

A Deeper Look at Post-9/11 GI Bill Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans

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Snapshot of PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans

KEY FINDINGS BY SEX



Compared to veterans at large of the same sex, **American Indian/Alaska Native, Black, and Hispanic veterans consistently were more likely to use PGIB but were less likely to complete a degree (with one exception).**



Among American Indian/Alaska Native, Black, and Hispanic veterans, **females consistently were more likely than males to use PGIB and complete a degree.**



Compared to veterans at large with the same degree attainment and sex, **American Indian/Alaska Native and Black veterans consistently earned less but Hispanic veterans earned more in several instances.**



Among American Indian/Alaska Native, Black, and Hispanic veterans, **females consistently earned less than males when they attained an associate degree and when they attained a bachelor's degree.**

KEY FINDINGS BY AFQT QUINTILE



Compared to veterans at large in the same AFQT quintiles, **American Indian/Alaska Native, Black, and Hispanic veterans were consistently as likely or more likely to use PGIB.**



Compared to veterans at large in the same AFQT quintiles, **American Indian/Alaska Native veterans were consistently less likely to complete a degree, but Black veterans in three AFQT quintiles were more likely to complete, and Hispanic veterans' were consistently as likely or more likely to complete across all five AFQT quintiles.**



Compared to veterans at large with the same degree attainment and the same AFQT quintile, **American Indian/Alaska Native and Black veterans consistently earned less but Hispanic veterans often earned more.**



Among American Indian/Alaska Native, Black, and Hispanic veterans, **use of PGIB benefits, degree completion, and earnings increased the higher veterans' AFQT quintile—with a couple of exceptions.**

Snapshot of PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans

KEY FINDINGS BY FAMILY RESPONSIBILITIES



Compared to veterans at large with the same family responsibilities, **American Indian/Alaska Native, Black, and Hispanic veterans were consistently more likely to use PGIB but frequently less likely to complete a degree.**



Among American Indian/Alaska Native, Black, and Hispanic veterans, **unmarried veterans were more likely to use PGIB, but married veterans were more likely than unmarried veterans to complete a degree.**



Compared to veterans at large with the same degree attainment and the same family responsibilities, **American Indian/Alaska Native and Black veterans consistently had lower average earnings, whereas Hispanic veterans often had higher average earnings.**



Among American Indian/Alaska Native, Black, and Hispanic veterans who attained either an associate degree or a bachelor's degree, those who were **single with dependents earned the least, and those who were married with dependents earned the most.**

KEY FINDINGS BY RURALITY



Compared to veterans at large in the same rurality categories, **American Indian/Alaska Native, Black, and Hispanic veterans consistently were more likely to use PGIB.**



Compared to veterans at large in the same rurality categories, **American Indian/Alaska Native and Black veterans were consistently less likely to complete a degree, but Hispanic veterans from rural and micropolitan areas were more likely to do so.**



Compared to veterans at large with the same degree attainment and rurality category, **American Indian/Alaska Native and Black veterans consistently earned less, whereas Hispanic veterans earned more (with one exception).**



Among American Indian/Alaska Native, Black, and Hispanic veterans who attained either an associate degree or a bachelor's degree, those in metropolitan areas **earned the most (with one exception).**

Introduction

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. This report takes a deeper look at outcomes for American Indian/Alaska Native, Black, and Hispanic enlisted veterans who were eligible for PGIB (henceforth referred to as “veterans” for brevity).¹ More specifically, it looks at these groups' use of PGIB, degree attainment, and subsequent earnings.

¹This report focuses on the PGIB outcomes of veterans who were enlisted (rather than commissioned officers) as enlisted personnel represent the vast majority of military servicemembers. Enlisted personnel also predominantly enter the military without a postsecondary degree (see Radford et al., 2024a) and are thus more likely to personally benefit from PGIB than officers who generally must already have a bachelor's degree.





About PGIB

PGIB was enacted on June 30, 2008 as Public Law 110-252, and became effective on August 1, 2009. PGIB-eligible veterans can receive benefits that fully cover their tuition and fees at any public college or university (or a capped amount that can be spent at a private college), a monthly housing allowance based on the local cost of living, and a stipend for books and supplies (Congressional Research Service, 2021a).² PGIB benefits also may be transferred to a spouse or dependent.³ Although military service members are eligible for various education benefits during and after their service,⁴ PGIB has represented more than 70% of total GI Bill participation and more than 80% of GI Bill spending in each year since FY2013 (Congressional Research Service, 2021a).⁵ Despite benefiting more than 600,000 individuals in fiscal year 2022 alone (Congressional Research Service, 2021a), PGIB remains relatively understudied, and no other PGIB study has included veterans across all branches.⁶

² Generally, veterans and service members who have served an aggregate minimum of 90 days on active duty since 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/>. VA regularly updates the dollar amount of the benefits that PGIB recipients can receive; for current amounts, see this VA website: <https://www.va.gov/education/benefit-rates/post-9-11-gi-bill-rates/>.

³ For current details related to transferability, refer to this VA website: <https://www.va.gov/education/transfer-post-9-11-gi-bill-benefits/>. Note that although a veteran's spouse can use benefits right away, a veteran's child cannot use benefits until the veteran has had at least 10 years of service in most cases.

⁴ See Congressional Research Service (2021b) for descriptions of these VA programs.

⁵ Our interagency research team found that among PGIB-eligible enlisted veterans who separated as of June 30, 2018, less than 1% (0.3%) used Montgomery GI Bill (MGIB) but not PGIB benefits. The percentage using MGIB was even lower (less than 0.1%) for those who first enlisted between 2009 and 2018, when PGIB was in effect.

⁶ One National Bureau of Economic Research paper released on PGIB had access only to Army data and looked only at cohorts that left between 2002 and 2010 (Barr et al., 2021). Kofoed (2020) was able to look at a slightly more recent range of cohorts (2008 to 2016) but, again, had only Army data.



About this project

This interagency research project aims to fill the gap in our understanding of PGIB and offer insights about veterans from all military branches for the first time.⁷ The U.S. Census Bureau hosted this interagency research project as one of its first evidence-building pilot projects,⁸ facilitating unprecedented federal interagency collaboration to examine PGIB outcomes. Over 7 years, multiple agencies worked together to establish data-sharing agreements and processes, leading to a combined dataset with information from the U.S. Department of Veterans Affairs (VA), Veterans Benefits Administration (VBA) at VA, Defense Manpower Data Center (DMDC) at the U.S. Department of Defense, Internal Revenue Service (IRS), U.S. Census Bureau, and the National Student Clearinghouse (Clearinghouse), as well as postsecondary institution-level data from the Integrated Postsecondary Education Data System (IPEDS) at the U.S. Department of Education. Support from Arnold Ventures enabled a team of external researchers from the American Institutes for Research® (AIR®), a nonpartisan, not-for-profit research organization, to join the Census Bureau as Special Sworn Status employees for this project, and also enabled the purchase of student records on postsecondary enrollment and degree completion from the Clearinghouse. The research team consists of these staff from AIR embedded at the Census Bureau, alongside staff from the Census Bureau and VA's National Center for Veterans Analysis & Statistics. The nonprofit organization Veterans Education Success helped to conceptualize the project and provided assistance. The Gates Foundation provided support for this report's analysis, and Arnold Ventures provided support for the overall project.

⁷ As noted above, 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). Kofoed (2020) was able to look at a slightly more recent range of cohorts (2008 to 2016) but again had only Army data.

⁸ As stated at <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."

This report is part of the research team's series of reports analyzing PGIB and its outcomes for veterans. The first report leveraged the unique, comprehensive dataset from the various agencies to highlight how eligible enlisted veterans' use of PGIB, degree attainment, and subsequent earnings varied across different racial and ethnic groups. That report also examined disparities in outcomes among veterans based on sex, academic preparation at time of enlistment (measured by the Armed Forces Qualification Test [AFQT] quintile⁹), family responsibilities, and rurality. A second report looked at how veterans' outcomes differed by the type of program pursued and education provider attended, and a third report provided a closer examination of veterans' outcomes at flagship public universities. Two additional reports focus on PGIB-eligible enlisted veterans who have not yet personally used or transferred their benefits, with one report highlighting characteristics of such veterans based on our rich quantitative dataset, and the other report sharing insights and recommendations based on new interviews with such veterans.¹⁰

This report further advances our understanding of PGIB by leveraging the dataset to take a deeper look at the outcomes of American Indian/Alaska Native, Black, and Hispanic veterans, (also referred to in this report as our populations of focus, for brevity).¹¹ This report makes two main contributions to the field. First, while many studies do not provide any data on American Indians/Alaska Natives,¹² our large dataset, containing 2.7 million PGIB-eligible enlisted veterans, enables us to present an array of results for this important population. Second, although studies often discuss results by race and ethnicity in the aggregate, the number of veterans in our dataset allows us to drill down and disaggregate the data to explore differences in outcomes within American Indian/Alaska Native, Black, and Hispanic veteran populations by sex, AFQT quintile, family responsibilities, and rurality.



A note of caution at the outset of this report: 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 causal methodology was undertaken in this project. This means we cannot conclude, for example, that veteran characteristics cause veterans to use PGIB benefits.

Additional information about our research questions, subsamples analyzed, and limitations on the interpretation of our results can be found in Exhibit 1. Further information about our methods can be found in Appendices A and B.

⁹ The AFQT measures the 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.

¹⁰ All reports for this project can be found here: <https://www.air.org/project/study-post-911-gi-bill-student-outcomes>.

¹¹ Race/ethnicity is defined in this report in accordance with VA race categories. Hispanic veterans can be of any race. Please see Appendix Table A-1 for further information on the sources used for variables included in this analysis.

