Variation in Participants and Policies Across ChalleNGe Programs
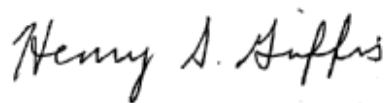
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Contents

Executive summary

The National Guard Youth Challenge (ChalleNGe) Program, operated jointly by the states and the state National Guard units with federal funding, targets at-risk youth between the ages of 16 and 18. ChalleNGe is a residential program that lasts 22 weeks. It includes classroom instruction on both academic and life-skills subjects; the academic focus of the program is designed to help cadets attain a GED (General Educational Development) credential. The program also features leadership opportunities and emphasizes developing short- and long-term goals.

Past analysis has shown that ChalleNGe graduates who enlist have higher attrition rates than high school diploma graduates, but there are large program-specific effects. Graduates of some ChalleNGe programs have consistently lower attrition than graduates of other programs and, indeed, have attrition rates below those of typical high school diploma graduates. In this report, we update and expand on our previous analysis; we focus on program-level differences.

First, we use data on the poverty rates of the neighborhoods where ChalleNGe participants lived before entering the program. We find that those from areas of higher poverty are less likely to graduate from ChalleNGe and less likely to enlist in the military. (These results hold even after we control for standardized test scores.) ChalleNGe participants who do enlist tend to come from poorer neighborhoods than enlistees with other education credentials. This puts them at a disadvantage because neighborhood poverty also has a small negative effect on military performance.

The importance of school quality may explain these results, but it is quite possible that school quality affects performance as much through noncognitive as cognitive skills. Noncognitive skill differences are thought to explain the difference in military performance between high school diploma graduates and those holding alternate

credentials. Locus of control provides one measure of noncognitive skills. Locus of control indicates the degree to which a person believes that his own actions/decisions affect what happens to him. Those who believe that external factors drive their outcomes are said to have an external locus of control; those who believe that their own (internal) factors drive their outcomes are said to have an internal locus of control. Having an internal locus of control is associated with many measures of success. Using a nationally representative dataset, we show that dropouts have a more external locus of control than graduates.

ChalleNGe focuses on noncognitive skills. We suspect, however, that different programs produce graduates with different levels of noncognitive skills and that this explains at least some of the program-specific differences. We recommend that future research on ChalleNGe emphasize the development of noncognitive skills.

The distance a cadet travels from his or her home to the program is related to the likelihood of completing ChalleNGe; those who travel farthest graduate at higher rates. In this case, distance may proxy for individual motivation. We recommend specific analysis comparing the density of high school dropouts with the location of ChalleNGe programs; this information could help to determine the placement of new programs and the advertising strategies of established programs.

Our research adds more evidence to our past findings that aspects of the ChalleNGe program have effects that last beyond the end of the program. Among those who enlist, ChalleNGe *graduates* have much lower attrition rates than ChalleNGe *terminates*. Also, physical fitness and leadership experience are associated with lower military attrition.

Many ChalleNGe participants/graduates continue to enlist; the majority join the Army, and this trend has strengthened over time. The ChalleNGe program data remain an important resource for tracking the progress of those who complete ChalleNGe. We find that those who complete ChalleNGe programs that award a high school diploma perform better in the military than other cadets.

Over the past few years, we find a notable downward trend in the attrition rates of ChalleNGe graduates who enlist. Attrition has trended

downward among both high school diploma graduates and GED-holders—and among dropouts, too. The trend among ChalleNGe graduates, however, is larger than that of high school diploma graduates and at least as large as the trend in the other groups. During the most recent years, the performance of ChalleNGe enlistees compares favorably with these other groups. We recommend continued tracking of this trend because past cohorts of ChalleNGe enlistees have struggled between the 12- and 36-month marks in terms of attrition. However, the current trend suggests an improvement in ChalleNGe enlistees' military performance.

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Introduction and background

The ChalleNGe program

The National Guard Youth Challenge (ChalleNGe) program was first authorized by Congress in FY93. The program is operated jointly by the states and the state National Guard units, with federal funding to cover a portion of the program's costs.

The program targets at-risk youth between the ages of 16 and 18. Participants must be (a) high school dropouts or expellees, (b) unemployed, and (c) drug free. Those on probation or parole, as well as those awaiting sentencing or indictment, are not eligible.

ChalleNGe includes a residential program that lasts 22 weeks. The environment is perhaps best described as *quasi-military;* participants (referred to as cadets) form platoons, drill and march, and engage in intensive physical training. The program also includes classroom instruction on both academic and life-skills subjects, such as financial management, drug avoidance, and health and sexual education. The academic focus of the program is designed to help cadets attain a GED (General Educational Development) credential. The program also features leadership opportunities, such as leading a platoon of fellow cadets. Finally, there is a strong emphasis on developing short- and long-term goals, and on planning out the specific steps necessary to achieve these goals. Another important aspect of the program is an adult mentor, who serves as an additional resource for cadets during and after ChalleNGe.

The ChalleNGe program has grown over time. In 1993, 10 states established ChalleNGe programs; today, 27 states (plus Puerto Rico) have programs. Several states have expanded the program to multiple campuses, and new programs are scheduled to come online in several more states in the next year. ChalleNGe is quite successful at placing cadets after graduation. In 2007, for example, 97 percent of recent

graduates who reported on their activities were employed, in school, or in the military [1].

Our previous research focused on the performance of ChalleNGe participants in the military. We found that those who complete the ChalleNGe program were much more likely to complete their first term of service than those who dropped out of ChalleNGe. Also, elements of the ChalleNGe program are important predictors of early military attrition; in particular, cadets who have better physical fitness or more contact with a mentor have lower bootcamp attrition.

In general, ChalleNGe graduates have higher attrition rates than high school diploma graduates, but there are large program-specific effects. Graduates of some ChalleNGe programs have consistently lower attrition than graduates of other programs and indeed have attrition rates below those of typical high school diploma graduates. While some of these differences may be due to unobserved differences in the state populations or the admissions procedures, our results strongly suggest that program-level differences are important. Finally, our results indicate that the ChalleNGe program has substantial, positive effects on participants.

In this report, we not only update our analysis to include more recent data but also expand our analysis; based on our earlier results, we focus our attention in this current effort on program-level differences. In addition, we use civilian data to describe the socioeconomic backgrounds of cadets. Given the strong program-level differences and the substantial focus in ChalleNGe on developing life-coping skills, we detail evidence on how noncognitive skills of ChalleNGe cadets are likely to vary across programs. We also survey ChalleNGe staff directly to quantify different circumstances and restrictions faced by the different programs. We next present some background information—first on military performance and then on noncognitive skills in general.

Military attrition and education credentials

The relationship between education credentials and performance in the military is well established. Most studies focus on first-term

attrition (failure to complete the term of service) as a primary measure of performance; on average, those who complete a traditional high school curriculum have lower attrition than those who attain an alternate credential. (Alternate credentials include GEDs, adult education certificates, some hours of community college, an occupational certificate, a homeschooling diploma, and completion of the ChalleNGe program.)[1]

The performance of GED-holders in the military provides a particularly pertinent example. Those who enlist with a GED credential attrite at substantially higher rates than those who enlist with a high school diploma—despite the fact that GED-holders must meet a higher threshold than high school diploma graduates on the Armed Forces Qualification Test (AFQT). Thus, on cognitive measures, those holding GEDs often exceed high school diploma graduates.

