or younger	54.2
Age 20–21	19.0
Age 22 or older	26.8
Number of months since receipt of high school credential ²	
12 months or less	47.9
13–24 months	12.9
25 months or more	39.2
Highest educational attainment	
High school credential or less	56.5
Some college but no postsecondary credential	30.2
Undergraduate certificate or associate's degree	3.9
Bachelor's or higher degree	9.4
Standard errors	
2002 high school sophomores who had served in the military	0.30
Among 2002 high school sophomores who had served in the military	
Age	
Age 19 or younger	2.53
Age 20–21	2.07
Age 22 or older	2.27
Number of months since receipt of high school credential	
12 months or less	2.42
13–24 months	1.69
25 months or more	2.53
Highest educational attainment	
High school credential or less	2.74
Some college but no postsecondary credential	2.43
Undergraduate certificate or associate's degree	1.13
Bachelor's or higher degree	1.61

¹ Among 2002 high school sophomores who had served in the military as of 2012, the average age at which they started their military service was about 20.5 years old.

² Among 2002 high school sophomores who had served in the military as of 2012, the average number of months between receipt of high school credential and start of military service was about 26 months.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-2. Estimates and standard errors for figure 2. MILITARY SERVICE BY STUDENT AND FAMILY CHARACTERISTICS
Percentage of 2002 high school sophomores who had served in the military, by selected student and family characteristics: 2012

Student and family characteristics	Percent
	Estimates
Sex	
Male	10.1
Female	2.1
Race/ethnicity ¹	
White	6.0
Black	5.8
Hispanic	4.9
Asian	3.3
Other	10.4
Highest education of parents	
High school diploma or less	5.1
Some college	7.0
Bachelor's or higher degree	5.6
At least one parent's job was a military-specific job when student was in 10th grade ²	
Yes	18.1
No	5.9
Family socioeconomic status (SES) when student was in 10th grade ³	
Lowest quarter	4.9
Middle two quarters	7.1
Highest quarter	5.0
Family type when student was in 10th grade	
Two-parent family	6.2
Single-parent family	5.4
Language student first learned to speak	
English	6.2
Not English	4.0
Expected occupation of 10th-graders at age 30	
Military-specific	51.3
Nonmilitary	5.9
Do not know	4.6

See notes at end of table.

Table A-2. Estimates and standard errors for figure 2. MILITARY SERVICE BY STUDENT AND FAMILY CHARACTERISTICS
Percentage of 2002 high school sophomores who had served in the military, by selected student and family characteristics: 2012—Continued

Student and family characteristics	Percent
	Standard errors
Sex	
Male	0.53
Female	0.23
Race/ethnicity	
White	0.38
Black	0.79
Hispanic	0.72
Asian	0.74
Other	1.63
Highest education of parents	
High school diploma or less	0.52
Some college	0.54
Bachelor's or higher degree	0.44
At least one parent's job was a military-specific job when student was in 10th grade	
Yes	4.54
No	0.30
Family socioeconomic status (SES) when student was in 10th grade	
Lowest quarter	0.49
Middle two quarters	0.43
Highest quarter	0.54
Family type when student was in 10th grade	
Two-parent family	0.36
Single-parent family	0.53
Language student first learned to speak	
English	0.71
Not English	0.31
Expected occupation of 10th-graders at age 30	
Military-specific	6.39
Nonmilitary	0.38
Do not know	0.49

¹ Black includes African American, and Hispanic includes Latino. Other includes American Indian, Alaska Native, Native Hawaiian, Other Pacific Islander, and individuals who indicated Two or more races. All race categories exclude persons of Hispanic or Latino origin.

² Base-year parent respondents provided job titles and duties for their current or most recent job. Parents' occupations were further augmented by data collected in the first follow-up survey.

³ SES is a measure of a family's relative social position. The measure is derived from five equally weighted, standardized components: family income, father's/guardian's education, mother's/guardian's education, father's/guardian's prestige of occupation, and mother's/guardian's prestige of occupation. High-SES families refers to families in the highest quarter of the overall SES distribution, middle-SES families refers to families in the middle two quarters of the overall SES distribution, and low-SES families refers to families in the lowest quarter of the overall SES distribution.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-3. Estimates and standard errors for figure 3. MILITARY SERVICE BY ACADEMIC AND HIGH SCHOOL CHARACTERISTICS

Percentage of 2002 high school sophomores who had served in the military, by selected academic and high school characteristics: 2012

