A First Look at Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes

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Contents

Introduction 3

Exhibit 1: Key Analysis Details 6

Research Questions 6

Subsamples Analyzed 7

Limitations on the Interpretation of Our Results 8

Results 9

Chapter 1: Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes 9

Chapter 2: Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Armed Forces Qualification Test Score 17

Chapter 3: Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Sex 19

Chapter 4: Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Race and Ethnicity 22

Chapter 5: Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Family Responsibilities 27

Chapter 6: Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Disability Rating 32

Chapter 7: Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Rurality 36

Conclusion 39

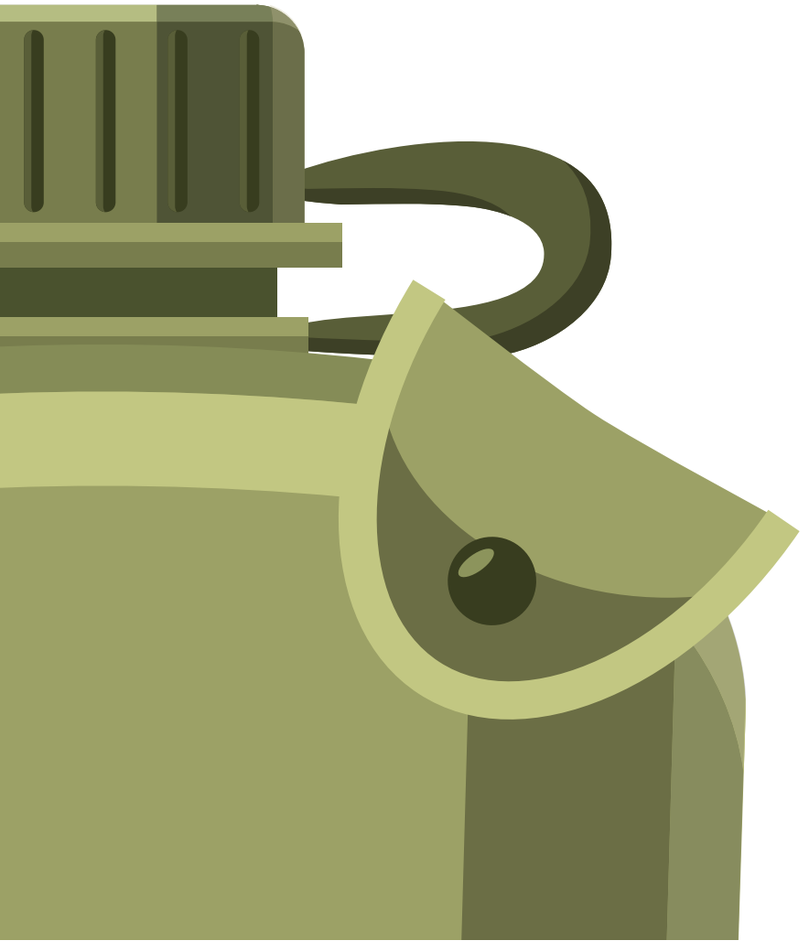
Appendix A: Methods 40

Appendix B: Methodological Details 47

Appendix C: Snapshot of Post-9/11 GI Bill-Eligible Veterans' Outcomes 49

References 50

Introduction



This first look at the Post-9/11 GI Bill and its outcomes for veterans is possible thanks to unprecedented access to federal data and interagency cooperation. *For the first time ever, we have combined and analyzed previously siloed federal data as part of the evidence-building decision-making work of the U.S. Census Bureau. There has never before been any definitive assessment of the outcomes associated with this critical federal investment across military branches, and the need for federal agencies to share data about veterans and the Post-9/11 GI Bill was singled out over the past decade by the bipartisan Congressional Commission on Evidence-Based Policymaking, by the Senate Committee on Health, Education, Labor and Pensions, and by a White House Executive Order.*[1]

The Post-9/11 Veterans' Educational Assistance Act of 2008 (also known as the Post-9/11 GI Bill, or PGIB) substantially increased the education benefit available to military service members who served after September 10, 2001. PGIB was enacted on June 30, 2008 (PL 110-252) and became effective on August 1, 2009. PGIB-eligible veterans[2] can receive benefits that fully cover their tuition and fees at any public college or university (or a capped amount[3] that can be spent at a private college), as well as a monthly housing allowance calculated on the basis of local cost of living, and a books and supplies stipend (U.S. Congressional Research Service, 2021a).[4]

The U.S. Congress has shown substantial interest in veterans, appropriating over **$284 billion to VA in FY 2022.**

Post-9/11 GIB Bill (PGIB) is the **U.S. Department of Veterans Affairs' (VA's) largest education program.**

PGIB obligations between 2009 and 2020 amounted to **$108 billion.**

Data on the outcomes of PGIB veterans are potentially relevant to broader policy discussions regarding college access, tuition-free college, and the labor market value of different degrees and fields of study.

[1] For more information, see Abraham et al. (2017), U.S. Senate Committee on Health, Education, Labor and Pensions (2014), and Exec. Order No. 13607, 77 F.R. 25861 (2012).

[2] Generally, veterans and servicemembers who serve an aggregate minimum of 90 days on active duty after September 10, 2001, and continue serving or are discharged honorably are considered eligible. In addition, individuals awarded the Purple Heart for service after September 10, 2001, and individuals who have been discharged or released for a service-connected disability after serving a minimum of 30 continuous days on active duty after September 10, 2001, can be eligible. For current eligibility details consult this U.S. Department of Veterans' Affairs (VA) website: https://www.va.gov/education/about-gi-bill-benefits/post-9-11/. PGIB benefits may also be transferred to a spouse or dependent. For current details refer to this VA website: https://www.va.gov/education/transfer-post-9-11-gi-bill-benefits/.

[3] For August 1, 2022 through July 31, 2023, the capped amount that could be used to attend a private institution was $26,381.37 per year (U.S. Department of Veterans Affairs, 2022).

[4] The dollar amount of the benefits PGIB recipients can receive is regularly updated. VA information for 2022 can be found here: https://benefits.va.gov/GIBILL/resources/benefits_resources/rates/ch33/ch33rates080122.asp.

It is important to understand PGIB outcomes for multiple reasons. First, the U.S. Congress has shown substantial investment in veterans and their successful transition to civilian careers; for example, Congress appropriated $14.95 billion in FY 2022 to VA for readjustment benefits, which includes education benefits. Second, while military service members are eligible for various education benefits both during and after their service,[5] PGIB is VA's largest education program. Specifically, PGIB has represented more than 70% of total GI Bill participation and more than 80% of GI Bill spending in each year since FY2013.[6] A Congressional Research Service (2021a) report disclosed that PGIB obligations between 2009 and 2020 amounted to $108 billion. The report also estimated that, in Fiscal Year (FY) 2022 alone, PGIB would benefit more than 600,000 individuals and expend almost $10 billion. Third, understanding PGIB outcomes is important due to the size of the program. Because of the large number of PGIB participants and the comprehensive financial support PGIB provides, data on the outcomes of PGIB veterans are potentially relevant not only to policymakers' assessment of how veterans are faring, but also to broader policy discussions regarding college access, tuition-free college, and the labor market value of different degrees and fields of study. However, despite PGIB's size and significance, little research has been conducted on the program and its beneficiaries, and no other PGIB study has included veterans across all branches.[7]

To address this gap in our understanding of PGIB outcomes, the U.S. Census Bureau agreed to host, as one of its first evidence building pilot projects, an interagency data-sharing effort to combine previously siloed data from multiple agencies to enable the first-ever look at combined federal administrative data regarding veterans' postsecondary outcomes across all branches of the U.S. Military.[8] This project represents an historic interagency effort to examine the PGIB program and how America's most recent generation of military servicemembers is faring as they return to civilian life. Support from Arnold Ventures enabled a team of external researchers from the American Institutes for Research (AIR), a nonpartisan, nonprofit research organization, to join the Census Bureau as Special-Sworn-Status employees for the purposes of this project. This support also enabled the critical purchase of student records from the National Student Clearinghouse (Clearinghouse), a nonprofit organization that provides data on enrollment and degree completion for students nationwide.[9] The nonprofit organization Veterans Education Success helped to conceptualize the project, secure funding, and provide assistance.

[5] See Congressional Research Service (2021b) for descriptions of these VA programs.

[6] See Congressional Research Service (2021a). Among veterans who are PGIB eligible, use of 1984 Montgomery GI Bill (MGIB) over PGIB benefits is very low. Our analysis of PGIB-Eligible Enlisted Veterans who separated as of June 30, 2018, indicated that less than 1% (.3%) used MGIB but not PGIB benefits. That percentage was even lower (less than .1%) for those who first enlisted between 2009 and 2018, when PGIB was in effect.

[7] One National Bureau of Economic Research paper released on PGIB had access only to Army data and looked only at cohorts who left between 2002 and 2010 (Barr et al., 2021). Kochhar (2020) was able to look at a slightly more recent range of cohorts (2008 to 2016) using Army data, and found many results consistent with those reported here (e.g., female veterans are more likely to use PGIB benefits). In contrast to these earlier studies, our data allow us to examine outcomes for all branches of the military and follow veterans who left the service though 2018, thereby providing a look at the outcomes for those separating after the recovery of the Great Recession.

[8] As stated here, https://www.census.gov/about/what/evidence-act/working-papers.html, "The Census Bureau seeks to be the federal leader in the collection and secure provisioning of data for evidence building and evaluation. This research is consistent with the vision and mission of the Census Bureau, the provisions of the Foundations of Evidence-Based Policymaking Act of 2018, and in support of the Presidential Memorandum on Restoring Trust in Government Through Scientific Integrity and Evidence-Based Policymaking."

[9] More specifically, the Clearinghouse's student records include more than 3,600 participating public and private colleges and universities, which enroll 98% of students in the United States. For more information, see https://www.studentclearinghouse.org/educational-organizations/studenttracker-for-educational-organizations/.

This work would not have been possible without the cooperation of multiple agencies. This project combines individual-level data from the U.S. Department of Veterans Affairs, Veterans Benefits Administration (VBA) at VA, Defense Manpower Data Center (DMDC) at the U.S. Department of Defense, Internal Revenue Service (IRS), and U.S. Census Bureau, as well as postsecondary-institution-level data from the U.S. Department of Education. Over seven years, representatives of these agencies worked to establish the data-sharing processes and agreements needed to merge these disparate data. The benefits of combining these data are numerous, allowing the project, for example, to examine veterans' earnings (using IRS data) by PGIB use and degrees completed (using VA, VBA, Clearinghouse data), while simultaneously also accounting for veterans' military occupations, service in hostile war zones, and academic preparedness at enlistment (using DMDC data).

A research team from AIR, Census Bureau, and VA's National Center for Veterans Analysis & Statistics is using these newly linked data to produce multiple reports providing critical insights about PGIB. This report provides a first look at the data by answering the following questions: Who uses PGIB? What are PGIB users' postsecondary outcomes? What are PGIB-Eligible Veterans' labor market outcomes? This report focuses on the PGIB outcomes of veterans who were enlisted (rather than commissioned officers).[10] Enlisted personnel represent the vast majority of military servicemembers. They also predominantly enter the military without a postsecondary degree[11] and are thus most likely to benefit from PGIB.[12] The data compiled for this project allow us to answer our research questions as of 2019, just prior to the COVID-19 pandemic's disruptions of education and the labor market.[13]

Each chapter in this report answers all three research questions, noted above, but focuses on a specific population. Chapter 1 provides results for PGIB-Eligible Enlisted Veterans overall. Subsequent chapters highlight variation in these veterans' outcomes by academic preparedness, as measured by the Armed Forces Qualification Test (AFQT) score (chapter 2), sex (chapter 3), race and ethnicity (chapter 4), family responsibilities (chapter 5), disability rating (chapter 6), and rurality (chapter 7).

A word of caution at the outset: as the research community understands well, there is a difference between association (which we present in this report) and causation (which we do not address here). Simply put, evidence that something has caused an outcome requires an experimental design such as a randomized controlled trial or a quasi-experimental design. Neither methodology was undertaken in this project. We cannot conclude with certainty that participating in PGIB caused postsecondary degree completion or that degrees earned with PGIB benefits affected veterans' earnings. Exhibit 1, below, elaborates on the research questions, samples analyzed, and limitations of the interpretation of our results for this series. Additional information on our methods can be found in appendices A and B.

Appendix C provides a snapshot summarizing the findings in this report.

[10] More specifically, we examine those who were enlisted and on active duty as of their last recorded pay plan.

[11] On the basis of our calculations using Clearinghouse data, we find that about 5% of PGIB-Eligible Enlisted Veterans had an associate degree, 6% had a bachelor's degree, and 1% had a graduate degree before activation.

[12] Officers, on the other hand, generally must have a bachelor's degree and thus face different considerations in thinking about how best to use their PGIB benefits. Spouses and dependents can also use veterans' PGIB benefits, but complete and vetted data on their use were not yet available from the VBA. We hope to examine officers' and dependents' use of PGIB benefits in the future.

[13] For more on COVID-19 and increased unemployment rates, see, for example, Kochhar (2020): https://www.pewresearch.org/fact-tank/2020/06/11/unemployment-rose-higher-in-three-months-of-covid-19-than-it-did-in-two-years-of-the-great-recession/. For more on postsecondary enrollment and retention declines, see https://research.collegeboard.org/media/pdf/enrollment-retention-covid2020.pdf. We hope to look at PGIB use, attainment and labor market outcomes after the pandemic began as more data become available.

Exhibit 1: Key Analysis Details

Research Questions

Our broad research questions include sub-questions, as described below:

1. Who uses PGIB?

What proportion of PGIB-Eligible Enlisted Veterans (as described below) used PGIB benefits at a postsecondary institution (i.e., were PGIB-Clearinghouse Users, also described below), and how did this vary by veterans' characteristics?