Noncognitive skills (i.e., skills that are not specifically academic in nature, such as persistence, motivation, and attitude) are a likely explanation for the high attrition rates of those who leave high school without graduating. Those who remain in school evidence persistence; they also tend to perform well in the military and in the job market (see [8, 9, and 10]). In contrast, GED-holders have fairly high cognitive skills compared with other dropouts and high school graduates who do not attend college, but they have very low measures of noncognitive skills; this explains some of their poor job market performance [9]. Consistent with this, those who complete high school coursework but fail their state exit exam often perform well in the military despite low test scores—probably because of their noncognitive skills [6].

Noncognitive skills

The term *noncognitive skills* can be thought of as referring to all skills that are not academic in nature. Thus, the ability to solve long division problems is a cognitive skill, whereas conscientiousness,

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1. See [2, 3, 4, 5, 6, and 7] for more discussion on the relationship between education credentials and military performance.

perseverance, leadership, and positive attitude are noncognitive skills. Although the current educational environment includes an emphasis on the importance of cognitive skills, researchers and others have long recognized the importance of noncognitive skills in explaining these outcomes.[2] Research indicates that the characteristics most desired by employers in their employees are attitude and communication skills—two noncognitive skills [12]. In addition, conscientiousness is closely tied to success at work [13].

Measuring noncognitive skills in a number of different ways, researchers consistently find that those with low noncognitive skills while in high school eventually earn much lower wages (e.g., [15]). Possession of more noncognitive skills during earlier grades is a major reason why girls attend college at higher rates than boys [16]. Those who held leadership positions in high school (and, thus, likely possess positive noncognitive traits) earn more as adults, even after controlling for cognitive skills [17]. This suggests that interventions (from the preschool level to ChalleNGe) should be judged on their ability to affect both cognitive and noncognitive skills [10].

Because of their all-encompassing nature, it is difficult to measure noncognitive skills with precision. During the middle of the last century, psychologists focused on developing so-called social learning theories—theories that account for how humans behave in complex social situations. In particular, the concept of *locus of control* was developed to explain why different people, faced with the same incentives, make different decisions.[3] Over time, locus of control has come to be viewed as a measure of motivation and, thus, a key factor in the development of noncognitive traits.

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2. Nearly 100 years ago, social scientist Edward L. Thorndike posited the existence of *social intelligence*—defined as the ability to act wisely in social situations and to successfully manage others ([11], cited in [12]).

3. Julian Rotter, with colleagues and graduate students, developed the theory of locus of control and conducted many early studies exploring the measurement and implications of the theory. See [14].

Locus of control

Locus of control is important in situations in which a given behavior sometimes, but not always, results in a reward or punishment, as well as situations in which any payoff occurs in the future. For example, a student who cheats on a test may be punished for this behavior, or may not, depending on a number of factors. Thus, locus of control describes the extent to which a person believes that rewards are contingent on or closely related to his or her behavior. Those who believe in a strong connection between their behavior and eventual outcomes are referred to as *internalizers,* or as having an internal locus of control. Those who believe the connection between their behavior and eventual outcomes is weak are referred to as *externalizers* and are said to have an external locus of control.[4]

Researchers believe that locus of control is formed during childhood and stabilizes during adolescence. Parents and parenting influence the development of locus of control; encouragement and consistent uses of reward and punishment help develop an internal sense of locus of control. Also, stressful life events, especially at a young age, increase externality.[5]

Differences in locus of control have implications for many social policies and outcomes. For example, human capital models in economics typically assume that a person makes schooling/training decisions to maximize expected future earnings. Thus, the person weighs the costs of completing high school versus the increase in wages that is likely to result. On a day-to-day basis, these models assume that people consider, for example, whether to study for a test based on the perceived costs and benefits of doing so. However, a student who views grades as random, or even as having a substantial random component, may be less likely to study. As another example, many states raise graduation standards for high school students, expecting that

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4. Externalizers may believe that outcomes are controlled by luck or fate, or by other powerful persons; in either case, the important distinction is the extent to which one's own behaviors are thought to affect outcomes.

5. See [18, 19, and 20] for locus of control in children and adolescents.

this will increase the effort put forth by students (and teachers). But a student with an external locus of control may view the outcome as uncontrollable and, thus, may not respond by working harder. Therefore, it is likely that those who have an external locus of control will be less likely to invest in education.

A specific example of expressed locus of control comes from the book *Ain't No Makin' It* [21]. The title itself could be said to express an external locus of control; the book describes decisions and attitudes of young men living in an urban public housing project. The following two quotations from the book express, respectively, an external locus of control and an internal locus of control:[6]

> I ain't goin' to college. Who wants to go to college? I'd just end up gettin' a *$%&&$ job anyway.

> If you put your mind to it, if you want to make a future for yourself, there's no reason why you can't. It's a question of attitude.

It seems clear that locus of control is an important ingredient in initiative. Externalizers could be expected to put forth less effort *given the same incentives*. Therefore, we would like to know how locus of control *develops*, and the extent to which it can be *changed*. Although the research contains some indications about formation of locus of control, most of the existing work focuses on measuring locus of control and correlating it with various events.

We wish to emphasize that locus of control is *not* simply an element of cognitive skills. Locus of control is usually correlated with cognitive skills—those with higher measured cognitive skills tend to have a more internal locus—but the correlation is far from perfect, and the

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6. As demonstrated in [21], locus of control is likely based only loosely on people's own experiences; rather, it is often defined by what they see in their immediate surroundings. In these cases, the author of the book posits that the internal locus of control expressed in the second quotation stems not from the young man's direct circumstances (which are similar to those of the first speaker) but from beliefs expressed by parents and others.

two concepts measure two different things.[7] Next, we discuss the specific implications of locus of control for schooling and labor market outcomes.

Locus and schooling/work outcomes

Locus of control is likely to affect or indicate how teens perceive payoff and, therefore, is likely to be predictive of their schooling decisions. Those who are more internal in eighth grade have higher levels of educational attainment several years later [18]. Those who have higher academic achievement have a more internal locus of control, and those who attain more schooling have a locus of control that becomes more internal over time [22]. Therefore, locus and education seem to work together; those with a more internal locus are likely to complete more schooling, but the very act of schooling reinforces and encourages an internal locus of control.

There is also ample evidence that those who have a more internal locus earn more (e.g., see [22, 23, and 24]). There is some evidence that spells of joblessness can result in more external locus, perhaps especially among young workers [25]. Based on these findings, the average high school dropout is likely to have a relatively external locus of control. In a later section, we use data from a large, nationally representative dataset to look at how measures of locus of control are related to dropout risk.

Noncognitive skills and ChalleNGe

The limited research on locus of control and military performance indicates that those with a more external locus have higher rates of bootcamp attrition, and that recruits' locus of control can be affected by their experiences in bootcamp. That is, recruits who were part of high-attrition units became more external during bootcamp, while those whose units had lower attrition became more internal [26, 27]. This suggests that the locus of control of ChalleNGe cadets, too,

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7. Locus of control is measured by testing a person's agreement with a series of statements. A few sample statements from the original measure appear in appendix B.

could change during the course of the program, and that program-level graduation rates could even affect this change. Specifically, cadets in programs with low levels of attrition could become more internal during the course of the program simply from observing the experiences of their fellow cadets.

