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Because of the substantial cost of replacing recruits who do not fulfill their enlistment obligation, attrition rates serve as our primary outcome measure; however, we also examine other measures including initial aptitude, initial paygrade, type of discharge, presence of waivers, and reason for separation. We find that both homeschooled and ChalleNGe GED recruits have much higher attrition rates than traditional high school graduates. Our findings on other measures match up with our attrition findings; homeschooled and ChalleNGe GED recruits are not strong recruits by these measures either.

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Henry S. Griffis, (703) 824-2208

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Final Analysis of Evaluation of Homeschool and ChalleNGe Program Recruits

Jennie W. Wenger • April K. Hodari

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Executive summary

The Conference Report of the National Defense Authorization Act of Fiscal Year 1999 directed the establishment of a 5-year pilot program requiring the military Services to treat the following two groups as Tier 1 (high school diploma graduates) for enlistment eligibility purposes [1]:

- Graduates of homeschools
- Graduates of the National Guard Youth ChalleNGe Program who also hold General Education Development (GED) certificates.

The law establishing the 5-year pilot program required that the government evaluate the program's effectiveness. For this purpose, the Directorate for Accession Policy, Office of the Assistant Secretary of Defense (Force Management Policy) asked CNA to assess how ChalleNGe graduates with GEDs and homeschooled graduates compare with other recruits.

Because of the substantial cost of replacing recruits who do not fulfill their enlistment obligation, the Services view first-term attrition as an important metric. Education credential is strongly associated with attrition. Traditionally, recruits with GEDs or other alternate credentials have exhibited much higher attrition rates than conventional high school diploma graduates. For this reason, the Services classify alternate credentials as Tier 2 and sharply restrict enlistment of applicants with Tier 2 credentials. Because of the importance of attrition for force planning, attrition rates are our primary outcome measure; however, we also examine other measures.

We find that both homeschooled and ChalleNGe recruits have much higher attrition rates than traditional high school graduates. Our interim report [2] found relatively low 12-month attrition rates for ChalleNGe recruits in the Army and Marine Corps and for all

homeschooled recruits with above-average scores on the Armed Forces Qualification Test. We replicate those findings, but we also find that attrition rates rise sharply for these groups by the 24- and 36-month points.

We examine other measures, including initial aptitude, initial pay-grade, type of discharge, presence of waivers, and reason for separation. In general, our findings match up with our attrition measures; homeschooled and ChalleNGe GED recruits are not strong recruits by these measures either.

Our interim report [2] detailed a high level of misclassification. In many cases, recruits indicated on our Survey of Recruits' Educational Background that they had lower-tiered credentials than were listed on their official records. We return to the misclassification issue in this report only as it relates to homeschooled and ChalleNGe recruits. We find that the Services have difficulty in determining which recruits are homeschooled and which are ChalleNGe graduates; the level of difficulty varies by Service. This suggests that it will be difficult for the Services to track the progress of these recruits, and perhaps of recruits with other alternative credentials, in the future.

To place our results in context, we explore trends in recruiting homeschooled and ChalleNGe graduates. The number of homeschooled students in the United States has grown rapidly over the last ten years; we expect that the number will grow at a more modest pace in the future. However, the Services actually recruit fewer homeschooled students today than they did in the past. Recruitment of ChalleNGe graduates, in contrast, seems to be increasing at a modest but steady pace. This difference may be related to the low propensity of homeschooled graduates to join the military. Recruiting homeschooled students is difficult and time-consuming, partly because recruiters cannot contact many students at a single central location.

Finally, based on our attrition results, the data do not support placing either homeschooled or ChalleNGe GED credentials in Tier 1. Our other outcome measures are consistent with attrition measures; people in both of these groups are far less likely than traditional high school graduates to complete an initial obligation.

Introduction

The Conference Report of the National Defense Authorization Act of Fiscal Year 1999 directed the establishment of a 5-year pilot program requiring the Services to treat two groups as Tier 1 for enlistment eligibility purposes: (1) graduates of homeschools and (2) graduates of the National Guard Youth ChalleNGe Program who also hold GED credentials [1]. The law limited the program to no more than 1,250 participants per Service per year for a combination of these two types of recruits.

The law establishing the 5-year pilot program contained a requirement that the Department of Defense evaluate the program's effectiveness. For this purpose, the Directorate for Accession Policy, Office of the Assistant Secretary of Defense (Force Management Policy) asked CNA to conduct an objective assessment of how ChalleNGe graduates with GEDs and homeschooled graduates compare with other recruits. To assess the progress of these two groups, we surveyed over 65,000 recruits between March 1999 and February 2000. The Survey of Recruits' Education and Background allowed us to collect (a) information on exactly which recruits were homeschooled or had participated in the ChalleNGe program and (b) additional background information not available in official records on all recruits. Our interim report [2] focused on 12-month attrition rates of homeschooled and ChalleNGe recruits, and compared the attrition rates of these groups with the rates of traditional high school diploma graduates as well as those of recruits holding other types of credentials.

Attrition at 12 months is an important metric because a substantial proportion of first-term attrition occurs within that time. There are indications, however, that later attrition (occurring between the end of the first year and the end of the first term) may often have different causes than initial attrition [3]. Also, much of the past research focused on longer-term (especially 36-month) attrition rates, so

measuring and reporting 36-month rates will allow us to compare our attrition rates with those reported in past studies.¹

In this, the final report, we again compare attrition rates of homeschooled and ChalleNGe graduates with attrition rates of other recruits; now, however, we have far more information to report because the recruits who filled out our survey have been in the Armed Services for 40 to 51 months. Thus, here we are also able to report other outcome measures, particularly 24- and 36-month attrition rates, promotion rates, rates of eligibility to reenlist, category of discharge, and (in some cases) 48-month attrition rates.

Homeschooling

The first focus of our study is on homeschooled recruits. There is no single, accepted definition of homeschooling; nor is there a single governing body that is charged with making sure homeschooled students meet set standards. Rather, there are many associations and affiliations of homeschoolers and their families. Some of these entities operate at a local level, while others operate at a state or national level.² As part of our interim report, we conducted a nationwide survey of homeschool associations. We used information gathered from that survey to help us delineate what constitutes homeschooling [2].

The homeschooled population has increased rapidly over the last 20 to 30 years; growth was particularly pronounced during the 1990s [7]. Our survey of the literature, along with our own estimates of

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1. For examples of research focusing on 36-month attrition, see [4] and [5]; [3] reviews a number of studies of first-term attrition, most of which focus on the 36-month window. Studies looking at attrition past the 36-month window tend to focus on reenlistment and consider primarily the relationship between pay and reenlistment. For a complete review of such work, see [6].
 2. Homeschooling is legal in all 50 states, although the requirements concerning curriculum, notification of authorities, learning assessment, record keeping, and teacher qualifications vary considerably between states; see [2] for details on state regulations.

the number of homeschoolers, suggests that about 2 percent of all K-12 students in the United States are homeschooled today. Thus, there were about 1 million homeschooled students in the United States in 2001, and perhaps 850,000 to 900,000 during the year of our recruit survey.³ The available research indicates that most homeschoolers score well above the average U.S. public school student on standardized tests [8, 9].

The ChalleNGe Program

The second focus of our study is on graduates of the National Guard Youth ChalleNGe Program who hold GEDs. The ChalleNGe program, first authorized in FY93, is operated jointly by the states and state National Guard units. The program targets “at risk” youth who are high school dropouts or expellees between the ages of 16 and 18, and who are neither on parole nor on probation. The program’s main goal is to provide enhanced employment potential and life skills training; it consists of a 22-week residential phase conducted in a quasi-military environment, followed by a longer mentoring phase.

The ChalleNGe program functions through agreements between state National Guard units and state governors. As such, ChalleNGe is the only multistate, residential youth program with a military focus. The program resembles bootcamp in several ways; ChalleNGe cadets form platoons, march, and engage in intensive physical training. However, the program also includes classroom instruction, some of which focuses on preparing participants to pass the GED exam.

By FY 2000, 26 states and territories were participating in the program, which had graduated more than 45,000 students since its inception.⁴ Limited studies of the program indicate that, from a

3. Appendix A includes more details on the various estimates of the number and grade distribution of homeschooled students, as well as likely future growth rates.
4. Of the program’s roughly 4,700 graduates in FY99, about 2,700 earned a GED. By 2002, 30 programs were in existence (several states run more than one program) [10, 11].

societal viewpoint, it is quite cost-effective [11]. Although a number of states are on the waiting list to receive federal funding to begin ChalleNGe programs, state budget problems may decrease the number of programs in the near future; for example, the State of Missouri closed its ChalleNGe program at the end of 2001 [12].

Education credentials/tiers in the military

Military recruits must meet several enlistment standards, including education credential and aptitude criteria. Recruits are considered both on the basis of their education credential (such as a high school diploma) and their aptitude (measured by Armed Services Vocational Aptitude Battery, or ASVAB, scores). A recruit's education credential repeatedly has been shown to be a strong predictor of the likelihood of completing the term of obligation [3]. Although the exact relationship between education credential and attrition is unclear, research suggests that the education credential measures something besides aptitude (e.g., "an index of social adjustment"); despite relatively high test scores, those without a high school diploma are much less likely to complete a term of service than are those with a diploma [3, 13]. Aptitude, however, is considered an important indicator of "trainability," the best measure of which is believed to be the ASVAB test [14]. The Armed Forces Qualification Test (AFQT), an ASVAB math and verbal composite, is used to select applicants and is highly related to job performance.

The most common credential possessed by enlisted recruits is a high school diploma. Most recruits who do not hold a high school diploma either have earned a GED or hold no credential at all. (Recruits without a credential are referred to as "dropouts.") These three credential categories form the basis of the education tiers. Recruits with a high school diploma (or a credential considered equivalent) are referred to as "Tier 1 recruits," recruits holding a GED (or other alternative credential) are considered "Tier 2," and those without a recognized credential form "Tier 3." Tier 1 recruits have historically had relatively low attrition rates, while rates of Tier 2 and 3 recruits have been higher. Current DoD accession standards require that at least 90 percent of accessions possess a Tier 1 cre-

dential; the individual Services often set even higher standards. In addition, Tier 2 and 3 recruits must meet more stringent aptitude criteria than Tier 1 recruits; specifically, Tier 2 and 3 recruits must attain a higher minimum AFQT score than Tier 1 recruits.

Although the vast majority of recruits hold a high school diploma or a GED, other alternate credentials exist. Examples include: an adult education diploma, no high school diploma but some college credits, a certificate of attendance or completion, a homeschool diploma, or a certificate of completion from a National Guard ChalleNGe program. Figure 1 provides a complete list of credentials and indicates the tier to which each credential belongs. ChalleNGe graduation (when accompanied by a GED) and homeschool diplomas are the two credentials that are the focus of this report. Before the pilot program was established in 1999, homeschool diplomas and ChalleNGe plus GED completion were considered alternate credentials and placed in Tier 2. Therefore, appropriateness of placing homeschooled and ChalleNGe recruits within Tier 1 will depend primarily on how their attrition levels compare with those of other Tier 1 recruits, especially traditional high school graduates.

Figure 1. Tier placement of education credentials

Tier 1:

- High school diploma
- Adult education degree
- 1+ semesters of college (for non-diploma grads)
- Homeschooled
- ChalleNGe + GED

Tier 2:

- GED
- Occupational program certificate
- High school attendance/completion
- Correspondence school degree

Tier 3:

- No credential ("dropouts")

Data and methodology

Sources of data

To identify education credentials earned and to explore various definitions of homeschooling, we created and administered the Survey of Recruits' Education and Background. We also conducted a special Youth Attitude Tracking Study (YATS) and a survey of homeschool associations. For the final report, we supplement these data with a file provided by the Defense Manpower Data Center (DMDC) that includes information on all recruits who were classified as homeschooled or as ChalleNge participants with GEDs between FY93 and FY02, inclusive. In addition, this file includes attrition rates for these enlistees throughout the pilot program. This final file allows us to explore trends in recruiting homeschooled and ChalleNge graduates over time and helps to guard against basing any recommendation on potentially anomalous situations.

Survey of recruits, electronic personnel files

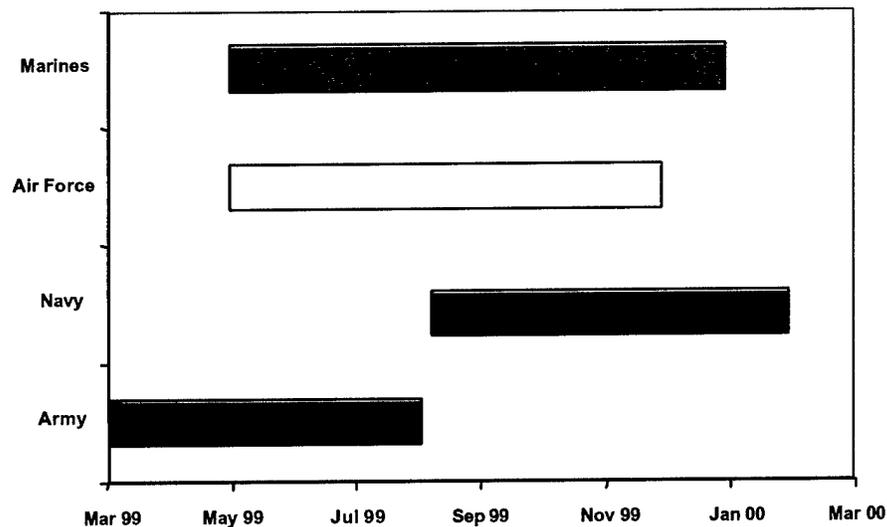
Briefly, we administered the Survey of Recruits' Education and Background to a large sample of recruits who enlisted between March 1999 and February 2000.⁵ Recruits completed the survey at reception battalions. Next, using information collected on the survey (primarily social security numbers), DMDC matched the survey information to recruits' electronic personnel files. At the end of this process, we had files containing both information on what the recruits said about their educational credentials and what their official records reported. In addition, we had other information from the

5. Appendix B contains a copy of the survey; [2] discusses the survey in more detail. Appendix C discusses the sample in more detail as well as the alterations we made to the data.

survey not included in electronic personnel files, such as details on educational background and attitudes. Finally, the electronic personnel files include information about service completion, as well as aptitude and other potential outcome measures, including eligibility for reenlistment.

Because of the size of the data collection effort, we surveyed the Services at somewhat different times during the year beginning in March 1999 (see figure 2). One concern raised in response to our interim report [2] was that our survey data may not be representative of all the recruits who entered the Services between March 1999 and February 2000, or of the recruits who entered during FY99 and FY00. (The Services judge recruit quality for the group that enters in any fiscal year; for example, the limits on the proportion of Tier 2 and Tier 3 recruits are for a given fiscal year.)

Figure 2. Dates of survey administration by Service



Specifically, representatives of the Navy expressed concern that “summer surge” recruits were not included among Navy survey respondents. The bulk of traditional high school recruits usually enter the Services during the summer surge; bootcamp attrition has been shown to be lower during these months [15]. As we picked up at

least some of the summer surge recruits for the Army, Air Force and Marines, we expected this problem to be most pronounced for the Navy. To explore this issue, we matched our survey data to data in CNA's tracking files; we found that, before or after correcting for several personal characteristics, those who responded to the survey were actually less likely to attrite than others. Therefore, there is no reason to expect attrition rates reported here to be higher than actual rates for the entire fiscal year (see appendix D for a more complete discussion and results of our tests).

Other surveys

We obtained additional information from a special Youth Attitude Tracking Study, as well as from a survey of homeschool associations. We used information from the YATS to determine the propensity for military service of both homeschoolers and participants in the ChalleNGe programs. We used information from the homeschool associations to determine the most appropriate definition(s) of a homeschooled person. Both of these surveys are discussed in more detail in [2]; we did not repeat these surveys for the final report.

Methodology

The authorization for the pilot program [1] directs us to compare homeschooled and ChalleNGe recruits with traditional high school graduates on the following measures:

- Attrition
- Discipline
- Adaptability to military life
- Aptitude for mastering the skills necessary for technical specialties
- Reenlistment rates.

We use a number of different outcome measures to discern differences between pilot program participants and traditional high

school graduates on these measures. We briefly discuss each outcome measure in turn below.

Initial aptitude, paygrade

We use ASVAB scores as a measure of the aptitude of recruits with various education credentials. ASVAB scores are strongly tied to aptitude or “trainability” [14], and many specialties require specific scores on key ASVAB subtests. We also examine initial paygrade; paygrade differences could be driven by several different factors, but they provide a potentially interesting measure of how the Services view recruits in terms of initial quality. Finally, we analyze promotion rates to see if educational credentials determine advancement rates. For the Navy, we also analyze the proportion of those who achieve a rating (one must achieve a rating to be permitted to perform certain jobs).

Waivers

Recruits may require waivers upon enlistment for a number of different reasons. We examine the overall prevalence of waivers; also, we focus on legal and drug/alcohol waivers, which we view as a potential measure both of discipline and of adaptability.

Attrition levels

Our primary measure of success is attrition. We measure the proportion of recruits who complete at least 12, 24, and 36 months of their obligation. When possible, we also measure the proportion of recruits who complete at least 48 months. We perform separate analyses based on educational credential and Service. We include regression results as a safeguard that the relationships we discern between education credential and attrition are not, in fact, driven by other observable characteristics (e.g., it is unlikely but possible that differences in AFQT scores, rather than differences in credential, are responsible for attrition differences between groups). Finally, we discuss the extent to which the Services accurately identify those recruits who are homeschooled or ChalleNGe graduates.

Trends in recruiting homeschooled and ChalleNGe graduates

In addition to the measures listed above, we include an analysis of a supplemental data file on all ChalleNGe and homeschooled recruits from FY93 to FY02. In addition, we report attrition rates on all ChalleNGe and homeschooled recruits who entered the Services during the pilot program. We include these analyses to characterize trends in recruiting and attrition over time. Thus, we are able to place in context our results on recruits who entered the Services in 1999 and 2000.

Reasons for separation

We examine DoD separation codes as a measure both of discipline and of the extent to which recruits are able to adapt to military life.

Type of discharge

Records of recruits who leave the Services indicate the type of discharge the recruits received. We examine the extent to which recruits with different education credentials are likely to receive less-than-honorable discharges. This is a potential measure both of discipline and of adaptability.

Reenlistment

Many of the recruits initially surveyed had not yet reached the end of their obligation when DMDC compiled our dataset in June 2003. Also, data issues made it impossible to accurately determine which of the recruits who had recently completed an obligation actually reenlisted. For this reason, we do not calculate reenlistment rates (see appendix C for more details). However, we do calculate the proportion of those who were eligible to reenlist. While imperfect, this measure is related to reenlistment as only those who are deemed eligible are allowed to reenlist. In addition, eligibility provides another measure of adaptability to military life.