Academic and high school characteristics	Percent
	Estimates
Rigor of high school curriculum ^{1,2}	
Below standard	6.1
Standard	5.9
Moderately rigorous	6.0
Rigorous	2.9
Highest math course taken since grade 9 ²	
No math, basic math, or pre-algebra	5.0
Algebra I, geometry, or algebra II	6.9
Trigonometry, statistics, or precalculus	5.5
Calculus	3.3
Cumulative academic grade point average (GPA) in high school	
0.00–1.99	7.7
2.00–2.49	7.8
2.50–2.99	5.7
3.00–3.49	3.9
3.50–4.00	3.3
Educational expectations when student was in 10th grade ³	
Do not know	7.4
High school or less	5.5
Some college	7.9
Bachelor's or higher degree	5.7
Control of last high school	
Public	6.2
Private	3.5
Urbanicity of last high school ⁴	
Urban	5.2
Suburban	5.9
Rural	7.4

See notes at end of table.

Table A-3. Estimates and standard errors for figure 3. MILITARY SERVICE BY ACADEMIC AND HIGH SCHOOL CHARACTERISTICS

Percentage of 2002 high school sophomores who had served in the military, by selected academic and high school characteristics: 2012—Continued

Academic and high school characteristics	Percent
	Standard errors
Rigor of high school curriculum	
Below standard	0.46
Standard	0.72
Moderately rigorous	0.58
Rigorous	0.61
Highest math course taken since grade 9	
No math, basic math, or pre-algebra	1.11
Algebra I, geometry, or algebra II	0.49
Trigonometry, statistics, or precalculus	0.48
Calculus	0.54
Cumulative academic grade point average (GPA) in high school	
0.00–1.99	0.67
2.00–2.49	0.67
2.50–2.99	0.62
3.00–3.49	0.55
3.50–4.00	0.51
Educational expectations when student was in 10th grade	
Do not know	0.98
High school or less	0.99
Some college	1.11
Bachelor's or higher degree	0.32
Control of last high school	
Public	0.32
Private	0.49
Urbanicity of last high school	
Urban	0.43
Suburban	0.44
Rural	0.78

¹ This measure is based on information collected from high school transcripts and is aligned with the four curriculum levels (below-standard, standard, moderately rigorous, and rigorous) developed for the National Assessment of Educational Progress High School Transcript Studies. Students who attain a standard curriculum must earn 4 credits in English and 3 credits each in social studies, math, and science. Students who do not meet these requirements complete a below-standard curriculum. Students who attain a moderately rigorous curriculum must meet the standard curriculum requirements plus three additional requirements: math credits earned must include algebra and geometry; science courses completed must cover two subjects among biology, chemistry, and physics; and 1 credit must be earned in foreign language courses. Students who attain a rigorous curriculum must meet the moderately rigorous curriculum requirements plus three additional requirements: 4 credits must be earned in math, of which one course must be precalculus or a higher level; science courses completed must cover all three subjects of biology, chemistry, and physics; and 3 credits must be earned in foreign language courses.

² Excludes about 15 percent of students with no or partial transcript information. About 16 percent of students with military service and about 14 percent of those without military service had no or partial transcript information.

³ Base-year student survey respondents were asked "As things stand now, how far in school do you think you will get?"

⁴ Following U.S. Census Bureau definitions, ELS:2002 classifies a school as urban if it is in a large or midsize central city, suburban if it is in a large or small town or on the urban fringe of a large or midsize city, and rural if it is in a rural area.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-4. Estimates and standard errors for figure 4. POSTSECONDARY ENROLLMENT AND TIMING BY MILITARY SERVICE
Percentage distribution of 2002 high school sophomores' postsecondary enrollment and timing of enrollment, by whether students had served in the military: 2012

Postsecondary enrollment and timing	Students without military service	Students with military service
	Estimates	
Did not enroll in postsecondary education	15.4	13.4
Total enrolled in postsecondary education by 2012	85.2	87.5
Enrolled 3 months after high school completion or exit	60.4	34.6
Enrolled 4–12 months after high school completion or exit	10.8	15.7
Enrolled 13 months or more after high school completion or exit	13.4	36.4
	Standard errors	
Did not enroll in postsecondary education	0.58	1.91
Total enrolled in postsecondary education by 2012	0.56	1.81
Enrolled 3 months after high school completion or exit	0.85	2.45
Enrolled 4–12 months after high school completion or exit	0.50	1.90
Enrolled 13 months or more after high school completion or exit	0.46	2.28

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students are referred to as “students with military service” in the figure and table. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-5. Estimates and standard errors for figure 5. SECTOR OF FIRST-ATTENDED POSTSECONDARY INSTITUTION BY MILITARY SERVICE