Some of the limited research on ChalleNGe finds that goal-setting and decision-making improve for those who complete the program; this is likely to be important because the literature indicates that at-risk youth have weak decision-making skills [28].

All of these findings suggest that cadets entering ChalleNGe programs are likely to have relatively external locus measures. Thus, cadets are likely to believe that their actions are only loosely linked to outcomes. The aspects of ChalleNGe that focus on setting specific goals and carrying out step-wise actions to achieve those goals are working toward "internalizing" the locus of cadets; it seems quite probable that some programs are more successful at this than others, and this could be a major reason for different observed outcomes across programs. Also, cadets from programs with higher graduation rates may have more internal locus-of-control measures at the end of the program. It is also possible that cadets who enter certain programs have, on average, better developed noncognitive skills than cadets who enter other programs. We know that cadets in some programs come from more disadvantaged backgrounds than those in other programs; such factors affect noncognitive skills as well.

In this research, we focus on explaining program-level differences. We use data from the programs, the neighborhoods where cadets lived before entering the programs, and our survey of program staff to explain these differences. Given the likely role of noncognitive skills in explaining both success in the civilian labor force and performance in the military, we consider noncognitive aspects throughout this research.

Data and methodology

Data

We base our analysis on data from several different sources. The sources are as follows:

- *ChalleNGe program data.* We use data from each ChalleNGe program, beginning in 1999 and extending through class 1 of 2006.

- *Defense Manpower Data Center (DMDC) matched data.* We requested that DMDC match the Social Security Numbers (SSNs) of *all* ChalleNGe participants to their files on non-prior service accessions across the four Services.

- *DMDC longitudinal data.* We requested a file including data on all enlistees across the four Services, for FY99 through FY06, who enlisted with one of the following education credentials: ChalleNGe, GED, high school diploma, or no recognized credential ("dropout").

- *Civilian neighborhood data.* We include measures of neighborhood poverty rates to describe the communities where ChalleNGe participants lived before entering the program. (We also include poverty measures in our analysis of those who enlist in the military.)

- *Survey data.* We use survey data from a survey we conducted of those who work with ChalleNGe cadets at each ChalleNGe site.

- *Youth dataset.* Finally, we use a nationally representative youth dataset (the National Educational Longitudinal Study of 1988) to trace how young peoples' locus of control measures change over time and with experiences.

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ChalleNGe program data

The ChalleNGe program data include a number of individual-level measures. The data include some information on those who applied to or expressed interest in, but did not enter, the program. Our past analyses [7] found that there was little difference in terms of measured characteristics between those who were and were not accepted, as well as between those who entered and those who did not. Based on this, we focus here on those who actually entered the program, the ChalleNGe cadets.

Our data include indicators of academic achievement and physical fitness, as well as the number of leadership positions held while in the ChalleNGe program. Our data also include an indicator of the cadet's home ZIP code; we use this variable to add data on each cadet's neighborhood and to calculate the distance from the neighborhood to the ChalleNGe program.

DMDC matched data

We submitted to DMDC a complete list of SSNs of all ChalleNGe participants. DMDC matched this list against its active-duty accession files for FY99 through FY06.[8] DMDC then provided us with performance measures on each cadet who eventually enlisted.

We use these data to examine performance of ChalleNGe cadets in the military. Specifically, we compare the performance of graduates and nongraduates. Also, we look at how graduates from various programs perform; our earlier research [7] suggested that graduates from some programs have military performance on a par with high school diploma graduates, while graduates from other ChalleNGe programs perform quite differently.

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8. We would like to thank Debi Williams of DMDC for her work matching the files. We initially attempted to get information on those ChalleNGe cadets who joined the Reserves as well, but, because of inconsistencies across the Reserve and active duty databases, this was not possible.

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DMDC longitudinal data

While our matched DMDC file provided us with a great deal of information on ChalleNGe participants in the military, it did not include information on other military enlistees. Thus, we also requested that DMDC create a file including performance indicators on all non-prior-service active duty enlistees who enlisted with one of the following education credentials:

- ChalleNGe completion

- GED

- No credential ("dropout")

- High school diploma.

This file allows us to compare the performance of ChalleNGe and other enlistees as well as to compare the total number of enlistees with ChalleNGe credentials versus the number in our matched file.

Civilian data

We wanted measures of poverty that were updated frequently during the period of interest (1999 through early 2006) and that we could link to the ChalleNGe participants. The Census collects poverty data at the school district level annually for the Small Area Income and Poverty Estimates (SAIPE) program, and it is available from 1999 through 2004. We use the family poverty rate for those 5 to 17 years of age; thus, our measure indicates the percentage of school-aged children who live in poverty. To convert these school-district-level measures to a ZIP-code-level measure, we use a mapping of school districts to ZIP codes based on the 2000 Decennial Census.[9] We use data from the United States Postal Service (USPS) and the National Center for Educational Statistics (NCES) to update ZIP code and school district boundaries for every year. Because the State of Hawaii

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9. We use the MABLE/Geocorr2K: Geographic Correspondence Engine with Census 2000 Geography, Version 1.3 (April 2007) made available by the Missouri Census Data Center at *http://mcdc2.missouri.edu/websas/ geocorr2k.html.*

comprises one school district, we exclude Hawaii from these measures. We also exclude Puerto Rico.

Survey data

Our prior research [7] found substantial differences in the performance of cadets from different ChalleNGe programs. During visits to various ChalleNGe sites, we learned that different programs face very different circumstances in terms of both facilities and state regulations. We suspect that these differences explain some of the program-level differences. Therefore, we developed a short survey to give to the ChalleNGe program staff; we will include survey results in the final version of this document.

Youth dataset

We examine how one noncognitive measure, locus of control, varies between high school dropouts and high school graduates. To do this, we use the National Education Longitudinal Study of 1988 (NELS:88), a dataset which is made up of a nationally representative sample of students who were first interviewed during 8th grade in 1988. These students were also surveyed in 1990 and 1992, allowing us to determine which students graduated high school and which dropped out. We are interested primarily in measures of locus of control and dropout status but we also examine measures of cognitive ability as well as the risk of dropping out.

Methodology

Our general framework is to begin with individual-level and program-level characteristics (for all ChalleNGe participants) and to test how these characteristics affect the likelihoods of (a) completing the ChalleNGe program ("graduation"), (b) enlisting in the military, and (c) military performance. Our military performance measure is attrition, measured at various intervals throughout the enlistee's first term. Finally, we use our DMDC longitudinal file to compare the performance of ChalleNGe enlistees and enlistees with other education credentials.

In the case of each outcome, we begin with descriptive statistics; we then include regression analysis to help determine how individual characteristics versus program characteristics affect outcomes. We emphasize program-level differences throughout much of this report.

Although most of our research focuses on the performance of cadets, we also provide some analysis at the program level. For example, we look at how the poverty rates of the population and cadets vary across programs. We also look at how programs of various sizes compare in terms of their graduation rates and their target graduation rates.

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Results

In this section, we present our empirical results. We begin by introducing measures of the neighborhoods that cadets come from; we also discuss how the distances between cadets' neighborhoods and the ChalleNGe program vary across programs. We continue with our results using the program data, detailing the factors that affect ChalleNGe graduation and military enlistment rates. We also include a brief subsection analyzing the distance between ChalleNGe participants' homes and the program sites.

