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THESIS

**EFFECTS OF HOMESCHOOL EDUCATION ON
ENLISTED MARINE QUALITY**

by

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March 2021

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**EFFECTS OF HOMESCHOOL EDUCATION ON ENLISTED MARINE
QUALITY**

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

Survey and polling data suggest that the U.S. homeschooled student population is increasing. Annual Marine Corps enlistments of homeschool graduates are also rising after a provision contained in the 2014 National Defense Authorization Act granted homeschoolers the same enlistment status as high school graduates. The purpose of this study is to determine how these trends impact Marine Corps recruiting efforts and whether homeschooled students differ significantly from the Marine Corps' primary recruiting market, traditional high school graduates. Statistical variations between homeschool and high school graduates are analyzed by examining yearly observations of enlisted accessions from fiscal year 2011 through fiscal year 2020. Regression analysis is used to test for a distinguishable difference between Marines whose highest education credential is either a homeschool or high school diploma. Performance and quality are measured across mental, physical, and behavioral categories selected to represent the "whole Marine concept." Results ultimately reveal no statistically observable difference exists between Marines who graduated from a traditional four-year high school and those who enlisted with a homeschool diploma.

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|----------|--|
| AFQT | Armed Forces Qualification Test |
| ASVAB | Armed Services Vocational Aptitude Battery |
| CFT | Combat Fitness Test |
| CNA | Center for Naval Analyses |
| COVID-19 | Coronavirus Disease 2019 |
| DEP | Delayed Entry Program |
| DMDC | Defense Manpower Data Center |
| DOD | Department of Defense |
| DOE | Department of Education |
| EAS | end of active service |
| EPM | Enlistment Processing Manual |
| FY | fiscal year |
| GED | General Educational Development |
| HSLDA | Homeschool Legal Defense Association |
| ICHER | International Center for Home Education Research |
| IRAM | Individual Records Administrative Manual |
| K-12 | Kindergarten through 12 th |
| MCRC | Marine Corps Recruiting Command |
| NCES | National Center for Education Statistics |
| NDAA | National Defense Authorization Act |
| NHERI | National Home Education Research Institute |
| NHES | National Household Education Survey |
| PFT | Physical Fitness Test |
| TAPAS | Tailored Adaptive Personality Assessment System |
| TFDW | Total Force Data Warehouse |

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EXECUTIVE SUMMARY

Department of Education (DOE) survey estimates and national polling data indicate that the number of U.S. homeschooled students has nearly doubled from 1999 to 2016¹ and has potentially doubled again or possibly tripled from 2016 to 2021.² A presumed surge occurring during the 2020–21 school year is likely attributed to increased demand for school choice compounded by the effects of school closures caused by the Coronavirus Disease 2019 (COVID-19) pandemic. If true, approximately eight percent of U.S. children ages five through 17 have shifted away from traditional public or private school curriculum and are now participating in a homeschool program. This represents an increase from 1.7 percent or 850,000 students in 1999 to possibly 4.3 million in 2021. Education laws in low-regulation states make it difficult to calculate the true number of U.S. homeschoolers.³ However, DOE survey estimates collected since 1999 through its National Center for Education Statistics (NCES) appear the most authoritative and are remarkably close (within \pm one percentage point) to Gallup Analytics data sampled over the same 20 year period.

While these estimations are generally informative to understanding growth trends within the U.S. homeschool population, some researchers referenced in this study argue that the true treatment effects of home-based education are complicated by a body of evidence that primarily relies on survey or polling data, doing little to control for other confounding demographic or socioeconomic variables such as, family income or parental support.⁴ As a result, these scholars warn against assigning too much causality to positive findings, but also found no evidence, themselves, to suggest that homeschool students suffer from a lack of social development or experience less success as adults compared to

¹ “Digest of Education Statistics,” National Center for Education Statistics, 2018, https://nces.ed.gov/programs/digest/d18/tables/dt18_206.10.asp.

² Gallup, *Gallup Poll Social Series: Work and Education*, 937614 (Gallup, 2020), <https://news.gallup.com/poll/317852/parents-satisfaction-child-education-slips.aspx>.

³ “Homeschooling by the Numbers,” Coalition for Responsible Home Education, 2021, <https://responsiblehomeschooling.org/research/summaries/homeschooling-numbers/>.

⁴ Joseph Murphy, “The Social and Educational Outcomes of Homeschooling,” *Sociological Spectrum* 34, no. 3 (May 2014): 244–72, <https://doi.org/10.1080/02732173.2014.895640>, 247.

their traditionally educated peers.⁵ This is contrary to much of the contemporary institutional research conducted by the Center for Naval Analyses (CNA) or RAND Corporation that finds homeschool graduates are less likely to excel in the military compared to traditional high school graduates.⁶ In light of the differing conclusions found in the broader academic literature, equal caution is observed in this analysis when examining the relationship between homeschool education and military service.

Research in this study that estimates the growth in the U.S. homeschool student population is based on data collected from the U.S. Census Bureau, homeschool research and advocacy groups, NCES survey results, and the Gallup analytics and consulting firm. The final data sample used to analyze statistical differences between homeschooled Marines and Marines that graduated from a traditional four-year high school was obtained from the Marine Corps Total Force Data Warehouse (TFDW) and includes yearly observations of 342,624 Marines that enlisted from Fiscal Year (FY) 2011 through FY 2020. The ten year period provides a robust sample to analyze changes in performance and quality metrics occurring after a 2014 change to DOD enlistment policy lifted Armed Forces Qualification Test (AFQT) restrictions on homeschool graduates.⁷ Performance and quality of homeschool and high school graduates is measured across mental, physical, and behavioral categories selected to represent the “whole Marine concept.” Regression analysis is also used to test for a distinguishable difference between Marines whose highest education credential is either a homeschool or high school diploma.

Along with the overall growth in the U.S. homeschool student population, the data from this study show the number of homeschool graduates enlisting in the Marine Corps grew from 1.1 percent in FY 2011 to 1.73 percent in FY 2020. Homeschooler accessions predictably increased after the 2014 enlistment policy change, but not at the expense of

⁵ Brian Ray, “Academic Achievement and Demographic Traits of Homeschool Students: A Nationwide Study,” *Academic Leadership: The Online Journal* 8, no. 1 (January 1, 2010): 49, <https://scholars.fhsu.edu/cgi/viewcontent.cgi?article=1366&context=alj>, 45.

⁶ Frederico E. Garcia et al., *Evaluation of the Pilot Program for Home School and ChalleNGe Program Recruits*, CRM D004598.A4 (Fort Belvoir, VA: Center for Naval Analyses, 2004), <https://doi.org/10.21236/ADA418850>, 101.

⁷ National Defense Authorization Act for Fiscal Year 2014, 10 U.S.C. § 573 (2013), <https://www.congress.gov/113/plaws/publ66/PLAW-113publ66.pdf>.

overall recruit quality. Findings in this study suggest that, compared to high school graduates, the average homeschool graduate enlists with fewer misconduct waivers; performs roughly at or above the same level in terms of AFQT and physical fitness scores; earns similar proficiency and conduct markings; scores slightly higher on the Tailored Adaptive Personality Assessment System (TAPAS) test; and is subject to less non-judicial punishment over their career. In addition to these observable similarities, attrition outcomes for homeschooled Marines are found to be comparable to high school graduates. Statistically insignificant results from probit regression analysis reveal no distinguishable difference in the first-term attrition behavior of Marines that graduated from a traditional four-year high school and Marines that enlisted with a homeschool diploma.

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I. INTRODUCTION

The purpose of this study is to determine how shifts in the U.S. homeschool population impact Marine Corps recruiting efforts and whether homeschool graduates differ significantly from the Marine Corps' primary recruiting market, traditional high school graduates. Chapter one of the Marine Corps Recruiting Command (MCRC) Enlistment Processing Manual (EPM) asserts that "an applicant who graduates from a traditional four-year high school is statistically more likely to complete an initial four or five-year enlistment in the Marine Corps."¹ A traditional high school is broadly defined in the EPM as "a public school(s), divided into grades and governed by school districts."² A homeschool is defined even more broadly as "a program of secondary education in compliance with the education laws of the state in which the person resides."³

Since 1965, the military Services have used educational background as a quality indicator to screen its enlisted applicants.⁴ All education credentials are classified according to the DOD's three-tiered system which, according to the EPM, uses "the traditional high school curriculum [as] the standard of measurement."⁵ Applicants, who at a minimum, graduated from a traditional four-year high school or legally operating homeschool program are placed in the first tier. Applicants with test-based equivalency certificates, such as a General Educational Development (GED) diploma make up the second tier. Those who fail to graduate high school, or whose credentials are not recognized, are considered third tier applicants.⁶ According to the Marine Corps' Guidebook for Recruiting Station Operations, Tier 1 applicants "have a much better chance

¹ Marine Corps Recruiting Command, *Marine Corps Recruiting Command Enlistment Processing Manual*, MCRC Order 1100.1A (Quantico, VA: Marine Corps Recruiting Command, 2020), 1–9.

² Marine Corps Recruiting Command, 2–27.

³ Marine Corps Recruiting Command, 2–29.

⁴ Andrew L Holmes, "Analysis of the Marine Corps Educational Tier System" (Master's Thesis, Monterey, CA, Naval Postgraduate School, 2013), <https://calhoun.nps.edu/handle/10945/32837>, 6.

⁵ Marine Corps Recruiting Command, *MCRC EPM*, 2–27.

⁶ Marine Corps Recruiting Command, 2–31.

of completing their initial enlistment, have higher retention rates, have fewer disciplinary problems, and, in the long-run, make better Marines.”⁷ Therefore, to improve overall quality within the ranks, the Marine Corps and DOD at large prioritize the enlistment of Tier 1 applicants while limiting the annual amount of Tier 2 and Tier 3 accessions.⁸

Annual Marine Corps enlistments of homeschool graduates have steadily increased after a provision contained in the 2014 National Defense Authorization Act (NDAA) granted homeschoolers the same Tier 1 educational consideration as traditional high school graduates.⁹ According to the most recent study conducted by the NCES in 2018, the estimated number of U.S. homeschooled students between the ages of five through 17 has nearly doubled from 850,000 in 1999 to 1.69 million in 2016.¹⁰ It is difficult to determine whether this is a close approximation. Education laws vary widely throughout the U.S. with many states having no registration requirement for homeschooled children. Nevertheless, polling and survey data indicate that home-based education is becoming more popular.¹¹ Analyzing this data may reveal future opportunities or unrealized risks in pursuing homeschoolers as a specific market for Marine recruiters. Furthermore, knowledge of specific low-quality predictive indicators for homeschoolers could help mitigate risks if they were identified at the time of enlistment or while the homeschooled recruit was awaiting accession in the Delayed Entry Program (DEP).

Considering the demand for Tier 1 applicants, the presence of recruiters in a high school setting is central to Marine Corps recruiting efforts.¹² Homeschooled military-age youth exist in an entirely different market that is difficult to reach. In fact, social and physical distancing controls implemented during the COVID-19 pandemic of 2020

⁷ Marine Corps Recruiting Command, *Guidebook for Recruiting Station Operations*, Volume III (Quantico, VA: Marine Corps Recruiting Command, 2015), 7–61.

⁸ Marine Corps Recruiting Command. 5–25.

⁹ National Defense Authorization Act for Fiscal Year 2014.

¹⁰ “Digest of Education Statistics,” National Center for Education Statistics, 2018, https://nces.ed.gov/programs/digest/d18/tables/dt18_206.10.asp.

¹¹ Gallup, *Gallup Poll Social Series: Work and Education*.

¹² Marine Corps Recruiting Command, *Guidebook for Recruiting Station Operations*, 6–6.

revealed just how challenging it is for canvassing recruiters to prospect potential applicants in a remote-learning environment.¹³ One of the pandemic's enduring impacts could be the permanent shift of a sizeable portion of qualified military applicants to a homeschool setting. While small sample and anecdotal evidence suggest homeschoolers are high-quality applicants that should be actively recruited,¹⁴ a new statistical analysis is needed to determine whether homeschooled Marines are significantly different from Marines that graduated from a traditional four-year high school. In the end, recruiting the most highly qualified applicants reduces annual accession targets for MCRC, decreases the Marine Corps' manpower costs, and results in all-around better Marines.¹⁵

ORGANIZATION OF THE STUDY

This study is organized into six chapters. Chapter II consists of a literary review, evaluating prior research conducted on home-based education and its effects on service in the military. Chapter III describes the data and quantitative methods used in this study, and includes relevant summary statistics for the final data sample. Chapter IV offers a macro-level analysis of U.S. homeschool education trends. DOE survey statistics and Gallup polling data are used to analyze current and future growth patterns in the U.S. homeschool population. Chapter V provides a micro-level analysis, comparing homeschooled Marines to Marines that graduated from a traditional four-year high school. Factors that serve as low-quality indicators and predictors of success are used to compare whether a statistically observable difference exists between homeschool and high school graduates. Chapter VI contains final conclusions and recommendations.

¹³ Daniel Sanchez, E-mail message to author, June 5, 2020.

¹⁴ Daniel Sanchez, E-mail message to author, February 5, 2021.

¹⁵ Marine Corps Recruiting Command, *Guidebook for Recruiting Station Operations*, 7–61.

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II. LITERATURE REVIEW

A considerable amount of research exists exploring the outcomes of homeschool education to include its impact on academic achievement, social development, and the ability to successfully serve in the military. Yet, some scholars allege that a lack of scientific evidence in the broader academic literature hinders attempts to fully understand the true causal effects of home-based learning. That which is known is often conjecture, inspired by positive stories of academically successful homeschoolers or discouraging anecdotes of social isolation that serve as a warning against homeschool education. What follows is a review of two studies examining the demographic traits, social development, and educational outcomes of homeschool students in the U.S.

A. THE SOCIAL AND EDUCATIONAL OUTCOMES OF HOMESCHOOLING (MURPHY, 2014)

A 2014 *Sociological Spectrum* journal article written by Joseph Murphy, the Frank W. Mayborn Chair of Education and Associate Dean at Peabody College of Education of Vanderbilt University, provides a holistic analysis of homeschooling outcomes in the U.S. At the time of publication, Murphy highlighted homeschooling as the most dynamic educational reform taking place in the country.¹⁶ With estimates that mirrored the most current Department of Education (DOE) statistics at the time, Murphy reports that the number of homeschoolers in the U.S. increased by more than 133 percent from the 1970s to 2010. Despite the growing popularity of home-based education, Murphy points to a lack of authoritative scientific evidence as a plague to understanding the true causal effects of homeschooling.

Murphy finds that the scarcity of empirical research on the effects of homeschooling limits the conclusions one can draw from most studies on homeschooling. As he points out, nearly all samples used in homeschool research are nonrepresentative due

¹⁶ Joseph Murphy, "The Social and Educational Outcomes of Homeschooling," *Sociological Spectrum* 34, no. 3 (May 2014): 244–72, <https://doi.org/10.1080/02732173.2014.895640>, 245.

to the prevalence of self-selection and sampling bias. Virtually all studies depend on survey data with little to no effort applied to examine nonrespondents. Further complicating the body of research is a lack of control for other confounding variables, such as family income or parental support, marital status, occupation, and education. Without accounting for these other socioeconomic variables, he concludes that it is difficult to understand the true treatment effect of homeschooling.¹⁷

Notwithstanding these limitations, Murphy examines the broader homeschool literature focusing on the impact homeschool education has on academic achievement, social development, and post-school success.¹⁸ A main caveat to his study, however, is that academic achievement as reflected by standardized test scores is a less effective measure of homeschooling's impact given a dearth of reliable findings in the existing research. The research in this area, he claims, does not measure up to scientific standards given a lack of experimental design that properly controls for selection bias and the endogeneity of school choice.¹⁹ This is an important stipulation to the findings discussed later in this chapter provided by Burkhauser, Hanser, and Hardison in their 2014 RAND study that found Armed Forces Qualification Test (AFQT) scores of homeschooled students often trend higher than those of traditional high school students.²⁰ It brings into question whether home-based education serves as an accurate predictor of performance on the AFQT, or whether educational background or some other factor(s) further explain the likelihood a homeschooler will excel in the military.