2. What are PGIB users' postsecondary outcomes?

a. Of the PGIB-Eligible Enlisted Veterans who used PGIB benefits at a postsecondary institution after their first separation (i.e., were PGIB-Clearinghouse Post-Separation Users, also described below),[14] what proportion completed a postsecondary degree by June 30, 2019?

b. Of the PGIB-Eligible Enlisted Veterans who used PGIB benefits at a postsecondary institution after their first separation (i.e., were PGIB-Clearinghouse Post-Separation Users), what proportion completed a degree within six years[15] of first enrolling after separating, and how did this vary by veterans' characteristics?

3. What are PGIB-eligible veterans' labor market outcomes?

a. What were PGIB-Eligible Enlisted Veterans' labor force participation rates?

b. What were PGIB-Eligible Enlisted Veterans' W-2 earnings?

c. Drilling down, what were the W-2 earnings outcomes for PGIB-Clearinghouse Users who completed an associate degree, and how did these earnings vary by veterans' characteristics?

d. Again, drilling down, what were the W-2 earnings outcomes for PGIB-Clearinghouse Users who completed a bachelor's degree, and how did these earnings vary by veterans' characteristics?

[14] For more details on why we focus on postsecondary outcomes after first separation, see "PGIB-Clearinghouse Post-Separation Users" in the section below entitled "Samples Analyzed."

[15] For more details on why we use six-year completion rates, see "Research Question 2" in Appendix A.

Subsamples Analyzed

In answering our research questions, we created four subsamples of veterans.

1. **PGIB-Eligible Enlisted Veterans.** Veterans identified by VA as eligible for receiving PGIB benefits who were 65 years or younger as of December 31, 2019, had a pay plan of "Enlisted" as their final rank, and separated prior to June 30, 2018. The study team used this separation cutoff date because July 1, 2018, through June 30, 2019, is the last full academic year for which VBA PGIB beneficiary information was available. Using this cutoff gave veterans at least one year to use PGIB benefits after separating from active duty. The study team used this sample in research questions 1 and 3.

2. **PGIB-Clearinghouse Users.** PGIB-Eligible Enlisted Veterans who received a PGIB payment according to VBA and had an enrollment record in the Clearinghouse data during the following period: after first activation in the military or August 1, 2009, whichever was later (as veterans would not be eligible to use PGIB benefits before their first activation date and PGIB benefits were not available prior to August 1, 2009) and before June 30, 2019 (which represents the end of the last full academic year for which we had VBA PGIB beneficiary information). Veterans do not have to use their PGIB benefits at an institution that reports to the Clearinghouse,[16] but completion data are not available for PGIB use that occurs outside of institutions covered by the Clearinghouse, and these data are critical to this series' examination of PGIB recipients' postsecondary degree completion and labor market outcomes. Exact details about which institutions are and are not included in Clearinghouse data can be found on a constantly updated coverage descriptor.[17] We find that 84% of all those who used PGIB had a Clearinghouse record, representing the PGIB-Clearinghouse Users examined in this series. The research team used this sample to address Research Question 1 about usage and Research Question 3 about earnings for those who complete specific degrees through PGIB.

[16] For example, veterans can use PGIB benefits for apprenticeships and on-the-job training, as well as other training like flight training, Emergency Medical Technician (EMT) training, and HVAC repair. Veterans can also use PGIB benefits for licensing and certification examinations and other national tests. See this VA website for current details: https://www.va.gov/education/about-gi-bill-benefits/how-to-use-benefits/.

[17] As of 2019, while overall Clearinghouse coverage was 97%, there is a notable coverage gap for 2-year for-profit schools at 12% (National Student Clearinghouse Student Research Center, 2022).

3. **PGIB-Clearinghouse Post-Separation Users.** PGIB-Clearinghouse Users who had at least one enrollment record after their first separation date. Although veterans can use PGIB benefits before they separate from the military, using PGIB after separating allows veterans to enroll without the pressure of active-duty military service and to receive the housing allowance portion of PGIB.[18] This group represents 96 percent of all PGIB-Clearinghouse Users. The research team used this sample to address Research Question 2 about postsecondary outcomes.

4. **PGIB-Eligible Enlisted Veterans in ACS.** The research team defined a fourth subsample based on the intersection between PGIB-Eligible Enlisted Veterans and data from the U.S. Census Bureau's American Community Survey (ACS). For the investigation of Research Question 3.a, involving labor force participation, only PGIB-Eligible Enlisted Veterans who appeared in the ACS data could be included.[19]

See appendix A for more details of how analyses on these subsamples were carried out.

Limitations on the Interpretation of our Results

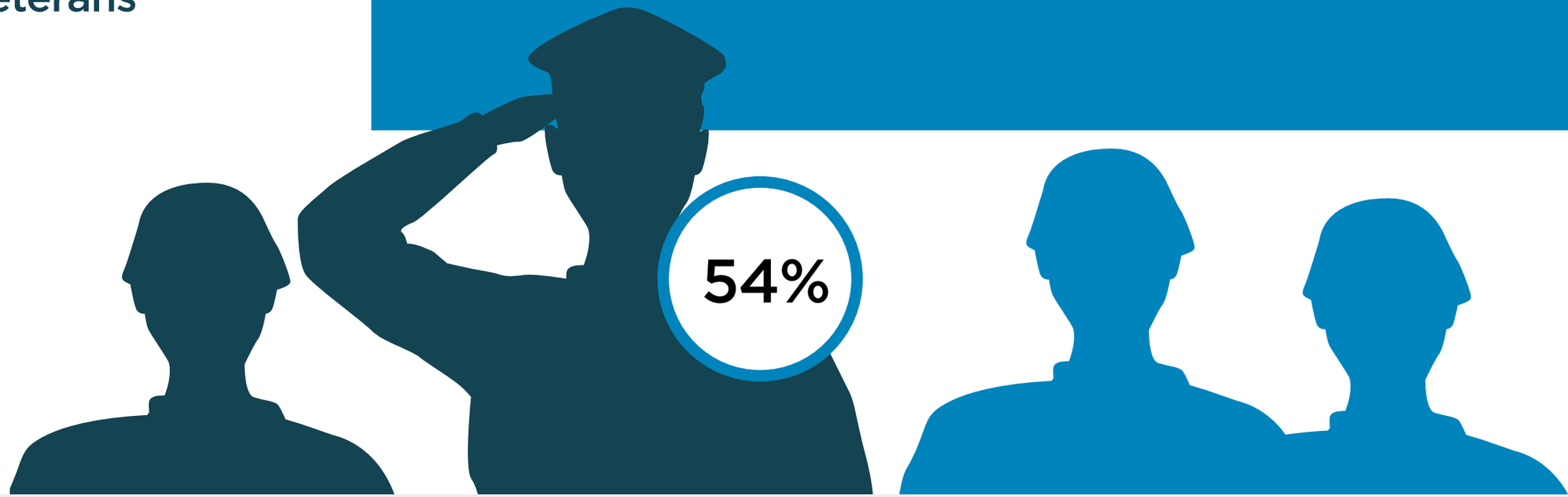
This study first presents bivariate descriptive statistics that examine PGIB-Eligible Enlisted Veterans' outcomes (e.g., PGIB use) by PGIB-Eligible Enlisted Veterans' characteristics (e.g., sex, race/ethnicity, or rurality). The study also incorporates regression analysis as a further set of descriptive statistics that can account for other variables, like academic preparedness and military occupation. A relationship between a factor of interest (e.g., race/ethnicity) and the outcome (e.g., PGIB use) that holds in both bivariate descriptive statistics and in regression results suggests that the other factors included in the regression are not explaining the relationship (though it is possible that that relationship is the result of another, unincluded factor shaping veterans such as motivation or preferences for certain careers). The methods used in this analysis are not causal, meaning that the results cannot show whether the outcomes were caused by PGIB or provide return on investment information.

[18] At the time of this analysis, the VBA had not yet validated and thus could not provide veterans' specific PGIB payment dates which would facilitate calculations of when PGIB-Clearinghouse Users' benefit use occurs (i.e., between first activation and first separation or after first separation). While it is possible to use PGIB benefits while serving on active duty, PGIB-eligible veterans have access to other military education programs while serving, such as the DoD Tuition Assistance (TA) Program and Credentialing Opportunities On-Line (COOL). PGIB-Eligible Enlisted Veterans may therefore take courses while serving, using other military education programs and saving the full support provided under PGIB (in particular, the housing allowance) when not already receiving housing as part of their military service. Measuring degree completion for PGIB-Clearinghouse Users who first enrolled while on active duty (when veterans would be less likely to attend full time) together with PGIB-Clearinghouse Users who first enrolled after separating (when veterans would be more likely to attend full time) would make it difficult to understand completion rates for veterans making full use of their PGIB benefit. Moreover, we find that only 3% of PGIB-Clearinghouse Users attained a degree between first activation and first separation. For all these reasons, we focus our examination of completion rates on PGIB-Clearinghouse Post-Separation users.

[19] ACS is based on a sample of 3.5 million addresses in the United States, taken annually.

Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes

About half (54%) of PGIB-Eligible Enlisted Veterans used their PGIB benefits, about half (47%) of PGIB users completed a degree within six years, and PGIB users with an associate or bachelor's degree earned around $50,000 ($44,100 and $55,700, respectively).



Who uses PGIB?

First, we look at veterans' usage of PGIB benefits. The VA identified more than 2.7 million PGIB-Eligible Enlisted Veterans.[20] Matching to VBA data and Clearinghouse data on postsecondary enrollment reveals that **about 54% of PGIB-Eligible Enlisted Veterans had enrolled in postsecondary education using PGIB benefits** (i.e., were PGIB-Clearinghouse Users, as explained in exhibit 1) as of June 30, 2019.[21]

[20] We use capitalization to help clearly identify the subsamples examined in this report. For more details on these subsamples, see "Samples Analyzed" in exhibit 1.

[21] Note that in a forthcoming report where we were able to use VBA payment records through September 30, 2018 to look at use of PGIB, we find that 62% of PGIB-eligible veterans used benefits personally or transferred them to a spouse or dependent. This report presents descriptive statistics on PGIB-Eligible Enlisted Veterans' outcomes. The methods used are not causal, meaning that the results cannot show whether the outcomes were caused by PGIB participation. For more detail, see "Introduction."

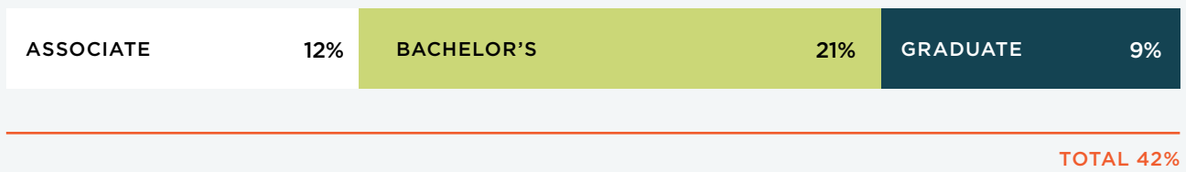
About half (54%) of PGIB-Eligible Enlisted Veterans used their PGIB benefits, about half (47%) of PGIB users completed a degree within six years, and PGIB users with an associate or bachelor's degree earned around $50,000 ($44,100 and $55,700, respectively).

What are PGIB users' postsecondary outcomes?

Here we focus on those who received a PGIB payment and had a Clearinghouse record after separating from the military (i.e., were PGIB-Clearinghouse Post-Separation Users[22]). We examine two measures: the overall completion rate as of June 30, 2019, and the six-year completion rate. Starting with overall completion, the results show that 42% of PGIB-Clearinghouse Post-Separation Users had completed at least one postsecondary degree by June 30, 2019, with 12% earning an associate, 21% receiving a bachelor's, and 9% attaining a graduate degree as their highest degree.

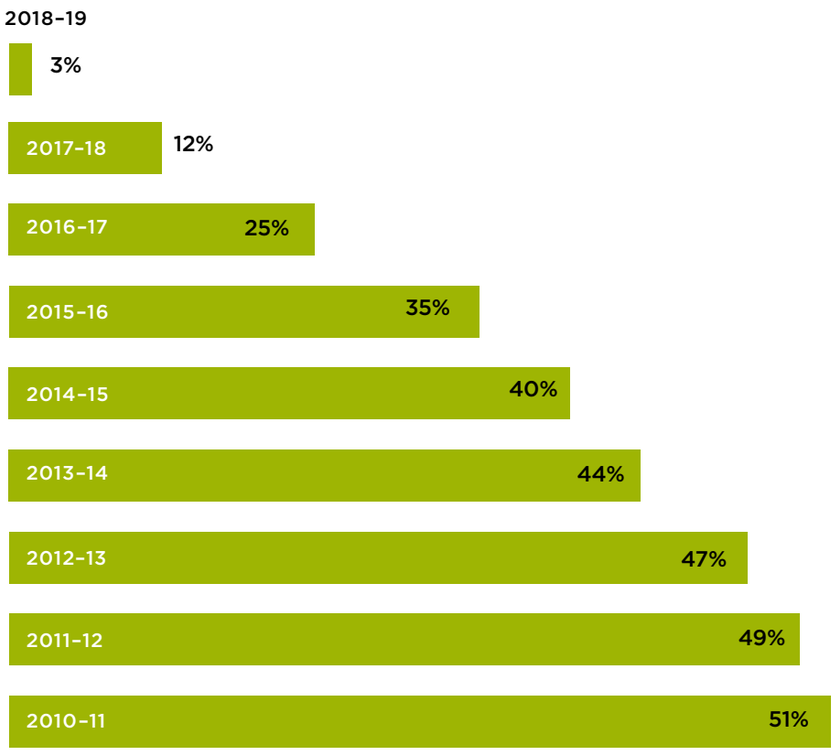
Yet this 42% completion rate somewhat understates veterans' completion because it includes veterans who enrolled recently and thus have not had much time to complete a degree. As is true in the general population, veterans' postsecondary degree completion increases as students have more time to attend and progress. As shown in the figure on the next page, PGIB-Clearinghouse Post-Separation Users who started in the 2018-19 academic year (in other words, had only one academic year of enrollment after first separating before completion was measured June 30, 2019) had a 3% completion rate, but those who started in 2015-16 and had four years to complete their studies had a 35% completion rate. Those in the 2013-14 cohort who had six years to complete a degree had a 44% completion rate, and those who had entered in 2010-11 and had nine years had a 51% completion rate.