Next we follow the progress of these ChalleNGe participants who go on to enlist through the first 3 years of their initial terms of service. Also, we compare ChalleNGe enlistees with similar enlistees holding different education credentials. In this subsection, we include an analysis of the neighborhood characteristics of ChalleNGe enlistees compared with enlistees who hold other credentials.

In the final subsections, we discuss the results of our survey of ChalleNGe program staff and likely reasons for program-specific differences. We also summarize what we know about the noncognitive skills of all young people based upon results from a large, random survey.

What do we know about cadets' neighborhoods?

Figure 1 shows the poverty rates of program participants, as well as the overall youth poverty rates for each state with a ChalleNGe program. Figure 1 also indicates the percentage of cadets who come from the state's poorest neighborhoods, where "poorest" is defined as being above the 60th percentile in terms of neighborhood poverty rates. Thus, if cadets were drawn evenly from all neighborhoods in the state, we would expect to see 40 percent from the poorest neighborhoods. Programs that draw from the poorest areas of the state are likely to show poverty rates higher than the overall poverty rate (the blue bar is higher than the red bar) and to have more than 40 percent of

cadets from the poorest neighborhoods. For example, the Camp Long and Illinois ChalleNGe programs both show this pattern. Some programs seem to draw cadets from varied neighborhoods; for example, cadets in the Maryland program come from neighborhoods with slightly lower than average poverty rates, but many cadets in this program come from the poorest neighborhoods in the state. This suggests a great deal of diversity among cadets in these programs.

Figure 1.   Poverty rates, by ChalleNGe program[a]
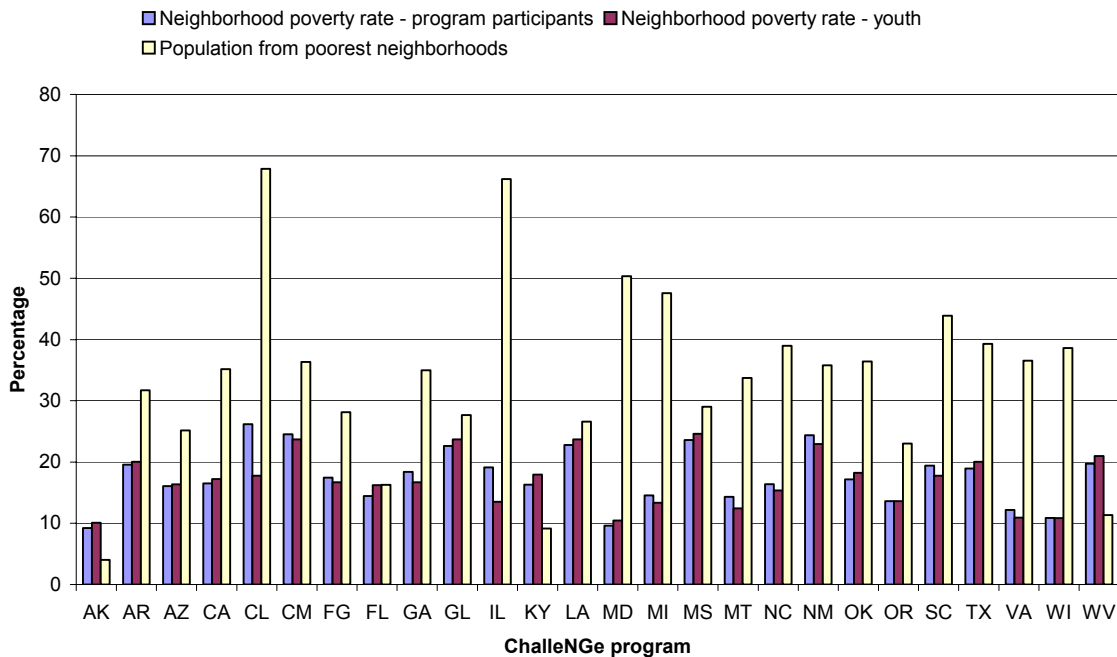
a. Consistent poverty data were not available for some programs; we exclude these programs from this figure.

Our program data include the home ZIP code of each cadet. Using this information, we calculated the distance between each cadet's neighborhood and the ChalleNGe program the cadet attended.[10]

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10. About 10 percent of cadets have missing ZIP codes, and a few cadets (about 0.3 percent) have improbable ZIP codes—that is, the distance between their home ZIP code and the ChalleNGe program is more than 2,500 miles.

Figures 2 and 3 indicate the percentage of cadets who live various distances from each ChalleNGe site. Figure 2 includes single-program states; figure 3 includes multiple-program states. The states are listed from largest to smallest in terms of geographical size in each figure.

Figure 2. Distance cadets traveled to attend ChalleNGe (states with one site)[a]
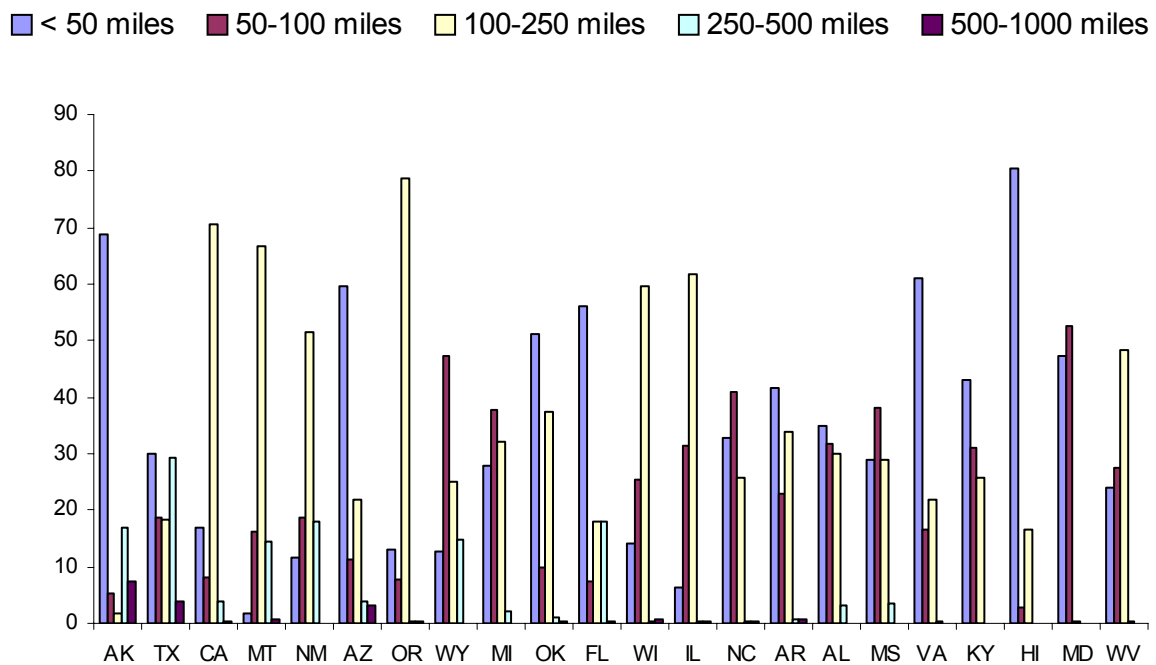
a. The percentage of cadets who traveled over 1,000 miles was very small; for visual clarity, we exclude these observations from this figure.