Perhaps the more compelling findings from Murphy's study result from the evidence surrounding the social development of homeschoolers. Here, Murphy finds that nearly every study at the time concluded that homeschooled children are not socially

¹⁷ Murphy, 247.

¹⁸ Murphy, 249.

¹⁹ Murphy, 246.

²⁰ Susan Burkhauser, Lawrence M. Hanser, and Chaitra M. Hardison, *Elements of Success: How Type of Secondary Education Credential Helps Predict Enlistee Attrition* (Santa Monica, CA: RAND, 2014), https://www.rand.org/pubs/research_reports/RR374.html, 18.

isolated.²¹ Bearing in mind the limited availability of scientific data, the average homeschooler is found to belong to an extensive and diverse social network, benefits from more mixed-age engagements with adults, and interacts with people from disparate socioeconomic and cultural backgrounds.²² In terms of social, religious, athletic, educational, and civic activities, homeschooled children tend to be just as, if not more, engaged than their traditional, public school-educated peers. Murphy finds that homeschoolers are just as mature or more mature than their public school counterparts. Homeschoolers also exhibit good leadership, communication, and daily living skills and receive high marks in both peer and adult interactions. Data also reveal that homeschoolers are socially responsible and suffer from fewer behavioral problems than their publicly educated peers.²³

Just as the available body of evidence belies claims of homeschooled students suffering from a lack of social development, the limited amount of research also undermines claims that adults possessing a homeschool diploma experience less post-school success than traditional high school graduates. Across the categories of college preparation, access, and success; employment and military service; civic engagement; and satisfaction with education and life, Murphy finds little meaningful difference between homeschool and traditional high school graduates. An interesting exception, however, presents under the category of military service. Here, Murphy relies on a 2004 singular study by Hodari and Wenger to conclude that homeschooled graduates fair worse than traditional public school graduates in terms of overall military recruit quality. At the time of publication, Murphy claims Hodari and Wenger provided the only robust examination of homeschooled graduates in the military.²⁴ Considering the availability of research studying the relationship between education credential and military service (some

²¹ Murphy, "The Social and Educational Outcomes of Homeschooling," 261.

²² Murphy, 261.

²³ Murphy, 263.

²⁴ Murphy, 264.

mentioned in this very chapter), this is either a gross oversight by Murphy, or is perhaps a signal that speaks to the authority of these prior studies.

B. ACADEMIC ACHIEVEMENT AND DEMOGRAPHIC TRAITS OF HOMESCHOOL STUDENTS: A NATIONWIDE STUDY (RAY, 2010)

A 2010 study published by Brian D. Ray, Ph.D., co-founder of the National Home Education Research Institute (NHERI), aimed to build on the limited body of evidence concerning the effects of homeschool education. In his research, he also attempts to address concerns raised by skeptics who question whether everyday parents are capable of fulfilling the role of government-certified educators.²⁵ Considering Ray's close affiliation with NHERI, a non-profit research organization specializing in homeschool research, one should review this study with careful scrutiny, ruling out any major findings that appear to strongly advocate for the benefits of home-based education. Notwithstanding this qualification, Ray's study provides a robust, cross-sectional analysis of the homeschooled population based on survey responses solicited from a more representative sample of homeschooling families than has been used in prior research. Whereas in previous studies, samples were drawn from only one large home education organization, Ray's 2010 study elicited contact information from numerous homeschool testing services. The resulting sample included demographic and performance-related data on 11,739 homeschooled students, which according to the National Center for Education Statistics (NCES) constituted approximately 1.4 percent of the homeschooled population at the time.²⁶

In light of this relatively small sample, Ray acknowledges the limitations of his research. A significant one being that homeschooling families, particularly as represented by the respondents in the study, are not a typical cross-section of all American families. Specifically, the educational attainment of homeschooling parents exceeds the national average with 66.3 percent of fathers and 62.5 percent of mothers possessing a bachelor's

²⁵ Brian Ray, "Academic Achievement and Demographic Traits of Homeschool Students: A Nationwide Study," *Academic Leadership: The Online Journal* 8, no. 1 (January 1, 2010): 49, <https://scholars.fhsu.edu/cgi/viewcontent.cgi?article=1366&context=alj>, 2.

²⁶ National Center for Education Statistics, "Digest of Education Statistics."

degree or higher.²⁷ The structure of homeschooling families in this sample is also characterized by that of the fading nuclear construct where both parents are married, the student is one of several siblings, the father provides the primary source of income, and the mother is a stay-at-home caregiver. The proportion of homeschoolers from white or non-Hispanic families in this study is also disproportionate to that of traditional U.S. public school students. Overall, it is difficult to say whether the demographic traits characterizing this sample are an accurate representation of the nation-wide homeschooled population.

In consideration of these limitations and due to a deficiency in experimental design, Ray cautions the reader to avoid assigning causation to his findings.²⁸ The most significant of which being that homeschool students are more academically successful, attaining average achievement test scores that lie within at least the 80th percentile when compared to public school students. He admits this could be caused by a decrease in the difficulty of standardized tests, a reduction in the abilities of the comparison group (public school students), or because the sample was over-represented by high-achieving homeschoolers.

Consistent with Murphy's 2014 study, Ray also found no evidence to suggest homeschoolers suffer from a lack of social, emotional, and psychological development. Moreover, Ray supports the body of evidence that indicates homeschooled graduates are just as, if not more, successful in adulthood as their traditionally schooled peers. Homeschoolers are reported to perform well in college, are more civically involved, and participate in activities that predict leadership in adulthood.²⁹ One of his more interesting assertions is that the current body of evidence appears to show little to no relationship between a home-educated student's achievement and the degree of homeschool regulation by that student's home state. This runs contrary to Hodari and Wenger's 2004 study which did find a significant relationship between level of state regulation and a homeschooled

²⁷ Ray, "Academic Achievement and Demographic Traits of Homeschool Students: A Nationwide Study," 17.

²⁸ Ray, 45.

²⁹ Ray, 3.

recruit's probability of successfully completing a first term of enlistment.³⁰ Like Murphy, Ray concludes that his study along with the body of research existing at the time, does little to establish causal effects, but suggests there exists a possibility that positive outcomes do result from home education.³¹

C. INSTITUTIONAL BACKGROUND: THE EFFECTS OF EDUCATION ON MILITARY SERVICE

There is extensive research examining cognitive and non-cognitive factors that generally predict whether a person will succeed in the military. Many of these studies analyze the effects of an enlistee's educational background. Contemporary research focusing on the impacts homeschool education has had on military service is largely motivated by changes to Department of Defense (DOD) enlistment policies beginning around 1999. The remainder of this chapter provides a review of four studies that examine both the impacts of these policy changes, as well as the effects of homeschool education, particularly on first-term enlisted attrition. While three out of four analyses ultimately found that homeschool graduates are less likely to succeed in the military compared to traditional high school graduates, each study used different sampling techniques and/or methods of analysis to arrive at these conclusions. The results from some of these studies have previously informed DOD policy decisions regarding enlistment requirements for homeschooled applicants.

1. Analysis of the Marine Corps Educational Tier System (Holmes, 2013)

A 2013 Naval Postgraduate School master's thesis written by Captain Andrew Holmes explores the effectiveness of the three-tiered educational system by analyzing the trends and probabilities associated with first-term enlisted attrition in the Marine Corps. In light of several changes to tier rating policy for homeschool education occurring at the

³⁰ Apriel K Hodari and Jennie W Wenger, *Predictors of Attrition: Attitudes, Behaviors, and Educational Characteristics*, CRM D0010146.A2 (Alexandria, VA: Center for Naval Analyses, 2004), https://www.cna.org/CNA_files/PDF/D0010146.A2.pdf, 39.

³¹ Ray, "Academic Achievement and Demographic Traits of Homeschool Students: A Nationwide Study," 4.

time, a primary focus of his study examines whether reclassifying a homeschool diploma from a Tier 2 to a Tier 1 education credential has a significant effect on non-end of active service (EAS) attrition.³² His ultimate objective was to analyze this change along with other factors to recommend an improved educational tier system that better predicts enlisted attrition in the Marine Corps.³³

Holmes provides a comprehensive review of historical attrition studies, explaining the disparities in how the Services used to classify secondary education credentials and the importance of screening applicants based on educational background. He recaps previous landmark studies conducted by Eli S. Flyer (1959) and Richard V. L. Cooper (1977), citing the relationship between attrition, education credential, and cognitive ability (as measured by AFQT score). Like many contemporary studies, these historical analyses found that, on average, attrition rates of non-high school graduates were two to three times higher than those who possessed a traditional high school diploma and, when combined with type of education credential, AFQT scores prove reliable in predicting enlistee attrition.³⁴ Holmes also contextualizes his research by citing a 1990 Center for Naval Analyses (CNA) study conducted by Quester, North, and Kimble which found key characteristics associated with completing a first term of enlistment. Those qualities include possession of a high school diploma, an AFQT score at or above the 50th percentile, meaningful participation in the Delayed Entry Program (DEP), and ability to meet Service-specific height and weight standards.³⁵

Employing probit regression analysis, Holmes examines predictors of non-EAS attrition using five years of enlisted data for Marine recruits who accessed from Fiscal Years 2003 through 2007. His final sample provided by the Marine Corps Total Force Data Warehouse (TFDW) included 163,744 observations. Focusing on the primary variables of interest (education credential and AFQT score), Holmes combines additional demographic

³² Holmes, “Analysis of the Marine Corps Educational Tier System,” 4.

³³ Holmes, 3.

³⁴ Holmes, 8.

³⁵ Holmes, 10.

variables, such as age, race, gender, and dependent status to create a model that more accurately predicts first-term attrition. The model demonstrated favorable results for homeschooled enlistees, revealing that, on average, a homeschool graduate's probability of attrition is 1.14 percentage points less than that of a traditional high school graduate.³⁶

While Holmes prefaces his study with rich contextual history and some of his findings are consistent with previous research, there is at least one oversight regarding educational credential policy that can mislead the reader. The error in his study may stem from a misunderstanding of which enlistment policies governing homeschool education were in effect at the time. Considering the myriad changes in tier rating policy occurring between 1999 and 2012, this could be deemed a forgivable mistake. For instance, he incorrectly theorizes why the homeschool education credential was reclassified from a Tier 2 to a Tier 1 in 2012. Holmes offers inconsistent speculation that this was both a policy decision made by the "military" at large based on the comparable performances of homeschooled graduates and traditional high school graduates in the civilian labor market, but also claims that the Marine Corps independently decided to change the homeschool tier classification after June 1, 2012.³⁷

For the sake of understanding the history of these policy shifts, it should be noted that the most recent tier credentialing changes for homeschooled graduates were initiated under Section 571 of the 1999 National Defense Authorization Act (NDAA). The Law directed the DOD to establish and study a five-year pilot program from October 1998 through September 2003 that afforded General Educational Development (GED) diploma and homeschool diploma recipients the same treatment as Tier 1 recruits. However, each Service was only allowed an annual limit of 1,250 applicants who possessed either a GED or homeschool diploma.³⁸ The program was ultimately extended by one year until October

³⁶ Holmes, 55.

³⁷ Holmes, 46.

³⁸ Strom Thurmond National Defense Authorization Act for Fiscal Year 1999, 10 U.S.C. § 571 (1998), <https://www.congress.gov/105/plaws/publ261/PLAW-105publ261.pdf>.

2004,³⁹ but in February 2004 the Secretary of Defense released a report detailing only the first 12 months of the pilot program.

The study performed by CNA drew massive criticism from the home-based education community, specifically from the Homeschool Legal Defense Association (HSLDA), who then successfully lobbied the President George W. Bush administration to grant “preferred enlistee” status to homeschoolers beginning in January 2005. This new directive gave homeschooled graduates equal consideration as Tier 1 applicants, even though the homeschool diploma officially remained a Tier 2 education credential.⁴⁰ It was not until 2012 that homeschooled graduates were granted the same tier status as traditional high school graduates for the purposes of military recruitment. Section 532 of the 2012 NDAA mandated that the Secretaries of each military department give equal treatment to graduates who complete “a program of secondary education in compliance with the education laws of the State in which the person resides.”⁴¹ This was, however, conditional upon the homeschooler achieving a score of 50 or higher on the AFQT - a stipulation carried over from a DOD-wide policy implemented in June 2007.⁴² Under the 2012 NDAA, homeschooled graduates that obtained a qualifying AFQT score below 50 were still enlisted under Tier 2 status. This policy continued until the 2014 NDAA banned the DOD from using different grading standards on the AFQT to determine a homeschooled graduate’s tier status. Since 2014, the homeschool diploma has been recognized as a Tier 1 education credential.⁴³

³⁹ Christopher J. Klicka, “Homeschool Graduates Enlisting in the Military Are Protected,” Homeschool World, 2006, <https://www.home-school.com/Articles/homeschool-graduates-enlisting-in-the-military-are-protected.php>.

⁴⁰ Klicka.

⁴¹ National Defense Authorization Act for Fiscal Year 2012, 10 U.S.C. § 532 (2011), <https://www.congress.gov/112/plaws/publ81/PLAW-112publ81.pdf>.

⁴² Camille Rodriguez, “Homeschooling - Entering the Military With Ease,” Ezine Articles, January 22, 2010, <https://ezinearticles.com/?Homeschooling---Entering-the-Military-With-Ease&id=3623657>.

⁴³ National Defense Authorization Act for Fiscal Year 2014.

2. Evaluation of the Pilot Program for Home School and Challenge Program Recruits (Garcia et al., 2004)

In 2004, CNA published the Garcia et al. report, assessing the effectiveness of the DOD's five-year pilot program that allowed homeschool graduates and GED holders to enlist as Tier 1 recruits. Their research examined enlisted recruit performance measures, quality indicators, and attrition behavior, comparing homeschool and GED diploma holders to public and private high school graduates.⁴⁴ The study matched education and background survey data of more than 67,000 military recruits to Defense Manpower Data Center (DMDC) files.⁴⁵ A significant finding from the recruit survey data revealed that the DMDC files contained misclassified educational credentials. Approximately eight percent of recruits that possessed a traditional high school diploma in the DMDC file reported on their survey that they either had no education credential or a GED diploma.⁴⁶ To avoid error caused by the misclassified DMDC files, Garcia et al. based their analysis on the recruit survey responses. These were believed to be more accurate, considering the survey was conducted immediately following the "moment of truth" screening when recruits are more apt to further disclose personal information not previously captured in their enlistment record.⁴⁷

Using 8,451 observations of non-prior service, active duty, enlisted Marine Corps recruits, Garcia et al. applied a probit regression model to analyze common predictors associated with military attrition.⁴⁸ With public high school graduates as the referenced education group, they found that attrition probability increased by 3.59 percentage points during a homeschool graduate's first 12 months in the Marine Corps.⁴⁹ This was lower

⁴⁴ Frederico E. Garcia et al., *Evaluation of the Pilot Program for Home School and Challenge Program Recruits*, CRM D004598.A4, 3–5 (Fort Belvoir, VA: Center for Naval Analyses, 2004), <https://doi.org/10.21236/ADA418850>.

⁴⁵ Garcia et al., 4.

⁴⁶ Garcia et al., 4.

⁴⁷ Garcia et al., 5.

⁴⁸ Garcia et al., 102.

⁴⁹ Garcia et al., 101.

than the combined Service average of 3.75 percentage points, but only second to the Army which had the lowest marginal increase amongst all branches at 0.4 percentage points. Probability of attrition amongst homeschoolers was found to decrease, though, with an increase in score on the AFQT. Attrition rates for homeschooled recruits who scored 50 or higher did not significantly differ from those of traditional high school graduates.