¹² For more on the complexities of collecting and reporting data on American Indian/Alaska Natives, see <https://www.ihep.org/publication/layers-of-identity-rethinking-american-indian-alaska-native-data-collection/>.

Exhibit 1: Key Analysis Details

Research Questions

Below we note our broad research questions.

1. Who uses the Post-9/11 GI Bill?

More specifically, among American Indian/Alaska Native, Black, and Hispanic PGIB-eligible enlisted veterans (as described below):

- what proportion used PGIB benefits at a postsecondary institution, and
- how did this vary by sex, AFQT quintile, family responsibility, and rurality?

2. What are veterans' degree completion outcomes?

More specifically, among American Indian/Alaska Native, Black, and Hispanic PGIB-eligible enlisted veterans who used PGIB benefits at a postsecondary institution after their first separation:¹³

- what proportion completed a degree within 6 years¹⁴ of first enrolling after separating and by June 30, 2019; and
- how did this vary by sex, AFQT quintile, family responsibility, and rurality?

3. What are the earnings of veterans who complete a degree?

a. More specifically, among American Indian/Alaska Native, Black, and Hispanic veterans who used PGIB and completed an **associate degree** by 2018 and were not enrolled in postsecondary education in 2019:

- what were their 2019 W-2 earnings; and
- how did these earnings vary by sex, AFQT quintile, family responsibility, and rurality?

a. More specifically, among American Indian/Alaska Native, Black, and Hispanic veterans who used PGIB and completed a **bachelor's degree** by 2018 and were not enrolled in postsecondary education in 2019:

- what were their 2019 W-2 earnings; and
- how did these earnings vary by sex, AFQT quintile, family responsibility, and rurality?

¹³ For more details on why we focus on postsecondary outcomes after first separation, see "PGIB-Clearinghouse Post-Separation Users" in the "Subsamples Analyzed" section of this exhibit.

¹⁴ For more details on why we use 6-year completion rates, see "Research Question 2" in Appendix A.

Subsamples Analyzed

To answer these research questions, we created three 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 a 1-year period to use PGIB benefits after separating from active duty. The study team used this sample in Research Question 1 about use of PGIB benefits.
- 2. PGIB-Clearinghouse Users.** PGIB-Eligible Enlisted Veterans who received a PGIB payment according to VBA and had an enrollment record in the Clearinghouse¹⁵ 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 need to use their PGIB benefits at an institution that reports to the Clearinghouse,¹⁶ but completion data for PGIB use are available only for institutions covered by the

Clearinghouse, and completion data are critical to this report’s examination of PGIB recipients’ postsecondary degree completion and earnings after degree completion.¹⁷ We find that 84% of all veterans who used PGIB had a Clearinghouse record, representing the PGIB-Clearinghouse Users examined in this report. The research team used this sample to address Research Question 1 about use of PGIB benefits and Research Question 3 about earnings for veterans who complete specific degrees.

- 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% of all PGIB-Clearinghouse Users. The research team used this sample to address Research Question 2 about degree completion.

See appendices A and B for more details.

¹⁵ The Clearinghouse (short for National Student Clearinghouse) holds student records on postsecondary enrollment and degree completion.

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 training, and heating and cooling repair. Veterans can also use PGIB benefits for licensing and certification examinations and other national tests. See this VA website for details: <https://www.va.gov/education/about-gi-bill-benefits/how-to-use-benefits/>.

¹⁷ According to the National Student Clearinghouse Research Center (2022), the Clearinghouse’s coverage of U.S. institutions overall in 2019 (the last year in which this report examines postsecondary enrollment and degree completions) was 97%, though coverage at 2-year, for-profit colleges was 12%.

¹⁸ When this analysis was conducted, 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). Although 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 therefore may 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.

PGIB Outcomes for American Indian/ Alaska Native, Black, and Hispanic Veterans by Sex

In this section of the report, we explore American Indian/Alaska Native, Black, and Hispanic veterans' use of PGIB benefits, degree completion, and earnings by sex. To provide context, we also include these outcomes for veterans at large by sex. Veterans' sex is based on VA data, which categorize veterans into male or female.¹⁹ For more details on the veteran population used to answer each research question noted below, see Exhibit 1 (page 8).

KEY FINDINGS



Compared to veterans at large of the same sex, **American Indian/Alaska Native, Black, and Hispanic veterans consistently were more likely to use PGIB but were less likely to complete a degree (with one exception).**



Among American Indian/Alaska Native, Black, and Hispanic veterans, **females consistently were more likely than males to use PGIB and complete a degree.**



Compared to veterans at large with the same degree attainment and sex, **American Indian/Alaska Native and Black veterans consistently earned less but Hispanic veterans earned more in several instances.**



Among American Indian/Alaska Native, Black, and Hispanic veterans, **females consistently earned less than males when they attained an associate degree and when they attained a bachelor's degree.**

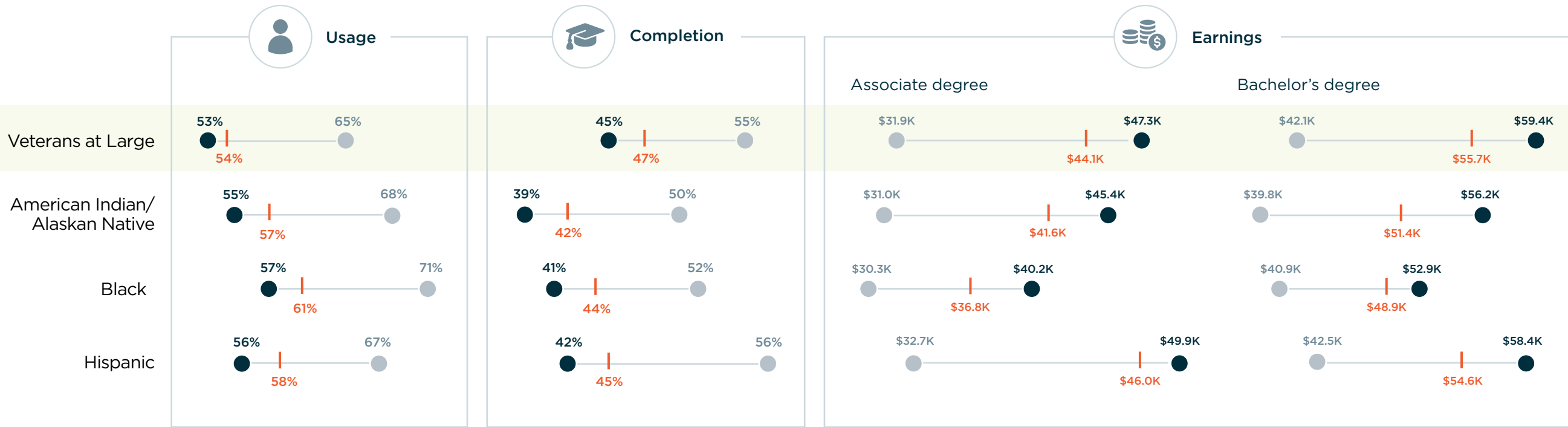
¹⁹ Please see Appendix table A-1 for further information on the data sources for variables included in analyses.

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans **by Sex**

EXHIBIT 2

Usage, Degree Completion, and Earnings, By Sex

MALE | FEMALE | OVERALL



Note: Hispanic veterans can be of any race.

How to interpret exhibits like Exhibit 2 in this report

This report contains several exhibits like Exhibit 2. Veteran outcomes on PGIB usage, degree completion, and earnings are presented across the top of these exhibits. Veterans at large and veterans from each of our populations of focus—American Indian/Alaska Native, Black, and Hispanic veterans—are presented as rows. The orange lines indicate the results for veterans overall in each row population (e.g., all American Indian/Alaska Native veterans). The colored circles disaggregate results for each row population by the variable of interest (e.g., sex).

In each section of the report, we highlight results in these exhibits by first discussing differences *between* veteran populations of focus and veterans at large. We do so by looking down each row (each of which represents a veteran population) and comparing results for specific colored circles (e.g., male veterans, female veterans). We then turn to discussing differences *within* specific veteran populations. We examine that by looking across each veteran population row and exploring the order of the colored circles and the size of the rate or earnings differences between the colored circles.

Who uses the Post-9/11 GI Bill?

We first examine how use of PGIB benefits among our veteran populations of focus compare to veterans at large by sex. We find that, **regardless of sex, American Indian/Alaska Native, Black, and Hispanic veterans consistently used PGIB benefits at higher rates than veterans at large.**²⁰ The higher usage of PGIB benefits among these veteran populations on which this report focuses can be readily observed by looking down the rows in the usage section of Exhibit 2. Examining the usage rates of veterans overall (displayed as orange lines), one sees that the orange line for each of our populations of focus is to the right of the orange line for veterans at large (presented in the first row), indicating higher usage rates. Continuing to look down the rows but this time focusing on only male veterans (black circles), and then only female veterans (gray circles) reveals the same pattern observed when looking at the orange lines representing veterans overall: male and female veterans from our veteran populations of focus both have rates that are to the right of the comparable circle presented for veterans at large in the first row, again indicating higher usage.