Figure 2 shows that, in many programs, a large proportion of cadets come from within 50 miles of the site. This may be due to population density or to overall size of the state. For example, although Alaska is the largest state in the union in terms of land mass, the population is concentrated in the southern end of the state near the ChalleNGe site. The situation is similar in the much smaller state of Hawaii; the ChalleNGe site is near Honolulu, where a large proportion of the population resides. However, some programs draw a large proportion of cadets from further away; California, Oregon, Illinois, and West Virginia are examples of such programs. When a high proportion of

cadets travel substantial distances to get to ChalleNGe, this could indicate very motivated cadets, an effective advertising campaign, an ability to choose among a large pool of cadets, or some combination of these factors. In large states with few cadets traveling long distances, this may indicate the need for a second program. Figure 3 demonstrates that, in the case of Georgia and Louisiana programs, many cadets travel substantial distances; in the case of the South Carolina programs, however, most cadets travel no more than 100 miles.

Figure 3.   Distance cadets traveled to enroll in ChalleNGe (states with multiple sites)[a]
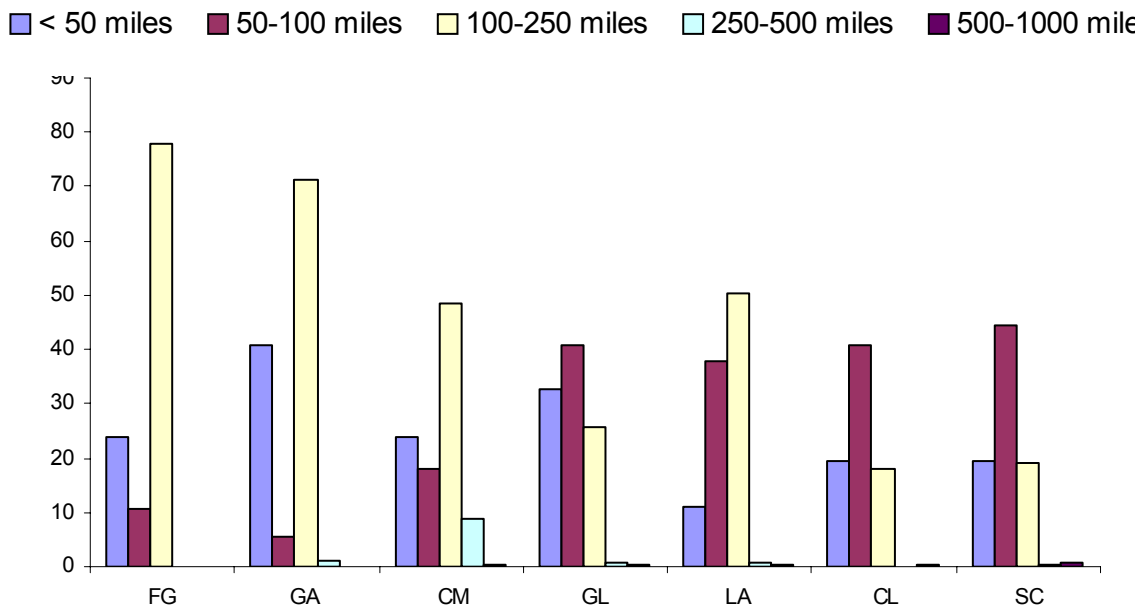
a. A very small percentage of cadets traveled over 1,000 miles; for visual clarity, we exclude these observations from this figure.

ChalleNGe program data

Graduation

Here, we detail the factors that influence the likelihood that a cadet will successfully complete the ChalleNGe program (i.e., graduate). To begin, we present descriptive statistics on some of the differences between those cadets who graduate and those who leave a ChalleNGe program before graduation (i.e., terminate).[11] In this subsection, we examine only those who entered the program, so all cadets either graduate or terminate; in other words, we do not examine the very limited data on those who express an interest in, but do not enter, a program.

Our sample includes data on 76,850 cadets who entered the program between 1999 and early 2006. The overall graduation rate was 63.6 percent.[12] As indicated in table 1, ChalleNGe graduates differ from terminates in several ways. In particular, male cadets are less likely than female cadets to graduate. Many cadets report either very low family incomes or do not report income levels at all; graduates are slightly less likely than terminates to have annual family incomes below $15,000, but the difference is very small. Graduates actually enter ChalleNGe with slightly lower physical fitness levels than terminates, but again the difference is very small and nongraduates' records often do not include initial physical fitness levels. (We compare only initial measurements of physical fitness and test scores because terminates have no final measure.) Those who go on to graduate enter ChalleNGe about half a year ahead of those who do not complete the program, according to their Test of Adult Basic Education (TABE) scores. Finally, ChalleNGe graduates come from neighborhoods with slightly lower levels of poverty than nongraduates.

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11. We use the word *terminate* to describe the process of leaving the program, whether the initiative to leave comes from the cadet or the staff.

12. Our definition of *graduation rate*—the ratio of graduates to entrants—is different from the definition used by ChalleNGe program managers and National Guard Bureau personnel for funding allocation.

Table 1 suggests that TABE scores, gender, ethnicity, and perhaps even neighborhood poverty rates are likely to influence the probability that a cadet will graduate from ChalleNGe. However, because these factors are likely to be correlated (e.g., those with higher TABE scores may come from less poor neighborhoods), we next use regression analysis to control for many potential factors at once and isolate effects from specific factors.[13] Figures 4 and 5 present the *marginal effects* from our regressions—that is, the change in the predicted probability of graduation that is associated with a change in one of the characteristics, such as male versus female or age differences.

Table 1.   ChalleNGe cadets, by graduation status

Variable	Terminated	Graduated
Male (percentage)	81.2	80.6
White (percentage)	46.1	49.0
Black (percentage)	32.7	29.0
Asian/Pacific Islander (A/PI) (percentage)	1.8	2.7
Hispanic (percentage)	11.4	13.3
American Indian (percentage)	3.7	2.8
"Other" (percentage)	4.1	3.2
Age (at entry)	17.1	17.1
Income < $15k (percentage)	57.0	53.2
Income missing (percentage)	30.8	30.3
Initial physical fitness score	0.0092	-0.0013
Initial physical fitness score missing (percentage)	75.2	30.6
Initial TABE score	6.8	7.4
Initial TABE missing (percentage)	78.6	36.4
Poverty rate of neighborhood (percentage)	18.2	17.8
N	27,958	48,939

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13. Throughout our Results section, we present regression results from logistic (logit) models. In such models, the relationship between the coefficient and the marginal effect is nonlinear; we present marginal effects calculated at or around the mean in the text and complete regression results in appendix A.

Figure 4 indicates that girls graduate from ChalleNGe at a higher rate than boys. Also, there are differences by ethnicity. These regression results include a control for initial TABE score, but this score may not completely measure preparation; it is possible that girls enter the program more prepared than boys.