In addition to recommending an inspection of the misidentified education credentials in the DMDC database, Garcia et al. advised DOD to classify homeschool graduates that score 50 or higher on the AFQT as a Tier 1 recruit while categorizing those scoring below 50 as a Tier 2 recruit. Such differentiation of tier placement would be similar to college admissions procedures that use standardized test scores to award scholarships and make acceptance decisions.⁵⁰ Since this conclusion was based only on one year of recruit data, they also recommended that their findings be validated as the pilot program continued so more recruits could be tracked for a longer period.⁵¹

3. Predictors of Attrition: Attitudes, Behaviors, and Educational Characteristics (Hodari and Wenger, 2004)

In 2004, CNA conducted a follow-up to the Garcia et al. study that further analyzed homeschool education as a predictor of attrition. Hodari and Wenger used the same survey data collected on recruits from March 1999 to February 2000. At the time of the survey, there were about 850,000 to 900,000 homeschooled students in the U.S. and the available research indicated most homeschoolers outperformed public-school students on standardized testing.⁵² However, according to Hodari and Wenger, “requirements concerning curriculum, notification of authorities, learning assessment, record keeping, and teacher qualifications vary considerably from state to state.”⁵³ As a result, using homeschool education as an accurate predictor of attrition is complicated. Therefore, they

⁵⁰ Garcia et al., 56.

⁵¹ Garcia et al., 56.

⁵² Hodari and Wenger, *Predictors of Attrition: Attitudes, Behaviors, and Educational Characteristics*, 16.

⁵³ Hodari and Wenger, 16.

tested the hypothesis that state-level regulations affect a homeschooled enlistee's probability of successfully completing a first term of enlistment.

Hodari and Wenger analyzed the effects of homeschooling regulations on attrition up to the 36-month mark. Unlike the Garcia et al. study, they did not conduct separate analyses by Service, but combined more than 47,000 observations from all military branches. The results were consistent with the previous CNA study: homeschool graduates demonstrated more attrition behavior than traditional high school graduates. However, they discovered that attrition was further affected by the level of homeschool regulation in the recruit's home state. According to Hodari and Wenger, "homeschooled recruits from minimally regulating states have 36-month attrition rates that are 17 percentage points higher than similar homeschooled recruits from states with more stringent regulation."⁵⁴ They further argued that large homeschool associations with considerable lobbying power could influence lawmakers to decrease homeschool regulations even more and that such legislation could reduce the overall quality of homeschooled recruits in the future.⁵⁵

4. Elements of Success: How Type of Secondary Education Credential Helps Predict Enlistee Attrition (Burkhauser, Hanser, and Hardison, 2014)

Ten years following the two CNA studies, a 2014 RAND Corporation study authored by Burkhauser, Hanser, and Hardison analyzed "whether applicants who scored less than 50 on the AFQT and have distance learning or homeschool credentials are more likely to attrit than those who scored less than 50 on the AFQT and have high school diplomas (all else being equal)."⁵⁶ Similar to the CNA studies, they also used individual-level data from DMDC to assess attrition behavior of service members who enlisted between 2000 and 2012. To answer their research question, Burkhauser, Hanser, and Hardison used logistic regression analysis, controlling for observable population characteristics of enlistees with different educational backgrounds. With these other

⁵⁴ Hodari and Wenger, 39.

⁵⁵ Hodari and Wenger, 39.

⁵⁶ Burkhauser, Hanser, and Hardison, *Elements of Success*, 21.

population attributes held constant, the goal was to estimate how an enlistee's education credential impacts the likelihood of attrition.⁵⁷

Overall, Burkhauser, Hanser, and Hardison found that “recruits with homeschool degrees have attrition rates that lie between those of high school diploma holders and GED holders but that are closer to high school diploma holders than they are to GED holders.”⁵⁸ Similar to both CNA studies, they also concluded that attrition rates for homeschooled enlistees differ depending on AFQT score. Homeschoolers who score 50 or higher on the AFQT are predicted to have slightly lower attrition rates than they would if they instead possessed a traditional high school diploma. The findings ultimately convinced Burkhauser, Hanser, and Hardison to support DOD's then policy of giving homeschool graduates with AFQT scores at or above 50 the same Tier 1 status as traditional high school graduates. They believed homeschool graduates with AFQT scores below 50 should still be enlisted with Tier 2 priority. However, due to the successful lobbying efforts of the HSLDA, the recommendations of Burkhauser, Hanser, and Hardison were negated by legislation introduced under Section 573 of the 2014 NDAA which nullified the DOD's practice of using higher AFQT standards to identify the tier status of homeschool graduates.⁵⁹

D. SUMMARY

This study contributes to the literature by developing further understanding of the effects of homeschool education. Analysis of characteristics and quality traits selected to exemplify the “whole Marine concept” is performed on the enlistment records of Marines whose highest education credential is a homeschool diploma. Representative samples of homeschool graduates that joined the Marine Corps before and after the latest DOD enlistment policy change in 2014 are compared to samples of traditional high school graduates that enlisted during the same time periods. Similar to the methods employed by

⁵⁷ Burkhauser, Hanser, and Hardison, 15.

⁵⁸ Burkhauser, Hanser, and Hardison, 18.

⁵⁹ National Defense Authorization Act for Fiscal Year 2014.

Holmes and Garcia et al., probit regression analysis is used to determine whether an observable difference exists between homeschool and high school graduates by analyzing the average marginal effects homeschool education has on the probability of first-term attrition. Additional analysis explores the growth in the U.S. homeschool population occurring since 1999 and provides an estimate of any potential increase resulting from the Coronavirus Disease 2019 (COVID-19) anomaly of 2020 and 2021.

III. DATA SAMPLE AND METHODS

Primary data used in the macroanalysis section of this study was acquired from the Department of Education’s (DOE) National Center for Education Statistics (NCES), the Coalition for Responsible Home Education, U.S. Census Bureau, and the Gallup analytics and consulting firm. NCES statistics provided the number and percentage of U.S. homeschooled students ages 5 through 17 in the grades of Kindergarten through 12th grade (K-12) from 1999 through 2016. NCES statistics are typically collected every four years through the National Household Education Surveys (NHES) Program, but as of the time of this study, the most current estimates available are from 2016.⁶⁰ Since NCES statistics are usually released every four years and include data aggregated at the national level, estimates from the Coalition for Responsible Home Education and U.S. Census Bureau are used to calculate the state-level population of homeschooled K-12 students for 2016 and 2020. In addition, results from a 2020 Gallup research poll are used to further estimate the growth in the U.S. homeschool population occurring since 2016, specifically assessing potential impacts from the Coronavirus Disease 2019 (COVID-19) pandemic during the 2020–21 school year.

The final data sample used in the microanalysis portion of the study was obtained from the Marine Corps Total Force Data Warehouse (TFDW) and includes yearly observations of 342,624 Marines that enlisted from Fiscal Year (FY) 2011 through FY 2020. The raw data contained 343,681 observations. 239 were duplicate entries, 709 observations included data on commissioned and warrant officers, and nine other observations contained erroneous information for one or more variables of interest. These observations along with 100 other entries whose accession date fell outside the research timeframe were dropped from the sample. The ten year period was chosen to analyze changes in performance and quality standards occurring before and after the 2014 National Defense Authorization Act (NDAA) enlistment policy change. This provided an adequate pre-2014 sample size of 118,021 observations.

⁶⁰ National Center for Education Statistics, “Digest of Education Statistics.”

A. DESCRIPTIVE STATISTICS

The relevant summary statistics for the data sample are shown in Table 1. 92 percent of the Marines in this sample possess a high school diploma as their highest education credential. Just over one percent of the sample are homeschool graduates. Below traditional high school graduates, the second highest education credential appearing in the sample consists of non-high school graduates that have earned 15 or more college semester credit hours.⁶¹ This number appears unusually high and is likely explained by the Marine having an erroneous education code applied to their enlistment record. It is likely that several Marines in this sample did graduate with a high school or even homeschool diploma, but also possessed a college transcript reflecting 15 or more college credit hours when they enlisted.

Variables representing several performance and quality metrics within the sample include Armed Services Vocational Aptitude Battery (ASVAB) test scores, Physical and Combat Fitness Test (PFT and CFT) scores, and average service proficiency and conduct markings. The average ASVAB Armed Forces Qualification Test (AFQT) score within the sample is 62 with a standard deviation of 17.84. With a range of zero to 300, the average PFT and CFT scores within the sample are 205 and 233, respectively. The average service proficiency and conduct marks within the sample are approximately 3.9/3.9, which is skewed low due to more than 32,000 observations having an entry of zero for both fields. The average observation in the sample also enlisted with 0.47 total misconduct waivers and has been the subject of 0.15 non-judicial punishment proceedings. The overall non-end of active service (EAS) first-term attrition rate for this sample is approximately 12 percent with a standard deviation of 0.32 percentage points. Demographics within the sample appear representative of the broader Marine Corps population. About 63 percent of the observations are identified as white, 22 percent are Hispanic, and about 10 percent are black or African American. Female Marines represent around nine percent of the sample. Any data or variables of interest not specifically discussed here are further explained in the subsequent Macro and Microanalysis chapters.

⁶¹ Marine Corps Recruiting Command, *MCRC EPM*, 2–28.

Table 1. Sample Summary Statistics

| | Observations | Mean | Standard Deviation | Min | Max |
|---|---------------------|-------------|-------------------------------|------------|------------|
| <u>Education Credential Type</u> | | | | | |
| High School Diploma | 342,624 | 0.92 | 0.28 | 0 | 1 |
| Homeschool Diploma | 342,624 | 0.01 | 0.11 | 0 | 1 |
| Virtual/Distance Diploma | 342,624 | 0.01 | 0.07 | 0 | 1 |
| Adult/Alternative Diploma | 342,624 | 0.01 | 0.11 | 0 | 1 |
| GED | 342,624 | 0 | 0.04 | 0 | 1 |
| Non-HS Grad with 15 College Credits | 342,624 | 0.03 | 0.16 | 0 | 1 |
| Associate Degree | 342,624 | 0.01 | 0.1 | 0 | 1 |
| Bachelor's Degree | 342,624 | 0.01 | 0.1 | 0 | 1 |
| Advance Degree | 342,624 | 0 | 0.02 | 0 | 1 |
| Other Education Credential | 342,624 | 0 | 0.03 | 0 | 1 |
| <u>Performance and Quality Metrics</u> | | | | | |
| ASVAB AFQT Score | 342,624 | 62 | 17.84 | 0 | 99 |
| ASVAB GT Score | 342,624 | 107.86 | 11.9 | 0 | 154 |
| TAPAS Score | 46,953 | 7.61 | 8.6 | 1 | 10 |
| PFT Score | 342,624 | 205 | 91.65 | 0 | 300 |
| CFT Score | 342,532 | 233.1 | 93.11 | 0 | 300 |
| Marksmanship Score | 158,154 | 304.72 | 26.26 | 0 | 350 |
| Average Proficiency Marks | 342,624 | 3.896 | 1.272 | 0 | 5.0 |
| Average Conduct Marks | 342,624 | 3.883 | 1.271 | 0 | 5.0 |
| Total Non-Judicial Punishments | 342,624 | 0.15 | 0.45 | 0 | 6 |
| Total Misconduct Enlistment Waivers | 342,624 | 0.47 | 0.79 | 0 | 5 |
| Sample Attrition Rate | 342,624 | 0.12 | 0.32 | 0 | 1 |
| <u>Sample Demographics</u> | | | | | |
| Mental Group I-III A | 342,624 | 0.73 | 0.45 | 0 | 1 |
| Mental Group IIIB-IV | 342,624 | 0.27 | 0.45 | 0 | 1 |
| Pre-2014 Accession | 342,624 | 0.34 | 0.48 | 0 | 1 |
| Post-2014 Accession | 342,624 | 0.66 | 0.48 | 0 | 1 |
| Age at Entry | 342,624 | 19.72 | 1.92 | 17 | 42 |
| Education Level | 342,193 | 12.12 | 0.62 | 10 | 25 |
| DEP Time | 342,624 | 174.59 | 107.56 | 0 | 854 |
| DEP Pool Moves | 243,557 | 1.96 | 1.38 | 1 | 26 |
| Active Component | 342,624 | 0.84 | 0.37 | 0 | 1 |
| Reserve Component | 342,624 | 0.16 | 0.37 | 0 | 1 |
| Asian | 342,624 | 0.03 | 0.17 | 0 | 1 |
| Native Hawaiian or Pacific Islander | 342,624 | 0.01 | 0.09 | 0 | 1 |
| Black or African American | 342,624 | 0.10 | 0.31 | 0 | 1 |
| Hispanic | 342,624 | 0.22 | 0.41 | 0 | 1 |
| White | 342,624 | 0.63 | 0.48 | 0 | 1 |
| Female | 342,624 | 0.09 | 0.28 | 0 | 1 |

B. METHODS

Data for this study was primarily cleaned and analyzed using version 16.1 of the Stata statistical software package. In some cases, Microsoft Excel was used to build tables and graphs for data that was previously cleaned in Stata or when analyzing statistics acquired from secondary sources, such as NCES or the Coalition for Responsible Home Education. Variables not otherwise defined in this study are based on definitions common to the DOD. Education credentials used in this research follow descriptions contained in the Marine Corps Recruiting Command Enlistment Processing Manual. All other references to the broader homeschool population are based on the U.S. DOE definition of a homeschooled student. According to its 2019 report on School Choice in the United States, “Students are considered to be homeschooled if their parents reported them being schooled at home instead of at a public or private school, if their enrollment in public or private schools did not exceed 25 hours a week, and if they were not being homeschooled only due to a temporary illness.”⁶²

1. Hypothesis and Research Questions

Along with analyzing the population trends of the U.S. homeschool population, this study examines similar quality and demographic factors used in prior studies conducted by the Center for Naval Analyses, RAND, and Holmes to compare homeschooled Marines to Marines that graduated from a traditional four-year high school. The null hypothesis is that a Marine whose highest education credential is a homeschool diploma is equal to a Marine whose highest education credential is a high school diploma both before and after the 2014 change to homeschool graduate enlistment policy. Further analysis is guided by the following research questions.

⁶² Ke Wang, Amy Rathbun, and Lauren Musu, *School Choice in the United States: 2019*, NCES 2019–106 (Washington, DC: National Center for Education Statistics, 2019), <https://nces.ed.gov/pubsearch>, 2.

a. Primary Research Questions

- How will the U.S. homeschool student population affect Marine Corps enlistments of both high school and homeschool graduates in the future?
- Are enlisted homeschooled Marines significantly different from enlisted Marines that graduated from a traditional four-year high school?

b. Secondary Research Question

- Are homeschooled enlisted Marines more or less likely to complete a first term of enlistment compared to Marines that graduated from a traditional four-year high school?

2. Empirical Model

Probit regression is used to determine whether a statistically observable difference exists between homeschool and high school graduates, as well as to assess the effects of homeschool education on first-term enlisted attrition. The model is designed to test the null hypothesis that a Marine with a homeschool diploma is equal to a Marine with a high school diploma both before and after the 1 April 2014 enlistment policy change. In addition to type of education credential, the model controls for other predictors of success, such as the number of misconduct waivers an applicant requires to be eligible for enlistment; the number of days an enlistee participates in the Delayed Entry Program (DEP); and the number of times an enlistee changes their projected date to report to recruit training.