Percentage Completing a Postsecondary Degree



[22] For more on why we focus on postseparation use in examining completion, see the reasons noted in exhibit 1.

Percentage Completing a Degree
by Academic Year Started



Notes: We use the U.S. Department of Education's measure of the academic year: from July 1 of one calendar year through June 30 of the next calendar year.

We turn now to six-year completion rates.[23] For this metric, we take all PGIB-Clearinghouse Post-Separation Users whose first post-separation PGIB-eligible enrollment occurred at least six years prior to June 30, 2019 (i.e., June 30, 2013, or before) and examine whether they completed a degree six years after their enrollment. This analysis reveals that 47% of PGIB-Clearinghouse Post-Separation Users finished a degree within six years. To put this in some perspective, nationally representative U.S. Department of Education data from the 2011-12 Beginning Postsecondary Longitudinal Study (BPS:12/17) indicates that, among first-time postsecondary students who were financially independent from their parents,[24] like veterans, 23% had earned an associate or bachelor's degree as their highest undergraduate degree six years later.[25] **In other words, PGIB-using veterans' six-year completion rate of an associate, bachelor's, or graduate degree was roughly double that of financially independent postsecondary students' completion rate of an associate or bachelor's degree.[26]**

[23] Since 1995, the U.S. Department of Education's National Center for Education Statistics has used a six-year window to examine the attainment of first-time postsecondary students pursuing a range of postsecondary credentials that take different amounts of time to complete in its Beginning Postsecondary Students Longitudinal Study (BPS). A six-year window gives bachelor's degree students 150% of the normal time needed to complete a four-year degree, an often-used yardstick by the Department of Education and others in measuring bachelor's degree completion. For more details on why we use six-year completion rates see "Research Question 2" in Appendix A.

[24] Students who are financially independent include those age 24 or over and students under 24 who are married, have dependents, are veterans or on active duty (although the Department of Education's collection of students' military status or veteran status was curtailed when the Department introduced a skip pattern in the FAFSA form), are orphans or wards of the courts, are homeless or at risk of homelessness, or were determined to be independent by a financial aid officer using professional judgment (Chen et al., 2019).

[25] See Chen et al. (2019).

[26] Note that national results reported are based on completion of an associate or bachelor's degree while PGIB results reported are based on completion of an associate, bachelor's, or graduate degree. As noted, only 6% of eligible enlisted veterans had a bachelor's degree before activation, so the percentage of veterans who completed just a graduate degree and not a bachelor's degree prior to that is likely to be relatively small. In other words, the inclusion of a graduate degree is unlikely to fully account for PGIB-Clearinghouse Post-Separation Users' higher completion rate compared with financially independent students.

What are PGIB-eligible veterans' labor market outcomes?

First, to get a sense of the extent to which PGIB-Eligible Enlisted Veterans have put their postsecondary education to use in the labor market, we look at their labor force participation using ACS data. Specifically, we examine PGIB-Eligible Enlisted Veterans' 2019 labor force participation, limiting our analysis to those not enrolled in postsecondary education in that year. We find that 85% of PGIB-Eligible Enlisted Veterans and 87% of PGIB-Clearinghouse Users were in the labor force. **These labor force participation rates mirror those of the general population;** after reweighting to achieve the same sex and age mix as the PGIB-Eligible Enlisted population, the national ACS labor force participation was also 85% in the same year. If PGIB-Eligible Enlisted Veterans had lower labor force participation, that could suggest an issue worthy of additional consideration and investigation – however, this is not the case.

Second, the relationship between postsecondary attainment and earnings may differ for veterans compared to non-veterans due to their military experiences. To examine this relationship, we looked at the 2019 W-2 wage data of PGIB-Eligible Enlisted Veterans not enrolled in postsecondary education in that year. We then compared these earnings by veterans' highest degree attained at the end of 2018, regardless of when this degree was attained (before, during, or after military service) and whether they were PGIB-Clearinghouse Users. **Consistent with national patterns,[27] PGIB-Eligible Enlisted Veterans' earnings generally increased with educational attainment.** Specifically, those who had no record of postsecondary enrollment at the Clearinghouse earned $41,300. Those with some college enrollment or a certificate but no degree, and those with an associate degree, earned $45,000 and $44,300, respectively. Earnings for those with a bachelor's degree reached $55,900, and those with a graduate degree had the highest salary, at $69,900.[28]

[27] See for example, https://www.bls.gov/emp/chart-unemployment-earnings-education.htm.

[28] The pattern was the same when we examined earnings looking at adjusted gross income (AGI). The AGI includes income when self-employed, spouse's income, and investments.

Taking into account academic preparedness as measured by veterans' scores on the Armed Forces Qualification Test (AFQT) and the array of demographic characteristics and military experiences noted in appendix table A-1, **earnings consistently increased as PGIB-Eligible Enlisted Veterans' postsecondary attainment became higher.** These controls (academic preparedness, demographic characteristics, and military experiences) are important in enabling a truer assessment of how veterans' earnings increased with their postsecondary attainment.

We now turn our focus from all PGIB-Eligible Enlisted Veterans to examine the earnings of PGIB-Clearinghouse Users who attained an associate or bachelor's degree as their highest degree. We find that PGIB-Clearinghouse Users who completed an associate degree earned, on average, $44,100, and those who completed a bachelor's degree earned, on average, $55,700.[29] Consistent with national patterns,[30] these degree completers' earnings varied by their major or field of study. This variation in veterans' earnings by field of study is discussed and displayed in figures within the next several pages of this report. We begin by noting the results for those who attained an associate degree before moving on to those who attained a bachelor's degree. In these analyses we compare each academic major to the average for all PGIB-Clearinghouse Users who completed the same degree.

Among PGIB-Clearinghouse Users who completed an associate degree, those who majored in engineering or military technology and protective services had mean earnings over 10% above the average for this group (23% and 12% over in fact, respectively). Those with majors in computer science, health care fields, other applied fields, business, and science all had earnings within 10% of the overall average PGIB-Clearinghouse Users who earned associate degrees. Finally, social sciences, humanities, and education majors had earnings that were more than 10% lower than the average PGIB-Clearinghouse User who completed an associate degree (18%, 26%, and 37% lower, respectively).

Next, we use regression to explore whether some of the variation in earnings by major among associate degree completers can be explained by veterans' academic preparedness as measured by their AFQT scores, demographic characteristics (e.g., age), and military experiences (e.g., military occupation and rank at separation), as detailed in appendix table A-1. Once we account for these additional control variables and look at adjusted earnings, the variation by major shrinks. Most notably, computer science, military technology and protective services, and engineering and engineering technology majors, the three highest earning majors, all decline by over $1,500, suggesting that other factors may be playing a role in these majors' earnings. Education, health, and social science majors, on the other hand, earn over $2,500 more than they did before accounting for other characteristics (though education and social sciences majors still earn less than the average associate degree recipient). **Overall, the results indicate that field of study is related to associate degree recipients' later earnings, even controlling for other factors like military rank.**

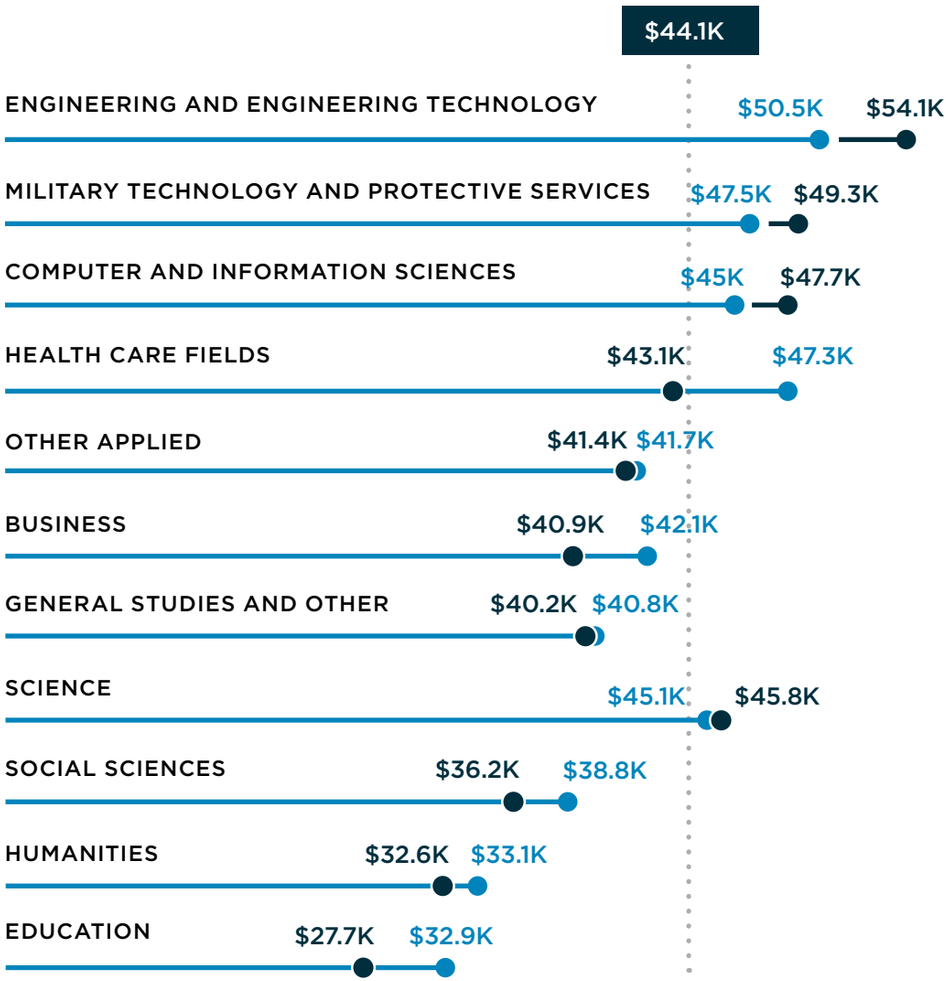
[29] To provide some context, when we examined 2019 ACS data on the U.S. population that were calibrated so the age and sex distributions were the same as PGIB-Eligible Enlisted Veterans, we found that the average earnings for those who held associate and bachelor's degrees was $46,200 and $74,700. Wages may be lower for PGIB-Clearinghouse Users, particularly those who complete a bachelor's degree, because they had a job (with the U.S. Military) before completing their degree and thus may have had less time working in the labor market with their degree in their possession.

[30] See Carnevale et al. (2021) and Carnevale et al. (2020).

About half (54%) of PGIB-Eligible Enlisted Veterans used their PGIB benefits, about half (47%) of PGIB users completed a degree within six years, and PGIB users with an associate or bachelor's degree earned around $50,000 ($44,100 and $55,700, respectively).

Fields of Study — Associate Degree W-2 Earnings

ADJUSTED | MEAN



Note: Science includes biological and physical science, science technology, math, and agriculture. General studies and other includes general studies, basic skills, and citizenship activities; leisure and recreational activities; personal awareness and self-improvement; high school/secondary diplomas and certificate programs; and interpersonal and social skills. Other applied includes personal and consumer services; manufacturing, construction, repair, and transportation; architecture; communications; public administration and human services; design and applied arts; law and legal studies; library sciences; and theology and religious vocations.

Military Technology and Protective Services are combined in line with National Center for Educational Statistics (NCES) practices; Military Technology can involve courses in military applied sciences, while Protective Services can involve courses in homeland security and counterterrorism operations.

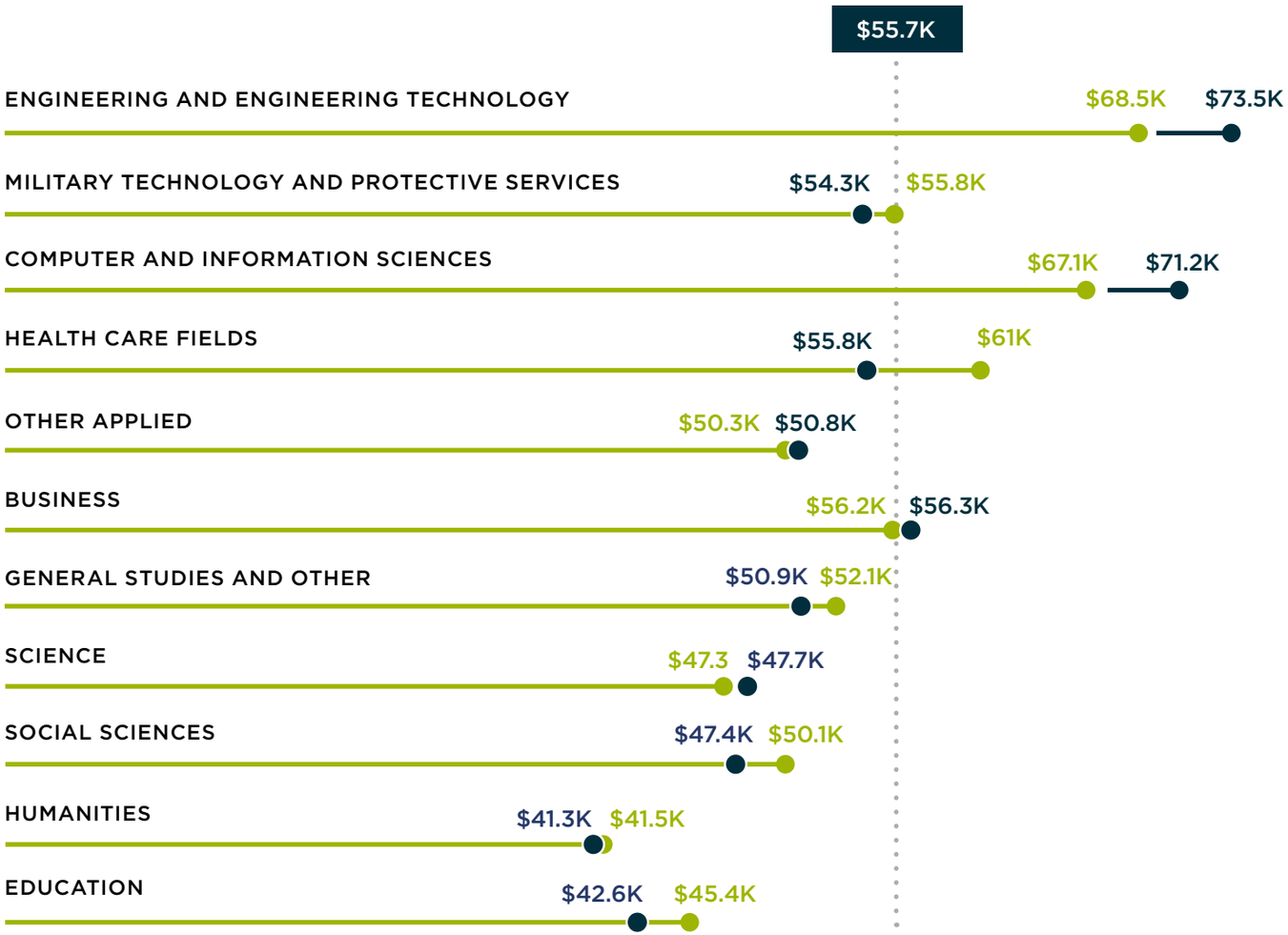
The earnings of bachelor's degree recipients varied by field of study too, but with some differences from what was observed for associate degree recipients. Among bachelor's degree recipients, computer science majors and engineering majors earned more than 25% above the average PGIB-Clearinghouse User who received a bachelor's degree, earning 28% and 32% above the average, respectively. Military technology and protective services majors this time joined majors in health care fields and business majors to have earnings very close to the average for all PGIB-Clearinghouse Users that received bachelor's degrees. As with associate degree recipients, bachelor's degree recipients who completed social science, humanities, and education majors had earnings more than 10% below the average for bachelor's degree recipients; however, in contrast to associate degree completers, bachelor's degree completers who majored in science also had earnings more than 10% below the bachelor's degree completer average.[31]