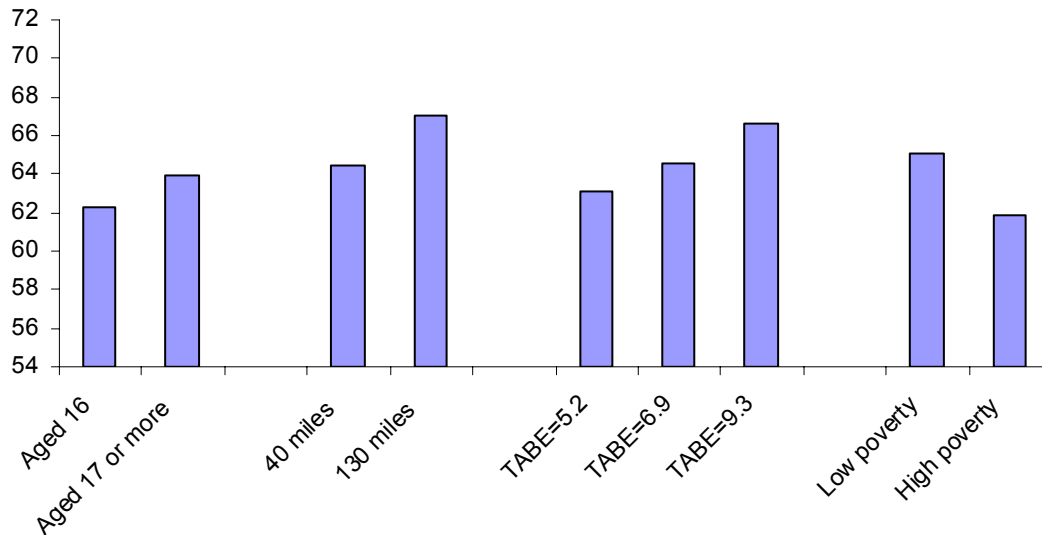Figure 4.   Regression-adjusted graduation of ChalleNGe cadets, by gender and ethnicity[a]
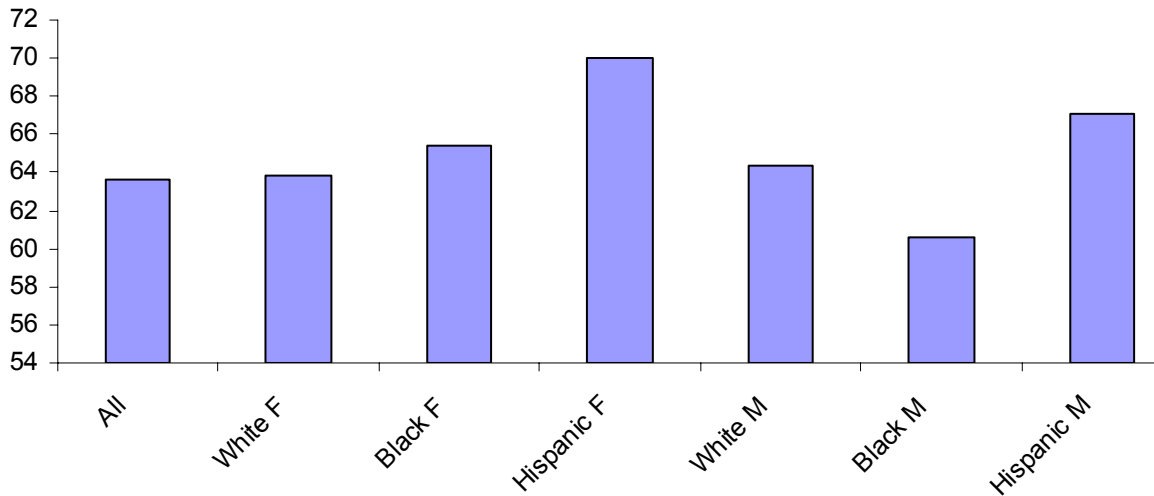
a. Regression also includes variables shown in figure 2 and controls for program, year, and class (1st vs. 2nd during year), as well as indicators that poverty rate or distance is missing. Appendix A has complete regression results.

Figure 5 includes regression-adjusted probabilities of graduation by age, TABE score, and neighborhood poverty rate. Figure 5 indicates that those who are at least age 17 at entry graduate at a higher rate than those who enter the program at 16. Also, those with higher TABE scores graduate at higher rates. Finally, figure 5 indicates that those who come from high-poverty neighborhoods graduate at a lower rate than those who come from low-poverty neighborhoods.[14] This result is particularly remarkable because the effect is large, even

14. Here, we define *high poverty* as a 26-percent poverty rate, which represents the 75th percentile among ChalleNGe participants; in a similar fashion, we define *low poverty* as 10 percent, representing the 25th percentile among ChalleNGe participants.

though our regression already includes controls for test scores, age, gender, ethnicity, and family income (although income data are often missing). Thus, living in a high-poverty neighborhood has an influence on the likelihood of successfully completing ChalleNGe, and the size of the effect is substantial—roughly equal to raising the person's TABE score from the 50th to the 75th percentile. This suggests that a person from a high-poverty neighborhood who enters the ChalleNGe program with a TABE score of 9.3 (indicating achievement at the third month of ninth grade) has the same likelihood of completing the program as a similar person who enters with a TABE score of 6.9 but lived in a low-poverty neighborhood. This effect probably reflects school quality and perhaps many other factors.

Figure 5.   Regression-adjusted graduation rates of ChalleNGe cadets[a]

Figure 5 also indicates that the distance from the cadet's neighborhood to the ChalleNGe program is correlated with graduation. We compare graduation probabilities of a cadet who lives 40 miles from the ChalleNGe site with those of a cadet who lives 130 miles away.[15] There could be several reasons for the correlation between distance and graduation. First, it may be that cadets who travel further to join ChalleNGe are more motivated. Also, it could be that taking a cadet farther from home and removing him or her from familiar surroundings directly increases the cadet's probability of graduation. Finally, it is possible that those programs that draw cadets from farther away have more effective advertising or networks to attract potential cadets. They may also have more applicants from which to select cadets.

Finally, we examine program-level effects. Figure 6 plots graduation rates, as well as regression-adjusted graduation rates, for all programs. In general, the regression adjustments are small; adjusted graduation rates are fairly similar to actual rates. If regression-adjusted rates are higher, it indicates that the characteristics of cadets/programs/ neighborhoods have an overall negative influence on graduation rate; essentially, cadets who enter these programs are less prepared than the average cadet. For example, TABE scores could be lower, more cadets could be 16, or cadets' neighborhoods could have higher poverty rates than average. In other cases, regression-adjusted rates are lower than actual rates, indicating that cadets are better prepared than average (i.e., come from lower poverty neighborhoods, are older, or have higher test scores). Note the substantial variation in graduation rates (adjusted or not) across programs. We return to this variation in a later section of the paper.

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15. We picked these two distances because they approximate the 25th and 75th percentiles in the distribution. Thus, about 25 percent of cadets live fewer than 40 miles from their ChalleNGe program, and roughly 25 percent live more than 130 miles away. As is usually the case with missing information, having a missing ZIP code is associated with not completing ChalleNGe. Those cadets whose ZIP codes indicate that they live improbably far from the ChalleNGe site are also less likely than others to complete the program.

Figure 6. Graduation rates and regression-adjusted rates, by program[a]

Military enlistment

Next, we examine the data with a focus on which cadets are most likely to enlist in the military after leaving ChalleNGe.[16] We requested that DMDC match the SSNs from the ChalleNGe program data against its files for non-prior-service active duty accessions during FY99 through FY06. Table 2 details a number of characteristics that differ between those ChalleNGe participants who enlist in the military and those who do not.

16. As before, we focus on those who entered the program, so everyone considered either graduated or was terminated. The military enlistment rate of those who expressed interest in, but did not enter, ChalleNGe is quite low.