The model also controls for component status, age and demographic variables, cognitive ability, and the total years of education the Marine achieved at time of accession. The referenced category is a white, male, active-duty, traditional high school graduate. Attrition in this model is defined as a Marine that separates the Marine Corps under a negative separation code with greater than six months remaining on their first enlistment contract. Estimates of the marginal effects are presented separately for the sample of Marines that enlisted between 1 October 2010 and 1 April 2014, and for those Marines that enlisted after 1 April 2014, but separated before 19 January 2021. Since the complete

data sample was drawn on 19 January 2021, observations of Marines that have not separated after this date are censored and, therefore, excluded from the model. The probit regression model is represented by the following equation:

$$Y_{it} = F[\beta_0 + \beta_1 educ_cert_i + \beta_2 dep_time + \beta_3 pool_moves + \beta_4 entry_age + \beta_5 educ_lvl + \beta_6 afqt + \beta_7 ttl_misconduct_waivers + \beta_8 race_i + \beta_9 gender_i + \beta_9 component_i]$$

Y_{it} = 1 if Marine i attrites in sample period t ; 0 otherwise

$F[.]$ = standard normal cumulative distribution function

$educ_cert_i$ = set of indicator variables for the highest education credential of Marine i at time of accession: homeschool diploma, virtual/distance diploma, adult/alternative diploma, GED, non-high school graduate with at least one semester of college, associate's degree, bachelor's degree, advanced degree, or other type of education credential

dep_time = Continuous variable controlling for days spent in the DEP

$pool_moves$ = Continuous variable controlling for the number of times a poolee in the DEP changes their projected report date for recruit training

$entry_age$ = Continuous variable recorded at time of accession

$educ_lvl$ = Continuous variable for highest level of education years obtained at time of accession

$afqt$ = Continuous variable for AFQT scores 0–99

$ttl_misconduct_waivers$ = Continuous variable for the number of misconduct waivers required for enlistment; 0–5

$race_i$ = set of indicator variables for race of Marine i : Asian, Native Hawaiian or Pacific Islander, Black or African American, or Hispanic

$gender_i$ = 1 if gender of Marine i is female; 0 otherwise

$component_i$ = 1 if component status of Marine i is Reserve; 0 otherwise

IV. MACROANALYSIS: U.S. TRENDS IN HOMESCHOOL EDUCATION

Using data obtained from the Department of Education (DOE), homeschool research and advocacy groups, and the Marine Corps Total Force Data Warehouse (TFDW), this chapter provides analysis and results of trends in U.S. homeschool participation and annual enlistment rates of homeschool graduates. Due to varying degrees of homeschool regulation and compulsory attendance laws, it is difficult to approximate the homeschool participation rate for each state. However, survey data collected by the DOE’s National Center for Education Statistics (NCES) shows the total population of U.S. homeschooled students has increased over the past 20 years. Recent polling data collected during the summer of 2020 also reveal an increased interest in home-based education amongst parents of Kindergarten through 12th grade (K-12) students. The results point to a dissatisfaction with public education after schools were forcibly closed during the COVID-19 pandemic of 2020, preventing students from attending classes in-person. This portion of the study seeks to answer research questions that ask whether the population of homeschooled students in the U.S. is increasing and how the change could impact Marine Corps enlistments of both high school and homeschool graduates in the future.

A. DATA AND METHODOLOGY

Approximately every four years, the NCES collects descriptive data on U.S. educational activities through its National Household Education Surveys (NHES) program.⁶³ Data for homeschooled K-12 children ages five through 17 are specifically captured in the Parent and Family Involvement in Education portion of the NHES.⁶⁴ Parents respond to questions regarding their reasons for homeschooling, choice of curriculum, and their child’s homeschooling experiences. Survey data collected by the NCES appears to be the most accurate and authoritative source for information and has long been used by the DOE to analyze trends relating to school choice in the U.S.⁶⁵ According to the most recently published NCES data and

⁶³ “National Household Education Surveys Program,” NCES, Feb. 1, 2021, <https://nces.ed.gov/nhes/>.

⁶⁴ “Homeschooling,” NCES, February 1, 2021, <https://nces.ed.gov/nhes/homeschooling.asp>.

⁶⁵ Wang, Rathbun, and Musu, *School Choice in the United States: 2019*, 1.

as depicted in Table 2, the number of homeschooled K-12 students in the U.S. ages five through 17 has increased from 850,000 in 1999 to 1.69 million in 2016. Homeschooled students in grades nine through 12 increased from 235,000 to 525,000. The largest percentage of homeschoolers also tend to be white and reside in rural areas.

Table 2. Estimates of Number and Percentage of U.S. Homeschooled Students Ages 5–17 with a Grade Equivalent of Kindergarten–12⁶⁶

| | 1999 | 2003 | 2007 | 2012 | 2016 |
|---------------------------------------|--------------------|----------------------|----------------------|----------------------|----------------------|
| <u>Total</u> | 850,000 (1.70%) | 1,096,000 (2.20%) | 1,520,000 (3.00%) | 1,773,000 (3.40%) | 1,690,000 (3.30%) |
| <u>Grade Equivalent</u> | | | | | |
| Kindergarten through 5th Grade | 428,000 (1.80%) | 472,000 (1.90%) | 717,000 (3.00%) | 833,000 (3.20%) | 767,000 (3.00%) |
| 6th through 8th Grade | 186,000 (1.60%) | 302,000 (2.40%) | 371,000 (3.00%) | 424,000 (3.50%) | 398,000 (3.30%) |
| 9th through 12th | 235,000 (1.70%) | 315,000 (2.30%) | 422,000 (2.80%) | 516,000 (3.80%) | 525,000 (3.80%) |
| <u>Race/Ethnicity of Child</u> | | | | | |
| White | 640,000 (2.00%) | 843,000 (2.70%) | 1,171,000 (3.90%) | 1,205,000 (4.50%) | 998,000 (3.80%) |
| Black | 84,000 (1.00%) | 103,000 (1.30%)* | 61,000 (0.80%)* | 140,000 (2.00%) | 132,000 (1.90%) |
| Hispanic | 77,000 (1.10%) | 59,000 (0.70%) | 147,000 (1.50%) | 265,000 (2.30%) | 444,000 (3.50%) |
| Asian/Pacific Islander | + | + | + | 73,000 (2.80%) | 44,000 (1.40%) |
| Other | 16,000 (1.60%)* | 59,000 (4.90%)* | 111,000 (4.80%) | 82,000 (3.20%) | 69,000 (2.70%) |
| <u>Locale</u> | | | | | |
| City | N/A | N/A | 327,000 (2.00%) | 493,000 (3.30%) | 493,000 (3.00%) |
| Suburban | N/A | N/A | 503,000 (2.60%) | 601,000 (3.10%) | 651,000 (2.90%) |
| Town | N/A | N/A | 168,000 (3.00%) | 127,000 (2.60%) | 177,000 (4.30%) |
| Rural | N/A | N/A | 523,000 (4.90%) | 552,000 (4.50%) | 368,000 (4.40%) |

* Interpret data with caution. The coefficient of variation for this estimate is between 30 and 50%; + Too few cases for NCES to report a reliable estimate.

⁶⁶ Adapted from National Center for Education Statistics, “Digest of Education Statistics.”

Determining the homeschool population by state proves difficult for several reasons. Many states have no requirement for parents to provide notification that their child is participating in a homeschool program; these same states, as well as others, do not collect data on homeschooled students; and traditional homeschool programs are frequently misclassified along with private umbrella schools and virtual charter programs.⁶⁷ In spite of this information gap, non-profit homeschool research and advocacy groups, such as The Coalition for Responsible Home Education and EdChoice use what limited state-level data is available to calculate each state's adjusted homeschool population number based on national level data aggregated in the quadrennial NCES survey. For example, to calculate the by-state homeschool population for 2016, The Coalition for Responsible Home Education combined state-level home-school data collected by the International Center for Home Education Research (ICHER) and applied the 2016 NCES nationwide homeschool rate of 3.3 percent while also factoring in each state's urban/rural composition, racial demographics, and child poverty rates.⁶⁸ Their adjusted by-state estimates for 2016 totaled 1.62 million homeschool students, which is slightly below the 2016 NCES nationwide survey estimate of 1.69 million.

National homeschool population estimates have not been published by NCES since 2016. Nonetheless, the school choice research and advocacy group, EdChoice, used the available state-level data collected by ICHER for 2018, as well as child population data from the U.S. Census Bureau to provide their estimate of the number of homeschool students by state. The EdChoice estimate shows the number of homeschool students in 2018 decreased to 1.47 million.⁶⁹ This is down 220,000 from the 2016 NCES survey results, but a decrease of only 120,000 from EdChoice's previous 2016 assessment.⁷⁰ The

⁶⁷ "Homeschooling by the Numbers," Coalition for Responsible Home Education, 2021, <https://responsiblehomeschooling.org/research/summaries/homeschooling-numbers/>.

⁶⁸ Coalition for Responsible Home Education.

⁶⁹ Michael Shaw and Drew Catt, "2021 EdChoice Share: Which Types of Schools and Learning Settings Are Families Choosing in the States," Engage by EdChoice, January 26, 2021, <https://www.edchoice.org/engage/2021-edchoice-share-which-types-of-schools-and-learning-settings-are-families-choosing-in-the-states/>.

⁷⁰ Shaw and Catt.

EdChoice calculation method uses the average of the known state-level homeschool participation rates to proxy as the participation rate for those states in which the actual homeschool student population is unknown. For example, of the 21 states for which homeschool population data was available for 2018, the average homeschool participation rate was 2.6 percent. 2.6 percent is then used by EdChoice to represent the national homeschool participation rate for 2018.⁷¹ While this computation method seems to provide a more modest estimate, it is less scientific and does not account for other demographic factors such as those used in the Coalition for Responsible Home Education calculations.

Interest in homeschool education increased in 2020 after the COVID-19 pandemic caused many public and private schools to close and shift their students to a remote-learning environment. Results from a Gallup Analytics poll conducted from July to August 2020 reveal that parents' satisfaction with K-12 education decreased 10 percentage points from its second highest recorded level in 2019.⁷² When asked what type of school their child will attend for the 2020–21 school year (i.e., public, private, homeschool), responses from parents of K-12 students revealed a five percentage point increase for homeschooling. The Gallup Social Series Poll on Work and Education has been conducted since 1999. The 2020 poll was conducted by telephone interview with over 1,000 adults sampled from all 50 states and the District of Columbia. The results in Table 3 reflect the responses of 214 parents of K-12 students with a maximum margin of sampling error of ± 8 percentage points at the 95 percent confidence level.

⁷¹ Shaw and Catt.

⁷² Megan Brenan, "K-12 Parents' Satisfaction with Child's Education Slips," Gallup News, August 25, 2020, <https://news.gallup.com/poll/317852/parents-satisfaction-child-education-slips.aspx>.

Table 3. Gallup News Service Work and Education Poll: 1999 to 2020⁷³

| | <u>Public</u> | <u>Private</u> | <u>Parochial</u> | <u>Charter school</u> | <u>Home School</u> | <u>No opinion</u> |
|--------------------|---------------|----------------|------------------|-----------------------|--------------------|-------------------|
| 2020 Jul 30-Aug 12 | 76 | 6 | 2 | 5 | 10 | 1 |
| 2019 Aug 1-14 | 83 | 7 | 4 | 2 | 5 | * |
| 2018 Aug 1-12 | 80 | 7 | 2 | 7 | 3 | -- |
| 2017 Aug 2-6 | 88 | 4 | 3 | -- | 3 | 2 |
| 2016 Aug 3-7 | 82 | 10 | 3 | -- | 4 | 1 |
| 2015 Aug 5-9 | 80 | 13 | 3 | -- | 3 | 1 |
| 2014 Aug 7-10 | 84 | 10 | 4 | -- | 3 | -- |
| 2013 Aug 7-11 | 86 | 8 | 2 | -- | 3 | 1 |
| 2012 Aug 9-12 | 83 | 9 | 2 | -- | 4 | 2 |
| 2011 Aug 11-14 | 84 | 9 | 2 | -- | 4 | 1 |
| 2010 Aug 5-8 | 85 | 7 | 5 | -- | 2 | 1 |
| 2009 Aug 6-9 | 81 | 12 | 3 | -- | 2 | 2 |
| 2008 Aug 7-10 | 81 | 12 | 5 | -- | 2 | -- |
| 2007 Aug 13-16 | 86 | 8 | 3 | -- | 2 | 1 |
| 2006 Aug 7-10 | 82 | 13 | 3 | -- | 2 | * |
| 2005 Aug 8-11 | 85 | 10 | 3 | -- | 2 | -- |
| 2004 Aug 9-11 | 86 | 7 | 4 | -- | 2 | 1 |
| 2003 Aug 4-6 | 85 | 6 | 5 | -- | 3 | 1 |
| 2002 Aug 5-8 | 89 | 7 | 2 | -- | 2 | * |
| 2001 Aug 16-19 | 88 | 5 | 5 | -- | 2 | -- |
| 2000 Aug 24-27 ^ | 86 | 9 | 4 | -- | 1 | * |
| 1999 Aug 24-26 ^ | 86 | 10 | 4 | -- | * | -- |

Given the disparity in homeschool regulation across all 50 states, it is difficult to determine how many U.S. students are actually educated at home. Nevertheless, the findings that proceed are based on analysis that combines Coalition for Responsible Home Education estimates, U.S. Census Bureau data, and responses from the 2020 Gallup research poll to determine the change in state-level homeschool student populations occurring since 2016. The change in Marine Corps enlistments of homeschool graduates from Fiscal Year (FY) 2011 through FY 2020 are also presented. Particular focus is given to the change in homeschool graduate enlistment rates following the change in tier rating policy codified by the 2014 National Defense Authorization Act (NDAA).

B. FINDINGS

Table 4 shows that the number of Marine Corps enlistees possessing a homeschool diploma as their highest education credential increased over the past 10 years. 1.73 percent

⁷³ Source: Gallup, *Gallup Poll Social Series: Work and Education*.

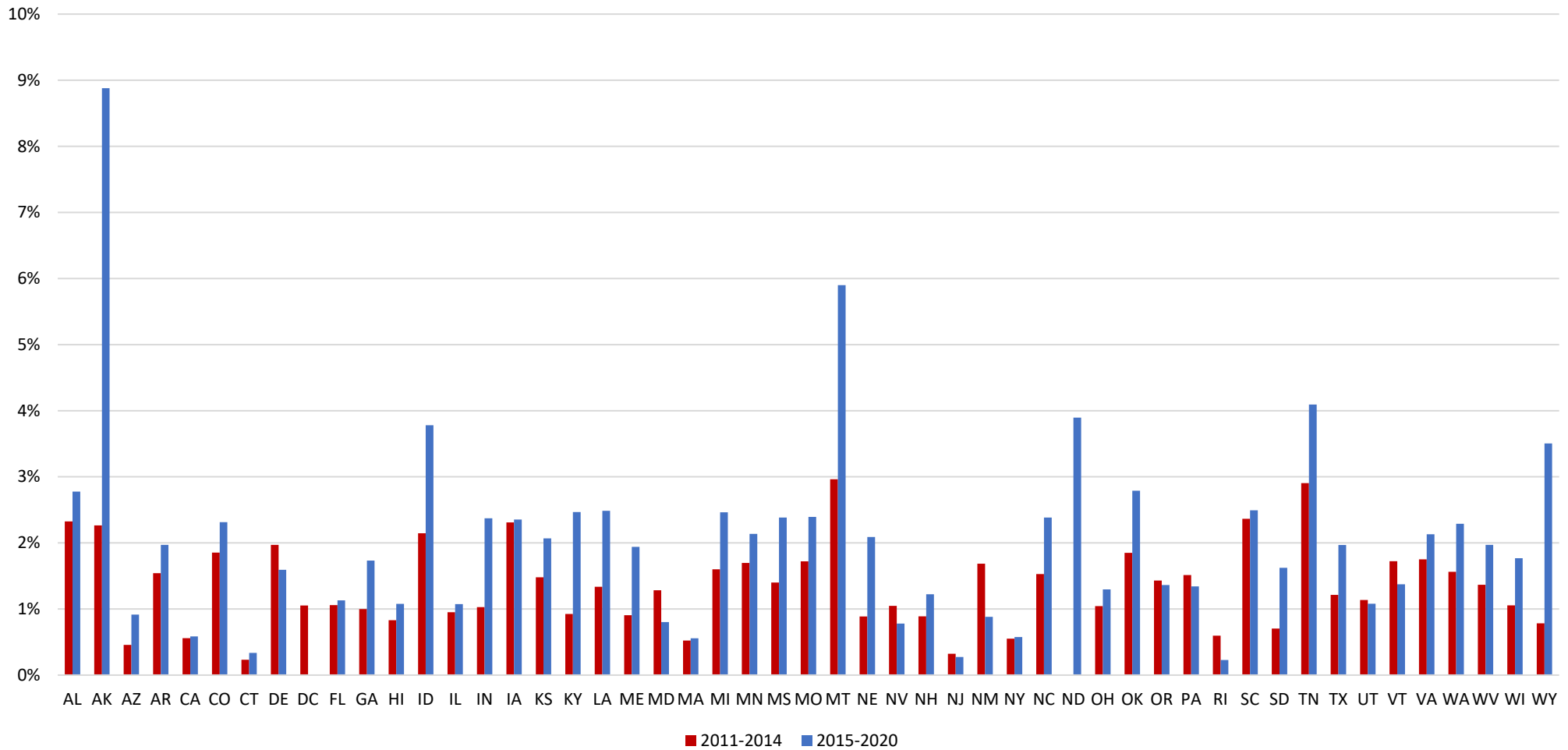
of all FY 2020 enlisted accessions possessed a homeschool diploma compared to 1.1 percent in FY 2011. Enlistments of homeschoolers predictably grew following enactment of the 2014 NDAA which eliminated the requirement for homeschool graduates to score 50 or higher on the AFQT to be considered a Tier 1 recruit. Compared to the cohort of Marines that enlisted from FYs 2011 through 2014, the number of Marines possessing a homeschool diploma that enlisted from FYs 2015 through 2020 increased by 0.39 percentage points. Figure 1 shows the change in homeschool graduate enlistments by state before and after the 2014 policy shift measured as a percentage of homeschool and high school graduates combined. From 2015 through 2020, all but 11 states and the District of Columbia showed an increase in homeschooler enlistments.