Before discussing the outcome measures, we present some descriptive statistics on our sample, and on the recruits who were homeschooled or ChalleNGe graduates.

Findings

Descriptive statistics—homeschooled and ChalleNGe recruits

Table 1 shows descriptive statistics for recruits with various education credentials. There is little difference in average age across credentials, although ChalleNGe graduates are slightly younger than other recruits; this is not surprising because the program targets relatively young high school dropouts. Recruits holding a GED, along with ChalleNGe graduates, are more likely to be male than other recruits. Homeschooled recruits are more likely to have dependents than traditional graduates, although less likely than those with a GED. The relatively high proportion of homeschooled recruits with dependents is somewhat surprising; it suggests that the homeschooled recruits in our sample may not be typical of the homeschooled population.⁶ Throughout this section, except where explicitly noted, we identify recruits' education credentials based on their responses to our survey rather than on their official records. At the end of this section, we compare the two sources.

6. Examining these data by Service reveals that the proportion of homeschooled recruits in the Army with dependents is quite high; 22.8 percent of homeschooled Army recruits have dependents. In the other Services, the proportion of homeschooled recruits with dependents is no higher than the proportion of public school recruits with dependents. (Recruits who are married and/or have children are considered to have dependents.) Results of statistical tests of difference: Age: $t = 8.07$, $p > 0.0000$; Male: ChalleNGe versus traditional: $t = -3.71$, $p > 0.0002$, GED versus traditional: $t = -14.76$, $p < 0.0000$; Dependents: homeschooled versus traditional: $t = 2.8668$, $p > 0.0041$, homeschooled versus GED or dropout: $t = 3.79$; $p > 0.0000$.

Table 1. Recruit characteristics

Characteristic	Homeschooled recruits	ChalleNGe recruits	Public school graduates	Private school graduates	GED holders
Age (years)	19.2	18.3	19.3	19.9	20.3
Male	83.1%	90.4%	80.9%	87.9%	91.6%
Have dependents	11.5%	9.2%	8.1%	8.6%	20.0%
AFQT score	58.5	49.0	59.0	63.4	59.0

Aptitude, paygrade, promotion

Initial aptitude—ASVAB and AFQT scores

The Armed Forces rely heavily on applicants' scores on the ASVAB; considerable evidence links scores on these tests to trainability (although the relationship between ASVAB/AFQT scores and attrition is weaker). The AFQT is "normed" so that a 50th-percentile score indicates average aptitude among the youth population. The test last underwent renorming in 1980. A recruit scoring at the 50th percentile on the AFQT is "average," while a recruit scoring at the 80th percentile is above average and specifically has achieved a higher score than 79 percent of the youth population.⁷

Along with other recruit characteristics, table 1 shows average AFQT scores for several groups. The AFQT scores of homeschooled recruits appear slightly lower than those of public school graduates;

7. Our data indicate that some individuals' official scores changed between the initial data collection and June 2003. Overall, 2.7 percent of the sample had a different score in June 2003 than in the earlier dataset. These changes were concentrated among the Marine Corps and the Navy; scores of 4.9 percent of Marine recruits and 6.7 percent of Navy recruits changed. We suspect that these changes are mostly due to recruits' attempts to qualify for specific ratings/MOSs (jobs) at reenlistment by re-taking the ASVAB.

the AFQT scores of ChalleNGe recruits are substantially lower. This pattern usually carries over into the ASVAB subscores.

Homeschooled recruits

Tests of statistical significance indicate that homeschoolers' average AFQT score is not statistically different from that of public school graduates or GED holders; however, we can say with greater than 99.9-percent confidence that homeschooled recruits in the military have lower average AFQT scores than do private school graduates. While roughly 30 percent of homeschooled recruits score in the top 30 percent on the AFQT, 36 percent score below 50; these people would not have been eligible to enlist before the pilot program.⁸

These scores of homeschooled recruits are surprising in light of the research indicating that homeschoolers tend to score well on standardized tests. Most evidence suggests that homeschoolers score between the 65th and the 80th percentile [8, 9].⁹ The ASVAB subscores (especially those that make up the AFQT) measure material that is quite similar to that found on many other standardized tests. Therefore, these results indicate that homeschooled recruits do *not* represent average homeschooled students. Instead, homeschooled recruits seem to represent a group of relatively low-achieving homeschooled students. This suggests, then, that the homeschooled recruits who enlist in the military are quite different from the group of all students who are homeschooled and probably different from private school enlistees. In terms of trainability, this group is similar to public school students and GED recipients. Therefore, we might expect homeschooled recruits to experience academic attrition at a

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8. The interim report [2] noted that, while homeschooled recruits as a group had quite high attrition rates, the group of homeschooled recruits with AFQT scores of 50 or greater had attrition rates that were comparable to traditional high school graduates. We continue to track the progress of this group below.
 9. Much like the AFQT, nationally used standardized tests are normed so that a student who scores in the 40th percentile has scored better than 39 percent of national students in the same grade.

rate similar to enlistees with a traditional high school diploma or a GED.

A potential explanation for this is the high rate of college enrollment among homeschooled students. Although there is no nationally representative data measuring the college attendance of homeschooled students, research suggests that at least 60 percent continue to postsecondary education and less than 1 percent join the military [2]. In contrast, close to 3 percent of all U.S. high school graduates and GED recipients enter the military. Over 60 percent of high school completers attend college, and the proportion has grown in recent years, but fewer than 60 percent of male high school completers continue to college [16]. Therefore, it is likely that homeschooled graduates attend college in larger numbers than public school graduates. It follows that the homeschooled graduates who join the military may be of lower aptitude than the average homeschooled graduate. The difference between homeschooled and private school students is even more surprising; the population of students graduating from private schools also continue to college at a high rate and seem to have test scores comparable to those of homeschooled students, yet private school recruits have substantially higher average test scores than homeschooled recruits.

ChalleNGe recruits

ChalleNGe graduates have the lowest average AFQT scores of any group listed in table 1; nearly 60 percent of this group scored between 31 and 49 and therefore would not have been eligible to enlist without the pilot program. Recruits in Tiers 2 and 3 have fairly high average test scores because scoring at or above the 50th percentile on the AFQT is a common service policy (although some Tier 2/3 recruits with lower test scores may enlist with waivers).

The average AFQT score of ChalleNGe graduates is about 10 points lower than that of (non-ChalleNGe) GED recipients and about 13 points lower than that of dropouts. The subtest scores of ChalleNGe graduates are also lower than those of all other groups. This does not mean that *all* ChalleNGe graduates have lower scores than *all* GED recipients or *all* high school dropouts. In contrast, we might

expect that the ChalleNGe group represents motivated individuals who have recently passed the GED and that they would score higher than the average dropout and the average GED recipient if the test were given to random groups. Rather, this difference surely occurs because recruits who are dropouts or GED holders must meet higher test score requirements than ChalleNGe recruits. Also, some of the difference is probably due to the relatively young age of ChalleNGe recruits; AFQT scores increase slightly with age. But considerable evidence shows that AFQT scores offer an accurate measure of trainability; therefore, we might expect that ChalleNGe graduates will be at a disadvantage in terms of trainability compared with other groups.

Initial paygrade

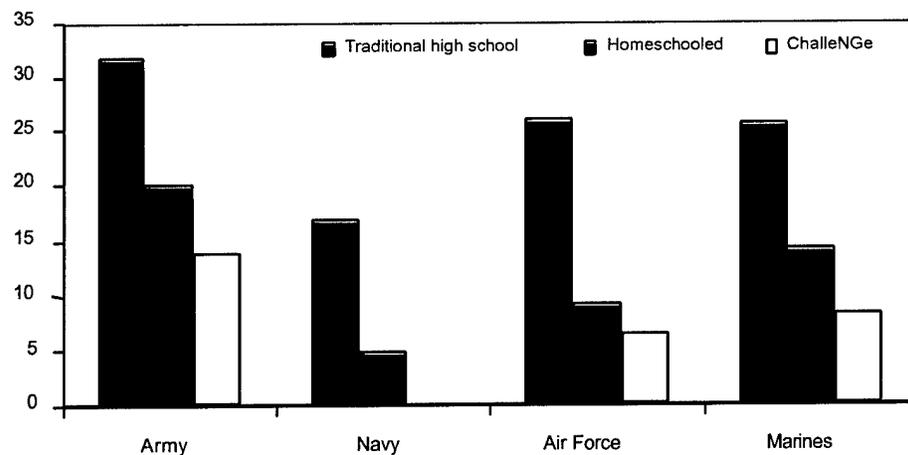
It is typical for a (non-prior-service) recruit to enter the Service at the initial paygrade (E-1). In fact, 73 percent of our sample enters at paygrade E-1.¹⁰ However, there is substantial variation in initial paygrades, both across the Services and across education credentials. Figure 3 shows the proportion of recruits who enter at an advanced paygrade (E-2 or higher), by Service and education credential.¹¹ This figure illustrates several findings: first, Army recruits are most likely to enter at advanced paygrades. Second, among the education credentials shown, those with a traditional high school diploma are

10. We have no information on the initial paygrade of 20 percent of the sample. Rather than assume that these people enter as E-1s, we exclude them from this section of the analysis. Therefore, the figure cited above (73 percent) is the percentage conditional on having information about the recruit's initial paygrade. We have initial paygrade information on almost all Army recruits but are missing information on roughly one-quarter of Air Force recruits and one-third of Marine and Navy recruits. In general, the paygrade is no more likely to be missing for homeschooled or ChalleNGe recruits than for others, but initial paygrade is missing for over half of all ChalleNGe recruits in the Air Force.

11. Most recruits who enter at an advanced paygrade enter at E-2. Some of the Services routinely award higher paygrades for specialties, such as entering the nuclear field in the Navy, or for possessing college credits.

the most likely to enter at advanced paygrades.¹² Homeschooled recruits are much less likely to enter at an advanced paygrade than recruits who graduated from traditional high schools and ChalleNGe recruits are even less likely to enter at an advanced paygrade.¹³ Although not shown in figure 3, ChalleNGe recruits in the Army are more likely to enter at advanced paygrades than either GED recruits or recruits who have no education credential. (ChalleNGe recruits are also more likely than GEDs or dropouts to enter the Marines at advanced paygrades, but the differences are very small in this case.) Therefore, to the extent that entering the Service at a paygrade of E-2 or higher indicates recruit desirability, this measure suggests that homeschooled recruits are of slightly lower quality than other high school graduates. By this measure, ChalleNGe recruits are of much lower quality than other Tier 1 recruits, but perhaps of higher quality than recruits with similar credentials in some of the Services.

Figure 3. Percentage of recruits who enter at advanced paygrade



12. Although we do not include them in this table, those with college degrees are also likely to enter at advanced paygrades.

13. The differences between traditional high school recruits and homeschooled and ChalleNGe recruits respectively are significant at the two percent level or better in each Service, with one exception. The difference between traditional high school recruits and ChalleNGe recruits in the Air Force is only significant at the ten percent level.

Promotion

Because we do not have a complete record of the level and date of each promotion experienced by each recruit, we need to exercise care when comparing promotion records. Specifically, we need to avoid comparing the final paygrade of a recruit who left the Services early with the paygrade of a recruit who completed his or her first term, and perhaps even reenlisted. For this reason, when we compare paygrades as of June 2003, we limit our analysis to recruits who have completed roughly the same number of months of service.

We form our sample from those recruits who are still in the Services as of June 2003. These recruits all have between 41 and 50 months of experience in the Services. We find no substantial differences in terms of current paygrade.

Waivers

The Services assign waivers to enlistees for a number of different reasons. Examples include height/weight, age, having dependents (including a spouse in the military), and aptitude (i.e., lower score on the AFQT than is required for a given education credential). The Services assign waivers to enlistees who have a history of legal problems, such as minor traffic violations, misdemeanors, and felonies. The Services also assign waivers for those who have a history of using or abusing drugs or alcohol. Each Service assigns waivers based on its own policies; mainly for this reason, the proportion of enlistees with waivers differs dramatically across the Services. In this section, we detail the presence of waivers; we include waivers assigned while enlistees are in DEP (the Delayed Enter Program) as well as enlistment waivers.

Twenty-eight percent of the enlistees in our sample entered the Services with at least one waiver. In this section, we focus on several types of waivers: “legal” waivers as defined above, “serious legal” waivers (which include serious misdemeanors and all felonies—adult or juvenile), and alcohol/drug waivers. These waivers make up only a fraction of the total waivers; about 8 percent of enlistees in the sample have legal waivers, 6 percent have serious legal waivers, and 4 percent have alcohol/drug waivers. Because of the large differences across the Services, we focus on how the prevalence of

waivers differs between homeschooled recruits and traditional high school diploma recruits, as well as between ChalleNGe recruits and traditional high school diploma recruits, *within* each Service. We report only those differences that are statistically significant.

In the Navy, homeschooled recruits are more likely to have a legal waiver, and are more likely to have a serious legal waiver, than traditional high school diploma graduates (see table 2). In the Marines, ChalleNGe recruits are more likely to have an alcohol/drug waiver than traditional high school diploma graduates.¹⁴ Thus, there is no evidence that either homeschooled or ChalleNGe recruits are particularly desirable recruits, based on their incidence of waivers.

Table 2. Percentage with waivers

	Legal	Serious legal	Alcohol/drug
Navy Traditional high school	11.5	10.4	~
Homeschooled	16.8	15.3	~
Marines			
Traditional high school	~	~	17.8
ChalleNGe	~	~	44.0
t-test (level of significance)	t = -2.29 (< 5%)	t = -2.187 (< 5%)	t = -4.81 (< 1%)

Qualification for a rating—Navy

Using CNA's in-house files, we examined the records of all Sailors who filled out our recruit survey to see which ones qualify for a rating.¹⁵ Some qualify for a rating upon initial entry into the Navy; others enter as General Detail (GENDETs). GENDETs may qualify for ratings at various times during their initial obligations, but they

14. In most cases, the differences between homeschooled/ChalleNGe recruits and traditional high school recruits are consistent with those reported in table 2, but the other differences are not statistically significant. The majority of the alcohol/drug waivers assigned by the Marines are for experimentation with marijuana.

15. A Navy rating is the equivalent of a military occupational specialty (MOS) in the other Services; it is essentially a qualification that is necessary for specific jobs requiring advanced training.

must qualify by the end of their obligations to be eligible to reenlist. Among other requirements, recruits must attain cutoff scores on certain ASVAB subtests to qualify for ratings (the requirements vary by rating). Qualifying certainly affects the probability of reenlistment. It could affect the probability of attrition as well because Sailors who qualify for a rating may be more likely to do work they find interesting. Because we have information on recruits only for as long as they remain in the Armed Services, we compare the probability of qualifying for a rating for two groups. First, we estimate the probability for those who remain in the Navy at least 36 months. Second, we measure initial qualification among those who attrite within the first year of their obligation. The results tell us which of these Sailors qualified initially.

Overall, homeschooled Sailors who entered as GENDETs are more likely to qualify for a rating than those who graduated from public schools. ChalleNGe graduates are far less likely to qualify than other groups. Table 3 shows the probability that a person in each group is qualified for a rating. The difference between ChalleNGe and GED recruits is significant at 12 months and marginally significant at 36 months; the difference between homeschooled and public school recruits is significant only for those who remain in the Navy for at least 36 months.¹⁶ Table 3 shows that Sailors holding GEDs are very likely to qualify for ratings mainly because they must score at least 50 on the AFQT, and ratings qualification often requires minimum scores on various ASVAB subtests.

Table 3. Qualification for Navy rating by education credential

Credential	Time in Navy	Percent rated	Time in Navy	Percent rated
Homeschool	< 12 months	69.8	>= 36 months	76.7
Public school	< 12 months	67.5	>= 36 months	68.2
ChalleNGe	< 12 months	46.2	>= 36 months	63.2
GED	< 12 months	73.6	>= 36 months	77.0

16. Results of statistical tests: homeschoolers and public school graduates at 36 months: $t = 1.92$, $p = 0.05$; ChalleNGe and GED recruits at 12 months: $t = 3.09$, $p = 0.0021$; ChalleNGe and GED recruits at 36 months: $t = 1.80$, $p = 0.07$.

Attrition

When we made our interim report, our main results hinged on 12-month attrition rates. Although a substantial proportion of first-term attrition does occur in the first 12 months, 36-month attrition is a more commonly accepted metric. However, because the interim report was written fairly close to the time that the survey was administered, the recruits who answered the survey had not yet been in the military for 36, or even 24, months. In fact, 12 percent of the recruits answering the survey had entered the Armed Services less than 12 months before the initial attrition data were collected.

Now, however, we have enough data to calculate 36-month attrition rates on each survey respondent. We have as much as 51 months of information on some recruits, so we can sometimes calculate 48-month attrition rates. Initially, we provide 12-, 24-, and 36-month attrition rates by key education qualifications and Service. We provide standard errors, along with results for each educational category, in appendix E. We also include attrition rates for three subgroups: ChalleNGe and homeschooled graduates with AFQT scores of 50 or higher, and a restricted sample of homeschooled who were homeschooled for at least 2 years. The first two groups exhibited relatively low 12-month attrition rates (see [2]); the third group meets a more stringent definition of homeschooling suggested by the results of our survey of homeschool associations. Appendix C contains further definitional details.

Table 4 shows 12-month attrition rates by educational category and Service. Overall, homeschooled and ChalleNGe recruits have considerably higher attrition rates than graduates of public or private high schools. In the Army and the Marine Corps, however, the attrition rates of ChalleNGe graduates are at least comparable to those of traditional high school graduates. This difference in 12-month attrition rates is consistent with previous findings [2].¹⁷

17. The attrition numbers in table 3 are not directly comparable to those reported in [2, table 5] for several reasons. First, the DoD numbers above are unweighted; weighted numbers appear in appendix D. Second, this sample does not include 2,161 observations from the initial

Individuals in our restricted homeschooled sample, as well as those in our sample of homeschooled recruits with high AFQT scores, have somewhat lower attrition rates than all homeschooled recruits.