Once we account for veterans' other characteristics using regression and look at adjusted earnings, the variation by major again shrinks, with two groups having the most notable changes. First, two of the highest earning majors for bachelor's degree recipients see their earnings decline but still remain above average once we account for these other characteristics. Specifically, we observe declines of $4,100 for computer and information science and $5,000 for engineering and engineering technology. Second, as the figure shows, veterans who earned a bachelor's degree in a health care field were within $100 of the average for all PGIB-Clearinghouse Users who received a bachelor's degree, but after we account for other characteristics their earnings are $5,300 above average. This suggests that majoring in health could be leading to higher salaries for veteran groups that are otherwise earning less. Overall, these results indicate that the wage differences observed for veterans with different majors may be shaped by the characteristics of veterans pursuing these majors as well.

[31] This science category includes those with majors in biological and physical science, science technology, math, and agriculture. Although it may seem surprising that science majors earn less than the average PGIB-Clearinghouse User who received a bachelor's degree, this is not an uncommon finding for recent college graduates (e.g., Carnevale et al. 2013).

Fields of Study — Bachelor's Degree W-2 Earnings

ADJUSTED | MEAN



Note: Science includes biological and physical science, science technology, math, and agriculture. General studies and other includes general studies, basic skills, and citizenship activities; leisure and recreational activities; personal awareness and self-improvement; high school/secondary diplomas and certificate programs; and interpersonal and social skills. Other applied includes personal and consumer services; manufacturing, construction, repair, and transportation; architecture; communications; public administration and human services; design and applied arts; law and legal studies; library sciences; and theology and religious vocations.

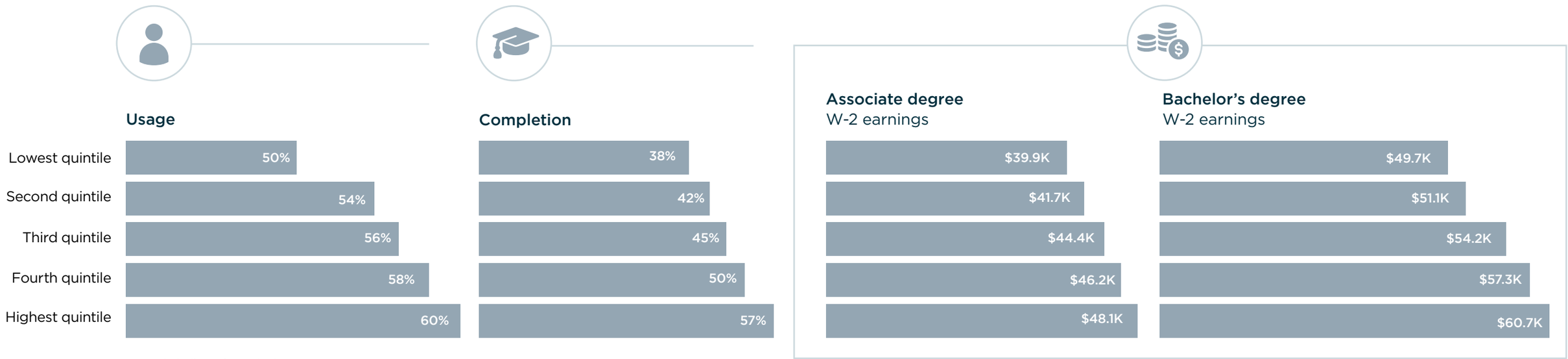
Military Technology and Protective Services are combined in line with National Center for Educational Statistics (NCES) practices; Military Technology can involve courses in military applied sciences, while Protective Services can involve courses in homeland security and counterterrorism operations.

2

Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Armed Forces Qualification Test Score

The Armed Forces Qualification Test (AFQT) measures arithmetic reasoning, mathematical knowledge, paragraph comprehension, and word knowledge of incoming service members, and thus can provide a snapshot of veterans' academic preparedness at the time they enlisted. **We find that, as veterans' academic preparedness (as measured by the AFQT score) increased, so did veterans' use of PGIB benefits, degree completion, and earnings.**[32]

Use of Benefits, Degree Completion, and Earnings Increase with Academic Preparedness at Enlistment



Note: Quintiles refer to AFQT score.

[32] Several nationally representative U.S. Department of Education studies also show this pattern. For differences in postsecondary enrollment by academic preparedness see, for example, table 3 in Radford et al. (2018). For differences in attainment of bachelor's degrees by academic preparedness see, for example, table 1 in Chen et al. (2019). Sockin (2021) reported positive correlations between both AFQT scores and SAT scores and income, using data from National Longitudinal Survey of Youth 1997.

Who uses PGIB?

First, we examine whether PGIB-Eligible Enlisted Veterans[33] used PGIB benefits at postsecondary institutions (i.e., were PGIB-Clearinghouse Users), according to their academic preparedness at time of enlistment. To capture academic preparedness we took veterans' AFQT score and split them into five equally sized groups or quintiles.[34] As the figure indicates, usage increases consistently as AFQT quintile rises, spanning 10 percentage points between the lowest and highest quintiles.[35] After accounting for an array of variables, including demographic characteristics and military experiences, the gap between the lowest and highest AFQT quintile declined by one percentage point to a spread of nine percentage points. **This result suggests that the other veteran characteristics included explain only a small portion of the overall gap in usage observed by AFQT and that higher AFQT scores are associated with higher PGIB usage.** For a complete list of the control variables included in such usage, degree completion, and earnings regression analyses, see appendix table A-1.

What are PGIB users' postsecondary outcomes?

Next, we explore PGIB-Clearinghouse Post-Separation Users' completion of an associate, bachelor's, or graduate degree within six years of their first post-separation enrollment according to their AFQT quintile.[36] As the figure reveals, completion rates increased with veterans' AFQT quintile. **In fact, the 19-percentage-point gap in completion between the lowest and highest AFQT quintiles is even larger than the 10-percentage-point gap noted above for PGIB usage by AFQT quintile.** Accounting for other veteran characteristics, this 19-percentage-point completion gap shifted to 14 percentage points. This change of five percentage points suggests that the other veteran characteristics included explain only a small portion of the difference in completion between the lowest and highest AFQT quintiles. **In short, higher AFQT scores are associated with higher completion rates.**

What are PGIB-eligible veterans' labor market outcomes?

W-2 earnings for PGIB-Clearinghouse Users who completed an associate degree or a bachelor's degree again varied by AFQT. **For both sets of degree completers, earnings increased with veterans' AFQT quintile.** As the figure shows, the earnings gap between the lowest and highest quintiles spanned about $8,200 for associate degree recipients and $11,000 for bachelor's degree recipients. However, after accounting for other veteran characteristics, the earnings gap shrunk to $2,500 for associate degree recipients and $5,100 for bachelor's degree recipients.[37]

[33] We use capitalization to help clearly identify the subsamples examined in this report. For more details on these subsamples, see "Samples Analyzed" in exhibit 1.

[34] Specifically, AFQT scores within each quintile were as follows: Quintile 1 (<41), Quintile 2 (41-54), Quintile 3 (54-65), Quintile 4 (66-79), and Quintile 50 (80+).

[35] This report presents descriptive statistics on PGIB-eligible veterans' outcomes. The methods used are not causal, meaning that the results cannot show whether the outcomes were caused by PGIB participation. For more detail, see "Introduction."

[36] Since 1995, the U.S. Department of Education's Beginning Postsecondary Students Longitudinal Study (BPS) has used a six-year window to examine the attainment of first-time postsecondary students pursuing a range of postsecondary credentials that take different amounts of time to complete. A six-year window gives bachelor's degree students 150% of the normal time needed to complete a four-year degree, an often-used yardstick by the Department of Education and others in measuring bachelor's degree completion. For more details on why we examine six-year completion rates, see "Research Question 2" in Appendix A.

[37] This positive relationship between AFQT quintile and earnings is similar to the relationship between SAT scores and starting salary reported in the general population (Oehrlein, 2009; Pinizzotto, 2020).

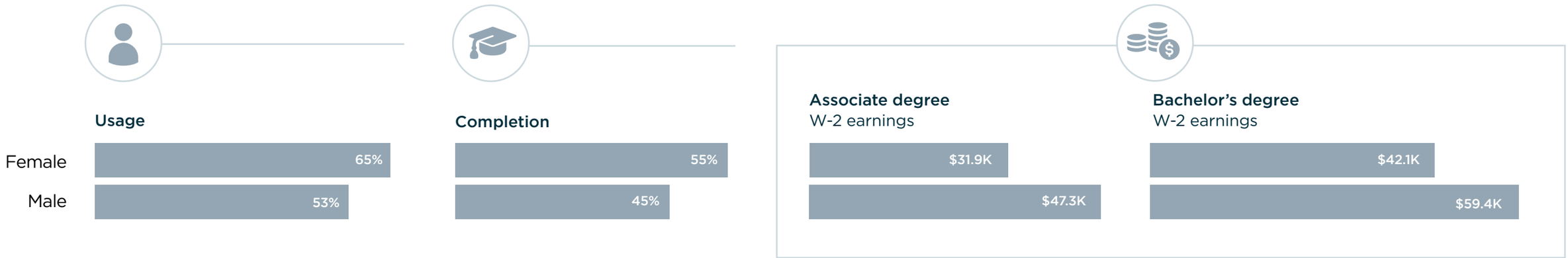
3

Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Sex[38]

Female veterans used PGIB benefits and completed degrees at rates far above male veterans. Yet female veterans earned less when they attained the same degrees, even taking into account field of study and an array of other veteran characteristics. These differences by sex in postsecondary enrollment, completion, and earnings are consistent with national patterns. In short, women in America generally enroll in and complete postsecondary degrees at higher rates but have lower earnings.

Female Veterans
Use Benefits and Complete Degrees at Higher Rates than Male Veterans, But Their Earnings Lag Behind

[38] Veterans' sex is based on VA data, which categorize veterans into two sexes: male or female. Please see appendix table A-1 for further information on the source for variables included in analyses.



Results

Who uses PGIB?

First, we examine whether PGIB-Eligible Enlisted Veterans[39] used PGIB benefits at postsecondary institutions (i.e., were PGIB-Clearinghouse Users). As the figure depicts, female veterans were 14 percentage points more likely than their male counterparts to use PGIB.[40] After taking into account an array of variables, including AFQT score, demographic characteristics, and military experiences, female veterans were 11 percentage points more likely than male veterans to use PGIB. This small change of three percentage points suggests that the other veteran characteristics included explain only a small portion of the difference in enrollment observed by sex. **In other words, the sex gap remains, even considering other veteran characteristics.** For a complete list of the control variables included in such usage, completion, and earnings regression analyses, see appendix table A-1.[41]

What are PGIB users' postsecondary outcomes?

Next, we examine the completion of an associate, bachelor's, or graduate degree within six years of the first post-separation enrollment of PGIB-Clearinghouse Post-Separation Users.[42] The figure reveals that female veterans who used PGIB to enroll in postsecondary education completed a degree within six years at a rate 10 percentage points higher than male veterans. This gap increased to 11 percentage points after taking into account other veteran characteristics.[43] **This consistent spread suggests a gap in college completion between men and women, and this gap is not attributable to the other veteran characteristics included.**

[39] We use capitalization to help clearly identify the subsamples examined in this report. For more details on these subsamples, see "Samples Analyzed" in exhibit 1.

[40] This report presents descriptive statistics on PGIB-Eligible Enlisted Veterans' outcomes. The methods used are not causal, meaning that the results cannot show whether the outcomes were caused by PGIB participation. For more detail, see "Introduction."

[41] These results are consistent with national patterns by sex in college enrollment. See, for example, Reeves and Smith (2021).

[42] Since 1995, the U.S. Department of Education's Beginning Postsecondary Students Longitudinal Study (BPS) has used a six-year window to examine the attainment of first-time postsecondary students pursuing a range of postsecondary credentials that take different amounts of time to complete. A six-year window gives bachelor's degree students 150% of the normal time needed to complete a four-year degree, an often-used yardstick by the Department of Education and others in measuring bachelor's degree completion. For more details on why we examine six-year completion rates see "Research Question 2" in Appendix A.

[43] These results are consistent with national patterns by sex in college completion. See, for example, Denning et al. (2020).

What are PGIB-eligible veterans' labor market outcomes?