Table 4. Enlisted Accessions of High School and Homeschool Graduates:
Fiscal Years 2011 through 2020

| Fiscal Year | Total Enlisted Accessions* | High School Graduates | Homeschool Graduates |
|--------------------|-----------------------------------|------------------------------|-----------------------------|
| 2011 | 33,753 | 92.30% | 1.10% |
| 2012 | 34,766 | 92.16% | 1.00% |
| 2013 | 36,912 | 91.22% | 1.12% |
| 2014 | 30,287 | 90.95% | 1.16% |
| 2015 | 33,029 | 91.87% | 1.27% |
| 2016 | 34,225 | 92.28% | 1.28% |
| 2017 | 37,305 | 91.51% | 1.54% |
| 2018 | 36,358 | 91.32% | 1.61% |
| 2019 | 36,583 | 91.14% | 1.50% |
| 2020 | 29,406 | 90.81% | 1.73% |

*Note: Sample data may not reflect exact accession totals for the years listed

Figure 1. Homeschool Graduate Enlistments as a Percent of High School and Homeschool Graduates Combined



Using data obtained from the U.S. Census Bureau, the Annie E. Casey Foundation compiles U.S. child population statistics on its Kids Count Data Center.⁸¹ State-level numbers maintained on their site are current as of 2019 and show that the population of children ages five through 17 decreased by 0.49 percent since 2016. Combining these figures with the state-level homeschool population estimates used by The Coalition for Responsible Home Education, the national homeschool participation rate for children ages five through 17 was 3.03 percent or 1.62 million in 2016. This is slightly lower than the NCES 2016 survey estimate of 3.3 percent. Using the 2019 population data for children ages five through 17 and holding the state-level homeschool participation rate constant from 2016, the estimated population of homeschooled students in the U.S. decreases by 0.47 percent for 2019. While it is unlikely that homeschool participation remained unchanged across all 50 states since 2016, this 2019 estimate provides a prudent baseline upon which the Gallup poll estimate of a five percentage point increase in homeschool participation can be applied for 2020. Adding the Gallup estimate and holding the 2019 population of children ages five through 17 constant, Table 5 illustrates how the homeschool student population by U.S. Census region increases from an estimated 1.62 million in 2016 to approximately 4.3 million in 2020. State-level population estimates are provided in Appendix A.

⁸¹ “Child Population by Age Group in the United States,” Annie E. Casey Foundation, 2021, <https://datacenter.kidscount.org/data/tables/101-child-population-by-age-group?loc=1&loct=2>.

Table 5. Homeschool Student Population Estimates by U.S. Census Region⁸²

| Census Region | 2016 | | | 2020 | | |
|--------------------|--------------------|-----------------------|--|---------------------|-----------------------|--|
| | Children Ages 5–17 | Homeschool Population | Percent of Homeschooled Children Ages 5–17 | Children Ages 5–17* | Homeschool Population | Percent of Homeschooled Children Ages 5–17** |
| East North Central | 7,796,729 | 241,623 | 3.10% | 7,621,358 | 617,299 | 8.10% |
| East South Central | 3,168,418 | 109,907 | 3.47% | 3,140,761 | 266,006 | 8.47% |
| Mid-Atlantic | 6,396,284 | 196,044 | 3.06% | 6,261,875 | 505,045 | 8.07% |
| Mountain | 4,239,016 | 106,747 | 2.52% | 4,281,299 | 322,036 | 7.52% |
| New England | 2,213,246 | 28,639 | 1.29% | 2,153,041 | 135,506 | 6.29% |
| Pacific | 8,764,437 | 251,482 | 2.87% | 8,699,813 | 684,121 | 7.86% |
| South Atlantic | 10,211,284 | 370,135 | 3.62% | 10,273,482 | 885,622 | 8.62% |
| West North Central | 3,619,154 | 101,173 | 2.80% | 3,627,362 | 282,503 | 7.79% |
| West South Central | 7,319,086 | 220,675 | 3.02% | 7,403,476 | 593,733 | 8.02% |
| Total | 53,727,654 | 1,626,425 | 3.03% | 53,462,467 | 4,291,871 | 8.03% |

* 2019 population numbers are used in place of unpublished 2020 data.

** 2020 estimates are an extrapolation of the 2016 homeschool population rate and include the Gallup poll estimate of +5.0 percentage points.

C. SUMMARY

Analysis from this chapter provides an estimate of the current U.S. homeschool student population using the most recent data made available through the U.S. Census Bureau, homeschool research groups, and one of the Nation’s most reputable analytics and polling organizations. The 2016 Coalition for Responsible Home Education rate of 3.03 percent for nationwide homeschool participation provided a middle-of-the-road estimate between the lower EdChoice participation rate of 2.68 percent and the higher NCES estimate of 3.3 percent. Applying the additional five percentage points from Gallup poll responses, results in a 2020 homeschool student population nearly triple that of 2016. Had the lower 2018 EdChoice state-level homeschool population figures been combined with the Gallup estimate, the total homeschool population for 2020 would be slightly smaller at an estimated 4.04 million students.

⁸² Adapted from Annie E. Casey Foundation (2016 and 2020 “Children Ages 5-17” column) and Coalition for Responsible Home Education, “Homeschooling by the Numbers” (2016 “Homeschool Population” column).

A surge of nearly 2.6 million homeschool students over the past four years seems like a dramatic increase. These results are largely based on an estimate born out of Gallup survey responses and should be interpreted with caution. Considering Gallup’s margin of sampling error of ± 8 percentage points, it may be difficult to believe that the number of parents that claim their child would be homeschooled during the 2020–21 school year doubled from the year prior. Nonetheless, results from prior Gallup poll responses in which parents of K-12 students stated their child was homeschooled are very close to NCES survey estimates for those same years. In the last three quadrennial surveys, the difference between the NCES homeschool population estimate and the Gallup poll responses of parents who homeschooled was only ± 1 percentage point. Moreover, these results should be interpreted in the broader context of the COVID-19 pandemic. It is possible that the long-term impact of closing schools as a means to combat community spread of the coronavirus could have resulted in a permanent and significant shift of K-12 students to a homeschool setting. If this is true—and provided recruiters view homeschoolers as a valuable emerging market—the Marine Corps could see a slight decline in traditional high school graduate enlistments while enlisting a greater number of homeschool graduates in the future.

V. MICROANALYSIS: COMPARISONS OF HOMESCHOOL AND HIGH SCHOOL GRADUATES

Given the national rise in the U.S. homeschool student population, it is important to understand what if any differences exist between traditional high school graduates and homeschool graduates. Using Marine Corps enlisted accessions data obtained from the Total Force Data Warehouse (TFDW), this chapter provides analysis of several factors selected to measure the “whole Marine concept.” Mental and physical quality measures are examined through kernel density estimations of the Armed Forces Qualification Test (AFQT) and physical fitness scores. Comparisons between the personality traits of homeschool and high school graduates are made by examining the distributions of composite scores derived from the Tailored Adaptive Personality Assessment System (TAPAS) test taken prior to enlistment. Performance and behavioral measures of homeschool and high school graduates are also evaluated by analyzing trends in average proficiency and conduct markings before and after homeschool graduate enlistment policy changed in April 2014. This portion of the study seeks to answer the research question that asks whether homeschooled enlisted Marines are significantly different from enlisted Marines that graduated from a traditional four-year high school.

A. DATA AND METHODOLOGY

A principal motivation for this study is to examine differences in the quality of homeschooled enlisted Marines before and after a 2014 change to homeschool graduate enlistment policy was introduced by the 2014 National Defense Authorization Act (NDAA). For the purpose of this analysis, a “Pre-2014” homeschooler is defined as an enlistee whose armed forces active duty base date occurs before 1 April 2014. While the 2014 NDAA was enacted on 26 December 2013, the change to the Marine Corps Recruiting Command (MCRC) Enlisted Processing Manual (EPM) was not published until 1 April 2014. Only four homeschool graduates scoring below 50 on the AFQT

accessed between the time the 2014 NDAA was signed and the 2014 EPM was published.

Table 6 provides the summary statistics comparing the dataset's high school graduates to homeschool graduates before and after the policy change. The complete sample of observations was drawn on 19 January 2021. To account for average attrition behavior, the sample includes only those Marines that separated before this date. Both before and after 1 April 2014, the average homeschool graduate possessed higher Armed Services Vocational Aptitude Battery (ASVAB) scores, as measured by the AFQT and General Technical (GT) score, than the average high school graduate. The average homeschooled Marine also scored higher on the Physical Fitness Test (PFT) and achieved higher marksmanship scores compared to the average high school graduate. On average, homeschooled Marines received higher proficiency and conduct markings and were the subject of fewer non-judicial punishments both before and after 2014. Compared to the average high school graduate, the average homeschooler also enlisted with fewer misconduct waivers and exhibited less first-term attrition behavior.

Table 6. High School and Homeschool Graduate Summary Statistics before and after 2014 Enlistment Policy Change

| | Observations | Mean | Standard Deviation | Min | Max |
|-------------------------------------|--------------|---------|--------------------|-----|-----|
| <u>Pre-2014 Homeschool</u> | | | | | |
| ASVAB AFQT Score | 1,079 | 70.926 | 14.236 | 32 | 99 |
| ASVAB GT Score | 1,079 | 114.986 | 10.353 | 88 | 151 |
| PFT Score | 1,079 | 218.808 | 77.344 | 0 | 300 |
| CFT Score | 1,079 | 259.513 | 68.661 | 0 | 300 |
| Marksmanship Score | 1,026 | 308.063 | 23.022 | 111 | 344 |
| Average Proficiency Marks | 1,079 | 4.312 | 0.216 | 1.7 | 4.7 |
| Average Conduct Marks | 1,079 | 4.297 | 0.249 | 1.7 | 4.7 |
| Total Non-Judicial Punishments | 1,079 | 0.19 | 0.515 | 0 | 4 |
| Total Misconduct Waivers | 1,079 | 0.258 | 0.621 | 0 | 4 |
| First-Term Attrition | 1,079 | 0.098 | 0.298 | 0 | 1 |
| <u>Pre-2014 High School</u> | | | | | |
| ASVAB AFQT Score | 90,064 | 62.119 | 17.638 | 9 | 99 |
| ASVAB GT Score | 90,064 | 108.278 | 11.633 | 0 | 309 |
| PFT Score | 90,064 | 214.724 | 80.225 | 0 | 300 |
| CFT Score | 90,064 | 260.244 | 68.098 | 0 | 300 |
| Marksmanship Score | 86,830 | 304.711 | 25.582 | 0 | 350 |
| Average Proficiency Marks | 90,064 | 4.300 | 0.223 | 0.4 | 4.9 |
| Average Conduct Marks | 90,064 | 4.283 | 0.248 | 0.4 | 4.9 |
| Total Non-Judicial Punishments | 90,064 | 0.235 | 0.56 | 0 | 6 |
| Total Misconduct Waivers | 90,064 | 0.483 | 0.788 | 0 | 5 |
| First-Term Attrition | 90,064 | 0.115 | 0.319 | 0 | 1 |
| <u>Post-2014 Homeschool</u> | | | | | |
| ASVAB AFQT Score | 1,213 | 65.235 | 18.464 | 31 | 99 |
| ASVAB GT Score | 1,213 | 112.366 | 11.756 | 82 | 151 |
| TAPAS Score | 114 | 8.167 | 12.417 | 0 | 99 |
| PFT Score | 1,213 | 219.251 | 72.004 | 0 | 300 |
| CFT Score | 1,213 | 244.196 | 66.752 | 0 | 300 |
| Marksmanship Score | 767 | 305.695 | 28.171 | 0 | 346 |
| Average Proficiency Marks | 1,213 | 4.274 | 0.175 | 3.1 | 4.7 |
| Average Conduct Marks | 1,213 | 4.266 | 0.193 | 2.8 | 4.7 |
| Total Non-Judicial Punishments | 1,213 | 0.162 | 0.492 | 0 | 4 |
| Total Misconduct Waivers | 1,213 | 0.289 | 0.673 | 0 | 5 |
| First-Term Attrition | 1,213 | 0.121 | 0.326 | 0 | 1 |
| <u>Post-2014 High School</u> | | | | | |
| ASVAB AFQT Score | 81,669 | 61.024 | 17.581 | 0 | 99 |
| ASVAB GT Score | 81,669 | 107.084 | 11.559 | 0 | 152 |
| TAPAS Score | 5,241 | 6.991 | 7.133 | 0 | 99 |
| PFT Score | 81,669 | 215.973 | 75.014 | 0 | 300 |
| CFT Score | 81,669 | 243.872 | 67.139 | 0 | 300 |
| Marksmanship Score | 57,291 | 304.798 | 27.014 | 0 | 350 |
| Average Proficiency Marks | 81,669 | 4.262 | 0.214 | 0.1 | 4.9 |
| Average Conduct Marks | 81,669 | 4.246 | 0.231 | 0.7 | 4.9 |
| Total Non-Judicial Punishments | 81,669 | 0.207 | 0.531 | 0 | 6 |
| Total Misconduct Waivers | 81,669 | 0.493 | 0.789 | 0 | 5 |
| First-Term Attrition | 81,669 | 0.142 | 0.349 | 0 | 1 |

B. FINDINGS

1. Mental and Physical Quality Measures

Inferences about the greater population of homeschooled enlistees are made by analyzing specific performance and quality indicators within the sample. Kernel density estimation is used to examine the differences in the probability distributions of the AFQT and

physical fitness scores of homeschool and high school graduates. The methodology was applied and extended by Combes et al. in their 2012 study examining the productivity advantage of large cities in France.⁸³ A similar approach was used by Bacolod, De la Roca, and Ferreyra in their 2021 study of agglomeration effects among young college graduates in Columbia.⁸⁴

The first estimation compares the AFQT score distributions of enlisted Marines whose highest education credential is either a high school or homeschool diploma. Figure 2 specifically compares the AFQT scores of high school and homeschool graduates before and after the FY 2014 NDAA mandated a change to homeschooler enlistment policy across the DOD. Prior to 1 April 2014, homeschool graduates were required to score 50 or above on the AFQT to enlist as a Tier 1 recruit. This particular sample contains only 24 homeschool graduates that enlisted prior to 1 April 2014 with an AFQT score below 50. Only four of those 24 accessed between the time the NDAA was signed on 26 December 2013 and when the revised MCRC EPM was published on 1 April 2014. For simplicity and for the purposes of this study, any homeschool or high school graduate who enlisted prior to 1 April 2014 is referred to as “Pre-2014.” Those who enlisted after 1 April 2014 are referred to as “Post-2014.”

a. Kernel Density Estimation of AFQT Score

Focusing first on the AFQT distributions of homeschoolers, Figure 2 shows the difference between pre-2014 homeschoolers that accessed between 1 October 2010 and 1 April 2014 (dashed red line), and post-2014 homeschoolers who accessed on or after 1 April 2014, but before 1 October 2020 (solid red line). The vertical reference line in both figures represents an AFQT score of 50. Not surprisingly, the mean AFQT distribution of post-2014

⁸³ Pierre-Philippe Combes et al., “The Productivity Advantages of Large Cities: Distinguishing Agglomeration From Firm Selection,” *Econometrica* 80, no. 6 (November 2012): 2543–94, <https://www.econometricsociety.org/publications/econometrica/2012/11/01/productivity-advantages-large-cities-distinguishing>.