Table 4. Twelve-month attrition rates by educational credential

	Army	Navy	Air Force	Marines	DoD
Homeschooled	22.8	28.4	10.4	27.6	22.6
Restricted homeschooled	22.3	24.8	8.4	30.2	21.2
Homeschooled, AFQT >= 50	21.5	19.0	7.6	22.6	17.2
ChalleNGe	12.7	33.3	37.9	16.0	23.4
ChalleNGe, AFQT >= 50	6.3	28.1	42.9	18.2	21.0
Public HS grad	17.0	17.6	8.2	15.0	14.6
Private HS grad	17.1	21.0	8.9	15.2	15.9
GED	31.3	32.2	18.9	28.6	31.1
Dropout	28.7	30.7	11.6	23.2	28.4
Overall *	18.6	21.0	8.5	16.2	16.6

* Overall figures reflect total attrition, by branch and for all Services combined, rather than the average of the figures shown for each branch because some education credentials are not included in the table. See appendix E for results on other education credentials, confidence intervals, and weighted DoD-wide results.

sample because we do not have complete information (see appendix C). Third, while preparing this report, we discovered that the 12-month attrition numbers used in [2] did not include FY99 losses, so the attrition rates reported in [2] were artificially deflated. The differences are largest for the Army because we surveyed many Army recruits during FY99. Our earlier report indicated that many recruits who left the Army soon after entering had actually survived 12 months; when we received updated data from DMDC in FY03, we discovered this discrepancy. The Navy numbers are affected the least because we surveyed most Navy recruits in FY00 and captured almost all of the early Navy attrition. The effects on the Air Force and Marine Corps are moderate. We will issue an erratum in the spring of 2004 detailing differences between these numbers and those in the earlier report. The qualitative findings of the earlier report, however, are unchanged.

Throughout this section, we define educational credential based on the recruit survey, *not* on the recruit's official record. We do this because, as detailed in [2], there are substantial discrepancies between recruits' official credentials and the credentials recruits themselves report on the survey. We believe the survey credentials to be more accurate than the official records because, in the majority of discrepancies, recruits indicate to us that they have fewer educational qualifications than their records indicate (for example, some individuals' records indicated that they held GEDs, but the individuals indicated on the survey that they held no credential). In the next section, we report attrition rates based on recruits' official credentials and discuss the extent to which the official credentials disagree with the survey results for homeschooled and ChalleNGe recruits.

For the purposes of calculating attrition rates, we do not count certain types of losses as attrition. For example, those who become officers are not considered attrites, nor are those who leave the Services after completing their obligation. Finally, in this section we report unweighted attrition figures. Weighting does not affect the attrition rates reported for each education credential by Service, but it does affect that DoD averages. See appendix E for a complete discussion of various weighting schemes, as well as weighted results for all survey respondents and confidence intervals.

Next, we present 24-month attrition rates in table 5. By the 2-year point, both homeschooled recruits and ChalleNGe recruits exhibit attrition rates that are uniformly higher than the rates of traditional high school graduates. Rates for the restricted sample of homeschooled recruits, as well as those with high AFQT scores, are slightly lower than rates for all homeschoolers but well above those of traditional high school graduates. At this point, the attrition rates of homeschooled recruits are comparable to those of dropouts. Attrition rates of ChalleNGe recruits are also similar to those of dropouts, with the exception of those in the Army.

Table 5. Twenty-four-month attrition rates by educational credential

	Army	Navy	Air Force	Marines	DoD
Homeschooled	32.9	40.0	21.6	32.9	32.8
Restricted homeschooled	31.9	35.7	21.7	35.8	31.5
Homeschooled, AFQT \geq 50	31.2	30.5	18.5	28.3	27.1
ChalleNGe	26.6	44.4	58.6	28.0	36.8
ChalleNGe, AFQT \geq 50	21.9	37.5	64.3	36.4	36.0
Public HS grad	23.7	23.8	13.8	19.7	20.6
Private HS grad	26.0	26.0	15.3	20.8	22.5
GED	43.7	43.8	27.8	34.9	42.5
Dropout	39.1	41.5	18.9	30.3	38.5
Overall *	26.0	28.2	14.2	21.0	23.1

* Overall figures reflect total attrition, by branch and for all Services combined, rather than the average of the figures shown for each branch because some education credentials are not included in the table. See appendix E for results on other education credentials, confidence intervals, and weighted DoD-wide results.

Table 6 shows 36-month attrition rates by education credential. At this point, the attrition rates of homeschooled and ChalleNGe recruits are substantially above those of traditional high school graduates. Again, the rates are most comparable to those of dropouts. Also, attrition rates of the restricted samples are uniformly close to those of all homeschooled recruits.

When possible, we present 48-month attrition rates on the limited sample of recruits who entered the military at least 48 months before June 2003. Because of the order in which we surveyed recruits and our sample sizes, only in the case of the Army do we have enough recruits with at least 48 months of potential experience to report attrition rates. As table 7 shows, 48-month attrition rates of homeschooled and ChalleNGe recruits in the Army remain well above those of traditional graduates.

Table 6. Thirty-six-month attrition rates by education credential

	Army	Navy	Air Force	Marines	DoD
Homeschooled	39.6	45.3	28.8	38.2	38.9
Restricted homeschooled	39.4	42.6	30.1	41.5	38.7
Homeschooled, AFQT >= 50	37.6	35.2	23.9	30.2	32.1
ChalleNGe	45.6	51.9	62.1	40.0	48.5
ChalleNGe, AFQT >= 50	43.5	43.8	64.2	45.5	47.0
Public HS grad	29.0	28.5	18.3	23.8	25.4
Private HS grad	31.9	30.0	19.5	25.0	27.1
GED	50.8	51.1	34.4	39.7	49.6
Dropout	47.6	48.7	24.2	37.2	46.0
Overall *	31.6	33.3	18.7	25.5	28.2

* Overall figures reflect total attrition, by branch and for all Services combined, rather than the average of the figures shown for each branch because some education credentials are not included in the table. See appendix E for results on other education credentials, confidence intervals, and weighted DoD-wide results.

Table 7. Forty-eight-month attrition rates

	Army	Navy	Air Force	Marines
Homeschooled	43.4	~	~	~
Restricted homeschooled	43.5	~	~	~
Homeschooled, AFQT >= 50	41.5	~	~	~
ChalleNGe	47.9	~	~	~
ChalleNGe, AFQT >= 50	47.1	~	~	~
Public HS grad	34.7	~	~	~
Private HS grad	36.6	~	~	~
GED	53.7	~	~	~
Dropout	52.5	~	~	~
Overall *	38.4	~	~	~

* Overall figure reflects total Army attrition. This figure is not the average of the figures in the table because not all education credentials are included.

~ Too few observations to calculate reliable reenlistment rate.

Attrition based on official educational credential

Next, we look at attrition rates based on the education credential listed on each recruit's official record. Table 8 shows 12-month attrition rates for recruits with each of five different education credentials. As in table 4, ChalleNGe recruits have lower 12-month attrition rates than traditional graduates in the Army, but ChalleNGe recruits in the Marine Corps exhibit higher attrition rates than traditional graduates. Another large difference between table 4 and table 8 is that, according to DMDC's official records, homeschooled recruits in the Air Force exhibit *very* low levels of attrition. After discussing 24-, 36-, and 48-month attrition rates based on DMDC's records, we test the hypothesis that misclassification could explain the differences between these tables.

Table 8. Twelve-month attrition rates by DMDC education credential

	Army	Navy	Air Force	Marines	DoD
Homeschooled	25.0	29.2	6.9	32.3	25.5
ChalleNGe	12.7	38.6	33.3**	20.7	26.1
High school	17.1	18.4	8.5	15.3	15.0
GED	32.0	32.2	13.5	27.8	31.1
Dropout	16.7	32.0	0.00	28.9	31.3
Overall *	18.6	21.0	8.5	16.2	16.6

* Overall figures reflect total attrition, by branch and for all Services combined, rather than the average of the figures shown for each branch because some education credentials are not included in the table. **Extremely small sample.

Table 9 shows 24-month attrition rates. At this point, ChalleNGe graduates in each Service and homeschooled recruits in the Army, Navy, and the Marines have substantially higher rates of attrition than traditional graduates.

Table 9. Twenty-four-month attrition rates by DMDC education credential

	Army	Navy	Air Force	Marines	DoD
Homeschooled	37.5	40.6	13.8	32.3	34.9
ChalleNGe	32.7	48.2	66.7**	34.5	40.2
High school	24.1	24.6	14.3	20.0	21.1
GED	43.5	43.1	18.0	33.9	41.7
Dropout	25.0	42.9	16.7	42.1	42.3
Overall *	26.0	28.2	14.2	21.0	23.1

* Overall figures reflect total attrition, by branch and for all Services combined, rather than the average of the figures shown for each branch because some education credentials are not included in the table. **Extremely small sample.

Table 10 shows 36-month attrition rates. At this point, homeschooled and ChalleNGe recruits have higher attrition rates than traditional recruits, with the exception of homeschooled recruits in the Air Force.

Table 10. Thirty-six-month attrition rates by DMDC education credential

	Army	Navy	Air Force	Marines	DoD
Homeschooled	44.6	45.8	17.2	45.2	41.5
ChalleNGe	45.5	57.8	66.7**	48.3	51.8
High school	29.6	29.2	18.9	24.4	26.0
GED	50.6	50.2	20.7	39.1	48.5
Dropout	25.0	50.1	16.7	42.1	49.1
Overall *	31.6	33.3	18.7	25.5	28.2

* Overall figures reflect total attrition, by branch and for all Services combined, rather than the average of the figures shown for each branch because some education credentials are not included in the table. **Extremely small sample.

Finally, table 11 shows 48-month attrition rates for the Army. Again, attrition rates of homeschooled and ChalleNGe recruits are substantially higher than those of traditional graduates.

Table 11. Forty-eight-month attrition rates by DMDC education credential

	Army	Navy	Air Force	Marines	DoD
Homeschooled	50.0	~	~	~	~
ChalleNGe	51.7	~	~	~	~
High school	35.4	~	~	~	~
GED	53.4	~	~	~	~
Dropout	44.4**	~	~	~	~
Overall *	38.4	~	~	~	~

* Overall figure reflects total Army attrition. This figure is not the average of the figures in the table because not all education credentials are included. ** Extremely small sample size.

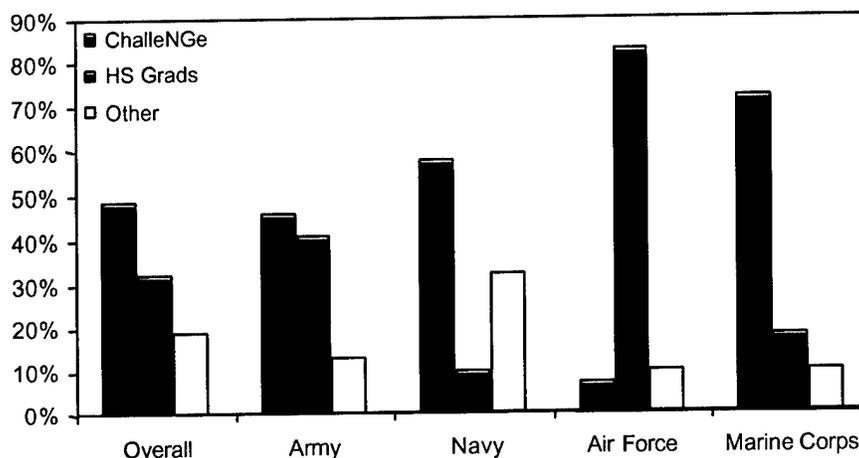
In summary, when we calculate attrition rates by educational credential using recruits' official records, the broad picture agrees with our findings in the previous section. That is, ChalleNGe and homeschooled recruits generally have higher attrition than traditional graduates. However, it is interesting to note that using recruits' official records to calculate attrition rates produces *higher* absolute attrition rates for both ChalleNGe and homeschooled recruits than using survey results in most cases. Thus, using official records to calculate attrition rates makes both homeschooled and ChalleNGe recruits look worse than using survey results. The exception to this is the differences in the attrition rates of homeschooled recruits in the Air Force. Calculating attrition based on the recruit's official record produces much *lower* attrition rates for homeschooled Air Force recruits than does repeating the same calculation using information from the recruit survey. One potential reason for these discrepancies is misclassification; if the education credentials on the official records and those collected as part of the survey disagree in a systematic way, it could explain this difference. To explore this possibility, we next compare the education credentials from the two different sources.

Misclassification of homeschooled and ChalleNGe recruits

Of the 239 respondents who indicate on their recruit survey that they both completed the ChalleNGe program and earned a GED, 117 (49 percent) are classified as ChalleNGe graduates on their official record. Another 77 (32 percent) are classified as high school graduates. Roughly 8 percent are classified as having a GED and the

other 11 percent are scattered throughout other educational credentials. As shown in figure 4, this pattern varies by Service. The Marines are most likely to list ChalleNGe graduates correctly, while over 80 percent of ChalleNGe graduates in the Air Force are listed as traditional high school graduates.

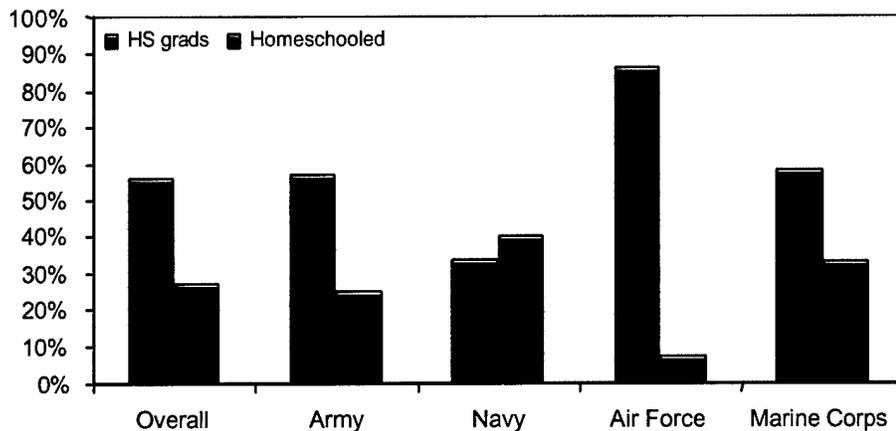
Figure 4. DMDC listing of ChalleNGe survey respondents



According to official records, 199 of the survey respondents are ChalleNGe graduates. Sixty percent of these indicate on the recruit survey that they are, in fact, ChalleNGe graduates. Thirteen percent, however, indicate that they are dropouts, holding no credential at all, and another nine percent indicate that they hold GEDs but did not complete ChalleNGe programs. In this case, the differences are similar by Service. This is an explanation for the different attrition results found in tables 4-7 versus tables 8-11 for ChalleNGe recruits; many of those whose records indicate they are ChalleNGe graduates are actually dropouts or simply hold GEDs; these groups traditionally have high attrition rates. Therefore, when we calculate attrition rates in tables 8-11 using official records we are including some Tier 2 and 3 recruits with the ChalleNGe recruits; this increases the attrition rate we observe.

In the case of the 540 recruits who indicated on the survey that they were homeschooled, more than half (56 percent) are listed as traditional high school graduates according to DMDC's records. Twenty-seven percent are actually listed as homeschooled. This proportion varies somewhat by Service, as figure 5 shows. Homeschooled recruits in the Navy are most likely to be listed as homeschooled on their official records, but only 7 percent of Air Force recruits who indicated on the survey that they were homeschooled are officially listed as homeschooled recruits.

Figure 5. DMDC listing of homeschooled survey respondents



When we look at the 212 recruits who are homeschooled according to DMDC's records, we find that 69 percent indicated on the survey that they were homeschooled. Eight percent did not give us enough information on the survey to determine their education credential. Seven percent indicated on the survey that they had completed Associate's degrees.

Again, differences across the Services are substantial. In the Army, Marine Corps, and Navy, 66 to 80 percent of those who are officially classified as homeschooled indicated the same on the recruit survey. However, 52 percent of Air Force recruits officially classified as homeschooled indicated on the survey that they hold Associate's

degrees.¹⁸ This is the source of the differences between Air Force homeschooled attrition rates in tables 4-6 versus tables 8-10. Recruits with Associate's degrees have very low attrition rates (the 24-month attrition rates are 24 percent across the Services and 10 percent in the Air Force, calculated using responses to the recruit survey). Therefore, because DMDC's records call a number of people with Associate's degrees homeschooled, this makes the attrition rates of homeschooled recruits in the Air Force appear to be very low.

General indications are that the Services do not do a particularly accurate job of coding (or determining) which recruits are homeschooled or ChalleNGe graduates. Also, official records identify fewer homeschooled and ChalleNGe recruits than do our survey results. Without the ability to accurately classify recruits, it will be very difficult for the Services to accurately track the progress of these recruits.

Attrition rates over time

To supplement our detailed analysis of the 67,000 recruits we surveyed in 1999 and 2000, we asked DMDC to calculate attrition rates of *all* homeschooled, ChalleNGe, traditional high school diploma, and GED recruits who entered the Services immediately before and during the 5-year pilot program. This dataset allows us to make sure that the cohort we followed over time is similar to other cohorts entering during the pilot program. This dataset does not allow us to check education credentials as we were able to do on the survey; in this case, we use official education credentials to classify recruits.

18. The sample of Air Force recruits listed as homeschooled in DMDC's records is very small; the total number is only 29. Most Air Force recruits with Associates' degrees are not, in fact, classified as homeschooled; however, because the number of homeschooled Air Force recruits is so small, misclassifying 15 recruits has a dramatic effect on the calculated attrition rate. This misclassification issue may stem from variation between the Air Force's codes and those used by the other Services as detailed by [17].

Therefore, we expect these attrition rates to be more similar to those shown in tables 8–11 than in tables 4–7.

Attrition rates over the entire time period for all four Services are shown in table 12. Overall attrition rates are weighted by the number of enlistees in each category (see appendix E for more discussion on weighting). Attrition rates by Service are fairly constant over time. Rates by Service for each fiscal year appear in appendix F.¹⁹

Table 12. Attrition rates over time, FY96-FY02

	Total number of accessions	6-month attrition	12-month attrition	24-month attrition	36-month attrition
Traditional high school graduates	1,082,278	12.6	16.4	23.1	28.7
Homeschooled graduates	2,845	18.7	26.1	35.9	42.7
ChalleNGe graduates	3,059	14.6	21.9	38.0	49.2
GED holders	75,075	21.4	27.9	39.7	47.6

In general, the attrition rates of both homeschooled and ChalleNGe recruits over time are quite similar to those shown in tables 8–11. In particular, both homeschooled and ChalleNGe recruits have higher attrition rates than traditional high school diploma graduates. This pattern generally holds for each year, although attrition rates for homeschooled recruits seemed to be somewhat lower before FY99.²⁰

19. We do not have enough information to calculate 36-month attrition rates on enlistees from FY01 or 24- or 36-month attrition rates on enlistees from FY02. Navy homeschooled recruits from FY99 are not included in these numbers because a substantial number of these enlistees did not have legitimate homeschooled credentials; including them increases overall attrition rates for homeschooled enlistees by 3 to 5 percentage points.