We now turn to how benefit use varies within veteran populations by sex. **Among veterans at large and among American Indian/Alaska Native, Black, and Hispanic veteran populations, females consistently outpaced males in utilizing PGIB benefits.** This can be observed by looking across each row in Exhibit 2, where one clearly sees that whether examining veterans at large or specific veteran population of focus, female veterans were more likely to use benefits than male veterans. Gaps in PGIB usage by sex ranged from 11 percentage points (for Hispanic veterans) to 14 percentage points (for Black veterans). **To better understand the role of sex after taking into account potential differences by sex in veterans' academic preparation, military occupation, family responsibilities, and the array of other veteran characteristics listed in Appendix Table A-1, the research team also conducted regressions. That analysis revealed that even after accounting for those other potential differences in veteran characteristics by sex, gaps by sex in usage for the veteran populations examined were still between 10 and 13 percentage points.**²¹ The fact that gaps in PGIB usage by sex decreased by between 0 and 2 percentage points after accounting for other variables depending on the veteran population examined suggests that these other veteran characteristics do not explain much of this gap in usage between male and female veterans. **In other words, comparing similarly situated veterans** (based on the list of other veteran characteristics in Appendix Table A-1), **female veterans were still more likely to use PGIB than male veterans.**²²

²⁰ This finding stands in contrast to 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. See NCES (2019a).

²¹ Specifically, usage rates between male and female veterans shrank from 14 to 12 percentage points for Black veterans, 12 to 11 percentage points for veterans at large, and 11 to 10 percentage points for Hispanic veterans. American Indian/Alaska Native veterans' 13-percentage-point gap in Exhibit 2 did not shrink at all.

²² These results are consistent with national patterns by sex in college enrollment. See, for example, Reeves and Smith (2021).

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans **by Sex**

What are veterans' degree completion outcomes?

We now discuss degree completion results. Again, we begin with how outcomes among our veteran populations of focus compare to veterans at large by sex. **American Indian/Alaska Native, Black, and Hispanic veterans had lower degree completion rates than veterans at large, with one exception.** This can be observed in the completion section in Exhibit 2 (page 12). Looking down the overall completion rates of each veteran population row, depicted by orange lines, male veterans' completion rates (black circles), and female veterans' completion rates (gray circles), American Indian/Alaska Native, Black, and Hispanic veterans consistently had completion rates to the left of veterans at large (signifying lower rates) in all but one case.²³

We now turn to how completion varies within veteran populations by sex. **Among veterans at large and among American Indian/Alaska Native, Black, and Hispanic veteran populations, female veterans had higher completion rates than male veterans.** Specifically, the gap between female and male veterans for degree completion ranged from 10 percentage points (for veterans at large) to 14 percentage points (for Hispanic veterans). This can be seen by looking across each row in the completion section of Exhibit 2 (page 12).

The completion gap by sex remained stubborn when we ran regressions to compare veterans who otherwise shared the same demographic and military characteristics. **After taking into account other veteran characteristics listed in Appendix Table A-1, degree completion gaps by sex still ranged from 11 to 12 percentage points,** and, in three out of four instances, the inclusion of these other variables did nothing to reduce the gaps in completion rates by sex presented in Exhibit 2.²⁴ This finding suggests that other veteran characteristics do little to explain female veterans' consistently higher completion rates than their male counterparts.²⁵

²³ Female Hispanic veterans completed at a rate 1 percentage point higher than all female veterans.

²⁴ More specifically, although the gap for Hispanic veterans shrank by 2 percentage points, the gap for American Indian/Alaska Native veterans did not budge at all and the gaps for veterans at large and Black veterans each increased by 1 percentage point.

²⁵ These results are consistent with national patterns by sex in college completion. See, for example, Denning et al. (2022).

What are the earnings of veterans who complete a degree?

We now examine veterans' earnings after completing an associate or bachelor's degree. We again start with how the earnings of our populations of focus compare to veterans at large. **Compared to veterans at large with the same degree attainment and sex, American Indian/Alaska Native and Black veterans consistently earned less, but Hispanic veterans earned more in three out of four instances.**

Exhibit 3 (page 16) is a visual representation of the earnings disparity between our veteran populations of focus and veterans at large. More specifically, it illustrates in percentage terms how the earnings of our veteran populations of focus compare to those of veterans at large with the same degree and sex. As the orange cells in the exhibit indicate, American Indian/Alaska Native and Black veterans earned between 83% and 97% of what veterans at large of the same sex earned when holding the same degree. Black male veterans had the lowest proportion of take-home pay relative to veterans at large of the same sex.²⁶ On the other hand, the green cells in the exhibit indicate that Hispanic veterans with associate degrees earned relatively more: between 103% and 105% of what veterans at large of the same sex earned. Among bachelor's degree holders, Hispanic female veterans earned 101% of what female veterans at large earned.²⁷




²⁶ Specifically, relative to veterans at large with the same degree and sex, the proportion of earnings Black male veterans took home was lower (85% or 89%, depending on degree attained) than the proportion American Indian/Alaska Native male veterans, Black female veterans, and American Indian/Alaska Native female veterans took home (between 95% and 97%, depending on race/ethnicity, sex, and degree attained).

²⁷ For context, our first report (Radford et al., 2024a), analyzed the earnings of associate degree and bachelor's degree holders by race and ethnicity for the American population in general. That report notes that, among those holding the same degree, American Indian/Alaska Natives, Black Americans, and Hispanic Americans each earned less than Americans at large. That said, the gaps between Hispanic Americans and Americans at large were the smallest. Also, just like we observe in the veteran population, the gaps between American Indian/Alaska Native Americans and Americans at large were smaller than the gaps between Black Americans and Americans at large.

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans **by Sex**

EXHIBIT 3

Earnings of American Indian/Alaska Native, Black, and Hispanic Veterans Relative to Veterans at Large with the Same Degree Attainment, By Sex



| | American Indian/ Alaska Native | | Black | | Hispanic | |
|---------|-----------------------------------|-----|-------|-----|----------|------|
| | AA | BA | AA | BA | AA | BA |
| OVERALL | 94% | 92% | 83% | 88% | 104% | 98% |
| Male | 96% | 95% | 85% | 89% | 105% | 98% |
| Female | 97% | 95% | 95% | 97% | 103% | 101% |

Note:

AA=Associate degree; BA=Bachelor's degree.

Hispanic veterans can be of any race.

Orange cells highlight instances where the column population of focus in that cell was taking home a lower proportion of earnings than veterans at large; green cells highlight instances where the column population of focus in that cell was taking home the same or a higher proportion of earnings than veterans at large.

Having examined differences in earnings between American Indian/Alaska Native, Black, and Hispanic veterans and veterans at large by sex, we now turn to earnings gaps within veteran populations by sex. These within-group gaps by sex can be seen in the earnings section of Exhibit 2 (page 11) by comparing the gray and black circles in each row. **Among veterans at large and our veteran populations of focus, male veterans consistently earned more than female veterans with the same degree.**²⁸ As for the size of the gap, among associate degree holders, Black veterans had the smallest earnings gap by sex (\$9,900) and Hispanic veterans had the largest (\$17,200). Among bachelor's degree recipients, the earnings gap by sex was again smallest for Black veterans (\$12,000) but biggest for veterans at large (\$17,300).

For both degree types, earnings gaps by sex shrank consistently after accounting for military occupation, field of study, family responsibilities, and the other veteran characteristics noted in Appendix Table A-1, but still spanned \$8,600 to \$15,300 for associate degree holders and \$9,900 to \$13,700 for bachelor's degree holders. These results suggest that **other veteran characteristics explain some, though certainly not all, of the earnings gaps by sex within veteran populations.**²⁹

²⁸ Of course, an earnings gap by sex is often found in the U.S. population, not just among veterans. For more on this, see Radford et al. (2024a).

²⁹ More specifically, among associate degree holders, the gap by sex shrank from \$15,400 to \$13,200 for veterans at large, \$14,400 to \$11,700 for American Indian/Alaska Native veterans, \$9,900 to \$8,600 for Black veterans, and \$17,200 to \$15,300 for Hispanic veterans. As for bachelor's degree recipients, the gap by sex shrank from \$17,300 to \$13,700 for veterans at large, \$16,400 to \$13,100 for American Indian/Alaska Native veterans, \$12,000 to \$9,900 for Black veterans, and \$15,900 to \$13,300 for Hispanic veterans.

PGIB Outcomes for American Indian/ Alaska Native, Black, and Hispanic Veterans by AFQT Quintile

In this section of the report, we explore American Indian/Alaska Native, Black, and Hispanic veterans' use of PGIB benefits, degree completion, and earnings by AFQT quintile. To provide context, we also include these outcomes for veterans at large by AFQT quintile. As noted in the introduction of this report, we use veterans' AFQT quintile as a proxy for veteran's academic preparation at time of enlistment. The AFQT is a test the military requires of all incoming service members that measures their arithmetic reasoning, mathematical knowledge, paragraph comprehension, and word knowledge, and thus can provide a snapshot of veterans' academic

preparedness at the time of enlistment. We split veterans' AFQT scores into five equally sized groups or quintiles. AFQT scores within each quintile are as follows: Q1/lowest quintile (<41), Q2/second quintile (41-54), Q3/third quintile (54-65), Q4/fourth quintile (66-79), and Q5/highest quintile (80+). In other words, veterans in Q1 had the lowest AFQT scores (or were the least prepared academically) and veterans in Q5 had the highest scores, displaying the most academic preparation. For more details on the veteran population used to answer each research question noted below, see Exhibit 1 (page 8).