Table 2.   ChalleNGe cadets, by military enlistment status

Variable	Did not enlist	Enlisted
ChalleNGe graduation rate (percentage)	60.4	88.2
Attained GED or other credential in ChalleNGe (percentage)	20.4	41.3
Credential information missing (percentage)	44.1	47.6
Male (percentage)	79.5	90.4
White (percentage)	47.4	66.0
Black (percentage)	32.8	18.4
Asian/PI (percentage)	3.3	2.1
Hispanic (percentage)	10.3	7.7
American Indian (percentage)	2.5	2.3
"Other" (percentage)	3.6	3.4
Age 16 or younger at entry[a]	24.2	19.4
Age 17 at entry	48.3	49.2
Age 18 or older at entry[a]	27.5	31.4
Income < $15k (percentage)	52.3	70.8
Income missing (percentage)	31.9	17.4
Initial physical fitness score	-.001	0.0096
Final physical fitness score	0.000037	0.015
Initial TABE score	7.2	8.1
Initial TABE missing (percentage)	51.2	51.6
Armed Services Vocational Aptitude Battery (ASVAB) score	28.6	48.1
Distance from neighborhood to ChalleNGe site (miles)	110.6	139.2
Poverty rate of neighborhood (percentage)	17.1	15.8
N	66,772	7,876

a. Records for a few cadets indicated that they were 15 or 19 at entry into ChalleNGe. We suspect this is due to incorrect birthday data.

Our data indicate that 10.6 percent of ChalleNGe participants go on to enlist; our records show that 7,876 cadets enlisted. This is certainly a lower bound because we calculate it using our matched file from DMDC. Consequently, any ChalleNGe cadet who had an incorrect SSN in the program data and later enlisted would not show up in our matched file.

Table 2 indicates that male cadets enlist at much higher rates than female cadets; however, this difference is smaller than the difference

across the civilian youth population. (About 80 percent of ChalleNGe cadets are young men; nearly 12 percent of male cadets, and about 10 percent of female cadets, enlist). Those who are at least age 17 when they enter ChalleNGe enlist at higher rates. There are differences in enlistment by ethnicity as well; in particular, non-Hispanic whites enlist at higher rates than other groups. Enlistees appear more likely than others to come from low-income families, but nonenlistees often have missing income data, so we suspect this statistic is misleading. Poverty data indicate that enlistees come from neighborhoods with *lower* levels of poverty than nonenlistees.

Those who enter ChalleNGe more physically fit are more likely to enlist, and those who enlist make more progress in terms of physical fitness while at ChalleNGe. Those who enlist have substantially higher ASVAB scores than those who do not, as well as higher initial TABE scores. Finally, those who enlist traveled slightly farther from their homes to the ChalleNGe program than others. As in the case of graduation, we suspect that many of these differences may be correlated, so we use regression analysis to separate the various effects.

Figures 7 and 8 present marginal effects for some of the variables included in our regression. As the descriptive statistics suggest, enlistment rates vary by ethnicity and gender, with male, non-Hispanic white cadets evidencing the highest probability of enlistment. Also, older cadets are more likely to enlist. (Complete regression results appear in appendix A.)

Figure 8 demonstrates that more fit cadets and cadets with higher test scores are more likely to enlist. However, the effect of completing ChalleNGe and earning a GED dwarfs the effects of physical fitness, ethnicity, and test scores. Those who graduate from ChalleNGe and earn a GED enlist at more than 2 times the rate of those who graduate but do not earn a GED and at more than 6 times the rate of those who neither complete the program nor earn a GED. Finally, even after holding constant test scores and these other factors, those from high-poverty neighborhoods are less likely to enlist.[17]

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17. We included distance from the cadet's neighborhood to the ChalleNGe program in this regression. The effect was positive (those from farther away were more likely to enlist), but the size of the effect was very small.

Figure 7.   Regression-adjusted enlistment rates of ChalleNGe participants, by gender, ethnicity, and age
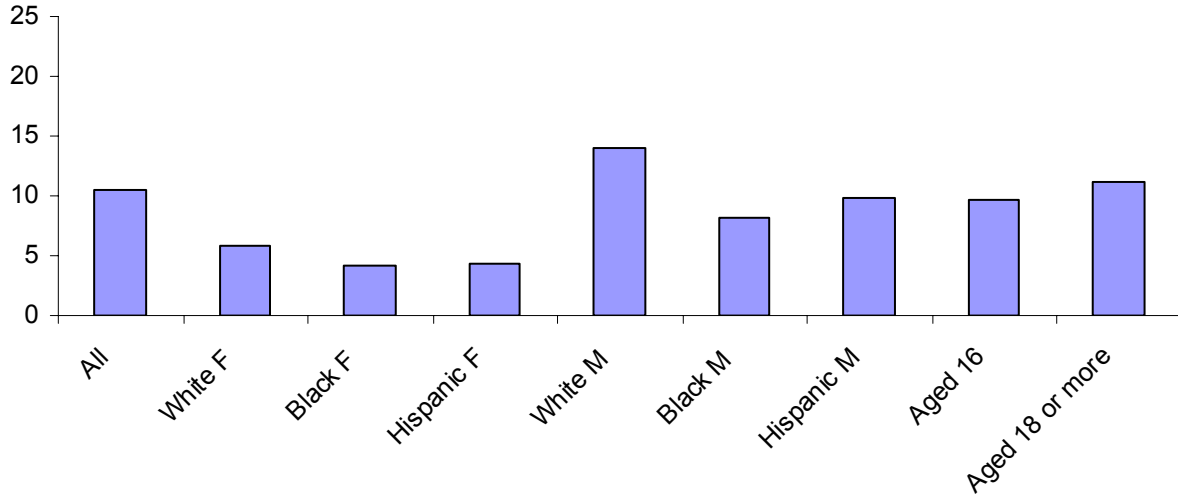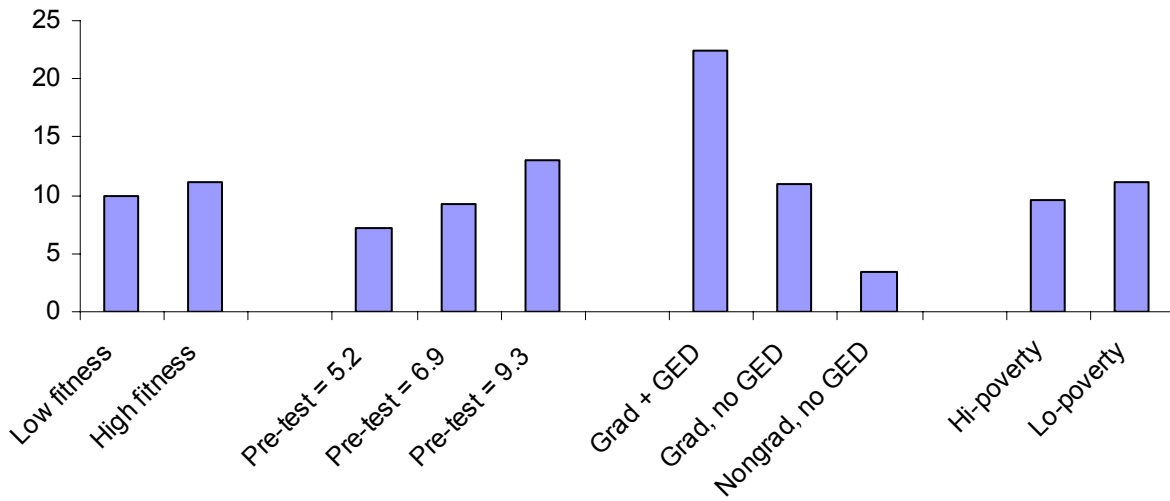

Figure 8.   Regression-adjusted enlistment rates of ChalleNGe participants, by personal characteristics

Finally, we examine how enlistment rates vary across programs (see figure 9). As in the case of graduation, we find substantial variation in the overall enlistment rate by program. Part of this may be due to regional differences (enlistment rates among all youth vary by

region), but some may be due to program-level differences, a subject to which we return in the next subsection.