20. The number of homeschooled recruits was very small before FY99; see appendix F. Slight decreases in the attrition rates of homeschooled recruits in the Marines and the Navy over the last FY are included in these data; again, see appendix F.

Because DMDC calculates 6- and 12-month attrition, its figures reveal that ChalleNGe recruits actually begin to fall behind before the end of the first year. Therefore, using DMDC's data makes it clear that, although ChalleNGe recruits have relatively low attrition rates for the first 6 months, their attrition rises rapidly after that. As is the case with our survey data, the low initial attrition rates of ChalleNGe recruits in the first 6 months are driven by ChalleNGe recruits in the Army and the Marines; ChalleNGe recruits in the Navy resemble Tier 2/3 recruits even within the first 6 months. (The sample of Air Force ChalleNGe recruits is extremely small.)

Attrition rates for all homeschooled and ChalleNGe recruits during the entire period of the pilot project are quite consistent with the attrition rates exhibited by the recruits in our sample. Therefore, we are confident that the attrition rates we calculate above are *not* specific to recruits who entered the Services between March 1999 and February 2000. Attrition behavior of homeschooled and ChalleNGe recruits who entered after February 2000 is quite similar to that of the recruits in our sample. Overall, homeschooled and ChalleNGe recruits had much higher attrition rates than traditional high school diploma graduates throughout the 5-year pilot program.

Summary of attrition rates

Both homeschooled and ChalleNGe recruits have higher attrition rates than traditional high school graduates. This is true for all four Services combined at the 12-, 24-, and 36-month points, and for the Army at 48 months (we have too few observations to calculate 48-month attrition rates for the other Services). Our interim report [2] detailed the relatively low 12-month attrition rates of homeschooled recruits with AFQT scores of 50 or better. At 24 months, this group continues to have lower attrition rates than other homeschooled recruits but displays rates that are somewhat higher than traditional high school diploma graduates. By 36 months, this group of high-scoring homeschooled recruits still exhibits attrition rates that are slightly lower than all homeschoolers, but substantially higher than traditional high school graduates. The restricted homeschool sample (including those with at least 2 years of homeschooling) exhibits attrition rates that are roughly equal to those of all homeschooled

recruits, indicating that restricting entry of homeschooled recruits in this manner will *not* decrease attrition rates.

The story of Challenge recruits is similar. While Challenge recruits in the Army and the Marines initially exhibit relatively low attrition rates (equal to or less than those of traditional graduates), by 24 months Challenge graduates exhibit attrition rates that are uniformly higher than those of traditional graduates. (The DMDC data suggest that Challenge recruits' attrition rates actually begin to increase sharply between 6 and 12 months.) At 36 months, Challenge graduates have attrition rates that are at least on a par with GED and dropout recruits. In the Army, Challenge recruits also exhibit very high 48-month attrition rates. Finally, even Challenge recruits with AFQT scores of 50 or higher exhibit high attrition rates by 24 and 36 months.

As an additional check, we requested that DMDC calculate attrition rates for all homeschooled and Challenge recruits who entered the Services immediately before or during the pilot program. Attrition rates of homeschooled and Challenge recruits across the entire time period were substantially higher than those of traditional high school graduates. In fact, the attrition rates calculated by DMDC are higher than those calculated using our survey information (as expected, they are on a par with the rates calculated for our sample using official credentials). Therefore, whether we use information from the recruit survey or official records to classify recruits' educational credential, and whether we use our sample or a sample of all recruits to enter during the pilot program, overall attrition rates of homeschooled and Challenge recruits are substantially higher than those of traditional high school graduates.

Trends in recruiting homeschooled and Challenge graduates

To track trends in recruiting homeschooled and Challenge graduates over time, we requested that DMDC provide a file of all enlisted Challenge and homeschooled Servicemembers. The dataset included observations from FY93 through FY02. (Recall that, begin-

ning in FY99, these recruits were classified as Tier 1.) For comparison purposes, we also requested that all enlistees holding (only) GEDs be included in the file.

As shown in figure 6, the percentage of ChalleNGe recruits recorded was zero before 1998; the percentage of homeschooled recruits was extremely small.²¹ Figure 6 also demonstrates that, while the numbers were growing over time, the percentage of homeschooled and ChalleNGe recruits remained very small compared with both the total number of recruits and the number of recruits with GEDs.²²

Figure 6. Percentage of recruits, by education credential

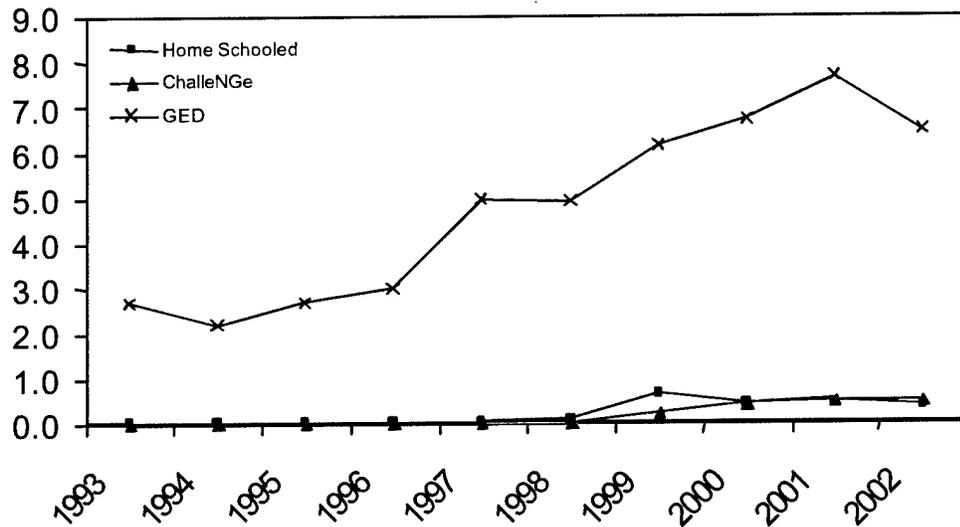


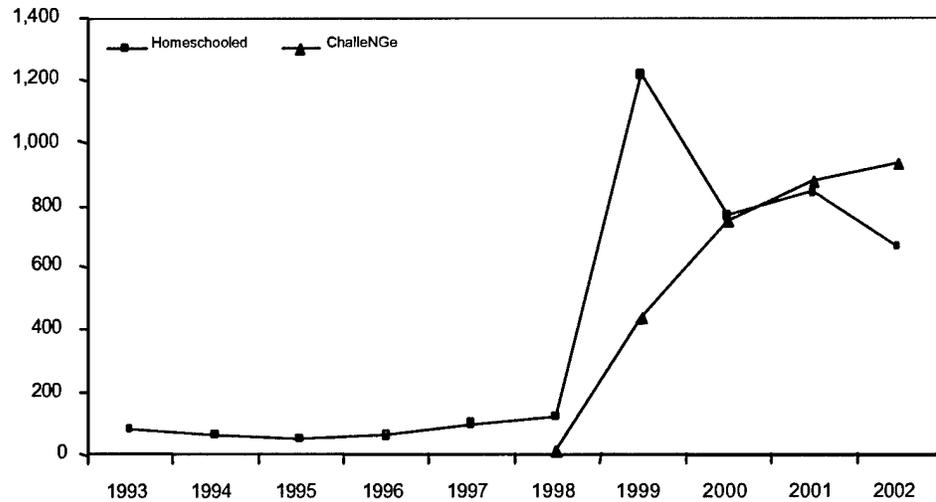
Figure 7 includes only homeschooled and ChalleNGe recruits; this graph indicates the total number of recruits rather than the proportion. This figure indicates that the number of homeschooled re-

21. ChalleNGe recruits were not tracked by DMDC or the Services before 1998. A small number may have been admitted; those holding GEDs would have been treated identically to other GED holders, while those without GEDs would have been classified as Tier 3.

22. Although the overall number of accessions fell during this time period, the number of accessions with GEDs increased substantially—from ~5,500 in 1993 to ~14,000 in 2001 and nearly 12,000 in 2002.

cruits peaked in 1999, while the number of ChalleNGe recruits increased steadily over the time period.

Figure 7. Number of recruits by educational credential

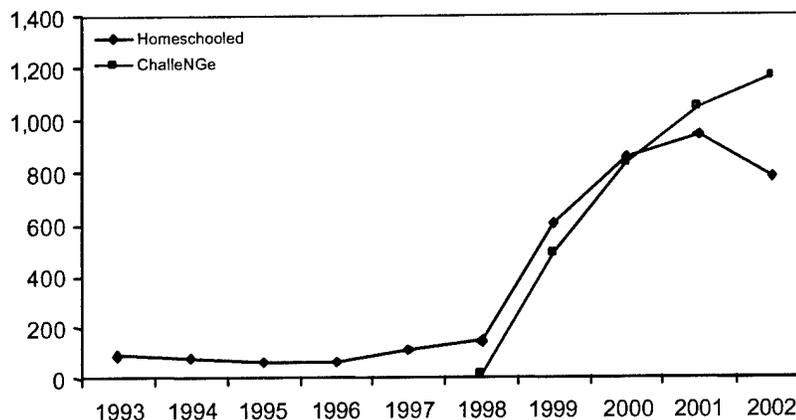


When we examine these data by Service, we find that the increasing proportion of GED recruits is driven largely by the Army. Also, the sharp increase in homeschooled recruits during FY99 was driven by the Navy. During this period, the Navy's recruiting policy on homeschooled enlistees was not well articulated, and many Navy recruits officially classified as homeschooled during FY99 actually held no credential. It appears that this problem was most severe between March and July 1999. When we exclude *all* Navy homeschooled recruits during this time period, the proportion of homeschoolers looks somewhat different (see figure 8).²³ Even with this exclusion, however, it appears that the recruitment of homeschoolers may have peaked in the Services by 2001. Numbers for the Navy and Marines

23. Conversations with Navy representatives indicate that they believe the average quality of homeschooled recruits is much higher today than in FY99. While more research is necessary to reach firm conclusions about the quality of current homeschooled recruits, average AFQT scores of this group increased after FY99. As of FY02, Navy homeschooled recruits' average AFQT score was above 60.

indicate that these two branches continued to recruit fewer homeschoolers in the initial quarters of FY03 than they had in earlier years. Finally, the percentage of ChalleNGe recruits accessed by the Army, Navy, and Marines has grown modestly over the last 5 years; the Air Force continues to recruit very few ChalleNGe graduates.

Figure 8. Number of recruits by education credential*



* This sample excludes homeschoolers who entered the Navy between March and July 1999.

Reasons for separation

Our data include a separation code for each recruit who left the military between the date of entry and June 2003. The Services report a separation code for each person who leaves active duty, whether before or at the end of his or her obligation. The information contained in the separation codes should be used with caution because there is evidence that the codes are limited in their ability to reflect the sometimes complex reasons that people have for leaving the Services.²⁴

Keeping these caveats in mind, we aggregate the separation codes into several categories (see table 13). In general, we divide the codes into “positive” and “negative.” Positive codes include reaching the end of

24. Potential problems stem from the fact that each record includes only one separation code, and that codes are often entered by relatively junior personnel. For more details of problems with separation codes, see [3] and [18].

obligation and becoming an officer; negative codes include various types of unsatisfactory performance.²⁵ Again, we see cross-Service differences that suggest these numbers should *not* be used to compare one Service to another. For example, the Army has far more losses (both in terms of total number and percentage of survey respondents) than any other Service. In the case of the Army, however, the majority of the losses are positive losses; this is not true of any other Service. This occurs for two reasons. First, the Army offers short (less than 4-year) obligations to more recruits than the other Services. Second, because of the order in which the Services were surveyed, we have at least 48 months of information on many Army recruits, but on very few recruits from the other Services. For these reasons, an Army recruit is far more likely to have reached the end of his/her obligation by June 2003 than a recruit in any of the other Services.

Table 13. Percentage of losses by type

	Army	Navy	Air Force	Marines
Positive	35	2	3	1
Negative	48	36	27	28
Personnel remaining	17	62	75	71

Comparing positive and negative losses across education credentials within each Service shows that both homeschooled and ChalleNGe recruits are more likely than traditional high school graduates to leave the Services for negative reasons, although ChalleNGe recruits in the Marines are the exception (see table 14). Especially in the Army, both homeschooled and ChalleNGe graduates “look like” GEDs and dropouts in terms of the proportion who have negative losses. When we examine these codes more closely, we find that ChalleNGe recruits in the Army are particularly likely to leave the Army due to discreditable incidents, as well as for “unknown” reasons. (“Discreditable incidents” is a category that includes a wide va-

25. A given code may be considered either positive or negative depending on when it occurs in relation to a person’s obligation. Also, such aggregation may actually improve the quality of the information if, for example, people leave for several reasons that all fall into the same aggregated category.

riety of behaviors viewed as negative, but not severe enough to result in a court-martial).

The sample sizes are *very* small at this point (we have only 37 ChalleNGe recruits who are coded as leaving the Army with a negative loss code), so in most cases the differences are not statistically significant. However, we can say that both ChalleNGe and homeschooled recruits are more likely than other recruits to leave the (combined) Services for negative reasons. In addition, we can say that ChalleNGe and homeschooled recruits are more likely than other recruits to leave the Army for negative reasons. This suggests that those ChalleNGe and homeschooled recruits who leave the Services are not viewed as particularly desirable Servicemembers at the time of their departure.

Table 14. Percentage of losses classified as negative

	Army	Navy	Air Force	Marines
Homeschooled	53	95	93	100
ChalleNGe	58	98	100	91
Public school	39	94	87	95
GEDs	60	98	87	100
Dropouts	59	99	89	98

Category of discharge

Type of discharge may provide a more accurate measure than the separation code of the circumstances under which a person leaves the Service. Discharges can be categorized in several different ways. We group discharge categories as follows: “Honorable” (including “Honorable” and “Under honorable conditions”), “Less than honorable” (including “Bad conduct,” “Under other than honorable conditions,” and “Dishonorable”), “Uncharacterized” (used mainly for those with a series of minor disciplinary infractions), and “Unknown.” Across the Services, there are large differences in the percentage of discharges coded in each category. Therefore, we focus on within-Service differences across education credential. Specifically, we compare homeschooled and ChalleNGe recruits with traditional high school diploma graduates. In each Service, more homeschooled recruits than traditional high school recruits receive

“Less than honorable” discharges. In each Service except the Air Force, ChalleNGe recruits receive more “Less than honorable” discharges than traditional high school recruits; in the Air Force, ChalleNGe recruits receive fewer “Honorable” discharges but more “Uncharacterized” discharges. In many cases, however, these differences are not statistically significant. Table 15 reports only those instances when the differences are statistically significant. Both the overall pattern and the statistically significant cases do not reflect positively on either homeschooled or ChalleNGe recruits; discharge codes indicate that when these recruits leave the Services, they are viewed as less desirable than traditional high school graduates.

Table 15. Percentage of leavers in each discharge category

		Army	Navy	Air Force	Marines
Traditional high school graduates:	“Honorable”	61	45	70	21
	“Less than honorable”	1.7	17	3.1	18
	“Uncharacterized”	37	11	21	31
	“Unknown”	0.3	27	5.9	30
Homeschooled recruits:	“Honorable”	~	35**	~	3.0***
	“Less than honorable”	~	~	~	~
	“Uncharacterized”	~	~	~	52***
	“Unknown”	1.6***	~	~	~
ChalleNGe recruits:	“Honorable”	~	24***	~	~
	“Less than honorable”	5.6***	~	~	39***
	“Uncharacterized”	~	20**	39*	~
	“Unknown”	~	~	~	~

Note: * Statistically significant at the 90% level or better.

** Statistically significant at the 95% level or better.

*** Statistically significant at the 99% level or better.

Eligibility for reenlistment

We also have information on the eligibility of those who left the Services. Each Service codes each loss record based on whether that person would have been eligible to reenlist. The codes vary across Services; therefore, we recommend that they not be used for cross-Service comparisons. However, it is interesting to look at the eligibility levels across education credentials within each Service.

First, we aggregated the eligibility codes into four categories: “eligible to reenlist,” “ineligible to reenlist,” “needs a waiver to reenlist,” or “unknown.”²⁶ Next, we examined all the people who filled out our survey but subsequently left the Services (between the date of the survey and June 2003). Roughly 16 percent of those who left the Services were coded as “eligible to reenlist.” Table 16, however, makes the point that cross-Service comparisons are not appropriate on this metric. This is true both because of differences in coding eligibility and because of cross-Service differences in the average amount of time between the survey and June 2003. Table 16 makes it clear that the first reason is probably more relevant; both the Navy and the Marine Corps code the vast majority of recruits who leave as ineligible to reenlist, while the Army and the Air Force code at least a fifth of those who leave as eligible to reenlist (and the Army codes roughly another 30 percent as eligible, conditional on receipt of a waiver).

Table 16. Percentage of departing recruits who are eligible to reenlist

	Army	Navy	Air Force	Marines
All recruits	20.1%	2.5%	24.6%	3.0%
Homeschooled	15.2%	3.2%	13.3%	3.5%
ChalleNGe	11.6%	2.2%	11.1%	4.4%
Public school	19.8%	3.3%	24.3%	3.3%
GEDs	23.1%	0.5%	15.4%	0.0%
Dropouts	18.1%	0.8%	19.2%	2.2%

Next, keeping the foregoing caveat in mind, we examine how reenlistment eligibility varies by education credential within each Service. In the cases of the Army, the Navy, and the Air Force, the Services are less likely to code either homeschooled recruits or ChalleNGe recruits as eligible to reenlist, compared with traditional graduates. (The differences are very small in the Navy.) In the case of the Army and the Air Force, GED holders and dropouts are also more likely than homeschooled or ChalleNGe recruits to be coded

26. Because eligibility codes are highly detailed and differ across the Services, we aggregated the codes into these four consistent categories. Only the Army uses the “needs a waiver” category.

as eligible. In the case of the Marines, both homeschooled and ChalleNGe graduates are slightly *more* likely than traditional graduates to be considered eligible.²⁷ This suggests that, especially in the Army and the Air Force, the Services do not view either homeschooled or ChalleNGe recruits as high quality at the time that they leave the Service.