When we turn to examine 2019 W-2 earnings for PGIB-Clearinghouse Users who completed an associate or bachelor's degree, women no longer come out ahead, as they did in usage of PGIB and degree completion. Specifically, we find that female veterans who completed an associate degree earned $15,400 less than male veterans. When we account for the array of demographic, military, and postsecondary characteristics (including major) that are noted in appendix table A-1, female veterans earned $13,200 less than their male counterparts, suggesting the control variables are not explaining a large portion of the gap. Moving to those who finished a bachelor's degree, female veterans earned $17,300 less than their male counterparts. Taking into consideration other veteran characteristics, female veterans still earned $13,800 less than their male equivalents. **In sum, female veterans earned less than male veterans even when they attained the same degrees.**

There are a couple of things to note in considering these earnings results. First, our analysis of PGIB-Eligible Enlisted Veterans in ACS indicated that female veterans were nine percentage points less likely than male veterans to participate in the labor force, which may explain some of the above earnings gap by sex for degree completed, since women veterans not participating in the workforce would have zero W-2 income. Second, the above gap by sex in earnings for veterans is smaller than that found in the overall U.S population (which likely follows more heterogeneous career paths than veterans). Specifically, our analysis using 2019 ACS data that was calibrated so the age and sex distributions were the same as PGIB-Eligible Enlisted Veterans, indicates that the earnings gap by sex among the general population for those with an associate degree was $18,100 nationally (compared to $15,400 for veterans as noted above). As for those with a bachelor's degree, the earnings gap by sex nationally (in the general population) was bigger: $32,400 (compared to $17,300 for veterans as noted above). **For both degree types, the earnings gap by sex is smaller for veterans than the general population.**

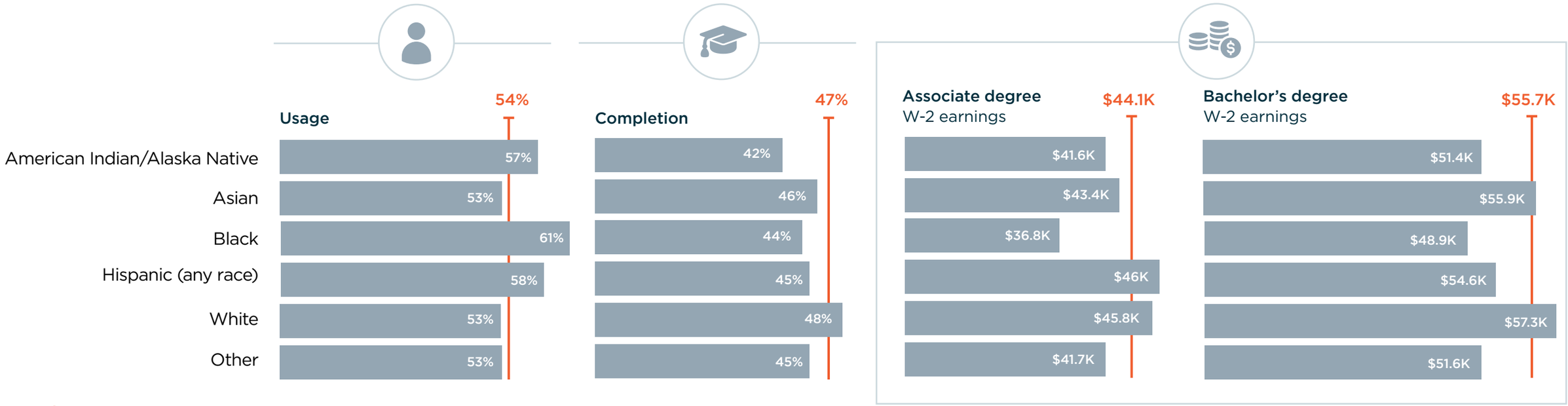
4

Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Race and Ethnicity

Compared to the overall average for the veteran samples we analyzed, Black, American Indian/Alaska Native, and Hispanic veterans enrolled in postsecondary education using PGIB benefits at above average rates but completed a postsecondary degree within six years using PGIB at below average rates.[44]

Veterans From Historically Underrepresented Groups Were **More Likely to Enroll but Less Likely to Complete**

[44] Race is defined in this report in accordance with VA race categories. Please see appendix table A-1 for further information on the source for variables included in analyses.



Results

Who uses PGIB?

First, we examine PGIB usage, comparing PGIB-Eligible Enlisted Veterans[45] in different race and ethnicity categories to the average for all PGIB-Eligible Enlisted Veterans. **The figure highlights that veterans from racial and ethnic groups who have been historically underrepresented at postsecondary institutions used PGIB benefits at postsecondary institutions (i.e., were PGIB-Clearinghouse Users) at rates above the average of the overall PGIB-Eligible Enlisted Veterans in this study.**[46] To be more specific, compared with PGIB-Eligible Enlisted Veterans overall, Black veterans were seven percentage points, Hispanic veterans (of any race) were four percentage points, and American Indian/Alaska Native veterans were three percentage points more likely to use PGIB. These findings stand in contrast with patterns by race and ethnicity in the broader U.S. population, in which Black, Hispanic, and American Indian/Alaskan Native have enrolled in postsecondary education at rates below the national average.[47]

We then examine PGIB usage taking into account an array of veteran characteristics, including AFQT score, demographic characteristics, and military experiences. **Controlling for these other factors, we find that Black veterans were eight percentage points and Hispanic veterans were three percentage points more likely than PGIB-Eligible Enlisted Veterans overall to use PGIB at postsecondary institutions.** (American Indian/Alaska Native veterans did not differ in a statistically significant way from PGIB-Eligible Enlisted Veterans overall once other veteran characteristics were considered.) For a complete list of the control variables included in such usage, degree completion, and earnings analyses, see appendix table A-1.

[45] We use capitalization to help clearly identify the subsamples examined in this report. For more details on these subsamples, see "Samples Analyzed" in exhibit 1.

[46] This report presents descriptive statistics on PGIB-Eligible Enlisted Veterans' outcomes. The methods used are not causal, meaning that the results cannot show whether the outcomes were caused by PGIB participation. For more detail, see "Introduction."

[47] For example, see NCES (2019a).

What are PGIB users' postsecondary outcomes?

Next, we examine veterans' completion of an associate, bachelor's, or graduate degree using PGIB within six years of their first post-separation enrollment.[48] Here we compare PGIB-Clearinghouse Post-Separation Users in different race and ethnicity categories to the average for all PGIB-Clearinghouse Post-Separation Users. This time the pattern is reversed, relative to what was seen for PGIB usage: **veterans from racial and ethnic groups who have been historically underrepresented at postsecondary institutions are less likely to complete a degree.** Specifically, as the figure highlights, American Indian/Alaska Native had completion rates five percentage points lower, and Black, and Hispanic veterans had completion rates two percentage points lower, than the overall average for PGIB Clearinghouse Post-Separation Users. These findings for completion are generally consistent with completion patterns by race and ethnicity in the broader population.[49] These results change slightly once we account for an array of veteran characteristics. Specifically, the size of the degree completion gap shrinks for American Indian/Alaska Native veterans (from five to four percentage points) and for Black veterans (from two to one percentage point), while Hispanic veterans move from being two percentage points less likely to complete to one percentage point more likely to complete than PGIB Clearinghouse Post-Separation Users overall. **These results indicate that other veteran characteristics are partially associated with the differences by race and ethnicity observed for postsecondary completion.**

[48] Since 1995, the U.S. Department of Education's Beginning Postsecondary Students Longitudinal Study (BPS) has used a six-year window to examine the attainment of first-time postsecondary students pursuing a range of postsecondary credentials that take different amounts of time to complete. A six-year window gives bachelor's degree students 150% of the normal time needed to complete a four-year degree, an often-used yardstick by the Department of Education and others in measuring bachelor's degree completion. For more details on why we examine six-year completion rates see "Research Question 2" in Appendix A.

[49] For example, see NCES (2019b).

What are PGIB-eligible veterans' labor market outcomes?

Finally, we look at W-2 earnings for PGIB-Clearinghouse Users who earned an associate degree or bachelor's degree. For these analyses we compare veterans in different race and ethnicity categories to the average for all PGIB-Clearinghouse Users who completed the same degree.

We start with the results for Black veterans. Compared to the average PGIB-Clearinghouse User who completed an associate degree, Black veterans who attained the same credential earned $7,300 less; this decreased to $1,800 less once we account for an array of demographic characteristics, military experiences (e.g., military occupation, rank), and characteristics of their postsecondary program (e.g., field of study for their degree). Among bachelor's degree recipients, Black veterans earned $6,800 less than the average veteran, a gap that was reduced to $2,000 less once we take into consideration these other veteran characteristics. **In short, once other veteran characteristics are taken into account, Black veterans who completed a degree using PGIB faced a smaller earnings gap. For context, the gaps in earnings between Black PGIB-Clearinghouse Users and the average PGIB-Clearinghouse User with the same degree were smaller than the gaps observed for Black individuals in the U.S population overall.** Specifically, our analysis of 2019 ACS data that was calibrated so that the age and sex distributions were the same as PGIB-Eligible Enlisted Veterans, revealed that the gap between Black Americans and all Americans with an associate degree was $9,500 (compared to $7,300 when we examined this gap for Black veterans above). As for those with a bachelor's degree, the gap between Black Americans and all Americans was $22,600 (compared to $6,800 when we explored this gap for Black veterans above).

Our analyses reveal that American Indian/Alaska Natives who completed degrees using PGIB also earned less than the average veteran. Specifically, American Indian/Alaska Native PGIB-Clearinghouse Users who completed an associate degree had earnings $2,500 below the average PGIB-Clearinghouse User who completed the same degree. That gap grew to $2,600 after taking other veteran characteristics into consideration. This indicates that the other variables we controlled for may play a role in the size of the difference between earnings of American Indian/Alaska Native veterans and the average PGIB-Clearinghouse User. The gap was more pronounced among veterans who completed a bachelor's degree. American Indian/Alaska Natives who attained this degree earned $4,300 less than the average PGIB-Clearinghouse User – and earned $2,700 less than the average PGIB-Clearinghouse User after accounting for other veteran

characteristics. Again, it is useful to put these earnings results in context through our analyses of ACS data. Nationally, the gap in earnings between American Indian/Alaska Native and the average American with an associate degree was $6,500 (larger than the $2,500 gap we observed for American Indian/Alaska Native veterans above). Among bachelor's degree holders the gaps stood at $17,800 nationally (vs. $4,300 when we investigated this gap for American Indian/Alaska Native veterans above). **In short, gaps in earnings between American Indian/Alaska Native veterans and the average PGIB-Clearinghouse User were smaller than those seen among the general population.**

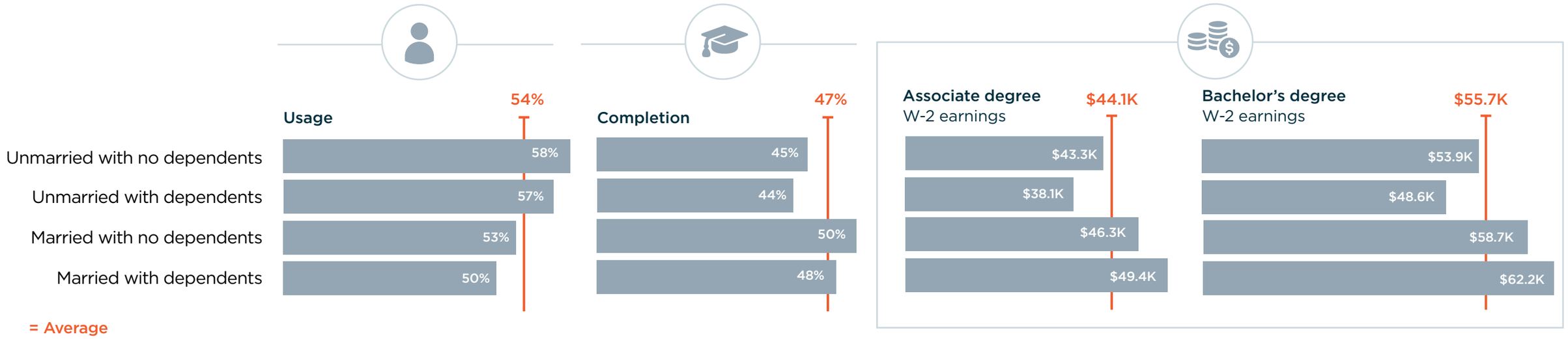
While Black and American Indian/Alaska Native veterans earned less than average PGIB-Clearinghouse Users who completed the same degrees, we do not observe the same for Hispanic veterans. Specifically, Hispanic veterans who received an associate degree earned $1,900 more than the average PGIB-Clearinghouse User who attained the same degree. Accounting for other veteran characteristics, Hispanic veterans earned $2,500 more. The change in the earnings gaps between Hispanic veterans and the average PGIB-Clearinghouse User once other variables are controlled indicates that these other variables may play a role in the differences in earnings. Turning to those who earned a bachelor's degree, Hispanic veterans earned $1,100 less than the average PGIB-Clearinghouse User who completed the same degree, but their earnings did not differ in a statistically significant way once we took other veteran characteristics into consideration. To put these results in perspective, we looked at ACS data for the general U.S. population and found that the gaps in average earnings between Hispanics and all Americans with the same degree were smaller than they were for Black and American Indian/Alaska Native Americans. On a national level, Hispanics consistently earned less than all Americans when holding the same degrees, which did not occur when we compared Hispanic veterans to veterans overall above. Specifically, we find that Hispanic associate degree holders nationally earned $3,300 less than the average associate degree holder nationally (while Hispanic veterans earned $1,900 more than the average PGIB associate degree holder, as noted above). Hispanic bachelor's degree holders nationally earned $15,800 less (while Hispanic veterans earned $1,100 less as noted above). **In general, the gaps in earnings between Hispanic veterans and the average PGIB-Clearinghouse User were smaller than those seen for the general population, regardless of degree earned.**

5

Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Family Responsibilities

Compared to the overall average for the veteran samples we analyzed, unmarried veterans used PGIB benefits at higher rates, but married veterans completed a postsecondary degree at higher rates. Notably, once we account for other veteran characteristics, unmarried veterans using PGIB benefits who had dependents were five percentage points less likely than veterans using PGIB benefits overall to complete a degree in six years. **Overall, married veterans had above average earnings, but looking more closely reveals that, compared to the average veteran, married men were the ones who earned more while married women earned less.**

Unmarried Veterans with Dependents Were Less Likely to Complete a Degree; Married Veterans Were More Likely to Complete a Degree, Earn More



Results

Who uses PGIB?