KEY FINDINGS



Compared to veterans at large in the same AFQT quintiles, **American Indian/Alaska Native, Black, and Hispanic veterans were consistently as likely or more likely to use PGIB.**



Compared to veterans at large in the same AFQT quintiles, **American Indian/Alaska Native veterans were consistently less likely to complete a degree, but Black veterans in three AFQT quintiles were more likely to complete, and Hispanic veterans' were consistently as likely or more likely to complete across all five AFQT quintiles.**



Compared to veterans at large with the same degree attainment and the same AFQT quintile, **American Indian/Alaska Native and Black veterans consistently earned less but Hispanic veterans often earned more.**



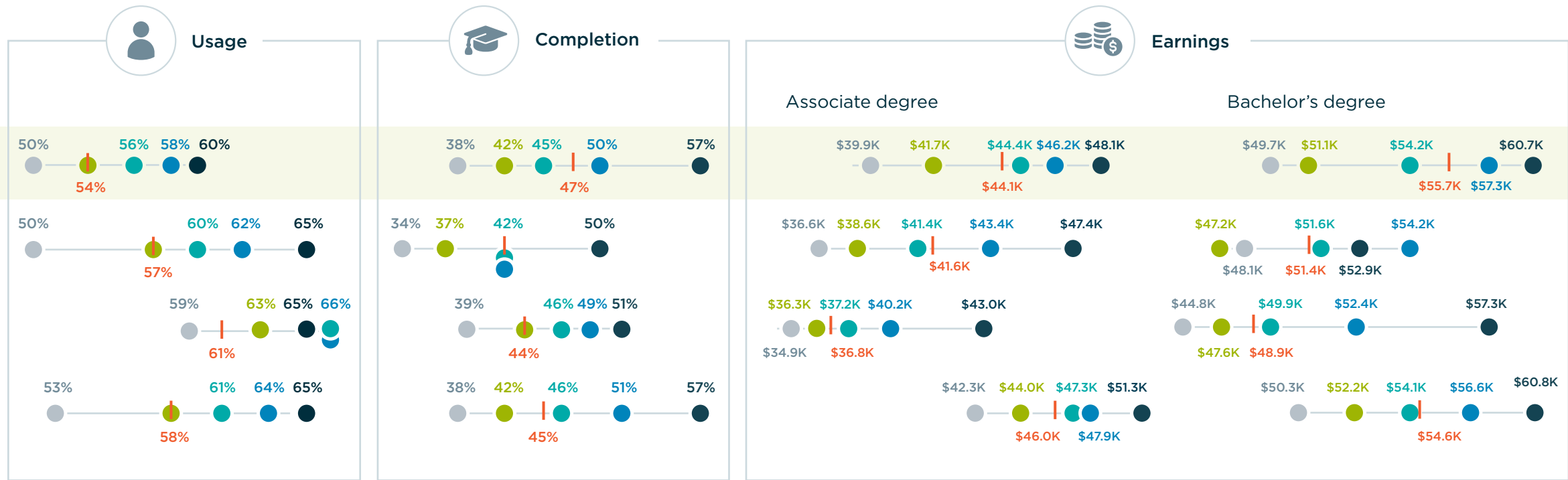
Among American Indian/Alaska Native, Black, and Hispanic veterans, **use of PGIB benefits, degree completion, and earnings increased the higher veterans' AFQT quintile—with a couple of exceptions.**

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans by AFQT Quintile

EXHIBIT 4

Usage, Degree Completion, and Earnings, By AFQT Quintile

Q1 | Q2 | Q3 | Q4 | Q5 | OVERALL



Note: AFQT scores within each quintile are as follows: Q1/lowest quintile (<41), Q2/second quintile (41-54), Q3/third quintile (54-65), Q4/fourth quintile (66-79), and Q5/highest quintile (80+).

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans by AFQT Quintile

Who uses the Post-9/11 GI Bill?

We start by comparing use of PGIB benefits for our populations of focus to veterans at large by AFQT quintile. **In every AFQT quintile, the percentage of American Indian/Alaska Native, Black, and Hispanic veterans who used their Post-9/11 GI Bill benefits matched or exceeded that of veterans at large.** These differences in PGIB usage between veteran populations can be clearly observed by looking down the row populations in Exhibit 4 (page 18). For each AFQT quintile (represented as a different colored circle in the exhibit) the usage rate shown for our veteran populations of focus is the same as or higher than for veterans at large. This pattern of higher usage rates for American Indian/Alaska Native, Black, and Hispanic veterans is not only observed in each AFQT quintile; it is also observed when examining usage rates overall (represented by orange lines in the exhibit).

We now turn to PGIB benefit use by AFQT quintile within veteran populations. For each veteran population, use of PGIB benefits increased with each quintile increase in their AFQT scores with one exception.³⁰ **In short, higher AFQT scores largely correlate with higher rates of using PGIB.** This can be seen by looking across each row population in Exhibit 4.

As for the extent to which PGIB use varies by AFQT quintile within veteran populations, we find that **Black veterans' PGIB usage by AFQT scores varied least**—by 7 percentage points. This finding appears to be due mainly to the higher usage rate of Black veterans in the lowest quintile (Q1) (59%)³¹ compared to the usage rate of other veteran populations in the lowest quintile (Q1) (50% to 53%).³² In contrast, **American Indian/Alaska Native veterans showed the biggest variation in PGIB usage by AFQT quintiles, with a gap of 15 percentage points.** However, for each of the veteran populations this report focuses on (American Indian/Alaska Native, Black, and Hispanic veterans), once we used regression analysis to account for veterans' other characteristics (such as sex, family status, rurality, military occupation, rank, and the veteran characteristics displayed in Appendix Table A-1), differences in PGIB usage by AFQT scores shrank. Specifically, the gaps ranged from 7–15 percentage points in Exhibit 4 to 5–10 percentage points after accounting for other variables.³³ This reduction suggests that **some of the gaps observed by AFQT quintile within veteran populations can be attributed to other characteristics.**

³⁰ The usage rate for Black veterans in the highest quintile (Q5) was 1 percentage point below the usage rate for Black veterans in the third and fourth quintiles (Q3 and Q4, respectively).

³¹ Predatory recruitment tactics of Black students by for-profit institutions (see Merrill et al., 2018) and Black veterans' overrepresentation at 4-year, for-profit institutions reported in our previous report (Radford et al., 2024b), may be contributing to Black veterans' higher usage rate. Future studies should consider exploring the relationship between AFQT scores, race and ethnicity, and enrollment in different sectors.

³² About 59% of Black veterans in this quintile used PGIB compared to 50% to 53% of other veteran populations in this same quintile.

³³ More specifically, the gap shrank from 15 to 10 percentage points for American Indian/Alaska Native veterans, 12 to 10 percentage points for Hispanic veterans, 10 to 9 percentage points for veterans at large, and 7 to 5 percentage points for Black veterans.

What are veterans' degree completion outcomes?

We now discuss degree completion outcomes. We start with differences in completion by AFQT quintile between veteran populations. We find that **American Indian/Alaska Native, Black, and Hispanic veteran populations' overall completion rates were consistently lower than those of veterans at large.**³⁴ (This can be seen in the orange lines in the completion section of Exhibit 4, page 18.) **Yet, when we disaggregate the results by AFQT quintile** (represented in the colored circles), a different pattern emerges. Compared to veterans at large with similar AFQT scores (as represented by AFQT quintiles), **American Indian/Alaska Native veterans still were consistently less likely to complete a degree, but Black veterans in the bottom three AFQT quintiles were more likely to complete, and Hispanic veterans in all five AFQT quintiles were consistently as likely or more likely to complete.**

In other words, American Indian/Alaska Native veterans were less likely to complete a degree than veterans at large; this remained the case across AFQT quintiles. The likelihood of Black veterans completing a degree was mixed compared to veterans at large. Black veterans overall and Black veterans in the two highest AFQT quintiles were less likely to complete, but those in the lower three AFQT quintiles were more likely to do so. Overall, Hispanic veterans were less likely to complete than veterans at large; however, when we compared Hispanic veterans to veterans at large in the same AFQT quintile, Hispanic veterans were as likely or more likely to complete their degrees.

The degree completion patterns seen for each veteran population overall versus by AFQT score underscore the value of disaggregating results. Disaggregating results—in this case, examining degree completion within veteran populations by AFQT quintile through the colored circles—uncovered patterns that could not be seen at the aggregate level (that is, degree completion for veteran populations overall shown in the orange lines). Disaggregating data in this way can enhance our understanding of what is occurring and help inform policies, practices, and the deployment of resources and supports.

³⁴ These findings for completion are generally consistent with completion patterns by race and ethnicity in the broader population. For example, see NCES (2019b).

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans by AFQT Quintile

What are veterans' degree completion outcomes?

We now shift from degree completion between veteran populations by AFQT quintile discussed above to degree completion within veteran populations by AFQT quintile. We find that veterans' **degree completion rates increased the higher their AFQT score.** Specifically, degree completion increased the higher the AFQT quintile within each veteran population presented (with one exception³⁵). This can be seen by looking across each row population in the completion section of Exhibit 4 (page 18). As for the size of the degree completion gap by AFQT quintile, that ranged from 12 percentage points (for Black veterans) to 19 percentage points (for veterans at large and Hispanic veterans). In other words, degree completion rates for Black veterans varied less by AFQT quintile than did those of Hispanic veterans and veterans at large.

When we used regression analysis to account for the many other veteran characteristics listed in Appendix Table A-1 that might be related to AFQT quintile, we found that these gaps in degree completion by AFQT quintile shrank for each veteran population presented in Exhibit 4 but still spanned 10 to 14 percentage points.³⁶ In other words, even after we compared veterans of the same sex, family status, and other demographic factors and the same military occupation, rank, and other military career factors, there still remained a difference in degree completion by AFQT score. Specifically, **the higher veterans' AFQT quintile, the more likely they were to complete a degree.**³⁷ These regression results suggest that other veteran characteristics partially explain the differences in degree completion by AFQT quintile for veterans at large and for our veteran populations of focus, but gaps by AFQT remain. **In other words, for veterans at large and for American Indian/Alaska Native, Black, and Hispanic veterans, AFQT quintile (representing a rough approximation of veterans' academic preparation at time of enlistment) correlated with degree completion.**

³⁵ Completion rates were the same for American Indian/Alaska Native veterans in the third and fourth quintiles.