Summary of results

By most measures, both homeschooled and ChalleNGe GED recruits have poorer performance than traditional high school graduates. ChalleNGe graduates in particular enter the Services with low AFQT scores; homeschoolers' scores are similar to those of public school graduates but noticeably lower than those of private school graduates.

Homeschooled recruits have uniformly higher attrition rates than traditional graduates. This is true for 12-, 24-, and 36-month attrition, and for 48-month attrition in the Army (the Army is the only branch with enough observations to measure 48-month attrition). This finding remains when we measure attrition based on recruits' official education credential, as opposed to using recruits' responses to the Survey of Recruits' Education and Background. (Homeschooled recruits in the Air Force exhibit very low attrition rates when we measure attrition based on official educational credential, but we demonstrate that this is due to the tendency of the Air Force to classify recruits with Associate's degrees as homeschooled.) We test two subsamples of homeschooled recruits: those with high AFQT scores and those with more than 1 year of homeschooling. Like all homeschooled recruits, these groups exhibit higher attrition than public school graduates.

27. The difference is not statistically significant in the case of homeschooled recruits. However, we can say with 97 percent certainty that ChalleNGe Marines who leave the Service are more likely than public school Marines to be listed as eligible to reenlist.

ChalleNGe recruits exhibit relatively low 12-month attrition rates in the Army and Marines; by the 24- and 36-month points, however, the attrition rates of these ChalleNGe graduates are substantially higher than those of traditional graduates. ChalleNGe graduates in the Navy and Air Force exhibit uniformly high attrition rates. This result does not depend on how we identify ChalleNGe graduates (through our survey results or through official records). By 36 months, attrition rates of ChalleNGe recruits are on a par with those of dropouts and recruits holding GEDs. This suggests that ChalleNGe recruits may experience schoolhouse problems in their training. This is not surprising given their low AFQT scores.

When we look at attrition rates of *all* homeschooled and ChalleNGe recruits during the pilot program, we still find that both groups exhibit higher attrition rates than traditional high school diploma graduates across the time period. Therefore, our results do not depend on the timing of our survey.

In general, results of other performance measures, such as initial paygrade, reason for separation, waiver status, type of discharge, and eligibility to reenlist, are consistent with the attrition findings. By most measures, both homeschooled and ChalleNGe recruits fail to match the performance of traditional high school graduates.

Finally, our results indicate that the Services do not accurately identify all, or even most, homeschooled or ChalleNGe recruits.

Conclusions and recommendations

Both homeschooled and ChalleNGe recruits exhibit high rates of attrition across the four Services. We recognize that 12-month attrition rates are relatively low for some homeschooled and ChalleNGe recruits; namely, ChalleNGe recruits have low 12-month attrition rates in the Army and Marine Corps, and homeschooled recruits with above-average AFQT scores have 12-month attrition rates on a par with those of traditional high school graduates. Over time, however, the attrition rates of these groups increase; by the 36-month mark, all ChalleNGe and homeschooled recruits exhibit substantially higher attrition than traditional high school diploma graduates. Given that tier placement is based on attrition rates, the data do not support considering ChalleNGe or homeschooled recruits on a par with high school diploma graduates or permanently placing these credentials in Tier 1.

In both cases, restricting these recruits to a lower tier will effectively deny entry to many because a substantial minority of homeschooled recruits, and the majority of ChalleNGe recruits, have AFQT scores below 50. In both cases, comparing these recruits to non-enlistees with similar credentials may be misleading. For example, our findings suggest that the homeschoolers recruited by the military are not typical of the population of homeschoolers; research shows that homeschooled students as a group tend to score substantially higher than public school students on a variety of standardized tests.

ChalleNGe recruits have lower AFQT scores than other recruits with GEDs, but this is certainly because (non-ChalleNGe) recruits with GEDs must achieve an AFQT score of 50 or better. It is likely that ChalleNGe recruits enter the Services with high motivation but that their lack of academic preparation is eventually reflected in their 24- and 36-month attrition rates. This finding is not a reflection on the overall value of the ChalleNGe program; in fact, ChalleNGe recruits compare favorably to other Tier 2 recruits in terms of initial

attrition. Those with AFQT scores of 50 or better have somewhat lower attrition rates than all ChalleNGe recruits, suggesting that high-scoring ChalleNGe recruits may perform as well as or better than other groups of Tier 2 recruits (small sample sizes prevent us from determining whether differences between all ChalleNGe graduates and high-scoring ChalleNGe graduates are statistically significant). However, as a group, ChalleNGe recruits' high attrition rates make them inappropriate for Tier 1.

The United States has more than 30 times as many homeschoolers as ChalleNGe graduates with GEDs (see appendix A). However, ChalleNGe graduates have a very high propensity to enlist, while homeschoolers continue to join the military at extremely low rates. The combination of these two trends means that the Services continue to recruit very small numbers of both groups. It is unlikely that the ChalleNGe programs will expand significantly in the near future, so the Services are unlikely to recruit more ChalleNGe graduates over the next few years than they have in the recent past. Despite the potential for growth in the overall number of homeschoolers, this group's low propensity to join the military, coupled with the difficulties in identifying and making contact with homeschoolers, suggests that this group is unlikely to yield a substantial proportion of recruits in the near future. Although there are good reasons to explore recruiting avenues beyond traditional public high schools, given the attrition rates of homeschoolers compared with other high school diploma graduates, homeschooled recruits seem to be a less desirable recruiting market than was originally thought.

Appendix A: Numbers of homeschooled and ChalleNGe youth

The interim report [2] discussed some strategies for recruiting homeschooled and ChalleNGe graduates. The report concluded that ChalleNGe graduates have a high propensity to enlist, while the propensity of homeschoolers is much lower than that of ChalleNGe graduates or of the general population. In this section, we discuss the best estimates of the current numbers of homeschooled and ChalleNGe youth. These numbers, of course, have some bearing on whether the Services are able to recruit successfully from these groups.

Homeschooled youth

It is difficult to estimate the total number of homeschooled students in the United States for several reasons. First, the type of state-level records that exist for public, and even private, schools do not exist for homeschooled students (most national counts of the number of students are built on these state-level records). Second, because they make up a small proportion of all students, very few homeschooled students are likely to be included in national household surveys, which ordinarily provide a second method of estimating the total number of students. A related concern is that parents who homeschool may be especially likely to refuse to respond to such surveys, or to not mention that they homeschool their children (for example, see [19]). Finally, the few surveys that focus on homeschooled children tend to be unrepresentative. However, we examine several potential data sources in this appendix and provide what we believe are reasonable estimates of the number of homeschooled students.

Estimates based on surveys of homeschooled children alone tend to come in at the high end of the range. For example, the Homeschool Legal Defense Association (HSLDA) uses information provided by the National Home Education Research Institute to estimate that nearly 2 million children were homeschooled during the 2001-2002 school year and that 250,000 to 340,000 of those were high school students.²⁸ If these numbers are accurate, more than 3 percent of all students, and roughly 2 percent of all high school students, are homeschooled.

Estimates based on responses to national surveys tend to be much lower. Reference [20], for example, estimated that in 1999 there were about 850,000 homeschooled students, 235,000 of whom were in high school. By those figures, homeschooled students made up 1.7 percent of all students, and 1.7 percent of high school students.²⁹

Reference [21] uses the same data source as [20], as well as two other national surveys, to estimate that there were 640,000 homeschooled students in 1996 and 791,000 in 1999, with an estimated range of growth between -3 percent and +15 percent annually. As of 1999, this author estimates that 28.5 percent of homeschooled students were between the ages of 15 and 17.³⁰

Reference [7] combines information from several different sources to estimate a homeschooled population of approximately 1.0 million students as of 2001 (2 percent of the school-aged population).

28. This information is from <http://www.hslda.org/research/faq.asp#1>. These estimates are calculated by applying a very generous 15-percent annual growth rate to estimates from several years ago.

29. However, because the sample of homeschooled students was extremely small (~275), the confidence intervals around these estimates are wide.

30. In discussing the exact wording of survey questions, this author suggests that one survey probably counts as homeschooled some students who were actually schooled at home by someone paid by the school, as in the case of severe medical problems. However, the problem of non-response, which works to lower estimates below the actual number, is probably bigger, so these numbers likely represent a net underestimate.

This estimate is probably the most accurate of those discussed. Also, this estimate matches fairly closely with our estimates made from Current Population Survey data.

Finally, because homeschooled children move at their own pace and more advanced children often take some courses at private schools or local colleges, it is particularly difficult to estimate how many high school students are homeschooled. However, one interesting point of agreement across estimates is the percentage of homeschooled students who are of high school age. Estimates of this percentage are very close across sources: 27.8 percent [20], 32 percent [19], 27 percent [our calculations using October CPS figures], and 28.5 percent [21].³¹ Thus, if we assume that 28 percent of all homeschooled students are enrolled in grades 9 through 12, and that there are about 1 million homeschooled students, the number of homeschooled high school students is roughly 280,000. If they are distributed equally across grades, there are about 70,000 homeschooled twelfth-graders in the United States. (If, as suggested by [8], the proportion falls off across the grades, the number would be closer to 60,000.) These students, then, make up the potential field of military recruits.

In 1999, there were perhaps 850,000 homeschooled students. Again assuming that 28 percent were in high school, the number of homeschooled twelfth-graders was between 50,000 and 60,000. Taking 55,000 as a median estimate, we know that between FY99 and FY02 inclusive, no more than 3,850 homeschoolers enlisted across the four Services combined (this assumes that all Navy homeschoolers in FY99 were "true" homeschoolers). During this period, there were a total of roughly 730,000 enlistees, so homeschoolers made up about .5 percent of all enlistees. This suggests that homeschooled students enlisted at a rate of 0.1 percent, or 1.1 of every 1,000 homeschooled students (or 2.2 of every 1,000 male

31. Estimates using a much larger sample of all homeschoolers who completed standardized tests through Bob Jones University [8] suggest that 17 percent of homeschoolers are at grade levels 9-12, but this may simply reflect parents' likelihood to use other standardized tests, such as the SAT or ACT, at this point in the students' education.

homeschooled students). This compares with an overall enlistment rate of close to 3 to 5 percent of all high school seniors, or 6 to 10 percent of all male high school seniors.³² Thus, homeschooled students have a much lower propensity to enlist than do students who graduate from public high schools or the ChalleNGe program.

In contrast, 2,941 of the 67,500 enlistees surveyed were graduates of private schools. The total number of private school graduates in 1999 was about 275,000 [16, table 63]. Assuming that half were males, this suggests that male private school graduates enlist at a rate of about 2 in 100. Thus, private school students also seem to enlist at higher rates than homeschooled graduates, although at a lower rate than public school graduates. There are more than four times as many private school graduates as homeschooled graduates in the U.S. today.

ChalleNGe youth

ChalleNGe graduates continue to enlist at relatively high rates; although it is difficult to determine exactly how many ChalleNGe graduates hold GEDs, figures suggest that the programs together graduate at least 2,500 people per year and that nearly two-thirds attained a GED during the program and another 8 percent returned to high school or earned a GED after completing the program [11]. Also, the limited longitudinal data suggest that ChalleNGe graduates may not join the military immediately after graduation, but may choose to do so in the following 2 to 3 years. The Services list roughly 1,000 ChalleNGe recruits per year over the last 3 years. However, we also know that the Services tend to misclassify ChalleNGe graduates (see attrition results). Therefore, we estimate the overall propensity of this group at 25 to 33 percent. This estimate is quite imprecise, but the propensity of ChalleNGe graduates is large enough so that there are actually more ChalleNGe recruits than

32. In truth, male graduates enlist at a lower rate because some enlistees are dropouts. In addition, roughly 18 percent of enlistees as of 1999 were female. However, we use the proportion of enlistees to male graduates as a simple comparison figure.

homeschooled recruits entering the Services today, despite the fact that there are more than 30 times as many homeschooled graduates as ChalleNGe graduates in any given year.

Conclusion

In summary, our figures suggest that homeschooled graduates enlist in the Armed Services at relatively low rates, while ChalleNGe graduates enlist at quite high rates. Although the number of homeschooled graduates has certainly grown somewhat since 1999 and the number of ChalleNGe programs has increased as well, homeschooled graduates still represent a small proportion of all high school graduates. Recent research suggests that the number of homeschoolers could potentially grow to as many as 30 million [21], but we find these growth rates to be quite optimistic. Because much of the alienation with public schools is concentrated among certain subgroups of churchgoing Protestants [22], actual growth over time will probably be quite a bit smaller.³³ ChalleNGe programs, meanwhile, are facing difficult times due to state fiscal crises [12]; there is little reason to expect this program to grow substantially in the near future. Therefore, our best estimates suggest that it is unlikely that the overall number of homeschooled or ChalleNGe recruits will increase dramatically in the near future.

33. The estimates of [21] are based on the number of households with one parent at home part- or full-time.

Appendix B: Copy of recruit survey

This appendix consists of a copy of our Survey of Recruits' Education and Background instrument. We administered this survey to more than 67,000 recruits who enlisted during the 12-month period ending in February 2000.

IMPORTANT: Before you continue, go back to question 4 and make sure you filled a circle for EACH GRADE you finished.

5. Did you finish high school?

- No Yes. If yes, choose the credential(s) you earned when you finished high school. Fill in at least one circle:
- Diploma -- earned from a public or private traditional day school
 - Diploma -- earned from an adult (continuation) school
 - Diploma -- issued by parents or tutors for home schooling
 - Diploma -- issued by an association, school, or state for home schooling
 - Diploma -- issued by a vocational or technical school
 - Diploma -- issued by a correspondence school
 - GED equivalency diploma
 - Certificate -- for high school attendance or completion

6. Did you finish one semester/quarter of college (at least 4 courses)? Do not include advanced placement courses you took in high school.

- No Yes. If yes, fill in your highest level:
- One or more semesters/quarters of college
 - One or more semesters/quarters of vocational college
 - An associate degree
 - A bachelor's or higher degree

7. Did you participate in the National Guard ChalleNGe program?

- No Yes. If yes, did you graduate from ChalleNGe?
- No Yes

8. Were you ever expelled from high school or junior high (intermediate school)?

- No Yes

9. Were you ever suspended from high school or junior high (intermediate school)?

- No Yes

10. If you ever thought about quitting high school, show why. MARK ALL THAT APPLY.

- I never thought about quitting high school
- My family needed money or needed me at home
- I was expelled or suspended
- I was bored, wasn't learning anything useful
- I got married or became a parent
- I was getting bad grades
- I didn't get along with the other students
- The rules were too strict
- I wasn't going to graduate on time
- I didn't get along with the teachers, counselors, or the principal
- I wanted to work full time
- Other reasons

11. During high school, did you participate in any of the following activities? MARK ONE RESPONSE FOR EACH ACTIVITY.

	Did Not Participate	Participated	Participated as a Leader or Officer
Athletic teams	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drama, music, art, chorus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
School clubs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other clubs (Scouts, Y, 4-H, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. During your high school years, what size city or area did you live in?

- Large city (over 300,000 people)
- Suburb of a large city
- Medium sized city (50,000-300,000)
- Small city or town (under 50,000)
- Rural area

13. Are you planning to go to college?
- Yes, while on active duty during this enlistment
 - Yes, after I complete this term of active duty
 - No
 - Undecided

14. Listed below are some reasons why people join the military. How important was each of these reasons in your decisions to join the military?

	Not at all Important	Slightly Important	Moderately Important	Very Important	Extremely Important
a. Military advertising	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Military recruiter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Desire to serve my country	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Develop self-discipline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Earn more money than previous job(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Educational benefits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Family social support services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Get away from a personal problem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Influence of family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Influence of friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Lack of civilian job opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Medical care, coverage and benefits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Military tradition in family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Need to be on my own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Pay and allowances	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Security and stability of a job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Training in job skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Chance to travel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Repayment of loans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Prove that I could do it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Make military a career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v. Become more mature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
w. Take time out to decide about my life plans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
x. Gain job experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
y. Escape from a bad neighborhood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
z. Needed a place to live	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
aa. Chance for adventure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. Which of the following strongly influenced you to join the military? MARK ALL THAT APPLY.

- Parent(s)/Guardian(s)
- Brother/Sister
- Friends(s)
- Wife/Husband/Girlfriend/Boyfriend
- Athletic Coach
- Teacher
- School Guidance Counselor
- ROTC student
- ROTC cadre member
- Service member
- Recruiter
- Radio advertisement
- Television advertisement
- Printed advertisement

16. How important is each of the following TO YOU PERSONALLY?

	Not at all important	Slightly important	Somewhat important	Moderately important	Quite important	Very important	Extremely important
a. Loyalty to the United States Armed Services	<input type="radio"/>						
b. Taking responsibility for your actions and decisions	<input type="radio"/>						
c. Putting what is good for others above your own welfare	<input type="radio"/>						
d. Dedication to serving the United States, even to risking your life in its defense	<input type="radio"/>						
e. Commitment to working as a member of a team	<input type="radio"/>						
f. Dedication to learning your job and doing it well	<input type="radio"/>						
g. Personal drive to succeed in your work and advance	<input type="radio"/>						
h. Being honest, open, and truthful	<input type="radio"/>						
i. Being courageous	<input type="radio"/>						
j. Standing up for what you firmly believe is right	<input type="radio"/>						
k. Working with others tactfully	<input type="radio"/>						
l. Exhibiting excellent appearance	<input type="radio"/>						
m. High moral standards	<input type="radio"/>						
n. Building and maintaining physical fitness and stamina	<input type="radio"/>						

17. When you were growing up, did you have a parent/guardian who was career active duty military?
 Yes No

18. During the last 6 months before entering the Delayed Entry Program (DEP), how often did you smoke cigarettes?
 Never
 Rarely
 Once a week or so
 2-3 times a week
 4-5 times a week
 Daily

19. During the last 6 months before entering the Delayed Entry Program (DEP), how often did you drink alcoholic beverages?
 Never
 Rarely
 Once a week or so
 2-3 times a week
 4-5 times a week
 Daily

Appendix C: Description of the sample

Our sample is made up of 67,091 surveys from enlisted recruits from each of the four Services, matched to DMDC tracking files. We initially collected and matched 67,810 surveys; however, we deleted all who had prior service experience, as well as those who were in National Guard or Reserve units. At that point, we had 67,468 surveys on non-prior-service (NPS) active-duty accessions. Next, we deleted 368 records of people who skipped the question indicating the type(s) of schools attended in grades 1 through 12. Finally, we deleted eight records because the respondents claimed to have between four and eight different types of high school diplomas. This left us with 67,091 records.