⁸⁴ Marigee Bacolod, Jorge De la Roca, and Maria Marta Ferreyra, *In Search of Better Opportunities : Sorting and Agglomeration Effects among Young College Graduates in Colombia*, 2021, <https://doi.org/10.1596/1813-9450-9433>.

homeschooled enlistees is wider after the policy changed the AFQT score thresholds for enlistment. Yet, there is still a larger distribution of post-2014 homeschoolers that score higher on the AFQT compared to either pre or post-2014 high school graduates.

The distribution functions for both pre-2014 high school graduates (dashed blue line) and post-2014 high school graduates (solid blue line) are fairly similar. Therefore, the change in AFQT distributions exhibited by homeschool graduates can be confidently attributed to the enlistment policy change and not some other factor. To test this assertion, a second kernel density estimation was performed where post-2014 homeschoolers with an AFQT score below 50 are excluded. The solid red line and dashed red line in Figure 3 are somewhat similar with exceptions around the 50–60th score percentile, as well as around the 78th percentile and above. Considering these differences, it is possible that the change in AFQT score distributions for homeschooled Marines resulted from the 2014 policy shift.

Figure 2. High School and Homeschool Graduate AFQT Score Distributions before and after 2014 Enlistment Policy Change

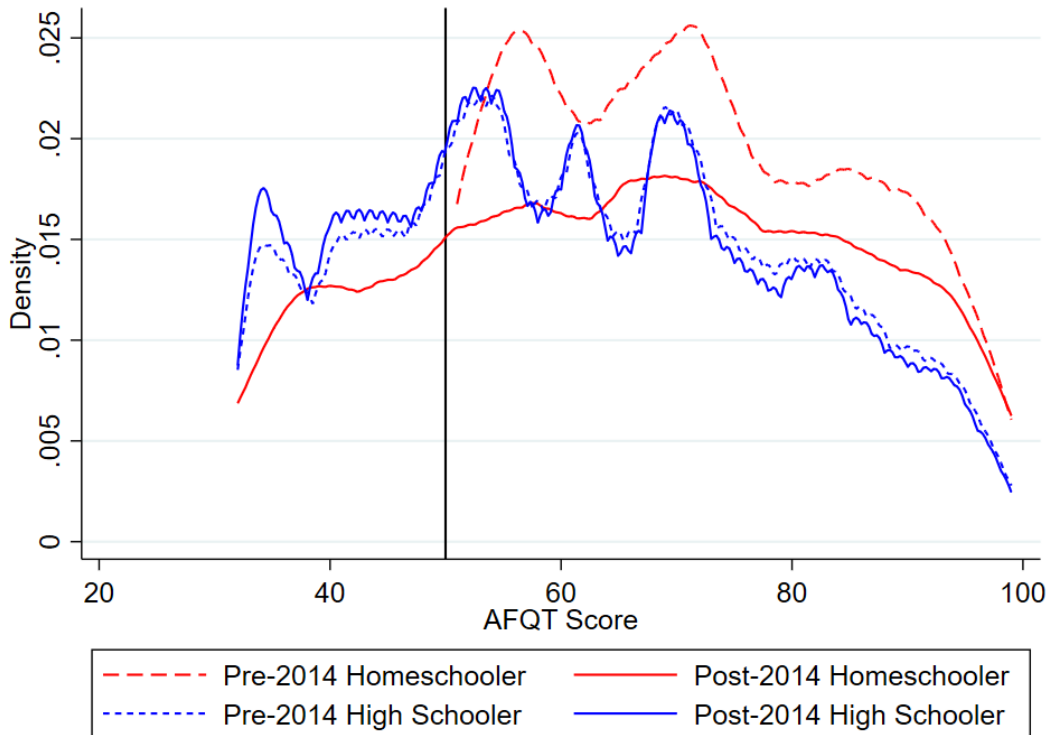
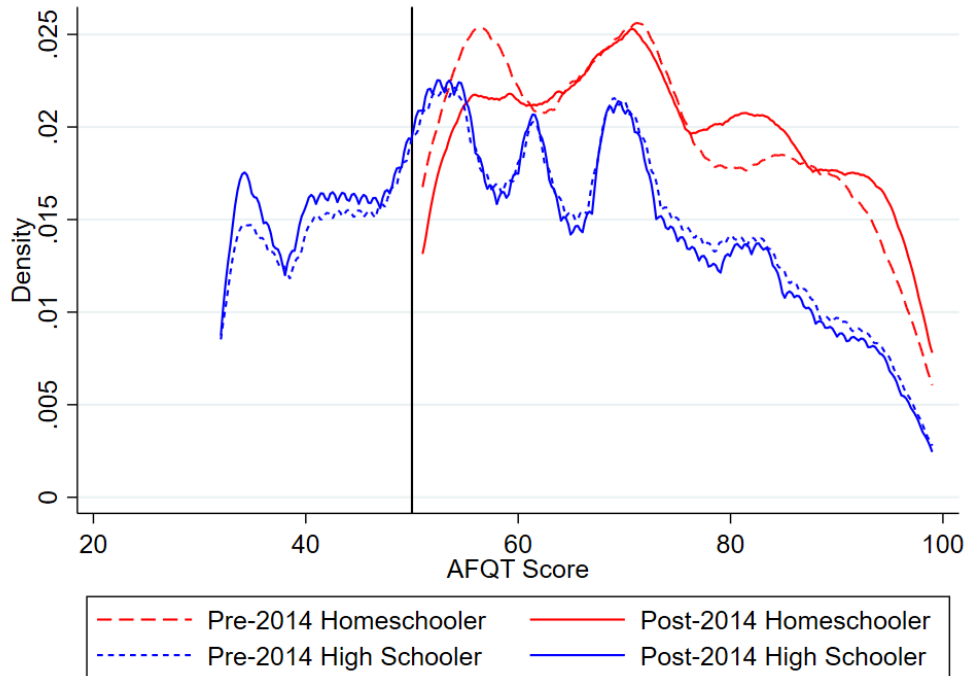


Figure 3. High School and Homeschool Graduate AFQT Score Distributions Assuming no Change in Enlistment Policy

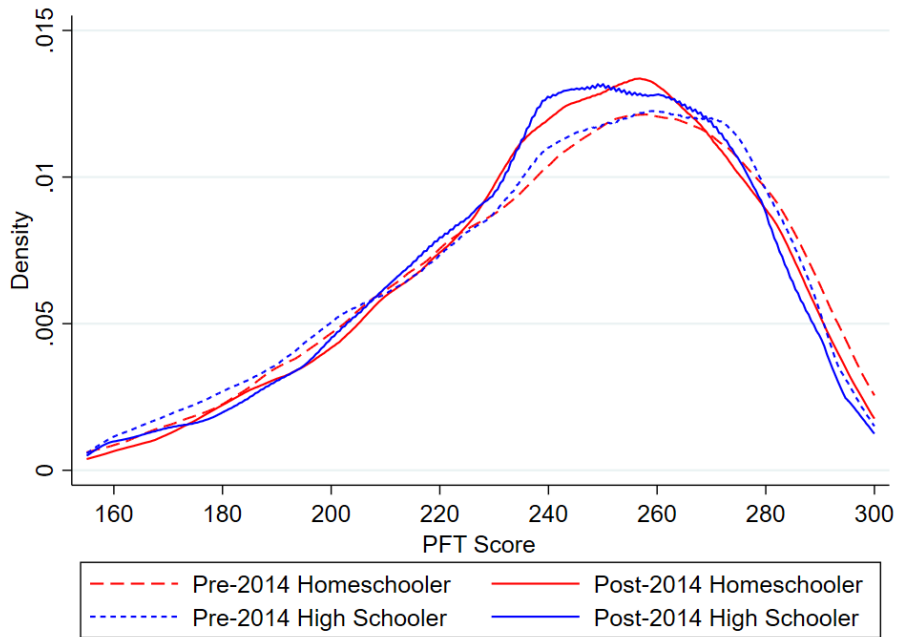


b. Kernel Density Estimation of Physical Fitness Scores

Physical fitness scores of pre and post-2014 homeschool and high school graduates are also analyzed by examining the distributions of PFT and Combat Fitness Test (CFT) scores. Starting with the PFT and focusing first again on homeschoolers, Figure 4 shows the difference in PFT score distributions between pre-2014 homeschoolers (dashed red line), and post-2014 homeschoolers (solid red line). The distribution for pre-2014 homeschoolers is more dispersed and reflects a larger proportion of homeschoolers achieving higher PFT scores. A similar pattern is observed in high school graduates with a greater percentage of pre-2014 high schoolers (dashed blue line) scoring higher on the PFT. Relative to high school graduates, however, the distribution of homeschool graduates that achieve higher PFT scores appears to be larger both before and after 2014. The difference in CFT score distributions shown in Figure 5 reveals that high school graduates score higher than homeschool graduates. Compared to homeschoolers, the distribution of high school graduates that achieve higher CFT scores is greater both pre and post-2014.

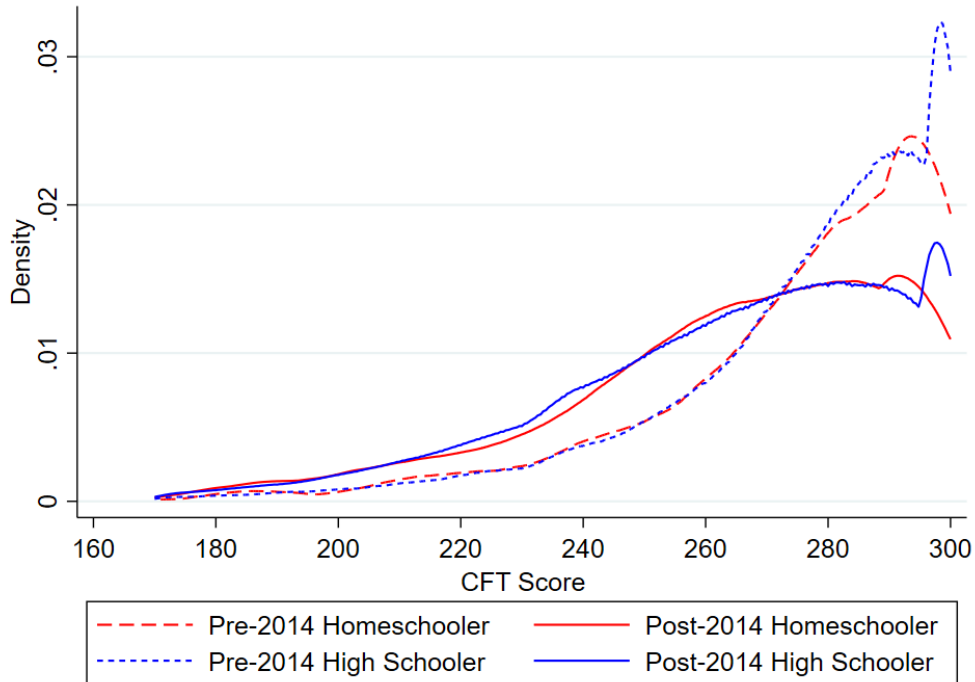
The gaps between the solid and dashed lines in both kernel density estimations are likely explained by changes to the PFT and CFT scoring tables implemented on 1 January 2017. The revised changes first promulgated in Marine Corps Bulletin 6100 dated 15 December 2016 introduced the pull-up requirement for female Marines and higher pull-up standards for male Marines based on age.⁸⁵ The revised order also incorporated push-ups as an alternative to pull-ups to measure upper body strength. More stringent scoring changes for abdominal crunches and the three-mile run were introduced as well. Higher scoring standards across all elements of the CFT for both male and female Marines were additionally created which likely explains the more pronounced gap in score distributions in Figure 5.

Figure 4. High School and Homeschool Graduate PFT Score Distributions before and after 2014 Enlistment Policy Change



⁸⁵ Department of the Navy, *Marine Corps Physical Fitness and Combat Fitness Tests*, Marine Corps Bulletin 6100 (Washington, DC: Headquarters United States Marine Corps, 2016), <https://www.marines.mil/Portals/1/Publications/MCBUL%206100%20DTD%2015DEC16.pdf?ver=2016-12-27-125044-450>.

Figure 5. High School and Homeschool Graduate CFT Score Distributions before and after 2014 Enlistment Policy Change



2. Personality Trait Measures

Further comparisons between homeschool and high school graduates are made in this section using the composite TAPAS score. Originally developed by the Drasgow Consulting Group with a grant from the U.S. Army, the TAPAS measures personality traits using 21 facets and is designed to withstand any attempts by applicants to “fake” their personality type.⁸⁶ Army applicants first began using the TAPAS in 2009 during enlistment screening at the Military Entrance Processing Station. The overall objective was to improve military occupational specialty qualification and matching for applicants based on their personality traits.⁸⁷ Other Services have since adopted the TAPAS with the Marine Corps first introducing it as a pilot program in 2014.

⁸⁶ Christopher D. Nye et al., *Assessing the Tailored Adaptive Personality Assessment System (TAPAS) as an MOS Qualification Instrument*, Technical Report 1312 (Fort Belvoir, VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 2012), <https://doi.org/10.21236/ADA566090>, 1.

⁸⁷ Nye et al., 3.

TAPAS composite and facet score results have been used in prior research, such as Turpin's 2014 study examining how TAPAS score might predict attrition behavior in the Navy's Delayed Entry Program (DEP).⁸⁸ Enlisted TAPAS research in the Marine Corps is less robust which makes it difficult to interpret composite scores from this sample in a meaningful way. The proceeding analysis uses the MCRC measure of five and above to define a quality TAPAS composite score.⁸⁹ Regardless of the score's actual or perceived meaning, the significance of this analysis is to examine how TAPAS scores compare across all education credentials, particularly between homeschool and high school graduates. Only 90 observations within this sample have a recorded TAPAS score prior to 1 April 2014. Therefore, the following analysis uses TAPAS composite scores of only those Marines who enlisted on or after 1 April 2014.

Figure 6 shows that, on average, TAPAS composite scores of homeschool graduates are slightly higher than high school graduates and rank just below enlistees who possess either a virtual/distance diploma or bachelor's degree. The average TAPAS scores of General Educational Development (GED) diploma holders rank the highest. This is likely due to the fact that, as a Tier 2 education credential, the Marine Corps is permitted to enlist a limited number of GED holders each year. Therefore, applicants with a GED tend to possess other desirable qualifications that overcome any hesitancy to risk enlisting a Tier 2 applicant. Figure 7 shows a fairly similar TAPAS score distribution between homeschool and high school graduates with the majority of high school and homeschool graduates possessing a composite score of seven or eight. Compared to 43 percent of homeschool graduates, nearly 50 percent of high school graduates have a TAPAS score of seven. However, almost 39 percent of homeschool graduates score an eight compared to roughly 32 percent of high school graduates. Scores of nine and 10 are roughly the same for both homeschool and high school graduates.

⁸⁸ Adam R Turpin, "Evaluating the Tailored Adaptive Personality Assessment System on Delayed Entry Program Attrition" (Master's Thesis, Monterey, CA, Naval Postgraduate School, 2014), https://calhoun.nps.edu/bitstream/handle/10945/41454/14Mar_Turpin_Adam.pdf?sequence=1&isAllowed=y.