³⁶ Specifically, veterans at large and Hispanic veterans had the largest gaps at 19 percentage points, with these gaps shrinking to 14 and 10 percentage points, respectively after taking into account other characteristics. American Indian/Alaska Native veterans' gap shrank from 16 to 12 percentage points and Black veterans' gap shrank from 12 to 10 percentage points.

³⁷ 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).

What are veterans' degree completion outcomes?

We now examine the earnings of veterans who completed an associate or bachelor's degrees by AFQT quintile. We start with disparities between our veteran populations of focus and veterans at large. Exhibit 5 (page 23) helps summarize these earnings differences by displaying in percentage terms the average earnings of American Indian/Alaska Native, Black, and Hispanic veterans relative to veterans at large who completed the same degree and achieved the same AFQT quintile.

American Indian/Alaska Native veterans and Black veterans each consistently earned less than veterans at large who completed the same degree and achieved the same AFQT quintile (as highlighted in the orange cells). The earnings Black veterans took home relative to veterans at large generally were lower than the earnings that American Indian/Alaska Native veterans took home relative to veterans at large (as indicated by the numbers within the orange cells).³⁸ **As for Hispanic veterans, associate degree holders took home more in earnings** than veterans at large in every AFQT quintile (as depicted by the green cells). **Hispanic bachelor's degree completers also took home more in all but one AFQT quintile.**^{39,40}

We now turn to how earnings within veteran populations differ by AFQT quintile. In general, **for each veteran population and each type of degree attained, the higher veterans' AFQT quintile, the higher their earnings.**⁴¹ This consistently held true for Black and Hispanic veterans as well as veterans at large and held true with just two exceptions for American Indian/Alaska Native veterans.⁴² This pattern can be seen by looking across each row population in the earnings section of Exhibit 4 (page 18).

Among associate degree holders, the difference in earnings between the lowest and highest AFQT quintiles ranged from \$8,100 (for Black veterans) to \$10,800 (for American Indian/Alaska Native veterans). In other words, compared with Hispanic veterans and veterans at large, Black veterans had less of a change in earnings by AFQT quintile whereas American Indian/Alaska Native veterans had a slightly larger change in earnings by AFQT quintile.

³⁸ There were two exceptions. Among bachelor's degree recipients, Black veterans in the second and fifth AFQT quintiles (Q2 and Q5) did slightly better than American Indian/Alaska Native veterans in those quintiles.

³⁹ The exception is the fourth quintile/Q4, where Hispanic bachelor's degree holders earned 99% of what veterans at large with the same degree were making.

⁴⁰ As discussed above, our previous report (Radford et al., 2024a) notes that in the general population, American Indian/Alaska Native, Black, and Hispanic Americans all earned less than Americans at large with the same degree, though the gap between Hispanic Americans and Americans at large was smaller.


⁴¹ Sockin (2021) reported positive correlations between both AFQT scores and SAT scores and income, using data from the National Longitudinal Survey of Youth 1997.

⁴² Among bachelor's degree attainers, American Indian/Alaska Native veterans in the lowest quintile (Q1) earned more than those in the second quintile (Q2) and those in the fourth quintile (Q4) earned more than those in the highest quintile (Q5).

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans by AFQT Quintile

EXHIBIT 5

Earnings of American Indian/Alaska Native, Black, and Hispanic Veterans Relative to Veterans at Large with the Same Degree Attainment, By AFQT Quintile



| | American Indian/ Alaska Native | | Black | | Hispanic | |
|---------|-----------------------------------|-----|-------|-----|----------|------|
| | AA | BA | AA | BA | AA | BA |
| OVERALL | 94% | 92% | 83% | 88% | 104% | 98% |
| Q1 | 92% | 97% | 87% | 90% | 106% | 101% |
| Q2 | 93% | 92% | 87% | 93% | 106% | 102% |
| Q3 | 93% | 95% | 84% | 92% | 107% | 100% |
| Q4 | 94% | 95% | 87% | 91% | 104% | 99% |
| Q5 | 99% | 87% | 89% | 94% | 107% | 100% |

Notes:

AFQT scores within each quintile are as follows: Q1/lowest quintile (<41), Q2/second quintile (41-54), Q3/third quintile (54-65), Q4/fourth quintile (66-79), and Q5/highest quintile (80+).

AA=Associate degree; BA=Bachelor's degree.

Hispanic veterans can be of any race.

Orange cells highlight instances where the column population of focus in that cell was taking home a lower proportion of earnings than veterans at large; green cells highlight instances where the column population of focus in that cell was taking home the same or a higher proportion of earnings than veterans at large.

Among bachelor's degree holders, the gap in earnings by AFQT quintile spanned \$7,000 (for American Indian/Alaska Native veterans) and \$12,500 (for Black veterans).⁴³ In other words, **American Indian/Alaska Native veterans saw less of a change in their earnings based on AFQT scores, whereas Black veterans with bachelor's degrees experienced a larger change.** This pattern was the opposite of what was found for associate degree holders (described in the previous paragraph).

When we ran regressions that account for the other veteran characteristics listed in Appendix Table A-1 to better isolate the role of AGQT quintile when veterans have similar demographic and military characteristics, **the size of the earnings gaps by AFQT quintiles consistently shrank.** In fact, depending on the veteran population, associate degree holders' gaps were 30% to 47% of their original size reported in Exhibit 4 (page 18), and bachelor's degree holders' gaps were 46% to 65% of their original size reported in Exhibit 4. These results suggest that the **other veteran characteristics** included in our regression analyses **do help explain gaps in earnings by AFQT quintile.**⁴⁴ In other words, a veteran's sex, family status, rurality, military occupation, military rank, and other demographic and military characteristics explain some of the difference in earnings by AFQT quintile that Black, Hispanic, and American Indian/Alaska Native veterans experienced.

⁴³ The lowest and highest earnings quintiles reported were typically the lowest and highest AFQT quintiles (Q1 and Q5). That said, for American Indian/Alaska Native veterans with bachelor's degrees, the quintiles with the lowest and highest earnings were the second and fourth quintiles (Q2 and Q4). We describe gaps based on the lowest and highest earning quintiles in Exhibit 4 (whatever those AFQT quintiles may be). We then examine the gap between the same lowest and highest earning quintiles from Exhibit 4 in regression results.

⁴⁴ Specifically, starting with the smallest initial gap among associate degree holders, the gap went from \$8,100 to \$3,100 for Black veterans, \$8,200 to \$2,500 for veterans at large, \$9,000 to \$4,200 for Hispanic veterans, and \$10,800 to \$3,700 for American Indian/Alaska Native veterans. For bachelor's degree recipients, again starting with the smallest initial gap, the gap went from \$7,000 to \$4,400 for American Indian/Alaska Native veterans, \$10,500 to \$6,300 for Hispanic veterans, \$11,000 to \$5,100 for veterans at large, and \$12,500 to \$8,100 for Black veterans.

PGIB Outcomes for American Indian/ Alaska Native, Black, and Hispanic Veterans by Family Responsibilities

In this section of the report, we explore American Indian/Alaska Native, Black, and Hispanic veterans' use of PGIB benefits, degree completion, and earnings by family responsibilities. To provide context, we also include these outcomes for veterans at large with the same family responsibilities. Veterans' family responsibilities were

measured using marital status and dependent status based on tax filing information from the year veterans first separated from the military, as provided by the IRS for this study. For more details on the veteran population used to answer each research question noted below, see Exhibit 1 (page 9).

KEY FINDINGS



Compared to veterans at large with the same family responsibilities, **American Indian/Alaska Native, Black, and Hispanic veterans were consistently more likely to use PGIB but frequently less likely to complete a degree.**



Among American Indian/Alaska Native, Black, and Hispanic veterans, **unmarried veterans were more likely than married veterans to use PGIB, but married veterans were more likely than unmarried veterans to complete a degree.**



Compared to veterans at large with the same degree attainment and the same family responsibilities, **American Indian/Alaska Native and Black veterans consistently had lower average earnings, whereas Hispanic veterans often had higher average earnings.**



Among American Indian/Alaska Native, Black, and Hispanic veterans who attained either an associate degree or a bachelor's degree, those who were **single with dependents earned the least, and those who were married with dependents earned the most.**

Who uses the Post-9/11 GI Bill?

We first consider use of PGIB by family responsibilities by comparing our veteran populations of focus with veterans at large. **Regardless of family responsibility category, American Indian/Alaska Native, Black, and Hispanic veterans were consistently more likely to use PGIB than veterans at large.**

This finding can be observed by looking down the rows in Exhibit 6 (page 26) at usage rates for veteran populations overall (captured by the orange lines), as well as usage rates by family responsibility categories (captured by the colored circles).