Some recruits reported attending two different types of schools in the same year. We assumed that they switched schools during the year and gave credit to the “new” type of school. For example, some recruits marked “public school” for the first ten years but “public school” and “GED” for the eleventh grade. In this case, we inferred that the recruit completed ten years of public school, began but did not complete eleventh grade, and then earned a GED.

Some of the respondents skipped other questions on the survey. We kept them in our sample, but this lowers the number of observations on some regressions and descriptive statistics.

We made several other alterations to the data. Seventy-four surveys had missing AFQT scores. To account for this, we created a variable to indicate “missing AFQT score” and assigned the mean AFQT score (58.9) to these people.³⁴

34. In [2], we reported 78 missing AFQT scores. Four of those records have been updated with legitimate AFQT scores in our new dataset; for these four people, we used the new AFQT scores in our analysis.

In addition, we recoded the records of all recruits who left the Service and reenlisted immediately. These recruits usually entered officer programs; we identified these cases as continuation of service rather than as attrition.

Finally, we deleted 2,161 individuals from our current sample based on their updated records. When we collected data in FY01, DMDC successfully matched these recruits to their tracking files. However, in this round of matching, the people did not match with either a loss transaction file or the June 2003 active duty inventory file.³⁵ When we matched the Navy subsample to CNA's own tracking files, we found that about half of the sample remained in the Navy as of September 2003 while the other half left the Navy sometime between the recruit survey and September 2003. Therefore, the problem does not seem to be concentrated among either losses or survivals. As such, we decided to delete the individuals rather than to make a random decision to consider them either all losses or all continuing.

We were unable to assign 512 recruits to any educational category because their surveys contained other types of incomplete or contradictory information. For example, some of these recruits listed a diploma from a traditional high school but also indicated that they have no diploma. We assigned these recruits to an "other education" category.

We identified recruits as homeschooled on the basis of several alternate definitions. The most restrictive definition follows:

- Hold a diploma from parents, tutors, an association, or an umbrella school for homeschooling (549), *and*
- Completed the twelfth grade at home, or graduated early after being schooled at home (813), *and*
- Were not expelled from high school (61,471), *and*
- Completed 2 or more years of homeschooling (1,103).

35. An additional 15 percent of the sample matched to *both* the active duty inventory file and a loss transaction file. These individuals are considered to be still on active duty.

This definition is based on information and recommendations of what constitutes a homeschooled high school graduate from our Survey of Homeschool Associations (see [2]). Specifically, we sought to avoid classifying as homeschooled those who were expelled or urged to leave public schools. In the list that follows, the number in parentheses indicates the total number of recruits who fulfilled each condition. A total of 359 recruits met all four conditions. However, this definition is rather restrictive and does not match the conditions required by DoD (specifically, there is no requirement that a recruit be homeschooled for more than 1 year to be considered a homeschooled graduate). Therefore, we explored several different potential definitions of homeschooling:

- *Definition 1:* Completed twelfth grade at home, earned diploma from parents/tutor or homeschooling association, was not expelled from high school or junior high. (Alternately, the recruit may have indicated that he or she completed at least 2 years of high school at home, graduated early, and met the other requirements). (499)
- *Definition 2:* Was homeschooled for 2 or more years in high school, completed twelfth grade in a private school, was not expelled. (8)
- *Definition 3:* Completed twelfth grade and at least one other grade of high school at home, was not expelled and received a GED. (23)
- *Definition 4:* Completed twelfth grade and at least one other grade of high school at home, was not expelled, earned a correspondence school diploma. (10)

The number in parentheses indicates the number of recruits who met each definition. We formed a less restrictive definition from a combination of individuals in the four categories above. A total of 540 recruits met one of these definitions (this group includes the 359 homeschooled recruits identified by the more restrictive definition). We use both definitions and test for differences between the performances of these two groups throughout the report.

Definition 1, met by the largest number of recruits, is closest to the most common definition of being “homeschooled.” We were concerned, however, that we might miss some recruits who are truly homeschooled, but who attended umbrella schools or supplemented their homeschooling with outside course work. For this reason, we considered definition 2. We considered definition 3 because we were concerned that some homeschooled students might earn a GED in lieu of a homeschooling association diploma; we considered definition 4 for a similar reason.

Identifying ChalleNGe graduates was more straightforward. We identified ChalleNGe graduates based on two pieces of information: first, the recruit indicated that he or she graduated from a ChalleNGe program; second, the recruit indicated that he or she earned a GED *or* an adult education diploma. We recognized adult education diplomas because some states do not grant GEDs to ChalleNGe Program participants. In most cases, this is because the states have an age limit on who may take the GED. By this definition, we identified 239 recruits who were ChalleNGe graduates.

Note that both of these definitions hinge on information collected in our recruit survey; as discussed in the main text, the people we classify as homeschooled or ChalleNGe recruits are *not* always the same as those so identified by the Services through their official education codes.

We chose *not* to calculate reenlistment rates even for those individuals for whom we had at least 48 months of data. We made this decision based on a number of problems we experienced determining the end of active obligated service dates and the separation program designator (SPD) codes. For example, we found evidence that end of active obligated service (EAOS) dates were changed to coincide with loss dates. (Based partly on this, we liberalized our definition of a “positive” versus a “negative” loss; all who left within 6 months of their EAOS were considered “positive” losses.) Across the Services, we found inconsistencies between the SPD and the date of last enlistment. For example, the SPD of numerous recruits indicated attrition due to personality disorder, misconduct, etc., yet the date of last enlistment indicated that the person was allowed to reenlist. In addition, there are a substantial number of obviously incorrect last enlistment dates, such as 000000 or 192412. In many cases, the eligibility of individuals who left the Services was

coded "UNKNOWN." For these reasons, we were not confident in our ability to accurately calculate either straight reenlistment rates or the commonly accepted metric of reenlistment conditional on eligibility.

Appendix D: How representative is our sample?

Given our sampling frame, one of our concerns is that our sample may not be directly comparable across Services. We sampled boot-camp recruits from all four Services, but it was necessary to carry out the survey over a relatively long period of time (March 1999 through February 2000). To some extent, we surveyed recruits in the four Services at different times of the year. All of the Services bring in more recruits (and a higher proportion of traditional high school graduates) during the summer; this is referred to as the "summer surge." We sampled recruits during some or all of the summer surge and during other parts of the year in each branch *except* the Navy (see figure 2). Therefore, we are particularly concerned that our Navy sample may not reflect the overall population of Navy recruits. We offer two reasons why our sample might not be representative.

First, because the mix of recruits is different during different times of the year, our sample may not be representative (especially in the case of the Navy). This problem has a relatively simple solution. Because we know exactly how many recruits each Service enlisted during the survey period, it is straightforward to weight our attrition numbers so that they represent the true mix of recruits. For example, perhaps we surveyed a higher proportion of GED enlistees than the Services recruited over the entire year. In this case, given the relatively high attrition rates of this group, our overall attrition rates will be higher than the true attrition rates because we have "too many" GED recipients in our sample. However, we can multiply each observation by a weight so that our sample attrition rates match those across each Service; if we have oversampled GED recruits, the weight assigned to each GED recruit will be smaller than the weight assigned to undersampled groups (see appendix E for an example of our weighting design).

The second reason our sample might not be representative is more subtle, and more difficult to correct. It is possible that, whether our sample is representative or not in terms of the proportion of people from each education category, there is something fundamentally different about recruits who enlist at different times of the year, *and* that “something” affects recruit performance. On one hand, it may be that recruits who enter during the summer are more likely to succeed because they are highly motivated, organized recent high school graduates. On the other hand, recruits who enter during the fall may be less likely to succeed because they are less organized or motivated; for this reason, they do not apply for enlistment during their last year of high school but instead enter the Armed Services only after dabbling in the civilian job market.³⁶ Therefore, the recruits who enter in the fall will be less likely to succeed than those who enter during the summer surge. In this case, there is no simple weight that can make the sample representative because the sample differs from all recruits in unobservable (unmeasured) ways.

To explore the extent to which seasonality is a concern in our sample, we matched our Navy survey population (“survey recruits”) to the population of all active duty NPS recruits who entered the Navy between March 1999 and February 2000 using CNA’s tracking files (PRIDE and Street to Fleet). After matching across the two tracking files, we had a total of 97,650 observations from FY99 and FY00. We dropped those whose age at entry was greater than 27 or less than 17, as well as those whose records were missing the date of entry. We merged the resulting 94,106 observations with the 17,622 observations on Navy active duty enlistees who completed the survey (this is the number of observations remaining after the cleaning of the survey data described in appendix C). We successfully matched 95 percent of the Navy survey respondents, resulting in a sample of 16,692

36. Considerable evidence suggests substantial seasonal effects in attrition. Reference [15] finds that recruits who entered the Navy in FY99 during July, August, and September had lower bootcamp and 6-month attrition than those who entered in the fall; in contrast, recruits who entered in March, April, and May had higher attrition (the seasonal effect remains after correcting for personal characteristics).

Navy recruits. Descriptive statistics reveal that we surveyed 12 percent of all Navy recruits in FY99 and 24 percent of all recruits in FY00.

Next we examine descriptive statistics on these groups to see how the survey recruits compare with all recruits on measurable characteristics. As shown in table 17, the survey recruits are slightly older and have higher AFQT scores. Those who took the survey spent less time in DEP. Also, those who completed the survey survived more months, on average, than the group of recruits who were not included in the survey.³⁷ The differences in DEP may well result from the time of year when recruits enlisted; those who ship during the summer usually spend more time in DEP than those who ship during other times of the year. These descriptive statistics, particularly the difference in time in the Navy, suggest that survey respondents are *not* less successful than other recruits; the survey respondents actually appear to do somewhat better in terms of completing their obligation. However, table 17 also shows that the survey recruits were more likely to have nontraditional education credentials; the survey population contains a higher proportion of dropouts and recruits with GEDs but also a higher proportion of recruits with a high school diploma *and* some college (the last group tends to have low attrition rates). Finally, the survey recruits include a smaller proportion of homeschooled recruits, and a larger proportion of ChalNge recruits, than the recruits not surveyed.³⁸

37. These differences are statistically significant at the 0.1-percent level or better, with the exception of the difference in survival months, which is significant at the 2-percent level (using a two-tailed test). In other words, there is greater than a 99.9-percent chance (98-percent chance in the case of months survived) that this relationship did not result from chance. See results of individual t-tests that follow.

38. These differences are statistically significant at the 0.1-percent level or better; results of individual t-tests follow. These education proportions are calculated based on DoD education codes from CNA's PRIDE database rather than on survey responses. We used DoD codes in this section because we had survey information on the survey respondents, but not on the other recruits.

Table 17. Characteristics of surveyed recruits and other recruits, Navy

Characteristic	Survey recruits	Recruits not surveyed
Proportion male	80.7	82.1
Average AFQT score	59.2	58.3
Age	19.7	19.4
Average months in DEP (Median months in DEP)	2.8 (1)	3.6 (2)
Average months in Navy as of June 2003 (Median months in Navy as of 6/03)	31.9 (41)	31.6 (35)
Proportion HS graduates	0.79	0.81
Proportion HS grads with 1 semester college	0.034	0.024
Proportion HS dropouts	0.067	0.041
Proportion GED recipients	0.075	0.051
Proportion homeschooled	0.0072	0.018
Proportion ChalleNGe graduates	0.0089	0.0046

Difference-of-means tests

We tested the differences in the means using two-tailed t -tests. Results follow:

- *AFQT*: reject the hypothesis that the test scores for these two groups are equal, $t = -6.2093$, $P > |t| = 0.0000$

- *Age*: reject the hypothesis that the average age is the same in the two groups, $t = -17.5867$, $P > |t| = 0.0000$
- *Months in DEP*: reject the hypothesis that the average months in DEP is the same for the two groups, $t = 27.4607$, $P > |t| = 0.0000$
- *Months survival (obligated months the individual remained in the Navy)*: reject the hypothesis that the average months survived is the same for the two groups: $t = -2.3804$, $P > |t| = 0.0173$.

Therefore, those who answered the survey were older, had higher test scores, spent less time in DEP, and completed more of their obligated time in the Navy than those who were not surveyed (differences in racial/ethnic make-up of the two groups were small and insignificant):

- *Proportion with high school diploma*: reject the hypotheses that proportion is the same for the two groups: $t = 20.218$, $P > |t| = 0.0000$
- *Proportion with no credential ("dropouts")*: reject the hypothesis that proportion is the same for the two groups: $t = -14.927$, $P > |t| = 0.0000$
- *Proportion with a GED*: reject the hypothesis that proportion is the same for the two groups: $t = -12.592$, $P > |t| = 0.0000$
- *Proportion with a high school diploma and some college*: reject the hypothesis that proportion is the same for the two groups: $t = -7.029$, $P > |t| = 0.0000$
- *Homeschooled*: reject the hypothesis that proportion is the same for the two groups: $t = 9.726$, $P > |t| = 0.0000$
- *ChalleNGe graduates*: reject the hypothesis that proportion is the same for the two groups: $t = -6.854$, $P > |t| = 0.0000$.

Therefore, the survey respondents were less likely to be traditional high school graduates, and more likely to hold alternate diplomas or credentials, than the group not surveyed. Note that the education credentials just listed include approximately 96 percent of FY99-00 Navy

recruits; other recruits hold various credentials, such as certificate of attendance, nursing degree, BA/BS, or adult education degree.

Correlations

Next, to further explore the relationship between time in the Navy and answering the survey, we look at the correlation between having responded to the survey and remaining in the Navy for various periods. Specifically, we ran pairwise correlations between responding to the survey and remaining in the Navy for at least 3, 6, 12, 24, and 36 months. We excluded those with 2-year obligations from the 24-month correlation; we excluded those with 2- or 3-year obligations from the 36-month correlation. In each case, the correlation between remaining in the Navy and responding to the survey is small and positive; in all cases except the 24-month survival rate, the relationship is statistically significant.³⁹ Results follow:

- *3-month*: Correlation = 0.0274, level of significance > 0.0000
- *6-month*: Correlation = 0.0212, level of significance > 0.0000
- *12-month*: Correlation = 0.0125, level of significance = 0.0001
- *24-month*: Correlation = 0.0050, level of significance = 0.1247
- *36-month*: Correlation = 0.0236, level of significance > 0.0000.

Finally, we ran simple models to predict which recruits would leave the Navy before the end of their obligation. We included age, AFQT score, race/ethnicity, dependents, citizenship, months in DEP, and a variable indicating that the recruit answered the survey. Each model indicated that those who took the survey were *less* likely to

39. We exclude those who have 2-year obligations from the 24-month correlation; we exclude those who have 2- or 3-year obligations from the 36-month correlation.

leave the Navy early than other recruits, after correcting for these personal characteristics.⁴⁰

The results in this section detail our analysis of how representative our sample is. Our initial concern was that the Navy subsample was most likely to be unrepresentative because it does not include summer-surge recruits (in each other Service, we surveyed at least some summer-surge recruits). However, our analysis indicates that the recruits who answered the survey were not subject to negative selection; on average, they were *more* likely to complete the first 36 months of their obligation than the recruits who were not included in the survey. Thus, concerns that this sample causes us to report artificially inflated attrition figures appear groundless. In fact, the Navy subsample seems to have lower attrition than the other recruits from FY99 and FY00. If this is true in the Navy, it is most likely true for the other Services as well. We offer two explanations for this finding. First, although we did not survey summer-surge recruits in the Navy, neither did we survey those who enter during the winter months.⁴¹ Second, we did not survey all recruits during September 1999 through February 2000 (we surveyed 79 percent of recruits who entered in this time frame, as opposed to 18 percent of all recruits who entered in FY99 and FY00 combined). For these reasons, we are confident that our sample does not overestimate attrition rates for the Navy, or the other Services, during FY99 and FY00.

40. These models predicted the probability of surviving at least 3, 6, 12, 24, and 36 months. Because survival is a dichotomous event, we used logit models. The overall explanatory powers of these models are fairly low, but many coefficients are both sizable and significant. Results are available on request.

41. Assuming that the monthly effects are constant across the Services, we surveyed only the Army during the months of the year with the highest attrition rates; however, our sample includes a large proportion of the Army's summer surge. Also, there are reasons to think that the Navy's "winter effect" might be larger than that of other Services because the Navy's only bootcamp is located in Great Lakes, IL.

Appendix E: Weighted results

First, we consider several examples of weighting. For the purpose of these examples only, we assume a world with exactly three education credentials: high school diploma, GED, and no credential (“dropout”). We assume that DoD recruits are split between the categories as follows, with the attrition rates shown in parentheses:

- 85 percent have a high school diploma (5-percent attrition)
- 10 percent have a GED (15-percent attrition)
- 5 percent are dropouts (25-percent attrition).

Assume that DoD enlists 100,000 recruits during the sample period: 85,000 with high school diplomas, 10,000 with GEDs, and 5,000 dropouts. Given the attrition rates above, the total attrition rate would be 7 percent (a total of 7,000 people, made up of 4,250 with high school diplomas plus 1,500 with GEDs plus 1,250 dropouts).⁴²

Weights can be designed to correct for two different types of unrepresentative surveys. First, surveys usually do not include every single potential respondent (every recruit, in this case). For example, we might randomly select 10 percent of the population to survey; this would be much less expensive than surveying everyone. Therefore, weights allow the researcher to estimate the total effect (attrition in this case) from the sample. Second, surveys often do not collect information in a representative manner. For various reasons, some people are more likely to be included in the survey than others. In other words, those included in the survey are *not* a random group. Even in this case, correctly designed weights allow the researcher to estimate the total effect from the sample, but weights must vary so

42. These assumptions simplify the calculations that follow, but they do not change the basic principles involved in weighting. Below, we report the weights that we used by Service.

that people who are more likely to be surveyed have smaller weights, and vice versa. We deal with each issue in turn.

First, we did not survey all recruits. Therefore, our total attrition numbers will be lower than those experienced by DoD during this time period. *If* our sample had been representative in terms of education, then we would still need weights to produce correct figures on total attrition, but we would weight each observation in an identical manner. For example, if we had surveyed half of all recruits, our sample would look like this:

- 42,500 high school graduates
- 5,000 GED holders
- 2,500 dropouts.

In this case, our total attrition percentage would be correct; we would expect to observe 3,500 individuals, seven percent the total, who did not complete their obligation (who “attrited”). Therefore, our attrition rate would be correct; however, because we surveyed only 50,000 people, we would report only 3,500 total attrites. Here, the weighting scheme is simple; each observation receives a weight of 2.0. After weighting the observations, our sample “looks like” reality: we see 100,000 observations and 7,000 attrites.