⁸⁹ Sanchez, E-mail message to author, February 5, 2021.

Figure 6. Average TAPAS Score by Education Credential after 2014 Enlistment Policy Change

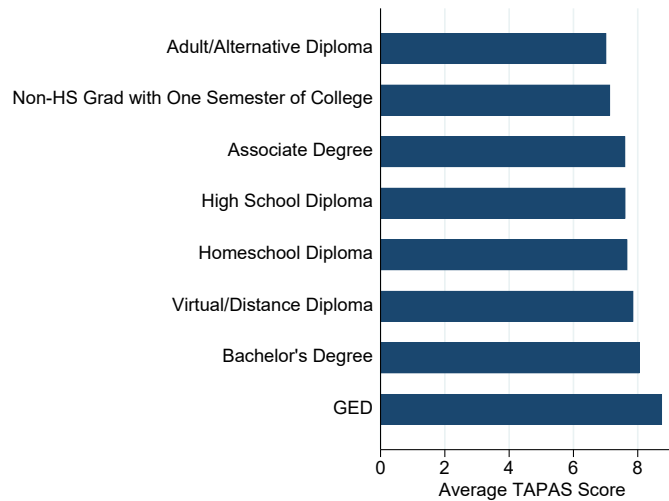
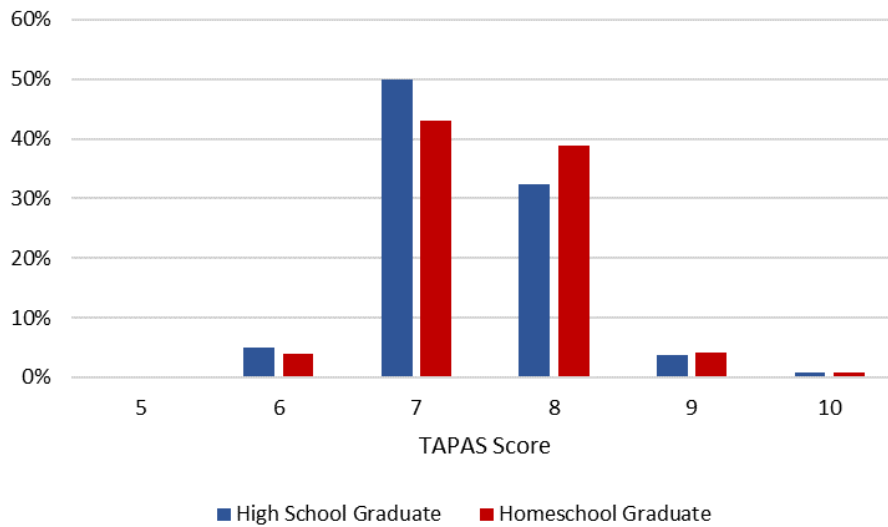


Figure 7. High School and Homeschool Graduate TAPAS Composite Scores After 2014 Enlistment Policy Change



3. Performance and Behavioral Measures

The average proficiency and conduct markings a Marine earns over their length of service is used to compare homeschool and high school graduates across the dimensions

of performance and behavior. Proficiency and conduct marks are assigned to Marines in the rank of corporal and below and are governed by the Marine Corps Individual Records Administrative Manual (IRAM).⁹⁰ The most recent IRAM was published in 2000 and prescribes specific occasions for when a Marine's proficiency and conduct marks must be reported. However, the IRAM is less prescriptive on how those markings should be assigned. Pages 4-41 through 4-43 offer subjective guidance on how standards of proficiency and conduct should be graded.⁹¹ As a result, Marine commanders are given wide discretion in evaluating their Marines performance and conduct. Without a measure to observe how commanders assign these marks across all Marines (similar to the grading profile used for Marine Corps fitness reports) it is difficult to associate true meaning to their value. Nonetheless, the point of this analysis is to determine how proficiency and conduct markings in this sample compare between high school and homeschool graduates before and after 2014.

Figure 8 is a side-by-side comparison illustrating the difference between average service proficiency marks before and after 2014. In the case of both homeschool and high school graduates, the highest distribution for average service proficiency markings shifted to the left after 2014 from 4.4 to 4.3. Figure 8 also reveals relatively similar proficiency marking distributions between homeschool and high school graduates with the majority of high school and homeschool graduates earning proficiency marks of 4.3 to 4.4. However, prior to 2014, the percentage of homeschool graduates who earned proficiency markings of 4.3 to 4.6 was slightly higher compared to high school graduates. After 2014, the distributions were fairly similar with high school graduates having slightly higher percentages for proficiency markings of 4.3 and 4.5.

⁹⁰ Department of the Navy, *Marine Corps Individual Records Administration Manual*, Marine Corps Order P1070.12K W CH 1 (Washington, DC: Headquarters United States Marine Corps, 2000), <https://www.marines.mil/portals/1/Publications/MCO%20P1070.12K%20W%20CH%201.pdf?ver=2012-10-11-163726-583>.

⁹¹ Department of the Navy, 4-43.

Figure 8. High School and Homeschool Graduate Average Service Proficiency Marks before and after 2014 Enlistment Policy Change

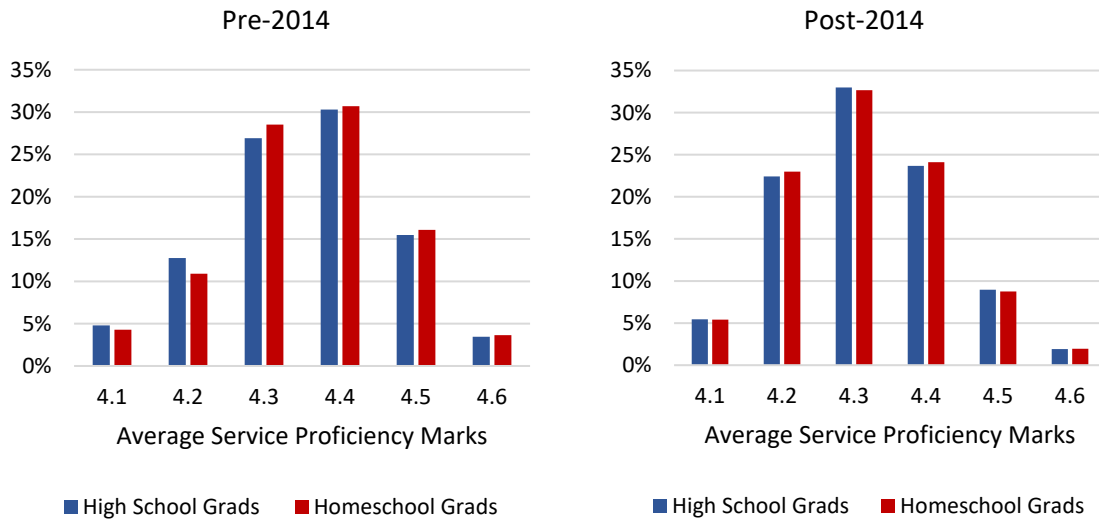
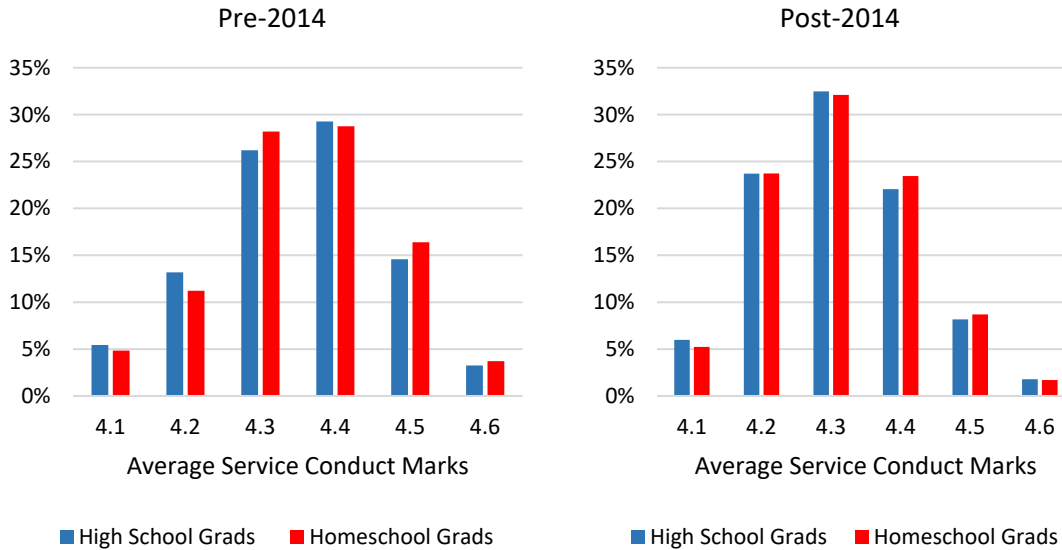


Figure 9 reveals the differences between average service conduct marks before and after 2014. Similar to proficiency marks, the highest average service conduct markings shifted to the left from 4.4 to 4.3 after 2014. Like average proficiency markings, the conduct marking distributions of homeschool and high school graduates generally trend the same. This is largely due to the grading convention of assigning matching proficiency and conduct markings. That is, corporals and below will often receive matched proficiency/conduct markings of 4.3/4.3 or 4.4./4.4, for example. Due to the inherent subjectivity of assigning proficiency and conduct marks, it is difficult to determine what caused the shift in distributions after 2014. The IRAM has existed unchanged since 2000, making it unlikely that this shift occurred as a result of an official policy change.

Figure 9. High School and Homeschool Graduate Average Service Conduct Marks before and after 2014 Enlistment Policy Change



4. Effects of Homeschool Education on First-Term Attrition

Table 7 shows that probit regression analysis did not produce statistically significant evidence that homeschooled Marines demonstrate more, or less, first-term attrition behavior compared to traditional high school graduates. Column (1) shows the attrition behavior of homeschool graduates that enlisted prior to the 2014 policy change are similar to those of traditional graduates. The same is true in column (2) for Marines who enlisted after 2014. Even as controls are added across columns in Table 7, the homeschool coefficient remains statistically indistinguishable from zero. When controlling for all variables in the model, the estimates in columns (7) and (8) show that, on average, homeschool graduates that enlisted prior to the 2014 policy change have a probability of first-term attrition that is 1.3 percentage points lower than that of pre-2014 high school graduates. After the policy change, the probability of attrition for homeschooled Marines increases by 0.06 percentage points, but is still 0.7 percentage points lower compared to traditional high school graduates. Yet, at the 95 percent confidence level, the *homeschool*

estimate is indistinguishable from zero, presenting no statistically observable difference between homeschoolers and high school graduates across all eight variants of the model.

The results do reveal a difference in first-term attrition behavior before and after 2014, but this is likely caused by factors other than a Marine possessing a homeschool diploma as their highest form of education credential. To formally examine this, a Hausman statistical hypothesis test was conducted to examine the similarity between estimators in columns (7) and (8) and to present a more thorough assessment of the null hypothesis. The resulting test-statistic had a probability value of 0.0000 which is statistically significant and is interpreted as evidence that the model's covariates affect attrition outcomes differently before and after 2014. Considering the statistical insignificance of the *homeschool* estimator, a conservative explanation is that attrition behavior in this sample is likely caused by factors other than a Marine being homeschooled. The model presents no evidence to support that attrition outcomes for homeschooled Marines - before or after 2014 - differ from Marines that graduated from a traditional four-year high school.

Table 7. Marginal Effects on Probability of First-Term Enlisted Attrition

| | (1) Pre-2014 | (2) Post- 2014 | (3) Pre- 2014 | (4) Post- 2014 | (5) Pre- 2014 | (6) Post- 2014 | (7) Pre- 2014 | (8) Post- 2014 |
|--|-----------------|----------------------|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|
| Homeschool | -0.019 | 0.001 | -0.020 | 0.001 | -0.014 | -0.002 | -0.013 | -0.007 |
| Virtual/Distance Diploma | | | 0.045 | 0.119*** | 0.058* | 0.097*** | 0.063* | 0.085*** |
| Adult/Alternative Diploma | | | 0.059*** | 0.078*** | 0.044*** | 0.049*** | 0.052*** | 0.050*** |
| GED | | | 0.132*** | 0.252*** | 0.060 | 0.184*** | 0.059 | 0.181*** |
| Non-HS Grad with Some College | | | -0.021** | -0.063*** | -0.005 | -0.021 | -0.007 | -0.009 |
| Associate Degree | | | -0.059*** | -0.063*** | -0.014 | 0.042* | -0.010 | 0.050** |
| Bachelor's Degree | | | -0.117*** | -0.127*** | -0.020 | 0.100*** | -0.005 | 0.100*** |
| Advance Degree | | | -0.182 | -0.094 | -0.014 | 0.140 | -0.020 | 0.127 |
| Other Education Credential | | | 0.089** | 0.088 | 0.071* | 0.034 | 0.058 | 0.037 |
| DEP Time | | | | | -0.000*** | -0.000*** | -0.000*** | -0.000*** |
| DEP Pool Moves | | | | | 0.004*** | 0.013*** | 0.004*** | 0.014*** |
| Age at Entry | | | | | -0.003*** | 0.003** | -0.003*** | 0.003** |
| Education Level | | | | | -0.020*** | -0.055*** | -0.024*** | -0.054*** |
| ASVAB AFQT Score | | | | | -0.001*** | -0.002*** | -0.001*** | -0.001*** |
| Total Misconduct | | | | | 0.021*** | 0.023*** | 0.022*** | 0.019*** |
| Enlistment Waivers | | | | | | | | |
| Asian | | | | | | | -0.041*** | -0.049*** |
| Native Hawaiian or Pacific Islander | | | | | | | -0.028* | -0.091*** |
| Black or African American | | | | | | | 0.037*** | 0.062*** |
| Hispanic | | | | | | | -0.023*** | -0.035*** |
| Female | | | | | | | 0.009 | 0.023*** |
| Reserve Component | | | | | | | 0.096*** | -0.103*** |
| Observations | 104,509 | 107,591 | 104,509 | 107,591 | 70,571 | 76,375 | 70,571 | 76,375 |
| Pseudo R ² | 0.0000 | 0.0000 | 0.0026 | 0.0034 | 0.0142 | 0.0150 | 0.0343 | 0.0290 |

Note: attrition defined as departure from service under a negative separation code with greater than six months remaining on first enlistment contract. Referenced category is a white, male, active-duty, traditional high school graduate. Standard errors are removed for ease of viewing.

***Statistically significant at the 99.9 percent confidence level.

**Statistically significant at the 99 percent confidence level.

*Statistically significant at the 95 percent confidence level.

Measuring the effect of only pre-accession factors on first-term attrition limits the explanatory power of this model. There are certainly more post-accession considerations not accounted for in this analysis that influence attrition behavior. Omitted variables bias is introduced when factors such as occupational specialty, duty station assignment, or

ability to maintain physical fitness standards are excluded. This could be reducing any one of the pre-accession variable's ability to explain attrition behavior. As a result, the extent to which this model can be used to accurately predict attrition outcomes is limited.

Using the standard prediction threshold of 0.5, a goodness-of-fit measure was performed to calculate the percent correctly predicted for the model variants represented in columns (7) and (8). The percentage of times the model correctly predicted attrition outcomes for the pre-2104 sample was 65.77 percent. The percentage of times the model correctly predicted attrition outcomes for the post-2104 sample was 65.63 percent. Considering these limitations, it cannot be inferred that homeschool education has a causal effect on first-term enlisted attrition. Nevertheless, when controlling for factors observed prior to accession, the model does show that there is no statistically significant difference between Marines who graduated from a traditional four-year high school and those who enlisted with a homeschool diploma. This is contrary to prior CNA and RAND studies that found, in some cases, homeschoolers do have a slightly higher probability of attrition. Results discussed in this chapter may actually support claims made by Murphy (2014), suggesting factors beyond educational credential likely explain whether a homeschooler will succeed in adulthood. It could be that other unobserved variables (not controlled for in this study), such as family income or parental support conceal the true treatment effect of homeschool education.