Among 2002 high school sophomores who had enrolled in postsecondary education, percentage distribution of sector of first-attended postsecondary institution, by whether students had served in the military and the timing of military service relative to first postsecondary enrollment: 2012

Military service and timing of enrollment	Public 4-year	Private nonprofit 4-year	Public 2-year	For-profit ¹	Other ²
Estimates					
Students without military service ³	38.0	16.2	35.2	8.5	2.1
Students with military service	29.3	9.8	43.5	11.8	5.5
All military service preceded postsecondary enrollment	16.9 †	‡	43.4	27.9	‡
All postsecondary enrollment preceded military service	39.6	19.6	35.4	‡	‡
Overlapping military service and postsecondary enrollment	29.6	8.7	44.6	9.3	7.8
Standard errors					
Students without military service	0.84	0.55	0.91	0.43	0.21
Students with military service	2.44	1.50	2.87	1.88	1.39
All military service preceded postsecondary enrollment	5.41	†	7.69	6.92	†
All postsecondary enrollment preceded military service	6.78	5.39	6.49	†	†
Overlapping military service and postsecondary enrollment	3.04	1.99	3.38	2.08	2.03

† Not applicable.

! Interpret data with caution. Estimate is unstable because the standard error is between 30 and 50 percent of the estimate.

‡ Reporting standards not met.

¹ Includes for-profit institutions at all levels.

² Includes private nonprofit 2-year, public less-than-2-year, and private nonprofit less-than-2-year institutions.

³ Approximately 2 percent of 2002 high school sophomores who had enrolled in postsecondary education and served in the military as of 2012 began their postsecondary education at the Community College of the Air Force, an institution established to encourage enlisted service members to enroll in college classes. These students are included in the public 2-year institution category.

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the figure and table. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-6. Estimates and standard errors for figure 6. HIGHEST EDUCATIONAL ATTAINMENT BY MILITARY SERVICE

Percentage distribution of 2002 high school sophomores' highest educational attainment, by whether students had served in the military: 2012

Highest educational attainment	Students without military service	Students with military service
	Estimates	
Bachelor's or higher degree	36.1	17.1
Associate's degree	8.6	10.6
Undergraduate certificate	9.9	8.5
Some postsecondary education; no postsecondary credential; enrolled as of 2012	11.3	25.5
Some postsecondary education; no postsecondary credential; not enrolled as of 2012	19.3	25.8
High school credential or less (no postsecondary enrollment)	14.8	12.5
	Standard errors	
Bachelor's or higher degree	0.79	2.14
Associate's degree	0.36	1.65
Undergraduate certificate	0.39	1.42
Some postsecondary education; no postsecondary credential; enrolled as of 2012	0.37	2.20
Some postsecondary education; no postsecondary credential; not enrolled as of 2012	0.46	2.00
High school credential or less (no postsecondary enrollment)	0.56	1.81

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the figure and table. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-7. Estimates and standard errors for figure 7. FEDERAL STUDENT LOANS BY MILITARY SERVICE AND HIGHEST CREDENTIAL

Among 2002 high school sophomores who had enrolled in postsecondary education, percentage who took out a federal student loan and, of those, median amount of federal student loan, by whether students had served in the military and their highest postsecondary credential: 2012

	Students without military service	Students with military service
	Estimates	
Percent who took out a federal student loan		
Total	60.2	45.8
Some postsecondary education; no postsecondary credential; not enrolled as of 2012	44.9	33.1
Some postsecondary education; no postsecondary credential; enrolled as of 2012	62.4	47.7
Undergraduate certificate or associate’s degree	58.2	41.9
Bachelor’s or higher degree	68.7	66.5
Median amount of federal student loan		
Total	\$16,800	\$9,800
Some postsecondary education; no postsecondary credential; not enrolled as of 2012	6,200	4,700
Some postsecondary education; no postsecondary credential; enrolled as of 2012	15,400	9,300
Undergraduate certificate or associate’s degree	9,500	10,100
Bachelor’s or higher degree	23,100	18,600
	Standard errors	
Percent who took out a federal student loan		
Total	0.75	2.73
Some postsecondary education; no postsecondary credential; not enrolled as of 2012	1.52	4.21
Some postsecondary education; no postsecondary credential; enrolled as of 2012	1.70	4.82
Undergraduate certificate or associate’s degree	1.39	5.77
Bachelor’s or higher degree	0.99	5.22
Median amount of federal student loan		
Total	\$300	\$1,330
Some postsecondary education; no postsecondary credential; not enrolled as of 2012	500	960
Some postsecondary education; no postsecondary credential; enrolled as of 2012	940	2,510
Undergraduate certificate or associate’s degree	280	1,870
Bachelor’s or higher degree	410	2,630