Next, consider a case in which we did not survey all recruits *and* in which high school graduates were underrepresented in the sample. In fact, imagine that we sampled every person holding a GED and every person who was a dropout, but only 35,000 high school graduates. Our sample might look like this:

- 35,000 high school graduates
- 10,000 GED holders
- 5,000 dropouts.

Here, we again surveyed exactly half of all recruits, but we surveyed 41 percent of high school graduates, 100 percent of GED holders, and 100 percent of dropouts. (We “undersampled” high school graduates and “oversampled” GED holders and dropouts.) Without

weights, neither our attrition rate nor our total number of attrites will be correct. Our attrition rate will be 9.0 percent, and our total number of attrites will be 4,500 (made up of 1,750 high school graduates, 1,500 GED holders, and 1,250 dropouts). If we give each observation a weight of 2, the sample will appear to have 100,000 observations, but it will *not* look like the actual pool of DoD recruits; instead it will suggest that there were 9,000 attrites and an overall attrition rate of 9.0 percent. Therefore, we need to design separate weights for each education category to make up for the oversampling and undersampling. We design the weights by calculating the proportion of recruits in each category who were included in the survey (this is equivalent to the probability that a person in that category was included in the survey). The inverse of this number is the weight; therefore, individuals who are more likely to have been surveyed receive smaller weights, and vice versa. We calculate weights for each education code as follows:

- High school graduates: 35,000 of 85,000 surveyed; weight = $(1/(35,000/85,000)) = 2.428$
- GED holders: 10,000 of 10,000 surveyed; weight = $(1/(10,000/10,000)) = 1.0$
- Dropouts: 2,500 of 2,500 surveyed; weight = $(1/(2,500/2,500)) = 1.0$.

When we weight each observation by the weight shown above, the sample appears to have 100,000 observations and an attrition rate of 7 percent, matching the true DoD totals.

Next, we consider the case of our survey. As in the first example above, we did not survey all recruits. Moreover, we surveyed a different proportion of recruits from each Service. Therefore, a recruit in the Air Force had a different probability of being included in the sample than did a recruit in the Navy. We construct simple weights to reflect this difference. Table 18 shows the total number of recruits who entered each Service between March 1999 and February 2000, and the number included in the survey. We calculate a Service-specific weight by taking the inverse of the number of recruits divided by the number surveyed. We also show this figure in the table.

Table 18 indicates that, relative to the other Services, we over-sampled Air Force recruits. Therefore, because Air Force recruits were more likely to be surveyed than other recruits, they receive a smaller weight and each Air Force recruit's attrition rate has a smaller effect on the overall DoD attrition rate than it would without the weights.

Table 18. Weights by Service

Service	Number of recruits	Number surveyed	Proportion surveyed	Weight
Army	69,093	23,438	0.339	2.95
Navy	52,404	16,802	0.321	3.12
Air Force	30,796	14,529	0.472	2.12
Marines	31,602	10,161	0.322	3.11
DoD	183,895	64,930	0.353	2.83

Using these weights, we present average attrition rates by education credential in table 19. We do not present separate attrition rates for each credential by branch; these figures appear in tables 4 through 6 for a limited number of education credentials and in tables 20 through 22 for all credentials. Again, weights do not affect the attrition figures by branch and credential (i.e., the 24-month attrition rate of homeschooled recruits in the Army is always 32.9 percent). However, weights *do* affect the DoD averages. For this reason, the weighted 24-month attrition rate of all homeschooled recruits shown in table 19 is 32.7 percent, but the unweighted DoD average of all homeschooled recruits shown in table 5 is 32.8 percent. Intuitively, the value in table 19 is smaller than that in table 5 because when the different Services' averages are weighted, the Air Force attrition rate has less influence and the Navy and Marine Corps rates have more influence. Note, too, that the two values are very close; weighting typically does not change DoD attrition numbers very much.

Table 19. Weighted attrition levels, DoD-wide

Education credential/tier	12-month	24-month	36-month
Tier 1:			
Homeschooled	23.3	32.7	38.7
ChalleNGe	24.0	37.8	48.8
Public school	14.9	20.7	25.4
Private school	16.1	22.5	27.1
Adult education	20.2	28.7	35.5
College semester: academic	22.0	28.6	33.6
College semester: vocational	24.6	33.5	41.6
College: 2 years	15.5	19.5	24.1
College: 4 years or more	9.8	15.0	18.3
Tier 2:			
GED	28.4	38.3	44.7
Occupational program	19.6	26.8	30.7
H.S. atten- dance/completion	17.7	22.8	27.1
Correspondence school	13.2	21.9	27.7
Tier 3:			
No credential	24.5	33.5	40.6
Credential un- known	19.4	28.1	33.6
All recruits:	16.7	23.0	27.9

Using these simple weights, we present attrition rates by education credential for all four Services, as well as DoD averages, in tables 20 through 22. These tables also include the total number of recruits in each education credential (based on recruits' survey responses). Finally, tables 20 through 22 include confidence intervals for each attrition rate. In each case, we can say with 90-percent certainty that the actual attrition rate falls within the confidence interval. Note that in cases of small samples, confidence intervals are quite large. The attrition figures reported in tables 20 through 22 match those reported for a subset of credentials in tables 4 through 6.

Table 20. 12-month attrition rates by education credential and Service with confidence intervals

Education credential	Army	Navy	Air Force	Marines	DoD
Tier 1:					
Homeschooled	22.8 (17.3-29.2)	28.4 (23.1-34.3)	10.4 (6.3-16.0)	27.6 (19.3-37.3)	22.6 (19.7-25.8)
ChalleNGe	12.7 (7.0-20.5)	33.3 (24.7-42.9)	37.9 (22.9-54.9)	16.0 (8.2-27.0)	23.4 (19.0-28.4)
Public school	17.0 (16.5-17.4)	17.6 (17.0-18.2)	8.2 (7.8-8.7)	15.0 (14.4-15.7)	14.6 (14.3-14.8)
Private school	17.1 (14.9-19.6)	21.0 (18.6-23.5)	8.9 (7.1-11.0)	15.2 (12.6-18.2)	15.9 (14.8-17.2)
Adult education	20.5 (17.5-23.9)	24.3 (21.2-27.6)	12.3 (8.8-16.7)	21.2 (17.3-25.5)	20.8 (19.0-22.6)
College semester: academic	28.1 (24.6-31.8)	24.1 (21.1-27.3)	12.0 (8.7-16.0)	21.0 (16.8-25.7)	22.8 (21.0-24.7)
College semester: vocational	30.3 (24.7-36.5)	31.9 (25.8-38.5)	11.4 (4.6-22.4)	21.2 (12.3-32.6)	27.9 (24.3-31.6)
College: 2 years	19.9 (16.7-23.4)	17.7 (14.1-21.7)	5.9 (3.7-8.8)	15.9 (9.6-224.0)	15.4 (13.6-17.3)
College: 4 years or more	9.9 (7.9-12.2)	17.2 (13.3-21.7)	5.4 (3.0-9.0)	5.4 (1.5-13.3)	10.6 (9.0-12.3)
Tier 2:					
GED	31.3 (29.2-33.5)	32.2 (30.2-34.3)	18.9 (12.4-27.0)	28.6 (23.9-33.6)	31.1 (29.8-32.6)
Occupational program	18.5 (14.8-22.7)	32.9 (26.9-39.5)	5.7 (2.9-10.1)	16.9 (11.8-23.1)	19.0 (16.6-21.6)
HS attendance/completion	23.0 (18.2-28.4)	19.5 (15.9-23.5)	8.0 (5.1-12.0)	17.7 (14.0-22.0)	17.4 (15.5-19.5)
Correspondence school	10.5 (4.7-19.7)	19.1 (10.4-31.0)	6.7 (.34-27.9)	14.4 (8.3-22.8)	13.8 (10.0-18.6)
Tier 3:					
No credential	28.7 (26.2-31.2)	30.7 (28.6-32.9)	11.6 (6.6-18.4)	23.2 (19.4-27.4)	28.4 (26.9-29.9)
Credential unknown	18.1 (13.6-23.3)	21.8 (16.8-27.6)	14.3 (7.7-23.6)	21.8 (14.8-30.4)	19.5 (16.7-22.6)

Table 21. 24-month attrition rates by education credential and Service with confidence intervals

Education credential	Army	Navy	Air Force	Marines	DoD
Tier 1:					
Homeschooled	32.9 (26.5-39.8)	40.0 (34.0-46.2)	21.6 (15.7-28.5)	32.9 (24.0-42.8)	32.8 (29.4-36.3)
ChalleNGe	26.6 (18.6-36.0)	44.4 (35.0-54.2)	58.6 (41.7-74.1)	28.0 (17.8-40.3)	36.8 (31.6-42.3)
Public school	23.7 (23.2-24.2)	23.8 (23.2-24.5)	13.8 (13.3-14.3)	19.7 (18.9-20.4)	20.6 (20.3-20.9)
Private school	26.0 (23.4-28.8)	26.0 (23.5-28.7)	15.3 (13.0-17.9)	20.8 (17.8-24.1)	22.5 (21.2-23.9)
Adult education	31.0 (27.5-34.7)	33.7 (30.2-37.3)	20.4 (15.9-25.5)	27.3 (23.0-31.9)	30.0 (27.7-31.7)
College semester: academic	38.1 (34.3-42.0)	32.2 (29.0-35.7)	15.8 (12.0-20.1)	25.0 (20.5-29.9)	30.1 (28.2-31.2)
College semester: vocational	37.6 (31.6-44.0)	41.9 (35.3-48.7)	22.7 (12.9-35.5)	28.8 (18.7-40.9)	36.6 (32.8-40.6)
College: 2 years	25.3 (21.8-29.1)	22.0 (18.1-26.3)	9.6 (6.8-13.1)	18.3 (11.6-26.8)	19.8 (17.8-21.9)
College: 4 years or more	14.7 (12.3-17.4)	21.7 (17.4-26.5)	9.2 (5.9-13.5)	12.5 (6.0-22.2)	15.3 (13.5-17.2)
Tier 2:					
GED	43.7 (41.3-46.0)	43.8 (41.6-46.0)	27.8 (20.1-36.6)	34.9 (29.9-40.2)	42.5 (41.1-44.0)
Occupational program	27.3 (22.0-31.9)	40.2 (33.8-46.9)	17.9 (12.7-24.0)	19.1 (13.8-25.5)	26.9 (24.2-29.7)
HS attendance/completion	28.5 (23.3-34.2)	25.7 (21.7-30.0)	14.1 (10.2-18.8)	20.7 (16.7-25.1)	22.6 (20.4-24.8)
Correspondence school	15.8 (8.5-25.9)	23.4 (13.7-35.7-8)	33.3 (14.2-57.7)	18.4 (11.5-27.3)	20.0 (15.4-25.3)
Tier 3:					
No credential	39.1 (36.4-41.9)	41.5 (39.2-43.8)	18.9 (12.6-26.8)	30.3 (26.1-34.8)	38.5 (36.9-40.1)
Credential unknown	28.7 (23.3-34.6)	28.7 (23.1-34.9)	22.2 (14.0-32.5)	31.0 (22.9-40.2)	28.3 (25.0-31.8)

Table 22. 36-month attrition rates by education credential and Service with confidence intervals

Education credential:	Army	Navy	Air Force	Marines	DoD
Tier 1:					
Homeschooled	39.6 (32.9-46.6)	45.3 (37.1-51.5)	28.8 (22.2-36.2)	38.2 (28.9-48.2)	38.9 (35.4-42.5)
ChalleNGe	45.6 (36.0-55.4)	51.9 (42.2-61.4)	62.1 (45.1-77.1)	40.0 (28.3-52.6)	48.5 (43.0-54.1)
Public school	29.0 (28.5-29.6)	28.5 (27.8-29.3)	18.3 (17.7-18.9)	23.8 (23.0-24.6)	25.4 (25.0-26.7)
Private school	31.9 (29.1-34.9)	30.0 (27.4-32.8)	19.5 (17.0-22.3)	25.0 (21.8-28.5)	27.1 (25.7-28.6)
Adult education	38.0 (34.3-41.9)	40.5 (36.9-44.2)	26.1 (21.1-31.5)	34.8 (30.2-40.0)	36.5 (34.5-38.7)
College semester: academic	44.5 (40.6-48.5)	37.3 (33.9-40.8)	20.3 (16.2-26.1)	28.6 (23.9-33.7)	35.3 (33.3-37.4)
College semester: vocational	47.2 (40.8-53.6)	47.5 (40.8-54.3)	27.3 (16.6-40.4)	40.4 (28.9-52.7)	44.5 (40.5-48.5)
College: 2 years	30.5 (26.7-34.4)	26.7 (22.5-31.2)	11.4 (8.4-15.1)	24.4 (16.8-33.4)	24.1 (21.9-26.3)
College: 4 years or more	19.0 (16.3-22.0)	22.5 (18.2-27.4)	11.9 (8.2-16.5)	17.9 (10.0-28.4)	18.5 (16.6-20.6)
Tier 2:					
GED	50.8 (48.4-53.1)	51.2 (48.9-53.4)	34.4 (26.1-43.5)	39.7 (34.5-45.0)	49.6 (48.0-51.1)
Occupational program	32.2 (27.6-37.0)	42.7 (36.2-49.4)	20.7 (15.2-27.2)	24.2 (18.3-31.1)	30.9 (28.0-33.8)
HS attendance/completion	31.5 (26.1-37.3)	31.0 (26.7-35.5)	18.1 (13.7-23.2)	25.5 (21.1-30.2)	27.0 (24.7-29.4)
Correspondence school	22.8 (14.1-33.8)	34.0 (22.7-47.0)	33.3 (14.2-57.7)	22.4 (14.8-31.6)	26.2 (21.0-31.8)
Tier 3:					
No credential	47.6 (44.9-50.4)	48.7 (46.3-51.0)	24.2 (17.1-32.5)	37.2 (32.7-41.8)	46.0 (44.4-47.6)
Credential unknown	35.1 (29.3-41.2)	31.6 (26.8-37.9)	31.7 (22.1-42.7)	35.6 (27.1-44.9)	33.6 (30.1-37.2)

Besides surveying different proportions of each Service, we also may have surveyed different proportions in each education credential. For example, because of the timing of the survey, we may have included 30 percent of all homeschooled recruits but 40 percent of all public school graduates. In this case, we can produce more accurate total attrition figures by creating individual weights based on the total number of recruits in each educational credential. Unfortunately, we do not have ready access to these figures; also, to the extent that we use information from the recruit survey to determine education credential and some recruits are misclassified on their official records, these weights will not be completely accurate. However, we do have information on the total number of homeschooled and ChalleNGe recruits (according to DMDC) from our longitudinal file. Using this information and comparing it with the total number of ChalleNGe and homeschooled recruits in our survey, we find that both groups were undersampled when we identify credentials by DMDC's records, and that both groups were oversampled when we identify credentials based on our survey results. (This is because numerous people indicated that they were ChalleNGe or homeschooled grads on the survey but their official records list a different credential). This suggests that misclassification is a potential problem in calculating accurate weights, but that neither ChalleNGe nor homeschooled recruits were dramatically oversampled or undersampled compared with other recruits.

As discussed in appendix D, weights can correct for observable differences, primarily the number of people in each category. They cannot, however, correct for other issues, such as seasonality; recruit quality may well vary depending on month of entry. As discussed in appendix D, however, the Navy survey respondents are at least as successful as other Navy recruits, and the seasonality issues are likely to be worse in the Navy than in the other Services. Therefore, we do not believe that seasonality issues affect our overall results.

Finally, we include regression analysis to make sure that the relationships between education credential and attrition are not caused by other factors.

Tables 23, 24, and 25 show regression results for all four Services combined. These results indicate which factors are associated with leaving

the military by the 12-, 24-, and 36-month points respectively. In each case, we indicate which education credentials are associated with increased or decreased probabilities of leaving the Services. In each table, the reference educational group is public high school graduates. Therefore, all marginal effects are relative to public high school graduates; a positive (and significant) marginal effect indicates an individual holding a particular credential is *more* likely to leave the Service than a public high school graduate while a negative and significant marginal effect indicates an individual holding the credential is *less* likely to leave the Service than an individual holding a high school diploma. For the racial/ethnicity variables, white (non-Hispanic) is the reference group.

We also control for personal characteristics (see tables). In addition, we control for state-level unemployment rates and sixteen occupational categories as well as information from our recruit survey indicating participation in high school activities, importance given to specific attributes, and smoking/drinking behavior prior to entering DEP (full results available upon request). Finally, we ran regressions separately by Service. Results are generally consistent with those shown here and are available upon request. In each case, we find that homeschooled recruits (even those with above-average AFQT scores) and ChalleNGe recruits (even those with above-average AFQT scores) have higher probabilities of attrition than traditional high school diploma graduates. Thus, our regression results agree with the attrition results reported in the main text.