First, we compare PGIB usage between PGIB-Eligible Enlisted Veterans[50] with different family responsibilities to the average for all PGIB-Eligible Enlisted Veterans. Family responsibility categories capture marital status and dependents status. The figure highlights that veterans who were unmarried (both with and without dependents) used PGIB benefits at postsecondary institutions (i.e., were PGIB-Clearinghouse Users) at rates that were three to four percentage points above the average for all PGIB-Eligible Enlisted Veterans.[51] Meanwhile, those married with no dependents and married with dependents used benefits at a rate one and four percentage points below the overall average for PGIB-Eligible Enlisted Veterans, respectively. Accounting for an array of variables, including AFQT score, demographic characteristics, and military experiences, these gaps shrunk. Unmarried veterans with no dependents were now only two percentage points more likely to enroll, and the other categories capturing various family responsibilities fell within one percentage point of the average. **In short, there were small differences in PGIB usage by family responsibilities once we consider other veteran characteristics.**

Our regression analysis also investigated family responsibilities by sex. We found that the additional percentage point difference of being female or male in combination with any of these family responsibility categories was no more than three percentage points, with female veterans who were single with dependents and female veterans who were married with dependents being more apt to use benefits. These percentage point differences occur in addition to differences by sex alone, which are discussed in Chapter 3, and in addition to differences by family responsibilities in general, which are discussed above. For a complete list of the control variables included in such usage, degree completion, and earnings regression analyses, see appendix table A-1.

[50] We use capitalization to help clearly identify the subsamples examined in this report. For more details on these subsamples, see "Samples Analyzed" in exhibit 1.

[51] This report presents descriptive statistics on PGIB-Eligible Enlisted Veterans' outcomes. The methods used are not causal, meaning that the results cannot show whether the outcomes were caused by PGIB participation. For more detail, see "Introduction."

What are PGIB users' postsecondary outcomes?

Next, we examine veterans' completion of an associate, bachelor's, or graduate degree using PGIB within six years of their first post-separation enrollment.[52] Here we compare PGIB-Clearinghouse Post-Separation Users in different family responsibilities categories to the average for all PGIB-Clearinghouse Post-Separation Users. The pattern switches from what we observed for PGIB usage. Compared to PGIB-Clearinghouse-Post-Separation Users overall, unmarried veterans have completion rates two to three percentage points below the average, and married veterans have rates one to three percentage points above the average. **In short, variation in completion occurs between PGIB-Clearinghouse Post-Separation Users in different family responsibility categories.**

We then examine completion rates for these same groups of veterans accounting for other veteran characteristics (e.g., age, military rank). Doing so indicates that veterans who were unmarried with dependents were the least likely to complete a degree among the four family responsibility categories examined, with veterans in this group having a completion rate five percentage points below the average for PGIB-Clearinghouse-Post-Separation Users overall. Other research on students nationally has found that **unmarried students with dependents were least likely to complete.**[53] As for our other three family responsibility categories, once we considered other veteran characteristics, the degree completion rate for veterans who were married with dependents did not differ from PGIB-Clearinghouse-Post-Separation Users overall, while those who were unmarried with no dependents and married with no dependents were one and three percentage points more likely to complete, respectively.

In this regression analysis, we also examined degree completion variation by family responsibilities and sex (the interaction between these two variables), while controlling for other variables. **We found that the additional percentage point difference of being female or male in combination with any of these four family responsibility categories was no more than two percentage points. Specifically, females who were married with no dependents were two percentage points less apt to complete and females who were unmarried with dependents were one percentage point more apt to complete.** These percentage point differences occur in addition to differences by sex alone, which are discussed in Chapter 3, and in addition to differences by family responsibilities in general which are discussed above.

[52] Since 1995, the U.S. Department of Education's Beginning Postsecondary Students Longitudinal Study (BPS) has used a six-year window to examine the attainment of first-time postsecondary students pursuing a range of postsecondary credentials that take different amounts of time to complete. A six-year window gives bachelor's degree students 150% of the normal time needed to complete a four-year degree, an often-used yardstick by the Department of Education and others in measuring bachelor's degree completion. For more details on why we examine six-year completion rates see "Research Question 2" in Appendix A.

[53] Specifically, running descriptive bivariate statistics (that do not account for other characteristics) on nationally representative U.S. Department of Education Beginning Postsecondary Students Longitudinal Study (BPS) data, Chen et al. (2019), found that 2011-12 beginning postsecondary students who were unmarried with dependents were the least likely of these four marital and dependent status categories to have completed an associate or bachelor's degree within six years. Nationally, the completion rate for this group was 16% (compared to 46% for PGIB-Clearinghouse Post-Separation Users).

What are PGIB-eligible veterans' labor market outcomes?

Finally, we look at W-2 earnings for PGIB-Clearinghouse Users with different family responsibilities who earned an associate degree or bachelor's degree. For these analyses, we compare veterans in different family responsibility categories to the average for all PGIB-Clearinghouse Users who completed the same degree. We then examine how veterans' earnings by family responsibilities relate to the broader U.S. population's earnings by family responsibilities. We conclude this section by looking at the intersection of sex and family responsibilities on these earnings outcomes.

As the figure indicates, those who were married earned above average amounts. This held true even accounting for other veteran characteristics (including military occupation, rank, and field of study). Specifically, those married without dependents who completed an associate degree earned about $2,200 more ($1,100 more with controls), while those with a bachelor's degree earned about $3,000 more ($1,400 more with controls) than the average PGIB-Clearinghouse User with the equivalent degree. Looking at veterans who were married with dependents, the earnings gap was greater. Specifically, veterans who were married with dependents and completed an associate degree earned $5,300 more ($4,000 more with controls) and those with a bachelor's degree earned $6,500 more ($4,200 more with controls) than the average PGIB-Clearinghouse User who completed the same degree. In all cases, differences were smaller when we controlled for other variables, suggesting that these other variables included may play a role in the earnings variability between family responsibility categories.

On the other hand, unmarried veterans received earnings below the average PGIB-Clearinghouse User. Notably, while unmarried veterans with dependents earned less than the average ($6,000 in the case of associate degree recipients and $7,100 in the case of bachelor's degree recipients), after we account for sex and other veteran characteristics noted in Appendix table A-1, their earnings did not differ in a statistically significant way from the average PGIB-Clearinghouse User with the same degree. This suggests that other factors may be shaping their earnings. Unmarried veterans without dependents, on the other hand, earned less even accounting for other veteran characteristics. Specifically, associate degree completers earned $800 less ($1,700 less with controls) and bachelor's degree completers earned $1,800 less ($1,800 less with controls) than the average PGIB-Clearinghouse User with the same degree.

What are PGIB-eligible veterans' labor market outcomes?

Using 2019 ACS data that were calibrated so that the age and sex distributions were the same as PGIB-Eligible Enlisted Veterans, we found that married individuals nationally also earn more than unmarried Americans, even when they hold the same degrees. These results are consistent with the patterns observed with PGIB-Clearinghouse Users and with other research.[54] **That said, this earnings gap by marital status is smaller among veterans than among the U.S. population at large.** For both types of degree completers, nationally the biggest gap in earnings occurred between those who were married with dependents and unmarried with dependents. For associate degree holders, the gap between those who were married with dependents and unmarried without dependents was $14,700 nationally vs. $11,200 for veterans. For bachelor's degree attainers, the gap between those with these different family responsibilities was $28,100 nationally vs. $13,600 for veterans. Overall earnings differences between the ACS sample and the veteran sample may be due to work experience differences between the groups.

It is also worth noting that, **while we found that married veterans enjoyed higher earnings overall, this was not uniformly true for men and women.**[55] We begin by discussing results for married veterans with no dependents. Accounting for other veteran characteristics, male veterans who completed an associate degree and were married with no dependents earned $300 more than the average PGIB-Clearinghouse User who completed the same degree. Meanwhile, female veterans with the same associate degree and family responsibilities earned $3,700 less that than average PGIB-Clearinghouse User with the same degree. Likewise, accounting for other characteristics, male veterans who held a bachelor's degree and were married with no dependents earned $500 more than the average PGIB-Clearinghouse User who completed the same degree. Yet female veterans with the same bachelor's degree and family responsibilities earned $4,300 less than the average PGIB-Clearinghouse User with the same degree.

When we turn to examine married veterans with dependents (again accounting for other veteran characteristics), the same pattern holds, but the magnitude of the gap in earnings by sex is larger. Compared to the average PGIB-Clearinghouse User who completed an associate degree, male veterans with the same degree who were married with dependents earned $300 more while female veterans with the same degree who had the same family responsibilities earned $5,500 less. Compared to the average PGIB-Clearinghouse User who completed a bachelor's degree, **male veterans with the same degree who were married with dependents earned $500 more while female veterans with the same degree who had the same family responsibilities earned $8,700 less, a difference of $8,200.** These results suggest that being married increases earnings more for male than for female veterans. **By comparison, among unmarried veterans with dependents, differences in earnings by sex were $1,400 or less for both associate and bachelor's degree holders. There were no earnings differences between male and female veterans who were unmarried with no dependents**.

[54] See, for example, Vandenbroucke (2018).

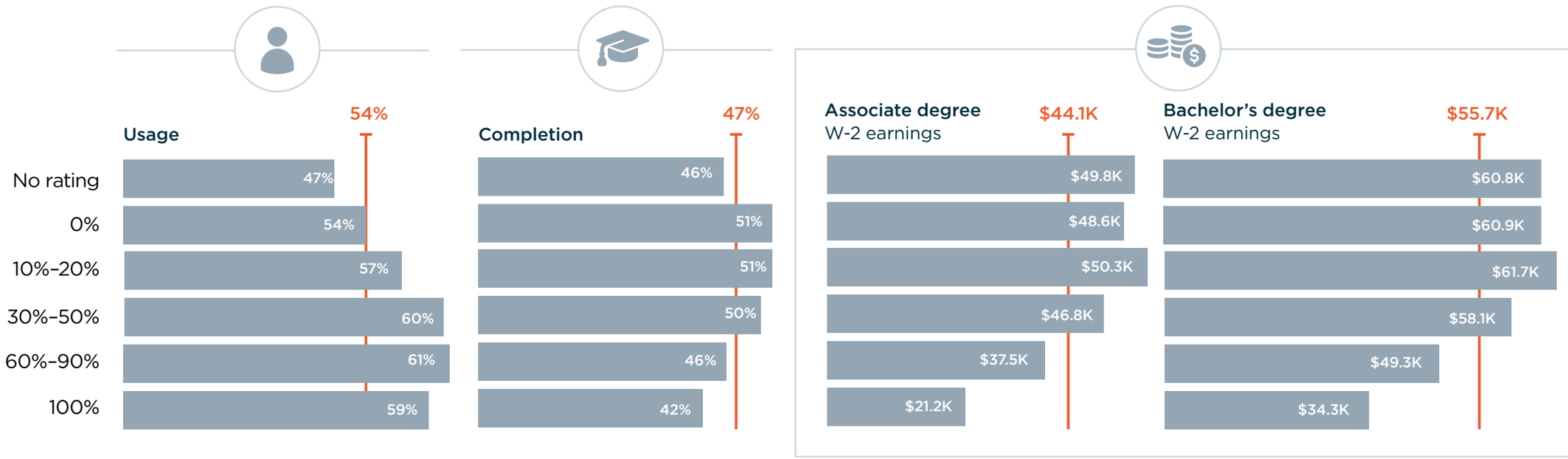
[55] More specifically, our regression analyses that accounted for other veteran characteristics revealed large differences in earnings for married veterans depending on the veteran's sex. To highlight those differences, these earnings results include family responsibilities, sex, and an additional factor capturing the intersection of family responsibilities by sex. We do not incorporate earnings differences based purely on sex, as they are discussed in Chapter 3.

6

Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Disability Rating

We find that 55% of PGIB-Eligible Enlisted Veterans were assigned a disability rating by VA (based on the severity of their service-connected condition).[56] Compared to the overall average for the veteran samples we analyzed, veterans with disability ratings of 10% to 20% and 30% to 50% were more likely to use PGIB, more likely to complete degrees, and had higher earnings. On the other hand, veterans with higher VA disability ratings, particularly those with a rating of 100%, exhibited higher than average PGIB usage but lower postsecondary completion and earnings.

Those With Disability Ratings Were More Likely to Use Benefits, but Groups with Highest Disability Ratings Were Less Likely to Complete Degrees, and Earn Less



[56] Veterans without a disability rating are not assessed for a service-connected condition. See https://www.va.gov/disability/about-disability-ratings/ for more information about disability ratings.

Who uses PGIB?

First, we examined usage, comparing PGIB-Eligible Enlisted Veterans[57] in different VA disability rating categories to the average for all PGIB-Eligible Enlisted Veterans. As this figure shows, those given a disability rating of 10% to 20%, 30% to 50%, 60% to 90%, and 100% used PGIB at postsecondary institutions (i.e., were PGIB-Clearinghouse Users) at rates that were three to seven percentage points higher than that of all PGIB-Eligible Enlisted Veterans.[58] Taking into account the array of veteran characteristics noted in appendix table A-1, including AFQT score, demographics, and military experiences, those with disability ratings of 10% or higher were between three and six percentage points more likely to use PGIB. **The fact that these percentages did not change more than one percentage point after accounting for other variables suggests that having a VA disability rating is associated with using PGIB benefits.** In thinking about these results, it is important to note that veterans with a service-connected disability participate in VA support programs for disabled veterans that include direct engagement with VA counselors, such as VA's Veterans Readiness and Employment program.[59]

57 We use capitalization to help clearly identify the subsamples examined in this report. For more details on these subsamples, see "Samples Analyzed" in exhibit 1.