NOTE: About 15,400 high school sophomores participated in the base-year study in 2002. The study sample of this report consists of the 13,130 cohort members who responded in the third follow-up survey in 2012. A total of 650 of these 13,130 reported ever serving in the military as of 2012; these students were referred to as "students with military service" in the figure and table. Estimates in the figure and table are based on data from the National Student Loan Data System, a federal government database that contains records of all federal loan information for anyone who has such a loan. Estimates for "Percent who took out a federal student loan" are based on all 2002 high school sophomores who had enrolled in postsecondary education as of 2012; estimates for "Median amount of federal student loan" are based on postsecondary enrollees who had taken out a federal student loan.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-8. Standard errors for table 1. STUDENT AND FAMILY CHARACTERISTICS BY MILITARY SERVICE
Percentage distribution of selected student and family characteristics among 2002 high school sophomores,
by whether students had served in the military: 2012

Selected student and family characteristics	Students without military service	Students with military service
Total	†	†
Sex		
Male	0.64	1.71
Female	0.64	1.71
Race/ethnicity		
White	0.93	2.42
Black	0.67	1.82
Hispanic	0.74	1.69
Asian	0.26	0.51
Other	0.33	1.44
Highest education of parents		
High school diploma or less	0.72	2.17
Some college	0.64	2.27
Bachelor's or higher degree	0.87	2.39
At least one parent's job was a military-specific job when student was in 10th grade		
Yes	0.13	0.99
No	0.13	0.99
Family socioeconomic status (SES) when student was in 10th grade		
Lowest quarter	0.69	1.69
Middle two quarters	0.74	2.38
Highest quarter	0.83	2.01
Family type when student was in 10th grade		
Two-parent family	0.50	2.00
Single-parent family	0.50	2.00
Language student first learned to speak		
English	0.57	1.54
Not English	0.57	1.54
Expected occupation of 10th-graders at age 30		
Military-specific	0.11	1.49
Nonmilitary	0.60	2.45
Do not know	0.60	2.33

† Not applicable.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-9. Standard errors for table 2. ACADEMIC AND HIGH SCHOOL CHARACTERISTICS BY MILITARY SERVICE
Percentage distribution of selected academic and high school characteristics among 2002 high school
sophomores, by whether students had served in the military: 2012

Selected academic and high school characteristics	Students without military service	Students with military service
Total	†	†
Rigor of high school curriculum		
Below standard	0.99	2.62
Standard	0.73	2.12
Moderately rigorous	0.86	2.45
Rigorous	0.46	0.74
Highest math course taken since grade 9		
No math, basic math, or pre-algebra	0.44	1.43
Algebra I, geometry, or algebra II	0.94	2.60
Trigonometry, statistics, or precalculus	0.84	2.35
Calculus	0.56	1.32
Cumulative academic grade point average (GPA)		
0.00–1.99	0.73	2.32
2.00–2.49	0.49	1.93
2.50–2.99	0.49	1.90
3.00–3.49	0.52	1.67
3.50–4.00	0.56	1.53
Educational expectations when student was in 10th grade		
Do not know	0.37	1.43
High school or less	0.37	1.13
Some college	0.39	1.74
Bachelor's or higher degree	0.60	2.36
Control of last high school		
Public	0.29	0.67
Private	0.29	0.67
Urbanicity of last high school		
Urban	0.84	2.28
Suburban	0.81	2.70
Rural	0.64	2.15

† Not applicable.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

Table A-10. Standard errors for table 3. MAJOR FIELD FOR HIGHEST DEGREE BY MILITARY SERVICE
Among 2002 high school sophomores who earned a postsecondary credential, percentage distribution of major field for highest postsecondary degree attainment, by whether students had served in the military: 2012

Major field for highest postsecondary degree attained as of 2012	Students without military service	Students with military service
Total	†	†
Business and marketing	0.57	2.98
Communications and arts	0.47	1.93
Education	0.44	†
General and interdisciplinary studies	0.31	2.26
Health care and health sciences	0.65	2.80
Humanities	0.32	1.77
Manufacturing, construction, repair, and transportation	0.34	2.56
Personal services	0.37	1.48
Public, legal, social, and protective services	0.40	3.18
Social and behavioral sciences	0.48	2.43
Science, technology, engineering, and mathematics (STEM)	0.59	2.90
Other	0.12	†

† Not applicable.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/12).

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