C. SUMMARY

Using 10 years of enlisted accessions data, this chapter compares several quality measures and first-term attrition outcomes of Marines whose highest education credential is either a high school or homeschool diploma. Categorical variables selected to measure the “whole Marine concept” were used to compare homeschool graduates to high school graduates before and after the 2014 NDAA changed DOD enlistment requirements for homeschooled applicants. The sample's summary statistics reveal that, on average, homeschooled Marines achieve higher ASVAB and physical fitness scores; their average service proficiency and conduct markings are higher; they are subject to less non-judicial

punishment; they enlist with fewer misconduct waivers; and their first-term attrition rate is lower than that of traditional high school graduates.

The findings from more detailed analysis also indicate that, in terms of mental and physical quality measures, homeschool graduates perform roughly at or above the same level as high school graduates. Kernel density estimates of AFQT scores revealed a larger distribution of post-2014 homeschoolers that score higher on the AFQT compared to either pre or post-2014 high school graduates. Despite lowering the AFQT score requirements, allowing homeschooled applicants to enlist with a score of 31, it is possible that the policy change actually increased enlistment rates of homeschool graduates with AFQT scores of 50 and above. Notwithstanding the 2017 changes to both the scoring and conduct of the PFT and CFT, kernel density estimates of fitness test scores revealed that homeschool graduates achieve higher PFT scores both before and after 2014. High school graduates, however, scored higher on the CFT both before and after the policy change.

Personality traits measured by TAPAS composite scores recorded after 2014 were used to compare homeschooled Marines to high school graduates, as well as Marines with other commonly held education credentials. The findings showed that, on average, homeschool graduates have slightly higher TAPAS composite scores than high school graduates, but scores for homeschool graduates are just below enlistees that possess either a virtual/distance diploma or bachelor's degree. TAPAS score distributions are fairly similar between homeschool and high school graduates with the majority of high school and homeschool graduates possessing a score of seven or eight. 50 percent of high school graduates have a TAPAS score of seven compared to 43 percent of homeschool graduates. However, almost 39 percent of homeschool graduates have a score of eight compared to approximately 32 percent of high school graduates. The percentage of both high school and homeschool graduates that score nine or 10 are roughly the same.

Differences in performance and behavior were measured by analyzing the average service proficiency and conduct markings before and after 2014. Similar to the comparison of TAPAS composite scores, the focus was to compare how a homeschool graduate's markings compared to those of a high school graduate without assigning too much meaning

to the value of the marking, itself. Regardless of what caused the highest distribution of both proficiency and conduct markings to shift from 4.4 to 4.3 after 2014, the overall distributions for both high school and homeschool graduates are fairly similar. The majority of high school and homeschool graduates in this sample earned proficiency marks of 4.3 to 4.4. The percentage of homeschoolers that earned proficiency and conduct marks of 4.3 to 4.6 was slightly higher compared to high school graduates prior to 2014. After 2014, high school graduates have slightly higher percentages for markings of 4.3 and 4.5.

Finally, probit regression analysis was used to analyze the effects of homeschool education on first-term enlisted attrition and to test the hypothesis that a pre-2014 homeschooled Marine is equal to a post-2014 homeschooled Marine. Controlling for demographic variables and other common predictors of success, the model estimated the probability of attrition using white, male, active-duty, traditional high school graduates as the referenced category. The estimates of the marginal effects show that on average, homeschool graduates have a lower probability of first term attrition compared to high school graduates before and after the policy change. However, when controlling for all variables in the model, the results show no statistically observable difference at the 95 percent level of confidence between Marines who enlisted with a homeschool diploma and Marines who graduated from a traditional four-year high school. A formal hypothesis test further revealed no evidence to support that attrition behavior of homeschooled Marines before or after 2014 is statistically different from Marines who graduated from a traditional high school. The explanatory power of the model is limited, considering the bias introduced by only measuring the effects of pre-accession factors on first-term attrition. A causal linkage between homeschool education and first-term enlisted attrition, therefore, cannot be inferred. However, despite its limitations, the model does show that between Marines that graduated from a traditional four-year high school and Marines that enlisted with a homeschool diploma, there is no statistically significant difference.

VI. FINAL SUMMARY

A. CONCLUSIONS

One motivation for this study was to examine how changes in the U.S. homeschool population affect Marine Corps enlistment trends of both high school and homeschool graduates. According to the most recent Department of Education survey data and estimates resulting from this study, the number of homeschooled K-12 students in the U.S. ages five through 17 has nearly doubled from about 850,000 in 1999 to approximately 1.6 million in 2016. In lieu of more recent survey estimates, Gallup polling data which has been historically accurate within \pm one percentage point of DOE estimates, suggests that the homeschool population for the 2020–21 school year has more than doubled again since 2016. This larger, more recent shift to home-based education is likely attributed to parents' growing interest in school choice, as well as frustration and/or concerns over children not attending in-person classes due to the Coronavirus Disease 2019 pandemic. This could mean upwards of four million homeschooled students representing approximately eight percent of U.S. children ages five through 17 have shifted away from traditional public or private school settings and are now being educated at home. If true, it is likely that Marine recruiters will soon realize an increase in the number of homeschool graduate enlistments beyond what was seen over the past 10 years.

Considering the growth in both the U.S. homeschool population and increasing enlistments in homeschool graduates, a second motivation for this study was to analyze quality and performance measures, comparing Marines with a homeschool diploma to Marines that graduated from a traditional four-year high school. In terms of the "whole Marine concept," the results show that homeschool graduates possess high quality traits and perform at the same level or higher than Marines whose highest education credential is a high school diploma. With regard to favorable personality traits, the Tailored Adaptive Personality Assessment System (TAPAS) data in this sample reveal that higher composite scores of eight and above are more frequently attained by homeschool graduates than high school graduates. The results also revealed that the latest change in DOD enlistment policy

introduced by the 2014 National Defense Authorization Act, which removed the requirement for homeschool graduates to achieve an Armed Forces Qualification Test (AFQT) score of 50 or higher to enlist as a Tier 1 recruit, did not negatively impact the quality of homeschooled applicants enlisting after 1 April 2014. In fact, the overall distribution of AFQT scores above the 50th percentile is larger for homeschool graduates that enlisted after the policy change.

Similar to previous research conducted by the Center for Naval Analyses, RAND, and Holmes, this study applied regression analysis to assess the effects of education credentials on military service. Estimates from the empirical model offered no statistically significant evidence to support that Marines who enlist with a homeschool diploma as their highest form of education credential are more or less likely to attrite during their first enlistment contract compared to traditional high school graduates. While the marginal effects of homeschool education are consistent with Holmes' 2013 findings who found that, on average, the probability of attrition for homeschooled enlistees is lower compared to high school graduates,⁹² the results in this study show no statistically observable difference amongst Marines from these two educational backgrounds.

The U.S. homeschool population has been steadily growing for the past 20 years. The impacts of a year-long pandemic have likely intensified this growth, but to a scale that is currently unknown. While enlistments of homeschool graduates have also increased in the past 10 years, it does not appear that homeschooled enlistees pose any more risk to the Marine Corps than a traditional high school graduate. The results of this study actually reveal that the average homeschooled Marine possesses more high-quality traits than low-quality indicators. In some respects, homeschooled Marines outperform their traditionally educated peers. Provided its recruiters actively pursue and gain access to this challenging market, homeschool graduates present an opportunity for the Marine Corps to keep building all-around better Marines.

⁹² Holmes, "Analysis of the Marine Corps Educational Tier System," 55.

B. RECOMMENDATIONS

1. Request Homeschool Student Contact Information

Operating within the bounds of the “Every Student Succeeds Act” of 2015, Marine recruiters should request the contact information of military-age homeschool students in states where records on students participating in a homeschool secondary education program are maintained by the local school district. In some cases, the names, telephone numbers, and home addresses of homeschoolers appear on the same contact lists as public school students unless the parent or guardian does not consent to their student being contacted by a military recruiter. Even though the lack of a traditional school setting may limit contact opportunities, recruiters should not be dissuaded in their efforts to canvass the homeschool population. In fact, tactics and techniques employed during the 2020 and 2021 school years in which recruiters’ prospecting efforts were hampered by unexpected and prolonged school closures should inform future best practices of how to recruit applicants that primarily exist in a home-based or remote-learning environment.

2. Analyze Changes within the U.S. Homeschool Population

Marine Corps Recruiting Command (MCRC) should validate this study’s projected estimates of the future U.S. homeschool population against the next survey estimates provided by the National Center for Education Statistics (NCES). Publication of results historically lags two years behind the completion of the quadrennial survey. Findings from the 2020 NCES study will likely be released sometime in 2022. Regular analysis of enlisted Marine records should also persist to determine whether increases in homeschool graduate enlistments pose a risk to the Marine Corps or come at the expense of overall recruit quality.

3. Continue to Screen Homeschool Education Credentials

Given the increasing trend in homeschool graduate enlistments since 2014, MCRC should continue to screen homeschool education credentials at the Recruiting Station level using the tier evaluation process. It is likely that the 1.7 million homeschool students

identified in the 2018 NCES survey has grown over the past two years with or without an additional uptick caused by the COVID-19 pandemic. Moreover, concentrations of homeschoolers are likely to increase in states exercising less restrictive homeschool regulations. This has the potential to dilute the value of homeschool education and reduce the overall quality of homeschooled recruits as Hodari and Wenger concluded in their 2004 CNA study.

4. Establish Meaningful Definitions for TAPAS Composite Scores

Meaningful interpretations should accompany TAPAS test composite scores. The individual TAPAS facet scores revealing the Marine's distinct personality traits were unavailable for this study. While the composite score proved useful by providing another metric to draw comparisons between high school and homeschool graduates, the score itself did not provide any practical insights into the personality types of homeschooled Marines. Lack of social development and aversions toward teamwork within homeschool students is a fundamental concern and should be identified at the time of enlistment. A clearly defined TAPAS composite score could proxy for these traits in the same way the AFQT score proxies for cognitive ability.

APPENDIX. HOMESCHOOL STUDENT ESTIMATES BY STATE

| State | 2016 | | | 2020 | | |
|-------|--------------------|-----------------------|--|---------------------|-----------------------|--|
| | Children Ages 5–17 | Homeschool Population | Percent of Homeschool Children Ages 5–17 | Children Ages 5–17* | Homeschool Population | Percent of Homeschool Children Ages 5–17** |
| AL | 805,241 | 27,230 | 3.38% | 793,949 | 66,546 | 8.38% |
| AK | 131,939 | 11,875 | 9.00% | 128,903 | 18,047 | 14.00% |
| AZ | 1,198,129 | 37,393 | 3.12% | 1,210,448 | 98,300 | 8.12% |
| AR | 514,524 | 19,229 | 3.74% | 511,691 | 44,708 | 8.74% |
| CA | 6,600,373 | 193,582 | 2.93% | 6,510,925 | 516,505 | 7.93% |
| CO | 927,383 | 7,659 | 0.83% | 927,318 | 54,024 | 5.83% |
| CT | 567,216 | 1,836 | 0.32% | 545,730 | 29,053 | 5.32% |
| DE | 148,681 | 3,051 | 2.05% | 148,853 | 10,497 | 7.05% |
| DC | 76,646 | 1,657 | 2.16% | 82,800 | 5,930 | 7.16% |
| FL | 3,033,238 | 87,462 | 2.88% | 3,090,187 | 243,613 | 7.88% |
| GA | 1,848,733 | 61,527 | 3.33% | 1,847,315 | 153,846 | 8.33% |
| HI | 215,920 | 3,045 | 1.41% | 214,649 | 13,760 | 6.41% |
| ID | 322,943 | 11,727 | 3.63% | 332,001 | 28,656 | 8.63% |
| IL | 2,151,042 | 65,212 | 3.03% | 2,070,941 | 166,331 | 8.03% |
| IN | 1,155,101 | 39,857 | 3.45% | 1,149,634 | 97,150 | 8.45% |
| IA | 532,517 | 19,226 | 3.61% | 531,205 | 45,739 | 8.61% |
| KS | 521,756 | 17,686 | 3.39% | 514,919 | 43,200 | 8.39% |
| KY | 735,092 | 27,656 | 3.76% | 730,261 | 63,987 | 8.76% |
| LA | 801,875 | 12,177 | 1.52% | 786,161 | 51,246 | 6.52% |
| ME | 190,034 | 5,467 | 2.88% | 185,305 | 14,596 | 7.88% |
| MD | 978,808 | 27,829 | 2.84% | 972,750 | 76,294 | 7.84% |
| MA | 1,015,733 | 7,497 | 0.74% | 995,438 | 57,119 | 5.74% |
| MI | 1,620,371 | 53,247 | 3.29% | 1,577,491 | 130,712 | 8.29% |
| MN | 939,137 | 12,927 | 1.38% | 951,535 | 60,674 | 6.38% |
| MS | 531,064 | 17,524 | 3.30% | 515,105 | 42,753 | 8.30% |
| MO | 1,011,272 | 34,802 | 3.44% | 1,002,505 | 84,626 | 8.44% |
| MT | 165,100 | 5,273 | 3.19% | 167,432 | 13,719 | 8.19% |
| NE | 341,232 | 8,290 | 2.43% | 345,194 | 25,646 | 7.43% |
| NV | 492,789 | 14,337 | 2.91% | 507,064 | 40,106 | 7.91% |
| NH | 198,064 | 6,655 | 3.36% | 191,632 | 16,020 | 8.36% |
| NJ | 1,450,566 | 41,806 | 2.88% | 1,423,888 | 112,232 | 7.88% |
| NM | 364,754 | 11,977 | 3.28% | 354,852 | 29,394 | 8.28% |
| NY | 2,981,918 | 90,291 | 3.03% | 2,901,298 | 232,915 | 8.03% |
| NC | 1,688,407 | 118,268 | 7.00% | 1,690,945 | 202,993 | 12.00% |
| ND | 121,105 | 4,384 | 3.62% | 126,070 | 10,867 | 8.62% |
| OH | 1,918,922 | 63,305 | 3.30% | 1,887,191 | 156,618 | 8.30% |
| OK | 696,216 | 22,866 | 3.28% | 696,705 | 57,717 | 8.28% |
| OR | 636,346 | 21,767 | 3.42% | 638,751 | 53,787 | 8.42% |
| PA | 1,963,800 | 63,947 | 3.26% | 1,936,689 | 159,899 | 8.26% |
| RI | 154,242 | 4,800 | 3.11% | 149,974 | 12,166 | 8.11% |
| SC | 805,987 | 25,846 | 3.21% | 818,719 | 67,190 | 8.21% |
| SD | 152,135 | 3,858 | 2.54% | 155,934 | 11,751 | 7.54% |
| TN | 1,097,021 | 37,497 | 3.42% | 1,101,446 | 92,721 | 8.42% |
| TX | 5,306,471 | 166,403 | 3.14% | 5,408,919 | 440,062 | 8.14% |
| UT | 667,067 | 16,085 | 2.41% | 683,381 | 50,647 | 7.41% |
| VT | 87,957 | 2,384 | 2.71% | 84,962 | 6,551 | 7.71% |
| VA | 1,357,074 | 33,415 | 2.46% | 1,355,371 | 101,142 | 7.46% |
| WA | 1,179,859 | 21,213 | 1.80% | 1,206,585 | 82,023 | 6.80% |
| WV | 273,710 | 11,080 | 4.05% | 266,542 | 24,117 | 9.05% |
| WI | 951,293 | 20,002 | 2.10% | 936,101 | 66,488 | 7.10% |
| WY | 100,851 | 2,296 | 2.28% | 98,803 | 7,190 | 7.28% |
| | 53,727,654 | 1,626,425 | 3.03% | 53,462,467 | 4,291,871 | 8.03% |

* 2019 population numbers are used in place of unpublished 2020 data.

** 2020 estimates are an extrapolation of the 2016 homeschool population rate and include the Gallup poll estimate of +5.0 percentage points.

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