We now turn to differences in PGIB benefit use by family responsibilities within American Indian/Alaska Native, Black, and Hispanic veteran populations. **Generally, single veterans (both with and without dependents) used PGIB benefits at higher rates than married veterans (both with and without dependents).** This was true for veterans at large as well as for American Indian/Alaska Native, Black, and Hispanic veterans with two exceptions.⁴⁵ This pattern can be seen by examining the order of the colored circles in each row population in Exhibit 6. The green and gray circles capturing single veterans are frequently higher than (to the right of) the black and blue circles capturing married veterans, meaning that single veterans use benefits at higher rates than married veterans. As for the size of the gap in PGIB usage by family responsibilities, that ranged from 5 percentage points (for American Indian/Alaska Native veterans) to 8 percentage points (for veterans at large). When we ran regressions to compare veterans who otherwise had the same demographic and military characteristics listed in Appendix Table A-1, gaps in PGIB benefit usage by family responsibility categories shrank to between 2 and 3 percentage points. This result suggests that **other veteran characteristics explain some of the variation in PGIB use by family responsibility** observed in Exhibit 6.⁴⁶

⁴⁵ Black veterans who were married with dependents were as likely to use benefits as those who were unmarried with no dependents, and Hispanic veterans who were married with no dependents were 1 percentage point more likely to use benefits than those who are unmarried with dependents.

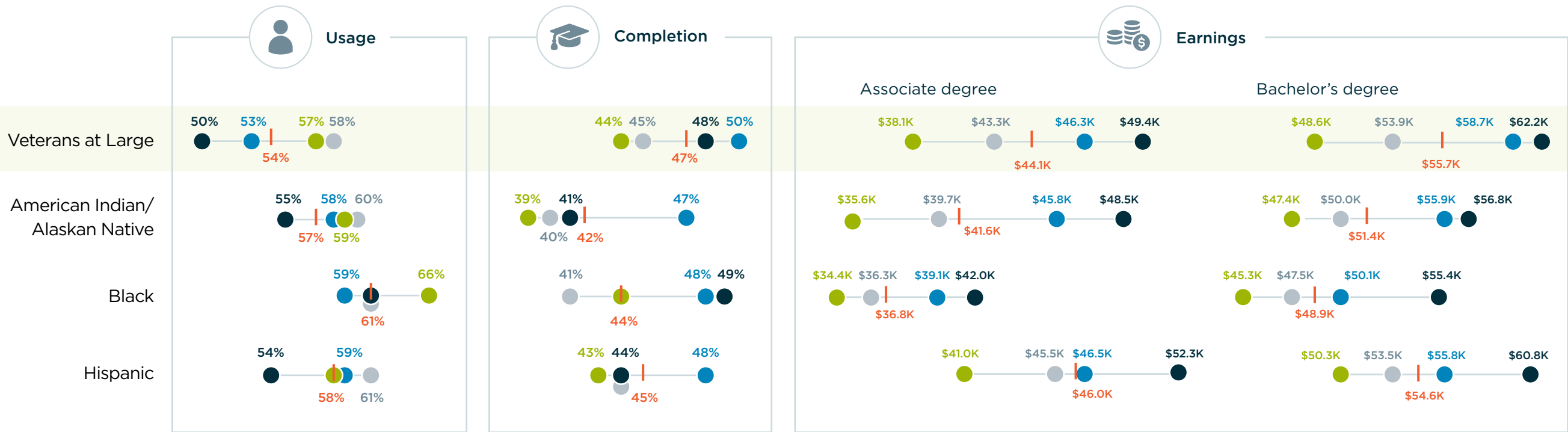
⁴⁶ More specifically, starting with the smallest initial gap American Indian/Alaska Native veterans' usage gap by family responsibility shrank from 5 to 3 percentage points, Hispanic veterans' gap shrank from 7 to 3 percentage points, Black veterans' gap shrank from 7 to 2 percentage points, and the gap for veterans at large shrank from 8 to 3 percentage points.

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans by Family Responsibilities

EXHIBIT 6

Usage, Degree Completion, and Earnings, By Family Responsibilities

SINGLE, NO DEPENDENTS | SINGLE, DEPENDENTS | MARRIED, NO DEPENDENTS | MARRIED, DEPENDENTS | OVERALL



Note: Hispanic veterans can be of any race.

What are veterans' degree completion outcomes?

We begin by comparing American Indian/Alaska Native, Black, and Hispanic veterans' degree completion results to veterans at large with the same family responsibilities. Examining degree completion rates for veteran populations overall and by specific family responsibility categories reveals that **American Indian/Alaska Native, Black, and Hispanic veterans completed degrees at lower rates than veterans at large who had the same family responsibilities with just two exceptions.**⁴⁷ This can be seen by looking down the rows in the completion section of Exhibit 6 (page 26) and examining veteran populations' completion rates overall (captured in the orange lines) as well as completion rates in each family responsibility category (captured in the colored circles).

We now turn to differences in degree completion by family responsibilities within each veteran population presented in Exhibit 6 (page 26). **Married veterans (both with and without dependents) completed degrees at higher or equal rates than unmarried veterans (both with and without dependents).**⁴⁸

In other words, veterans' family responsibilities appear to be correlated to some extent with whether American Indian/Alaska Native, Black, and Hispanic veterans and veterans at large completed their degrees. Gaps in degree completion rates by family responsibilities ranged from 5 percentage points (for Hispanic veterans) to 8 percentage points (for American Indian/Alaska Native and Black veterans).

When we ran regressions to better isolate the role of family responsibilities by accounting for the wide range of veteran characteristics listed in Appendix Table A-1, we found that the degree completion gap by family responsibilities for Black veterans' shrank by 3 percentage points, whereas the degree completion gaps by family responsibilities for American Indian/Alaska Native veterans, Hispanic veterans, and veterans at large grew by 2 to 3 percentage points.⁴⁹ These results suggest that other veteran characteristics were at least partially associated with the gap in Black veterans' college completion rates by family responsibilities observed in Exhibit 6. For other veteran populations, however, differences in degree completion by family responsibilities were even greater after accounting for other veteran characteristics, suggesting that completion differences by family responsibilities were even greater than what is indicated in Exhibit 6. **In short, family status is a factor for most veterans in whether they complete a degree, but it is less of a factor for Black veterans.**

⁴⁷ This general completion pattern is also observed by race and ethnicity in the broader population. For example, see NCES (2019b). The exceptions to this completion pattern are Black veterans who were unmarried with dependents who were equally as likely to complete as veterans at large and Black veterans who were married with dependents who were 1 percentage point more likely to complete.

⁴⁸ Chen et al. (2019) also 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 6 years.

⁴⁹ Specifically, the gap for American Indian/Alaska Native veterans grew from 8 to 10 percentage points, the gap for Hispanic veterans grew from 5 to 8 percentage points, and the gap for veterans at large grew from 6 to 8 percentage points.

What are the earnings of veterans who complete a degree?

We now turn to the earnings of American Indian/Alaska Native, Black, and Hispanic veterans relative to veterans at large who finished the same degree and had the same family responsibilities. **American Indian/Alaska Native and Black veterans consistently earned less than veterans at large with the same family status** (as shown in the orange cells in Exhibit 7 (page 29)). That said, the proportion that American Indian/Alaska Native veterans earned compared to veterans at large with the same family status was consistently higher than what Black veterans earned compared to veterans at large with the same family status (as indicated by the percentages in the orange cells in the exhibit). In other words, American Indian/Alaska Native veterans fared slightly better than Black veterans in their earnings relative to the overall veteran population with the same family status. **Meanwhile, Hispanic veterans had higher earnings than veterans at large with the same family status** (as shown in the green cells in Exhibit 7). Among associate degree attainers, Hispanic veterans consistently took home higher earnings than veterans at large when matched by family responsibilities. In addition, among bachelor's degree attainers, Hispanics who were single with dependents (i.e., children) took home greater earnings than veterans at large who were similarly single with dependents.⁵⁰

We shift now to earnings patterns by family responsibilities within each veteran population. For both associate and bachelor's degree completers, and for every veteran group presented in Exhibit 6 (page 26), **veterans who were single with dependents had the lowest earnings, those who were single with no dependents earned more, those who were married with no dependents earned still more, and those who were married with dependents earned the most.**⁵¹ This can be observed by looking across each row (representing a veteran population) in the earnings section of Exhibit 6.

As for associate degree holders, gaps in earnings by family responsibilities ranged from \$7,600 (for Black veterans) to \$12,900 (for American Indian/Alaska Native veterans). This suggests that **family responsibilities appeared to be less related to Black veterans' earnings than American Indian/Alaska Native veterans' earnings.** When we ran regressions that account for the other veteran characteristics in Appendix Table A-1 to better isolate the role of family responsibilities, earnings gaps by family responsibilities ranged from \$3,500 to \$6,900, depending on the veteran population.⁵² In other words, the earnings gap shrank, suggesting that **other veteran and military characteristics do help explain some of the gap in veterans' earnings by family responsibilities** observed in Exhibit 6.

⁵⁰ As reported previously, looking nationally, American Indian/Alaska Native, Black, and Hispanic Americans with associate and bachelor's degrees earn less than Americans at large with the same degrees, though the gap between Hispanic Americans and Americans at large is smaller (see Radford et al., 2024a).


⁵¹ This earnings pattern is also observed in the national population. See Radford et al., 2024a.

⁵² Specifically, beginning first with veterans with the smallest initial gap, Black veterans' gap shrank from \$7,600 to \$3,800, Hispanic veterans' gap shrank from \$11,300 to \$5,100, and American Indian/Alaska Native veterans' gap shrank from \$12,900 to \$6,900. The gap for veterans at large shrank from \$11,300 to \$3,500.