58 This report presents descriptive statistics on PGIB-Eligible Enlisted Veterans' outcomes. The methods used are not causal, meaning that the results cannot show whether the outcomes were caused by PGIB participation. For more detail, see "Introduction."

59 Specifically, veterans who have a disability rating of 10% or higher qualify for Veterans Readiness and Employment, which also supports postsecondary education. More information about Veterans Readiness and Employment benefits, and how use of these benefits affect PGIB benefits, can be found here: https://www.va.gov/careers-employment/vocational-rehabilitation/eligibility/.

What are PGIB users' postsecondary outcomes?

Next, we examine veterans' completion of an associate, bachelor's, or graduate degree using PGIB within six years of their first post-separation enrollment.[60] Here we compare PGIB-Clearinghouse Post-Separation Users in different VA disability rating categories to the average for all PGIB-Clearinghouse Post-Separation Users. We find that those with disability ratings of 0%,[61] 10% to 20%, and 30% to 50% all completed a degree at rates three to five percentage points higher than PGIB-Clearinghouse Post-Separation Users overall. Even accounting for other veteran characteristics, those in these three disability rating categories continued to complete a degree at rates two percentage points higher than PGIB-Clearinghouse Post-Separation Users overall. In contrast, veterans with disability ratings of 100% had a postsecondary completion rate four percentage points below PGIB-Clearinghouse Post-Separation Users overall. After taking into account other veteran characteristics, this difference stood at three percentage points. For context, other studies have found that postsecondary students with disabilities have lower completion rates. Specifically, using nationally representative BPS data, Pretlow et al. (2020) report that 34% of 2011-12 beginning postsecondary students with a disability completed an associate or bachelor's degree within six years compared to 49% of beginning postsecondary students without a disability. **The fact that this variation in completion rates by disability rating continues when we include other key veteran characteristics suggests that the severity of veterans' disability is important to consider in understanding veterans' completion.**

[60] Since 1995, the U.S. Department of Education's Beginning Postsecondary Students Longitudinal Study (BPS) has used a 6-year window to examine the attainment of first-time postsecondary students pursuing a range of postsecondary credentials that take different amounts of time to complete. A 6-year window gives bachelor's degree students 150% of the normal time needed to complete a four-year degree, an often-used yardstick by the U.S. Department of Education and others in measuring bachelor's degree completion. For more details on why we examine six-year completion rates, see "Research Question 2" in Appendix A.

[61] Please note that a 0% disability rating (noncompensable disability) is distinct from having no disability rating. Those who receive a 0% disability rating are eligible for some benefits but do not receive disability payments. See https://www.va.gov/resources/non-compensable-disability/ for more information.

What are PGIB-eligible veterans' labor market outcomes?

Finally, we look at W-2 earnings for PGIB-Clearinghouse Users who earned an associate degree or bachelor's degree. For these analyses we compare veterans in different VA disability rating categories to the average for all PGIB-Clearinghouse Users who completed the same degree. **Here we see that those with no rating and those in disability rating categories up to 50% who completed an associate or a bachelor's degree received earnings above the average for PGIB-Clearinghouse Users who completed the same degree.** It is worth wondering why this may be true. One possibility is that existing assistance is working, on average, for these veterans. The story is different for those with higher disability ratings. Associate degree and bachelor's degree completers in the 60% to 90% disability category earned $6,600 and $6,400 less than PGIB-Clearinghouse Users who attained the same degree, respectively, and those with disability ratings of 100% earned $22,900 and $21,300 less, respectively. After taking into account other veteran characteristics (e.g., military occupation, rank, and academic major of completed credential), these differences in earnings for those in the two highest disability rating categories budged no more than $200. **In short, veterans with higher disability ratings are earning significantly less than their PGIB counterparts, even after taking into account other veteran characteristics.** These differences could be explained in part by some proportion of veterans with disability ratings of 60% to 90% receiving a designation of Individual Unemployability, which allows a veteran to receive disability compensation at the 100% disability rating level if the veteran is unable to hold substantially gainful employment.[62]

It is important to consider several factors in thinking about these earnings results for those with high disability ratings. First, the data on earnings in this study are limited to W-2 earnings data, so these earnings do not include disability payments.[63] Second, these earnings results include those not participating in the labor force and working less than full time. **Thus, these lower earnings may be affected not only by what employers pay but also by veterans' employment decisions (e.g., whether to work, the number of hours to work, the pay sought in a job), for which disability compensation pay may be a factor.[64]**

[62] For more information on Individual Unemployability, see https://www.va.gov/disability/eligibility/special-claims/unemployability/.

[63] According to SIPP, 19.5% of veterans receive disability payments (Giefer and Loveless, 2021). The disability payments cover all veterans with a disability rating at or above 10% and include modifiers to account for dependents at or above 30%. For more details, see https://www.va.gov/disability/compensation-rates/veteran-rates/.

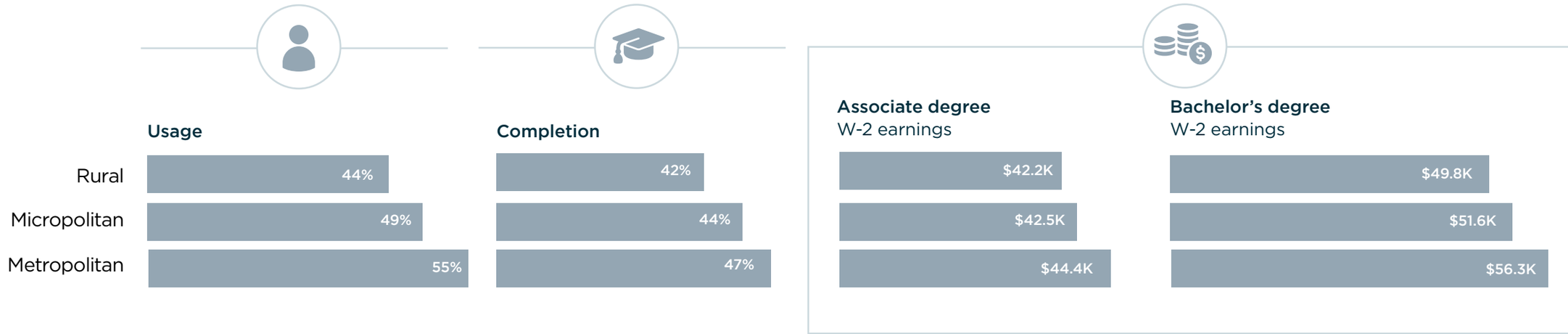
[64] For more on disability compensation rates, see https://www.va.gov/disability/compensation-rates/veteran-rates.

7

Post-9/11 GI Bill-Eligible Enlisted Veterans' Outcomes by Rurality

About 6% of PGIB-Eligible Enlisted Veterans reside in rural areas upon separating from the military. Another 9% of PGIB-Eligible Enlisted Veterans settled in micropolitan areas, while the vast majority (84%) lived in metropolitan areas.[65] Our analyses indicate that veterans' use of PGIB, degree completion, and earnings increase the more metropolitan and less rural their residence.[66]

Veterans in Rural Areas Were Less Likely to Use PGIB Benefits, Were Less Likely to Complete a Degree, and They Earn Less



[65] A micropolitan statistical area must have at least one urban cluster with a population size between 10,000 and 50,000, see https://www.census.gov/programs-surveys/metro-micro/about.html for more information.

[66] For more detail on how the U.S. Census Bureau defines rural, micropolitan, and metropolitan areas, see https://www.census.gov/content/dam/Census/library/publications/2016/acs/acsgeo-1.pdf.

Who uses PGIB?

First, we examine usage by rurality. As the figure shows, PGIB-Eligible Enlisted Veterans[67] who settled in rural areas after first separating from military service used PGIB at postsecondary institutions (i.e., were PGIB-Clearinghouse Users) at rates 11 percentage points lower than those who resided in metropolitan areas where colleges tend to be more plentiful.[68] Micropolitan veterans fell in between; they were six percentage points less likely to use PGIB than metropolitan veterans.[69] Taking into account an array of variables, including AFQT score, demographic characteristics, and military experiences, rural veterans were six percentage points and micropolitan veterans were four percentage points less likely to use PGIB than were metropolitan veterans.[70] **In short, once we controlled for an array of variables, the enrollment gap for rural veterans was halved. This suggests that lower enrollment numbers for rural veterans is not solely due to their rurality, but that other demographic characteristics and military experiences may also play a role in their decision to use their PGIB.** For a complete list of the control variables included in such usage, degree completion, and earnings regression analyses, see appendix table A-1.

What are PGIB users' postsecondary outcomes?

Next, we explore PGIB-Clearinghouse Post-Separation Users' completion of an associate, bachelor's, or graduate degree within six years of their first post-separation enrollment.[71] We observe the same pattern, although differences were not as large, especially after considering other veteran characteristics. Specifically, rural veterans completed their degrees at a rate five percentage points lower than metropolitan veterans both before and after accounting for other veteran characteristics. Micropolitan veterans again fell in between. They were three percentage points less likely to complete than metropolitan veterans but four percentage points less likely after considering other veteran characteristics.[72] In sum, residing in a micropolitan or rural community is associated with four to five percentage points lower completion rates after controlling for other characteristics. This association may be worth further investigations into how to support less metropolitan veterans with completion.

[67] We use capitalization to help clearly identify the subsamples examined in this report. For more details on these subsamples, see "Samples Analyzed" in exhibit 1.

[68] For more on so-called education deserts, see Hillman (2022).

[69] This report presents descriptive statistics on PGIB-Eligible Enlisted Veterans' outcomes. The methods used are not causal, meaning that the results cannot show whether the outcomes were caused by PGIB participation. For more detail, see "Introduction."

[70] For more information on differences in college enrollment for rural versus metropolitan U.S. residents, see Sowl and Crain (2021).

[71] Since 1995, the U.S. Department of Education's Beginning Postsecondary Students Longitudinal Study (BPS) has used a six-year window to examine the attainment of first-time postsecondary students pursuing a range of postsecondary credentials that take different amounts of time to complete. A six-year window gives bachelor's degree students 150% of the normal time needed to complete a four-year degree, an often-used yardstick by the Department of Education and others in measuring bachelor's degree completion. For more details on why we examine six-year completion rates see "Research Question 2" in Appendix A.

[72] Similar gaps in postsecondary completion between those who reside in metropolitan versus non-metropolitan areas have been found for the non-veteran U.S. population. See for example, Clark et al. (2022).

What are PGIB-eligible veterans' labor market outcomes?

The differences by rurality continue when investigating the W-2 earnings of PGIB-Clearinghouse Users who earned an associate degree or a bachelor's degree.[73] **In considering these earnings results, it is important to keep in mind the differences by rurality in purchasing power (i.e., how many goods or services can be purchased with a given dollar amount).[74] In short, both costs and wages are lower in rural areas.**

We begin with those who completed an associate degree. Rural veterans earned $2,200 less than metropolitan veterans; $3,500 less when we account for other veteran characteristics that include, among others, military occupation, rank at separation, and academic major of completed credential. Micropolitan veterans fell in the middle, earning $1,900 less than metropolitan veterans; $3,000 less after considering other veteran characteristics. These results indicate that the lower wages of less metropolitan veterans with an associate degree were not explained away by other veteran characteristics; rather, the observed wage gap increased when considering these other veteran characteristics. Turning to bachelor's degree recipients, the rural-metropolitan and micropolitan-metropolitan gaps were larger but changed less when we considered other factors. Specifically, rural veterans earned $6,500 less than metropolitan veterans ($6,200 less taking into account other veteran characteristics). Micropolitan veterans earned $4,700 less than metropolitan veterans ($4,800 less after accounting for other veteran characteristics). **Rural veterans' lower earnings[75] — particularly, lower earnings for bachelor's degree recipients[76] — are consistent with national data on earnings by rurality.**

[73] Veterans' rurality was captured for the tax year of the veterans' separation, while income was captured for the 2019 tax year. We found that 88% of veterans lived in the same rurality category (i.e., rural, micropolitan, metropolitan) in 2019 as in their year of separation.

[74] For more, see https://www.oecd-ilibrary.org/docserver/3d8f5f51-en.pdf?expires=1664513155&id=id&accname=guest&checksum=6B07D69826B18BC49B8F2E13DF3C7003.

[75] For example, see Bishaw and Posey (2016).

[76] For more, see https://www.ers.usda.gov/topics/rural-economy-population/employment-education/rural-education/.



Conclusion

We are pleased to share this first look at the Post-9/11 GI Bill and its outcomes for veterans, which is possible thanks to unprecedented access to federal data and interagency cooperation. For the first time ever, we have combined and analyzed previously siloed federal data as part of the evidence-building decision-making work of the U.S. Census Bureau. There has never before been any definitive assessment of the outcomes associated with this critical federal investment across military branches.

This study team will be publishing additional reports on the Post-9/11 GI Bill this year and over coming years.

Appendix A
Methods

This methodological appendix provides additional information on our data sources and our methods for answering the research questions asked in this report.

Data sources

This project required significant cooperation across U.S. government agencies and the National Student Clearinghouse. Below we note the data that each entity provided to help us answer the research questions. Appendix table A-1 shows more specifically how the data were used.

- **The U.S. Department of Veterans Affairs:** a list of all PGIB eligible veterans; veteran demographic data from 2020 included in the U.S. Veterans Trends and Statistics (USVETS) data and the U.S. Department of Veterans Affairs Veterans Benefits Administration's Education Services Files
- **The Veterans Benefits Administration (VBA):** veterans' use of PGIB benefits through March 2020
- **National Student Clearinghouse:** PGIB eligible veterans' postsecondary enrollment and attainment records through June 2020
- **The U.S. Department of Defense:** Defense Manpower Data Center (DMDC) data on veterans' AFQT percentile upon activation, service experience (e.g., rank, military occupation), all activation and separation dates as of 2020
- **The Internal Revenue Service (IRS):** W-2 income from tax year 2019 and marital and dependents status, region, and zip code as of year of first separation
- **The U.S. Census Bureau:** American Community Survey (ACS) labor force participation from the 2019 ACS, along with the Census Bureau's crosswalk of Rural-Urban Commuting Area Codes (RUCA) and region for U.S. zip codes
- **The Integrated Postsecondary Education Data System (IPEDS):** institution-level 2020 data on institution control and sector, as well as by-institution counts of students involved exclusively in distance education courses, merged with information on students' institutions using the Clearinghouse's Unit-ID Crosswalk Table

All individual-level data were merged using the U.S. Census Bureau's Protected Identification Key (PIK), which uses a variety of record linkage techniques to identify individuals on incoming files while simultaneously protecting respondent confidentiality (Wagner & Layne, 2014).