Table 23. The probability of attrition in the first 12 months—all Services combined

Variable	Coefficient	Marginal effect (percentage point)	z ratio
Age	0.036***	0.004	5.72
Male	-0.390***	-0.043	-9.78
African American	-0.059	-0.006	-1.29
Hispanic	-0.159**	-0.015	-2.49
Asian/Pacific Islander	-0.171**	-0.016	-2.33
Other race/ethnicity	0.005	0.0005	0.06
AFQT score	-0.011***	-0.0011	-12.02
Accession waiver	0.178***	0.019	4.96
Homeschooled	0.928***	0.131	4.93
Homeschooled, AFQT >= 50	-0.816***	-0.060	-2.93
ChalleNGe	0.505**	0.061	2.00
ChalleNGe, AFQT >= 50	-0.109	-0.011	-0.26
Private school	0.063	0.006	0.81
Adult education	0.348***	0.040	4.03
College sem: academic	0.293***	0.033	3.23
College sem: vocational	0.426***	0.050	2.71
College: 2 yrs	-0.159	-0.015	-1.16
College: 4 or more yrs	-0.932***	-0.066	-5.24
GED	0.713***	0.091	12.43
Occupational program	0.196	0.021	1.47
H.S. attendance/completion	-0.048	-0.005	-0.40
Correspondence school	-0.374	-0.033	-1.26
Dropout	0.624***	0.078	10.00
Other credential	0.376**	0.044	2.52

Notes: Probit estimates. Dependent variable is leaving the Services by the 12-month point. Pseudo R-squared:

0.406. Statistical significance:

*** Statistically significant at the 99-percent confidence level

** Statistically significant at the 95-percent level

* Statistically significant at the 90-percent level

Table 24. The probability of attrition in the first 24 months—all Services combined

Variable	Coefficient	Marginal effect (percentage point)	z ratio
Age	0.014***	0.002	2.68
Male	-0.359***	-0.063	-11.47
African American	0.060*	0.010	1.72
Hispanic	-0.178***	-0.028	-3.56
Asian/Pacific Islander	-0.184***	-0.029	-3.18
Other race/ethnicity	-0.026	-0.004	-0.44
AFQT score	-0.010***	-0.002	-13.97
Accession waiver	0.190***	0.033	6.62
Homeschooled	0.830***	0.168	4.99
Homeschooled, AFQT >= 50	-0.417*	-0.061	-1.87
ChalleNGe	0.624***	0.121	3.04
ChalleNGe, AFQT >= 50	0.151	0.026	0.48
Private school	0.113*	0.019	1.89
Adult education	0.409***	0.075	5.94
College sem: academic	0.333***	0.060	4.56
College sem: vocational	0.506***	0.096	4.01
College: 2 yrs	-0.152	-0.024	-1.44
College: 4 or more yrs	-0.438***	-0.064	-3.49
GED	0.826***	0.165	17.56
Occupational program	0.252**	0.045	2.45
H.S. attendance/completion	-0.075	-0.012	-0.77
Correspondence school	-0.203	-0.032	-0.92
Dropout	0.684***	0.133	13.37
Other credential	0.475***	0.089	4.06

Notes: Probit estimates. Dependent variable is leaving the Services by the 24-month point. Pseudo R-squared:

0.271. Statistical significance:

*** Statistically significant at the 99-percent confidence level

** Statistically significant and the 95-percent level

* Statistically significant at the 90-percent level

Table 25. The probability of attrition in the first 36 months—all Services combined

Variable	Coefficient	Marginal effect (percentage point)	z ratio
Age	0.009*	0.002	1.90
Male	-0.346***	-0.072	-12.26
African American	0.124***	0.025	3.95
Hispanic	-0.219***	-0.042	-4.87
Asian/Pacific Islander	-0.213***	-0.041	-4.06
Other race/ethnicity	-0.043	-0.008	-0.80
AFQT score	-0.010***	-0.002	-15.14
Accession waiver	0.174***	0.036	6.64
Homeschooled	0.883***	0.203	5.54
Homeschooled, AFQT >= 50	-0.501**	-0.088	-2.40
ChalleNGe	0.812***	0.186	4.25
ChalleNGe, AFQT >= 50	0.112	0.023	0.38
Private school	0.079	0.016	1.47
Adult education	0.441***	0.096	7.01
College sem: academic	0.310***	0.066	4.62
College sem: vocational	0.615***	0.137	5.34
College: 2 yrs	-0.121	-0.024	-1.31
College: 4 or more yrs	-0.408***	-0.074	-3.75
GED	0.838***	0.190	18.90
Occupational program	0.144	0.030	1.52
H.S. attendance/completion	-0.076	-0.015	-0.87
Correspondence school	-0.058	-0.011	-0.31
Dropout	0.727***	0.163	15.26
Other credential	0.429***	0.093	3.97

Notes: Probit estimates. Dependent variable is leaving the Services by the 36-month point. Pseudo R-squared:

0.217. Statistical significance:

*** Statistically significant at the 99-percent confidence level

** Statistically significant at the 95-percent level

* Statistically significant at the 90-percent level

Appendix F—Attrition rates of homeschooled and ChalleNGe recruits, FY96-FY02

This appendix includes 6, 12-, 24-, and 36-month attrition rates of all homeschooled and ChalleNGe recruits who entered the Services from FY96 to FY02, inclusive. We also include attrition rates of traditional high school diploma graduates and enlistees with a GED for comparison purposes. These attrition rates were calculated by DMDC; recruits' education credential was identified from the recruits' official records. We present the results separately by fiscal year. Finally, we report attrition rates for the four Services combined, by fiscal year. Note that some cell sizes are quite small; we report no attrition rates for cells with fewer than 20 recruits.

Table 26. Army attrition rates, by education credential and fiscal year

		GED	ChalleNGe	Traditional HS diploma	Homeschooled
FY96	# of accessions	3,307	0	60,389	8
	6-month	21.87	~	14.67	*
	12-month	29.76	~	19.00	*
	24-month	40.40	~	25.43	*
	36-month	48.87	~	32.23	*
FY97	# of accessions	7,399	0	61,224	29
	6-month	20.35	~	11.19	10.35
	12-month	26.48	~	15.29	13.80
	24-month	39.94	~	23.51	31.04
	36-month	48.01	~	30.21	41.38
FY98	# of accessions	6,787	1	55,819	13
	6-month	23.90	*	17.26	*
	12-month	31.52	*	21.04	*
	24-month	44.16	*	28.21	*
	36-month	51.41	*	33.55	*
FY99	# of accessions	7,670	180	53,957	129
	6-month	24.52	13.34	14.60	24.04
	12-month	31.65	20.00	18.90	30.24
	24-month	41.48	36.12	25.44	37.99
	36-month	48.97	44.45	31.33	44.19
FY00	# of accessions	8,577	312	51,344	201
	6-month	19.70	11.54	11.80	24.38
	12-month	23.95	16.99	15.26	30.35
	24-month	35.55	32.38	22.60	45.28
	36-month	43.82	46.16	28.67	53.24
FY01	# of accessions	10,612	410	50,037	286
	6-month	18.63	10.25	11.87	16.09
	12-month	23.82	16.59	15.53	24.83
	24-month	37.75	34.64	23.63	36.37
	36-month	~	~	~	~
FY02	# of accessions	9,315	477	49,215	321
	6-month	19.84	12.37	12.62	20.88
	12-month	26.44	17.20	16.80	27.11
	24-month	~	~	~	~
	36-month	~	~	~	~

Notes: Attrition rates calculated by DMDC for all accessions in each educational category; educational category determined by official records. ChalleNGe education code used consistently beginning in FY99. Insufficient time has passed to calculate 36-month attrition rates for FY01-02 or 24-month attrition rates for FY02. * Fewer than 20 individuals in cell.

Table 27. Navy attrition rates, by education credential and fiscal year

		GED	ChalleNGe	Traditional HS diploma	Homeschooled
FY96	# of accessions	1,402	0	40,208	10
	6-month	26.25	~	13.50	*
	12-month	36.52	~	19.55	*
	24-month	49.51	~	27.61	*
	36-month	54.93	~	32.34	*
FY97	# of accessions	1425	0	42,565	20
	6-month	25.55	~	15.68	25.00
	12-month	35.72	~	20.91	40.00
	24-month	45.90	~	28.15	50.00
	36-month	51.09	~	32.45	50.00
FY98	# of accessions	1,449	0	38,764	35
	6-month	25.06	~	14.34	20.00
	12-month	34.72	~	19.07	25.72
	24-month	45.35	~	25.13	40.00
	36-month	50.45	~	29.10	42.86
FY99	# of accessions	2,866	134	41,075	936
	6-month	27.64	29.86	15.38	31.74**
	12-month	35.42	41.80	19.54	39.00**
	24-month	43.72	56.72	25.31	50.33**
	36-month	49.80	64.93	29.37	55.45**
FY00	# of accessions	2,664	265	39,651	392
	6-month	22.90	23.02	12.47	21.69
	12-month	29.73	32.46	16.61	32.91
	24-month	39.68	46.80	22.65	41.33
	36-month	46.51	56.99	27.05	46.94
FY01	# of accessions	2,672	264	39,937	370
	6-month	19.92	18.57	10.59	20.82
	12-month	27.14	29.17	14.50	30.28
	24-month	37.99	43.94	20.57	39.46
	36-month	~	~	~	~
FY02	# of accessions	1,951	242	35,458	141
	6-month	16.20	13.64	9.22	12.77
	12-month	22.97	21.91	12.58	20.57
	24-month	~	~	~	~
	36-month	~	~	~	~

Notes: Attrition rates calculated by DMDC for all accessions in each educational category; educational category determined by official records. ChalleNGe education code used consistently beginning in FY99. Insufficient time has passed to calculate 36-month attrition rates for FY01-02 or 24-month attrition rates for FY02. * Fewer than 20 individuals in cell. ** Rates inflated because some of these individuals lacked legitimate homeschooled credentials and were actually dropouts.

Table 28. Air Force attrition rates, by education credential and fiscal year

		GED	ChalleNGe	Traditional HS diploma	Homeschooled
FY96	# of accessions	258	0	29,713	27
	6-month	20.16	~	12.33	11.12
	12-month	22.49	~	15.03	14.82
	24-month	30.24	~	20.64	14.82
	36-month	36.05	~	25.95	22.23
FY97	# of accessions	256	0	28,656	35
	6-month	14.85	~	12.59	11.43
	12-month	18.36	~	15.38	11.43
	24-month	26.57	~	20.99	14.29
	36-month	28.91	~	25.74	17.15
FY98	# of accessions	299	0	29,824	43
	6-month	11.71	~	11.51	9.31
	12-month	15.06	~	14.48	13.96
	24-month	20.07	~	20.17	18.61
	36-month	23.08	~	24.77	20.94
FY99	# of accessions	351	8	30,269	82
	6-month	13.97	*	11.87	17.08
	12-month	18.24	*	14.85	19.52
	24-month	23.08	*	20.76	24.40
	36-month	27.07	*	24.36	29.27
FY00	# of accessions	212	6	31,325	85
	6-month	11.33	*	10.09	22.36
	12-month	15.57	*	13.01	30.59
	24-month	18.87	*	17.23	36.48
	36-month	24.53	*	21.32	41.18
FY01	# of accessions	165	2	31,926	90
	6-month	7.28	*	6.88	10.00
	12-month	9.70	*	8.46	11.12
	24-month	18.79	*	12.58	16.67
	36-month	~	~	~	~
FY02	# of accessions	132	6	34,226	85
	6-month	6.82	*	5.86	12.95
	12-month	7.58	*	7.83	18.83
	24-month	~	~	~	~
	36-month	~	~	~	~

Notes: Attrition rates calculated by DMDC for all accessions in each educational category; educational category determined by official records. ChalleNGe education code used consistently beginning in FY99. Insufficient time has passed to calculate 36-month attrition rates for FY01-02 or 24-month attrition rates for FY02. * Fewer than 20 individuals in cell.

Table 29. Marine Corps attrition rates, by education credential and fiscal year

		GED	ChalleNGe	Traditional HS diploma	Homeschooled
FY96	# of accessions	832	0	30,169	14
	6-month	20.08	~	12.27	*
	12-month	26.93	~	16.04	*
	24-month	37.99	~	22.12	*
	36-month	45.32	~	27.01	*
FY97	# of accessions	841	0	31,171	15
	6-month	25.45	~	14.77	*
	12-month	34.13	~	18.71	*
	24-month	43.05	~	24.09	*
	36-month	49.23	~	28.46	*
FY98	# of accessions	916	11	30,663	29
	6-month	29.15	*	15.24	20.69
	12-month	34.39	*	18.45	20.69
	24-month	42.47	*	22.97	27.59
	36-month	48.15	*	26.98	27.59
FY99	# of accessions	1,033	139	30,185	81
	6-month	23.34	12.95	11.88	16.05
	12-month	30.01	21.59	15.73	27.17
	24-month	36.69	29.50	20.34	34.57
	36-month	44.54	42.45	24.79	39.51
FY00	# of accessions	904	179	27,500	86
	6-month	20.80	15.09	11.95	19.77
	12-month	28.54	22.35	16.23	29.07
	24-month	35.96	33.52	20.77	36.05
	36-month	41.60	39.67	24.61	45.35
FY01	# of accessions	825	205	27,637	95
	6-month	20.49	12.69	11.66	17.90
	12-month	26.91	20.49	15.81	22.11
	24-month	34.07	32.20	20.14	27.37
	36-month	~	~	~	~
FY02	# of accessions	585	218	29,371	123
	6-month	23.08	11.93	12.58	12.20
	12-month	30.43	17.44	16.42	17.89
	24-month	~	~	~	~
	36-month	~	~	~	~

Notes: Attrition rates calculated by DMDC for all accessions in each educational category; educational category determined by official records. ChalleNGe education code used consistently beginning in FY99. Insufficient time has passed to calculate 36-month attrition rates for FY01-02 or 24-month attrition rates for FY02. * Fewer than 20 individuals in cell.

Table 30. Attrition rates for all four Services combined, by fiscal year

		GED	ChalleNGe	Traditional HS diploma	Homeschooled
FY96	# of accessions	5,799	0	160,479	59
	6-month	22.60	~	13.49	15.26
	12-month	30.67	~	17.84	16.95
	24-month	41.81	~	24.47	20.34
	36-month	49.25	~	30.11	30.51
FY97	# of accessions	9,921	0	163,616	99
	6-month	21.38	~	13.28	13.14
	12-month	28.25	~	17.42	19.20
	24-month	40.72	~	24.39	29.30
	36-month	48.06	~	29.68	34.35
FY98	# of accessions	9,451	12	155,070	120
	6-month	24.20	*	15.02	19.17
	12-month	31.77	*	18.78	22.50
	24-month	43.42	*	24.86	30.84
	36-month	50.05	*	29.45	32.50
FY99	# of accessions	11,920	461	155,486	292
	6-month	24.85	18.66	13.75	19.87
	12-month	32.02	27.34	17.66	26.38
	24-month	41.06	40.57	23.50	33.22
	36-month	48.14	50.11	28.19	38.70
FY00	# of accessions	12,357	762	149,820	764
	6-month	20.33	16.41	11.65	22.26
	12-month	25.39	23.76	15.33	31.55
	24-month	36.19	37.93	21.15	41.24
	36-month	43.91	48.82	25.96	47.78
FY01	# of accessions	14,274	881	149,537	841
	6-month	18.84	13.29	10.42	17.72
	12-month	24.46	21.23	13.80	25.45
	24-month	37.37	36.78	19.81	34.61
	36-month	~	~	~	~
FY02	# of accessions	11,983	943	148,270	670
	6-month	19.27	12.52	10.24	16.57
	12-month	25.86	18.35	13.65	22.99
	24-month	~	~	~	~
	36-month	~	~	~	~

Notes: Attrition rates calculated by DMDC for all accessions in each educational category; educational category determined by official records. ChalleNGe education code used consistently beginning in FY99. Insufficient time has passed to calculate 36-month attrition rates for FY01-02 or 24-month attrition rates for FY02. Finally, note that Navy homeschooled accessions from FY99 are excluded.* Fewer than 20 individuals in cell.

References

- [1] United States House of Representatives, *National Defense Authorization Act for Fiscal Year 1999*, Conference Report, Section 571, H.R. 3616 (pages 116-118), Sep 22, 1998, Washington, DC
- [2] Federico E. Garcia et al. *Evaluation of the Pilot Program for Home School and ChalleNGe Program Recruits*, Nov 2001 (CNA Research Memorandum D0004598.A2)
- [3] Janice H. Laurence, Jennifer Naughton, and Dickie A. Harris. *Attrition Revisited: Identifying the Problem and Its Solutions*, Jan 1996 (United States Army Research Institute for the Behavioral and Social Sciences, ARI Research Note 96-20)
- [4] Department of Defense. *Improvements of the New Armed Services Vocational Aptitude Battery and Actions To Improve the Enlistment Standards Process*, 1981 (Report to the House and Senate Committees on Armed Services, Washington, DC: Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics))
- [5] Janice H. Laurence. *Military Enlistment Policy and Education Credentials: Evaluation and Improvement*, 1987 (Human Resources Research Organization Final Report 87-33, FR-PRD-87-33)
- [6] Matthew S. Goldberg. *A Survey of Enlisted Retention: Models and Findings*, Nov 2001 (CNA Research Memorandum D0004085.A2)
- [7] Patricia M. Lines. *Homeschooling*, Sep 2001 (ERIC Digest 151)
- [8] Lawrence M. Rudner. "Scholastic Achievement and Demographic Characteristics of Home School Students in 1998." *Education Policy Analysis Archives* 7(8), Mar 1999 <<http://epaa.asu.edu/epaa/v7n8/>>

- [9] Brian D. Ray. *Home Schooling on the Threshold: A Survey of Research at the Dawn of the New Millenium*, 1999 (National Home Education Research Institute, Salem, OR)
- [10] Personal communication with Joe Padilla, Chief of Youth Programs Branch, National Guard Bureau
- [11] Social Consultants International. *National Guard Youth ChalleNGe Program 1999 Annual Report*, 2000
- [12] "State Cuts Force Closure of Popular Youth Boot Camp." *Jefferson City News Tribune*, 31 Dec 2002
- [13] J. Toomepuu. *Soldier Capability—Army Combat Effectiveness (SPACE), Volume I: Main Report*, Apr 1981 (Fort Benjamin Harrison, IN: U.S. Army Soldier Support Center ACN64024) cited in Laurence, 1984.
- [14] Janice H. Laurence. *Education Standards for Military Enlistment and the Search for Successful Recruits*, Feb 1984 (Human Resources Research Organization Final Report 84-4, FR-PRD-84-4)
- [15] Peggy Golfin and Amanda B. N. Kraus with Lynda G. Houck, David Gregory, and David L. Reese. *Analysis of the Navy's Increased Cap on Accessions of Non-High-School-Diploma Graduates in FY99*, Aug 2001 (CNA Annotated Briefing D0004011.A2)
- [16] National Center for Education Statistics. *Digest of Education Statistics 2002, 2003* (U.S. Department of Education, Washington, DC: National Center for Education Statistics)
- [17] Janice H. Laurence, Peter F. Ramsberger, and Jane Arabian. *Education Credential Tier Evaluation*, Sep 1996 (Human Resources Research Organization Final Report 96-19, FR0EADD-96-19)
- [18] Timothy W. Cooke and Aline O. Quester. *Who Stays and Who Leaves? Identifying Successful Navy Recruits*, Jun 1988 (CNA Research Memorandum 88-75)
- [19] Stacey Bielick and Christopher Chapman. *Trends in the Use of School Choice: 1993 to 1999*, 2003. (U.S. Department of

Education, Washington, DC: National Center for Education Statistics (NCES 2003-031))

[20] Stacey Bielick, Katherine Chandler, and Stephen P. Broughman. *Homeschooling in the United States: 1999, 2001* (U.S. Department of Education, Washington, DC: National Center for Education Statistics (NCES 2001-033))

[21] Kurt J. Bauman. *Home Schooling in the United States: Trends and Characteristics*, Aug 2001 (U.S. Census Bureau, Washington, DC: Population Division (Working Paper Series No. 53))

[22] David Sikkink. "The Social Sources of Alienation from Public Schools." *Social Forces* 78.1 (1999): 51-86

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