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans **by Family Responsibilities**

EXHIBIT 7

Earnings of American Indian/Alaska Native, Black, and Hispanic Veterans Relative to Veterans at Large with the Same Degree Attainment, By Family Responsibilities



| | American Indian/ Alaska Native | | Black | | Hispanic | |
|------------------------|-----------------------------------|-----|-------|-----|----------|------|
| | AA | BA | AA | BA | AA | BA |
| OVERALL | 94% | 92% | 83% | 88% | 104% | 98% |
| Single, No Dependents | 92% | 93% | 84% | 88% | 105% | 99% |
| Single, Dependents | 93% | 98% | 90% | 93% | 108% | 103% |
| Married, No Dependents | 99% | 95% | 84% | 85% | 100% | 95% |
| Married, Dependents | 98% | 91% | 85% | 89% | 106% | 98% |

As for bachelor’s degree recipients, gaps in earnings by family responsibilities ranged from \$10,100 (for Black veterans) to \$19,400 (for American Indian/Alaska Native veterans). This again suggests a larger change in earnings associated with family responsibilities for American Indian/Alaska Native veterans than for Black veterans. When we again ran regressions that account for the range of veteran characteristics listed in Appendix Table A-1, the earnings gaps again shrank, with gaps spanning \$1,900 to \$4,000.⁵³ In short, for both associate and bachelor’s degrees, the earnings gap by family status shrank once we accounted for veterans’ other demographic and military characteristics. The consistent shrinking of earnings gaps by family responsibilities across each veteran population suggests that **other veteran characteristics explain some of the earnings gaps by family responsibilities** observed in Exhibit 6.

Notes:

AA=Associate degree; BA=Bachelor’s degree.

Hispanic veterans can be of any race.

Orange cells highlight instances where the column population of focus in that cell was taking home a lower proportion of earnings than veterans at large; green cells highlight instances where the column population of focus in that cell was taking home the same or a higher proportion of earnings than veterans at large.

⁵³ Again starting with the smallest initial gap, gaps shrank from \$10,100 to \$4,000 for Black veterans, \$10,500 to \$3,200 for Hispanic veterans, \$13,600 to \$4,400 for veterans at large, and \$19,400 to \$1,900 for American Indian/Alaska Native veterans.

PGIB Outcomes for American Indian/ Alaska Native, Black, and Hispanic Veterans by Rurality

In this section of the report, we explore American Indian/Alaska Native, Black, and Hispanic veterans' use of PGIB benefits, degree completion, and earnings by rurality (or how rural their home community is). The U.S. Census Bureau aggregates the rurality of American communities into three categories: rural, micropolitan, and metropolitan.⁵⁴ To provide context, we also include these outcomes for veterans at large by rurality. Our rurality measure captures the community in which veterans

settled when they first separated from the military. As our earlier report stated (Radford et al., 2024a), about 6% of the PGIB-Eligible Enlisted Veterans (as defined in Exhibit 1 (page 9)) resided in rural areas upon separating from the military. Another 9% of settled in micropolitan areas, whereas the vast majority (84%) lived in metropolitan areas. For more details on the veteran population used to answer each research question noted below, see Exhibit 1.

KEY FINDINGS



Compared to veterans at large in the same rurality categories, **American Indian/Alaska Native, Black, and Hispanic veterans consistently were more likely to use PGIB.**



Compared to veterans at large in the same rurality categories, **American Indian/Alaska Native and Black veterans were consistently less likely to complete a degree, but Hispanic veterans from rural and micropolitan areas were more likely to do so.**



Compared to veterans at large with the same degree attainment and rurality category, **American Indian/Alaska Native and Black veterans consistently earned less, whereas Hispanic veterans earned more (with one exception).**



Among American Indian/Alaska Native, Black, and Hispanic veterans who attained either an associate degree or a bachelor's degree, those in metropolitan areas earned the most (with one exception).

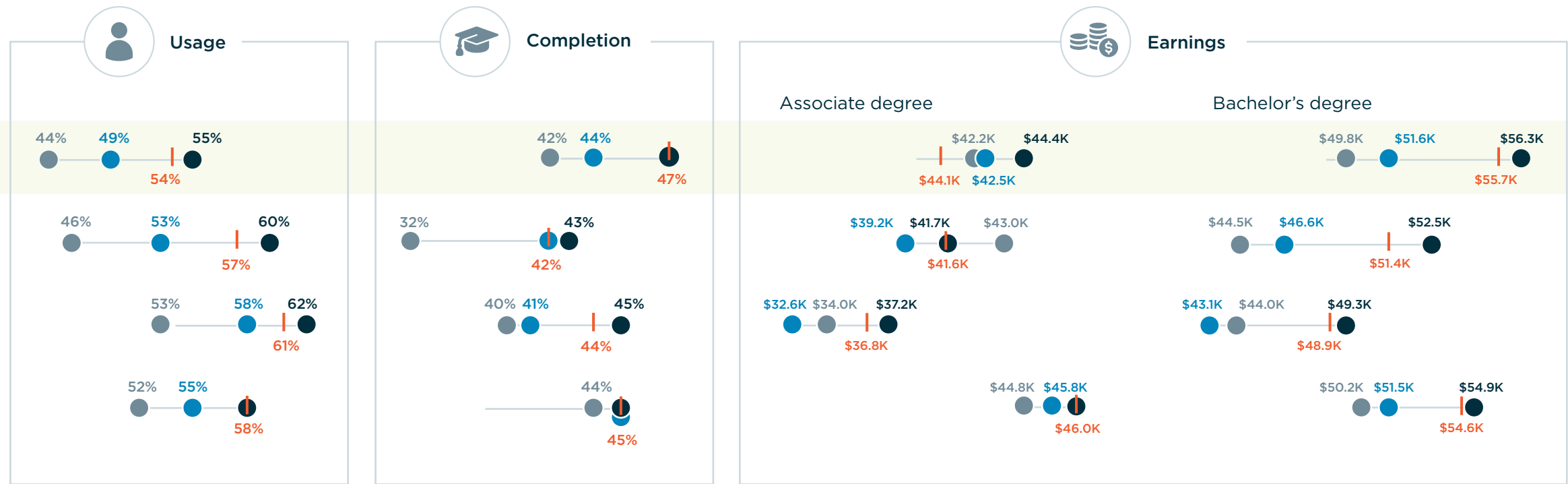
⁵⁴ A micropolitan statistical area must have at least one urban cluster with a population size between 10,000 and 50,000. Rural communities do not have an urban cluster of that size. For more detail on how the U.S. Census Bureau defines rural, micropolitan, and metropolitan areas, see <https://www.census.gov/programs-surveys/metro-micro/about.html> and <https://www.census.gov/content/dam/Census/library/publications/2016/acs/acsgeo-1.pdf>.

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans by Rurality

EXHIBIT 8

Usage, Degree Completion, and Earnings, By Rurality

RURAL | MICROPOLITAN | METROPOLITAN | OVERALL



Note: Hispanic veterans can be of any race.

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans **by Rurality**

Who uses the Post-9/11 GI Bill?

First, we compare the PGIB benefit use of our veteran populations of focus to veterans at large. We find that, **regardless of their rurality, American Indian/Alaska Native, Black, and Hispanic veterans consistently used PGIB benefits at higher rates than veterans at large.** This pattern can be observed by looking vertically down the rows of the usage section in Exhibit 8 (page 31) and focusing on results for veteran populations overall (indicated in the orange lines) and then each rurality category (indicated in the colored circles).

We now turn to patterns and gap sizes by rurality within veteran populations by looking horizontally across each row population in Exhibit 8. **For veterans at large as well as American Indian/Alaska Native, Black, and Hispanic veterans, use of PGIB consistently increased the less rural and more metropolitan the veterans' residence.** In other words, metropolitan veterans were the most likely to use PGIB, and this was true both for all veterans and for our specific population focus. The gap in usage rates by rurality was smallest for Hispanic veterans (6 percentage points) and largest for American Indian/Alaska Native veterans (14 percentage points). In other words, **Hispanic veterans had a smaller difference in PGIB usage by their community's level of rurality than did American Indian/Alaska Native veterans.** When we ran regression analyses to account for the array of veteran characteristics listed in Appendix Table A-1 and better isolate the role of rurality, we found that the gap in PGIB usage rates by rurality shrank for veterans at large and for Black veterans but grew slightly for Hispanic veterans. These results suggests that **other veteran characteristics explain some of the variation in usage by rurality presented in Exhibit 8 for veterans at large and for Black veterans but do not explain differences in usage by rurality for Hispanic veterans.** Regression results for American Indian/Alaska Native veterans could not be reported for disclosure reasons.⁵⁵

⁵⁵ Regression results by rurality for American Indian/Alaska Native veterans cannot be reported for disclosure reasons. For regression results that can be reported, usage rates shrank from 11 to 6 percentage points for veterans at large and shrank from 9 to 4 percentage points for Black veterans. On the other hand, Hispanic veterans' gap grew from 6 to 7 percentage points.

What are veterans' degree completion outcomes?

We begin by examining degree completion for our populations of focus compared to veterans at large. **Compared to veterans at large in the same rurality category, American Indian/Alaska Native and Black veterans consistently had lower degree completion rates.** Hispanic veterans from metropolitan areas also had lower completion rates than veterans at large from metropolitan areas, **but Hispanic veterans from rural and micropolitan areas completed at rates 1-2 percentage points higher than veterans at large in rural and micropolitan communities.** These patterns of completion between veteran populations can be observed by looking vertically down the rows in the degree completion section of Exhibit 8 (page 31).