Question 1:
Who uses PGIB?

Question 2:
What are PGIB users' postsecondary outcomes?

Question 3:
What are PGIB-eligible veterans' labor market outcomes?

Methods

Here we discuss the methods used to answer the research questions in this series.

Research Question 1. Analyses addressed the question of who enrolls in postsecondary education using PGIB benefits, with the subsample of PGIB-Eligible Enlisted Veterans and PGIB-Clearinghouse Users. The study team used bivariate descriptive statistics and logistic regression to examine the association of demographic and military service variables with the use of PGIB benefits, defined above as the subsample PGIB-Clearinghouse Users. Logistic regression models' uptake and completion results are difficult to interpret in a latent space, so we map the outcomes to percentage point changes for interpretability. Appendix table A-1 lists the variables included in the regressions for each research question. Because of the number of variables, the study team used lasso regularization, tuning regularization with 10-fold cross-validation to reduce nonreporting variables to just those that improve prediction quality. To account for the number of policy-relevant variables included in the logistic regression, the study team used false discovery rate (FDR; Benjamini & Hockberg, 1995) on a robust (HC-3) Wald test statistic that tested whether all levels in a variable were statistically significant.

Research Question 2. Analyses addressed postsecondary completion using PGIB benefits, with the subsample of PGIB-Clearinghouse Post-Separation Users. The study team first used descriptive statistics to explore the percentage of PGIB-Clearinghouse Post-Separation Users, by first enrollment year, that attained an associate, bachelor's, or graduate degree between their first PGIB-eligible enrollment and June 30, 2019. To investigate variables associated with the likelihood of receiving an associate degree or higher within six years after first enrolling, the study team used bivariate descriptive statistics and logistic regression, as described in Research Question 1. The same method of lasso, HC-3 Wald tests, and FDR also were applied.

Research Question 3. Research Question 3.a addresses the labor force participation of the subsample of PGIB-Eligible Enlisted Veterans, by educational attainment using 2019 ACS data. Here, in place of HC 3 standard errors, the study team reports cluster-robust standard errors that account for the sampling methodology used in the ACS (U.S. Census Bureau, 2022; chapter 12). The weights are calibrated on age, state, race/ethnicity, and sex, as well as family structure, so that the estimate of the number of people from the ACS sample emulates our full veteran population values. The FDR corrections above were applied.

Research question 3.b examines earnings of PGIB-Eligible Enlisted Veterans, and research questions 3.c and 3.d look specifically at earnings for PGIB-Clearinghouse Users who attained an associate degree or who attained a bachelor's degree, respectively. For all three questions, the study team used W-2 wage data. We conducted bivariate descriptive statistics, as well as linear regression, to examine the association between demographic and military service variables and W-2 reported income. The same methods of lasso, HC-3 Wald tests, and FDR were applied as in question 1. When looking at 2019 labor force participation and earnings, attainment is measured as of December 31, 2018, regardless of when that attainment occurred (e.g., prior to activation, between activation and separation, or after separation) or whether PGIB funds supported that attainment. For labor force participation, we used the relevant ACS variables. ACS is based on a sample of 3.5 million addresses in the United States, taken annually. It is designed to be a nationally representative household survey. We know which of our PGIB-eligible veterans in our sample were in ACS in 2019, and we calibrated the ACS weights to several demographic factors in the PGIB population.

As a general note, to provide comparisons to national averages, we also used 2019 one-year ACS data formatted by iPUMS (Ruggles et al., 2022), which we first filtered to those not in school and then calibrated (using raking) to the age and sex distribution of PGIB-Eligible Enlisted Veterans.

APPENDIX TABLE A-1. VARIABLES USED IN REGRESSIONS

VARIABLE	DEFINITION	SOURCE	RQ 1	RQ 2B	RQ 3B	RQ 3C	RQ 3D
Age range	Difference, in years between birth date and 12/31/2019	VA PGIB eligibility file	●	●	●	●	●
Race/Ethnicity	Race and Ethnicity were imputed when missing. As a result, it is expected that some individuals may have the wrong Race or Ethnicity mapped to them. In addition, there are some "original" Race/Ethnicity classifications that cannot be assigned to the most recent Office of Management and Budget (OMB) classification. For example, an original source has an individual as "Asian or Pacific Islander;" whether the person is "Asian" or "Hawaiian or Pacific Islander" cannot be recovered. Ethnicity (Hispanic/Not Hispanic) is collected separately from Race.	USVETS data	●	●	●	●	●
Sex	USVETS categorizes veterans into two sexes: male or female	USVETS data	●	●	●	●	●
Disability rating category	Latest nonmissing value based on the 10% increments provided; "No Disability Rating" for those with only missing values	USVETS data	●	●	●	●	●
Years since separation	Difference, in years between first separation date and 12/31/2019	USVETS data; if missing, DMDC	●	●	●	●	●
Rank	Pay plan and pay grade	DMDC	●	●	●	●	●
Two-digit Standard Occupational Classification (SOC) grouping for military occupation	Two-digit SOC code, clustered for some codes with low incidence rates	DMDC	●	●	●	●	●
AFQT percentile	The AFQT percentile associated with veterans' earliest available Uniform Service Agreement Date from DOD Military Entrance Processing Command (MEPCOM) records	DMDC	●	●	●	●	●
Family responsibilities	Combined filing status and dependent information from tax filing year of first separation from military	IRS	●	●	●	●	●

APPENDIX TABLE A-1. VARIABLES USED IN REGRESSIONS

VARIABLE	DEFINITION	SOURCE	RQ 1	RQ 2B	RQ 3B	RQ 3C	RQ 3D
Region	Derived from zip code, based on Census Bureau crosswalk	IRS if available, USVETS data if available, and VA eligibility file as last data source if previous two sources were missing	●	●	●	●	●
Census rural-urban commuting area (RUCA) codes	Derived from zip code, based on Census Bureau crosswalk, combined into the higher-order categories of "rural," "micropolitan," and "metropolitan"	IRS if available, USVETS data if available, and VA eligibility file as last data source if previous two sources were missing	●	●	●	●	●
Combat status	Served in Afghanistan, Syria, or Iraq	DMDC	●	●	●	●	●
Sex X race			●	●	●	●	●
Sex X ethnicity			●	●	●	●	●
Sex X family status			●	●	●	●	●
RUCA X race			●	●	●	●	●
RUCA X ethnicity			●	●	●	●	●
RUCA X sex			●	●	●	●	●
AFQT percentile X race			●	●	●	●	●
AFQT percentile X ethnicity			●	●	●	●	●
AFQT percentile X sex			●	●	●	●	●
AFQT percentile X RUCA			●	●	●	●	●
Year of first enrollment				●		●	●

APPENDIX TABLE A-1. VARIABLES USED IN REGRESSIONS

VARIABLE	DEFINITION	SOURCE	RQ 1	RQ 2B	RQ 3B	RQ 3C	RQ 3D
Sector of institution of first enrollment after first separation	IPEDS sector information for the institution of first enrollment after first separation for the year of enrollment	IPEDS and Clearinghouse		●			
Percent of all students enrolled exclusively in distance education courses at institution of first enrollment after first separation	Students exclusively enrolled in distance education courses as a proportion of all students at the first enrollment institution after first separation for the year of enrollment	IPEDS and Clearinghouse		●			
PGIB-Clearinghouse use	PGIB-Eligible Enlisted Veterans who had a Clearinghouse record of enrollment after their first activation date and after August 1, 2009	Clearinghouse			●	●	●
Sector of institution of highest credential	IPEDS sector information for the institution of highest credential for the year of completion	Clearinghouse and IPEDS			●		
Highest credential achieved	Highest Clearinghouse attainment record as of December 31, 2018	Clearinghouse			●		
Sector of institution of highest credential where earned associate degree (RQ3c) or bachelor's degree (RQ3d)	IPEDS control information for the institution of highest credential for the year of completion	IPEDS and Clearinghouse				●	●
Major for highest credential where earned associate degree (RQ3c) or bachelor's degree (RQ3d)	Major information for highest Clearinghouse attainment record	Clearinghouse				●	●

APPENDIX TABLE A-1. VARIABLES USED IN REGRESSIONS

VARIABLE	DEFINITION	SOURCE	RQ 1	RQ 2B	RQ 3B	RQ 3C	RQ 3D
Percent of all students enrolled exclusively in distance education courses at institution of highest credential where earned associate degree (RQ3c) or bachelor's degree (RQ3d)	Students exclusively enrolled in distance education courses as a proportion of all students at the highest credential institution for the year of completion	IPEDS and Clearinghouse				●	●
OUTCOME VARIABLES							
Use of PGIB benefits	PGIB-Eligible Enlisted Veterans who had a Clearinghouse enrollment record after first activation date or August 1, 2009, whichever was later, and before June 30, 2019	VA and Clearinghouse	●				
Degree completion within six years	Highest degree attained per Clearinghouse records within six years of first enrollment record post-separation	Clearinghouse		●			
W-2 earnings	W-2 earnings for 2019 or the most recent tax year available for those who were not enrolled in postsecondary education in 2019 according to the Clearinghouse. Zero was imputed when a veteran was missing all W-2 information. Analyses for earnings include veterans not in the labor force and those not working full time.	IRS			●	●	●

AFQT = Armed Forces Qualification Test
Clearinghouse = National Student Clearinghouse
DMDC = Defense Manpower Data Center
IPEDS = Integrated Postsecondary Education Data System
IRS = Internal Revenue Service
PGIB = Post-9/11 GI Bill
RUCA = Rural-Urban Commuting Area
VA = Veterans Administration

Appendix B
Methodological Details

Logistic Regression

Logistic regression estimates the probability of using the PGIB through a latent regression, a mapping of the latent parameter to the probability space, and a variance function from that mapping.

$$\boldsymbol{E}(\boldsymbol{Y}|\boldsymbol{X}) = \pi(\boldsymbol{X}) = logit(\boldsymbol{X}\boldsymbol{\beta})$$

$$\mathrm{Var}(\boldsymbol{Y}|\boldsymbol{X}) = \pi(\boldsymbol{X})(\mathbf{1} - \pi(\boldsymbol{X}))$$

Where **Y** is a vector that is 1 if the veteran takes up the GI Bill and 0 if they do not; **X** is a matrix of the covariates, shown below; π is the predicted probabilities; and β is regression coefficients. To linearize the coefficients, we simply difference the variable in the two states, evaluated at the mean of other coefficients.

$$\Delta\boldsymbol{Y} = logit(\boldsymbol{X}_1\widehat{\boldsymbol{\beta}}) - logit(\boldsymbol{X}_0\widehat{\boldsymbol{\beta}})$$

Where $\widehat{\boldsymbol{\beta}}$ is the fitted regression coefficients; X_0 are the actual data, with the coefficient of interest set to 0; and X_1 are the actual data, with the coefficient of interest set to 1; and **ΔY** is the estimated change in program take-up associated with having the covariate level.

Appendix B Methodological Details

ACS weighting

The American Communities Survey uses a nonstandard survey sample selection and recommends researchers use their variance estimator (U.S. Census, 2014), which is Fay's method, where a statistic ($\hat{\boldsymbol{\theta}}$) is estimated and then estimated again with each of eighty replicate weights $(\hat{\theta}^{(1)}, \ldots, \hat{\theta}^{(80)})$ and then the variance estimator is

$$\mathrm{Var}(\hat{\theta}) = \frac{4}{80}\sum_{i=1}^{80}\left(\hat{\theta} - \hat{\theta}^{(i)}\right)^2$$

For the Wald tests, we used a covariance term, and this method generalizes to a vector with *k* estimands by replacing the summand with an inner product of vectors. Theta is now a vector of the *k* estimated values

$$\hat{\boldsymbol{\theta}} = \begin{bmatrix}\theta_1 \\ \vdots \\ \theta_k\end{bmatrix}$$

With residuals

$$\epsilon^{(i)} = \hat{\boldsymbol{\theta}} - \hat{\boldsymbol{\theta}}^{(i)}$$

$$\mathrm{V} = \mathrm{Cov}(\hat{\boldsymbol{\theta}}) = \frac{4}{80}\sum_{i=1}^{80}\left(\epsilon^{(i)}\right)\left(\epsilon^{(i)}\right)^T$$

The Wald-test statistic for a hypothesis matrix **R** is then

$$W = (\boldsymbol{R}\hat{\boldsymbol{\theta}})(\boldsymbol{RVR})^{-1}(\boldsymbol{R}\hat{\boldsymbol{\theta}})$$

where the hypothesis matrix has a column per coefficient we are testing and a row per coefficient in $\hat{\boldsymbol{\theta}}$ and a 1 in a row/column that the null hypothesis is testing to be zero. Because the number of degrees of freedom is large in ACS, we tested *W* against a chi-squared distribution with *q* degrees of freedom, where *q* is the number of coefficients simultaneously set to zero in the test (Korn & Graubard, 1990).

Appendix C Snapshot of Post-9/11 GI Bill-Eligible Veterans' Outcomes

54% of PGIB-eligible veterans **used their PGIB benefits**

47% of PGIB users **completed a degree** within six years

PGIB users who **completed a degree** earned around **$50,000**

Veterans in **Rural Areas**



Academic Preparedness at Enlistment



Female Veterans



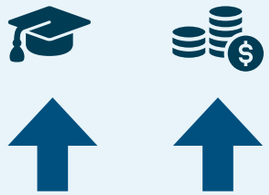
Veterans From **Historically Underrepresented Groups**



Unmarried Veterans with Dependents



Married Veterans



Veterans with **Highest Disability Rating**



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