We now turn to patterns of completion within veteran populations. **Veterans' degree completion rates increased the less rural and more metropolitan their residence for each of our veteran populations of focus** (American Indian/Alaska Native, Black, and Hispanic) with just one exception.⁵⁶ Gaps in degree completion by rurality for different veteran

populations ranged from 1 percentage point (for Hispanic veterans) to 11 percentage points (for American Indian/Alaska Native veterans). When we ran regressions that took into account the veteran characteristics noted in Appendix Table A-1 to better isolate the role of rurality, the gap in degree completion rates by rurality ranged from between 1 and 7 percentage points, depending on the veteran population. Specifically, the gap for American Indian/Alaska Native veterans shrank from 11 to 5 percentage points and the gap for Black veterans shrank from 5 percentage points to 1. That said, the 7-percentage-point gap for veterans at large and 1-percentage-point gap for Hispanic veterans remained unchanged. These results suggest that **other veteran characteristics help explain some of the completion gap by rurality reported in Exhibit 8 for American Indian/Alaska Native and Black veterans but do not help explain the completion gap by rurality for veterans at large and Hispanic veterans.** The fact that Black and Hispanic veterans' gap by rurality was just 1 percentage point after considering other veteran characteristics suggests that rurality is not strongly associated with Black and Hispanic veteran populations' completion rates, particularly compared to veterans at large who still had a 7-percentage-point gap.

⁵⁶ The exception to this pattern was that completion rates for Hispanic veterans in micropolitan and metropolitan areas were the same.

What are the earnings of veterans who complete a degree?

We now discuss earnings disparities between our veteran populations of focus and veterans at large. Exhibit 9 (page 35) shows in percentage terms the earnings of our veteran populations of focus compared to veterans at large who held the same degree and fell in the same rurality category. As can be seen in the orange cells, **American Indian/Alaska Native and Black veterans continued to consistently earn less than veterans at large who lived in the same rurality category and had attained the same level of academic degree** with one exception.⁵⁷ As noted in this report's previous sections examining outcomes by sex, AFQT score, and family responsibilities, the percentages reported in these orange cells indicate that the proportion that American Indian/Alaska Native veterans earned relative to veterans at large was higher than the proportion that Black veterans earned relative to veterans at large. This means that **American Indian/Alaska Native veterans earned amounts closer to the veteran population at large, whereas Black veterans earned amounts lower than the veteran population at large.**⁵⁸

The pattern was different for Hispanic veterans, as can be seen in the green cells of Exhibit 9. Among associate degree holders, Hispanic veterans earned more than veterans at large across all three rurality categories. Among bachelor's degree attainers, Hispanic veterans from both rural and micropolitan areas earned more than, or the same as, veterans at large in those same two rurality categories. Hispanic veterans who received bachelor's degrees and lived in metropolitan areas earned 97% of what veterans at large with a bachelor's degree earned.


⁵⁷ American Indian/Alaska Native veterans in rural areas earned more than veterans at large in rural areas.

⁵⁸ As also noted earlier, this result follows national patterns in earnings by degree attained and race and ethnicity. As detailed in Radford et al., (2024a), among both associate degree holders and bachelor's degree holders, the gap in earnings between American Indian/Alaska Natives and Americans at large was smaller than the gap between Black Americans and Americans at large.

PGIB Outcomes for American Indian/Alaska Native, Black, and Hispanic Veterans by Rurality

EXHIBIT 9

Earnings of American Indian/Alaska Native, Black, and Hispanic Veterans Relative to Veterans at Large with the Same Degree Attainment, By Rurality



| | American Indian/ Alaska Native | | Black | | Hispanic | |
|--------------|-----------------------------------|-----|-------|-----|----------|------|
| | AA | BA | AA | BA | AA | BA |
| OVERALL | 94% | 92% | 83% | 88% | 104% | 98% |
| Rural | 102% | 89% | 81% | 88% | 106% | 101% |
| Micropolitan | 92% | 90% | 77% | 84% | 108% | 100% |
| Metropolitan | 94% | 93% | 84% | 88% | 104% | 98% |

Notes:

AA=Associate degree; BA=Bachelor's degree.

Hispanic veterans can be of any race.

Orange cells highlight instances where the column population of focus in that cell was taking home a lower proportion of earnings than veterans at large; green cells highlight instances where the column population of focus in that cell was taking home the same or a higher proportion of earnings than veterans at large.

We now turn to the patterns in earnings by rurality within veteran populations. Within each veteran population of focus, and **among those who earned an associate degree as well as those who earned a bachelor's degree, veterans in metropolitan areas earned the most with one exception.**⁵⁹ This can be seen in Exhibit 8 (page 31). Rural and micropolitan veterans varied in who earned the least depending on the degree attained and specific population of focus.⁶⁰ This can be observed by looking at the order of circles capturing the rural and micropolitan categories for each veteran population shown.⁶¹

⁵⁹ Among American Indian/Alaska Native veterans with associate degrees, those who lived in rural areas earned more than those in micropolitan and metropolitan areas.

⁶⁰ This matches general findings in the U.S. population, where wages in rural communities are generally lower, as is the cost of living. See discussion in Radford et al. (2024a).

⁶¹ In the remainder of this discussion we focus on the gap between rural and metropolitan veterans. We do so for consistency and since micropolitan data were not disclosed in our regression analysis. In the disclosure process we had to choose one of our rurality categories to not disclose in order to prevent revealing the values for the "unknown" category, which had too few people to disclose. We chose not to disclose the micropolitan category.

What are the earnings of veterans who complete a degree?

Moving to the size of the gap in earnings by rurality, **associate degree completers' earnings gap by rurality across veteran populations ranged from \$1,200 (for Hispanic veterans) to \$3,200 (for Black veterans)**. When we ran regressions that account for the veteran characteristics listed in Appendix Table A-1 and thus help to isolate the role of rurality, the earnings gap in rurality across veteran populations grew larger, to \$1,400 to \$3,500. In other words, **rurality plays an even greater role in the earnings of veterans with associate degrees than that suggested in Exhibit 8**. Examining specific veteran populations, Black veterans' earnings gap by rurality shrank after taking into account other variables, but for each other veteran population examined the earnings gap by rurality grew.⁶² These growing gaps in earnings in the regression analyses for all but Black veteran populations suggest that, when other veteran characteristics were held constant for other veteran populations, earnings differences by rurality were greater than what is suggested in Exhibit 8.

Turning to bachelor's degree recipients, gaps between rural and metropolitan veterans ranged from \$4,700 (for Hispanic veterans) to \$8,000 (for American Indian/Alaska Native veterans). When we ran regressions that take into account the veteran characteristics listed in Appendix Table A-1, this time we found that each veteran population's gaps in earnings between rural and metropolitan veterans shrank. These results suggest that (unlike what we observed for some veteran populations with associate degrees), other characteristics do help explain part of the earnings gap by rurality among bachelor's degree holders displayed in Exhibit 8.⁶³ In other words, **the role of rurality on earnings for bachelor's degree holders was less than suggested in Exhibit 8**.

⁶² Specifically, Black veterans' earnings gap by rurality shrank from \$3,300 to \$3,000. In contrast, the gap between rural and metropolitan veterans with associate degrees increased from \$2,200 to \$3,500 for veterans at large, from \$1,200 to \$1,400 for Hispanic veterans, and from \$1,300 to \$1,600 for American Indian/Alaska Native veterans

⁶³ Specifically, we found that among bachelor's degree holders, the gap shrank from \$6,500 to \$6,200 for veterans at large, \$8,000 to \$7,800 for American Indian/Alaska Native veterans, \$5,300 to \$4,500 for Black veterans, and \$4,700 to \$2,700 for Hispanic veterans.



Conclusion

We are pleased to provide this deeper dive into the outcomes of American Indian/ Alaska Native, Black, and Hispanic veterans. This report is possible thanks to unprecedented interagency cooperation, which allowed our interagency research team to combine and analyze previously siloed federal data as part of the evidence-building decision-making work of the U.S. Census Bureau, offering valuable insights for policymakers and other key players focused on veterans. Prior to this project, there had never been any definitive assessment of the outcomes associated with this critical federal investment across military branches. This report is one in a series of reports on the Post-9/11 GI Bill by this interagency study team. All reports can be found here: <https://www.air.org/project/study-post-911-gi-bill-student-outcomes>.

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 the interagency research team 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 veterans eligible for the Post-9/11 Veterans' Educational Assistance Act of 2008 (also known as the Post-9/11 GI Bill, or PGIB); 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 as well as 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 within each race/ethnicity group, 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 tenfold 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 & Hochberg, 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 for each race/ethnicity group, 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 Questions 3a and 3b look specifically at earnings for PGIB-Clearinghouse Users who attained an associate degree or who attained a bachelor's degree, respectively. For these questions, the study team conducted analyses separately for each race/ethnicity group and 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 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.

APPENDIX TABLE A-1. VARIABLES USED IN REGRESSIONS

| VARIABLE | DEFINITION | SOURCE | RQ 1 | RQ 2 | RQ 3A | RQ 3B |
|---|---|-------------------------------|------|------|-------|-------|
| 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 where available; veterans with only missing values were categorized as having “No Disability Rating” | 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 2 | RQ 3A | RQ 3B |
|--|---|--|------|------|-------|-------|
| 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 2 | RQ 3A | RQ 3B |
|--|---|-------------------------|------|------|-------|-------|
| 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 2 | RQ 3A | RQ 3B |
|--|--|-------------------------|------|------|-------|-------|
| 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 6 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 = Department of Veterans Affairs

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.

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

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

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

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

Where $\hat{\boldsymbol{\beta}}$ 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 $\Delta\mathbf{Y}$ 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 ($\hat{\theta}$) is estimated and then estimated again with each of eighty replicate weights ($\hat{\theta}^{(1)}, \dots, \hat{\theta}^{(80)}$) and then the variance estimator is

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

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

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

With residuals

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

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

The Wald-test statistic for a hypothesis matrix \mathbf{R} is then

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

where the hypothesis matrix has a column per coefficient we are testing and a row per coefficient in $\hat{\theta}$ 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).

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