Figure 9.   Enlistment rates by ChalleNGe program[a]
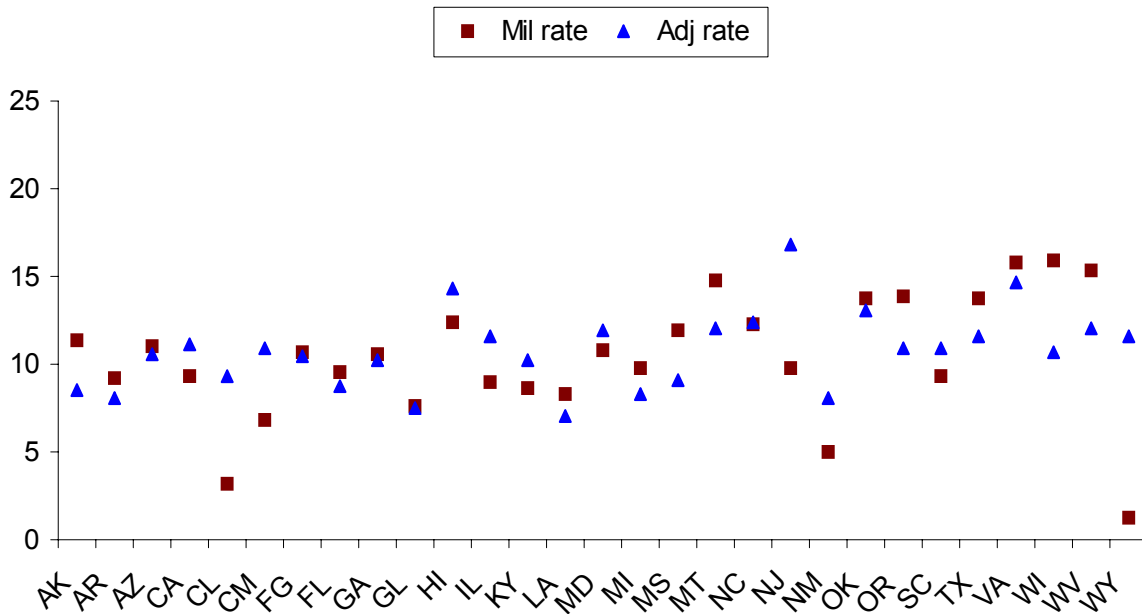
a. Complete regression results appear in appendix A; table 8 includes program-specific effects.

DMDC matched data—success in the military

ChalleNGe participants in the military

In this subsection, we describe the performance of those ChalleNGe participants who enlist in one of the four Services. Attrition is our primary measure of performance; we focus on how individual attributes, neighborhood characteristics, and program attributes affect the attrition rates of those ChalleNGe participants who enlist. (In the next section, we explicitly compare the performance of ChalleNGe graduates with enlistees who have other credentials).

To track ChalleNGe participants who enlist, we use a DMDC matched sample from a complete list of SSNs of all ChalleNGe participants (we

include participants rather than graduates only; nongraduates some-times enlist after leaving the ChalleNGe program). First, how many participants enlist? Figure 10 indicates that between FY99 and FY06 there were 10,491 ChalleNGe participants who became non-prior-service, active duty enlistees. The number of enlistees rose steadily throughout the FY99–04 period; during this time, the ChalleNGe credential was considered Tier I when accompanied by a GED. Although the number of enlistees fell after FY04, the next 2 years showed substantial numbers of ChalleNGe participants joining the Services.

Figure 10 includes all enlistees, regardless of their official education credential. For example, some ChalleNGe programs award a high school diploma; such enlistees would be listed as high school diploma graduates on their official record but are included in figure 10 based on their SSNs. However, this number is certainly a lower bound estimate because it does not include any ChalleNGe enlistee who had a missing or incorrect SSN in the ChalleNGe program data. Some programs had significant numbers of missing or "bad" SSNs, especially during past years; we detail these problems in appendix B.

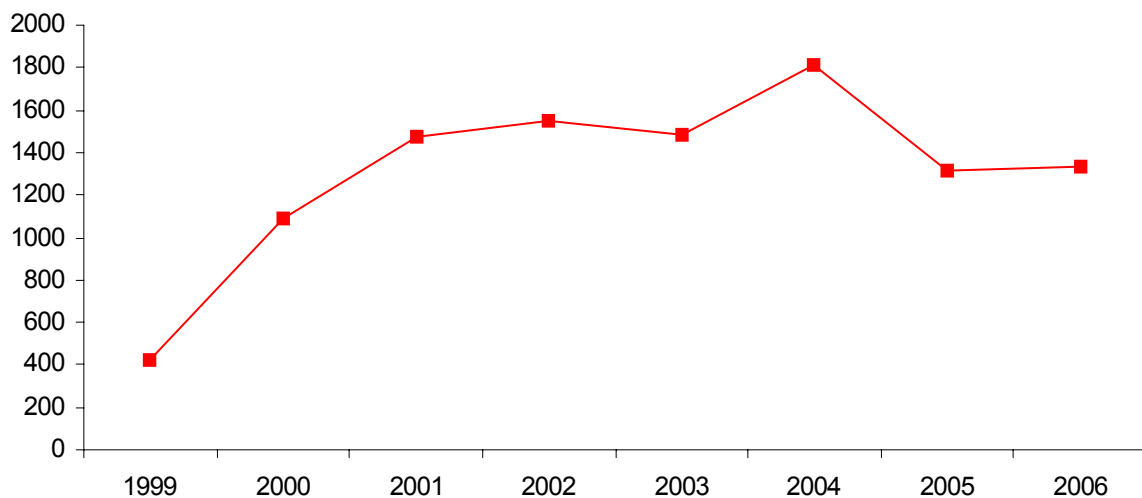Figure 10. Enlistment rate of ChalleNGe participants over time

Figure 11 shows a breakdown of the official education credential of ChalleNGe *graduates* who enlist—a group of 7,775. (Nongraduates, of course, would be expected to enlist with a non-ChalleNGe credential.) Nearly 60 percent of ChalleNGe graduates who enlist have official records that indicate completion of the program; most of the rest are listed as high school diploma graduates. This is reasonable since several ChalleNGe programs award high school diplomas. This figure indicates the importance of ChalleNGe program data; without them, it is impossible to track the progress of cadets who enlist under another education credential.

Figure 11. Education credentials of ChalleNGe graduates who enlisted, FY99 through FY06[a]

Legend: No credential, GED, Homeschool, Other Tier II, ChalleNGe, HSDG, Other Tier I

4% 1% 8% 0% 1% 28% 58%
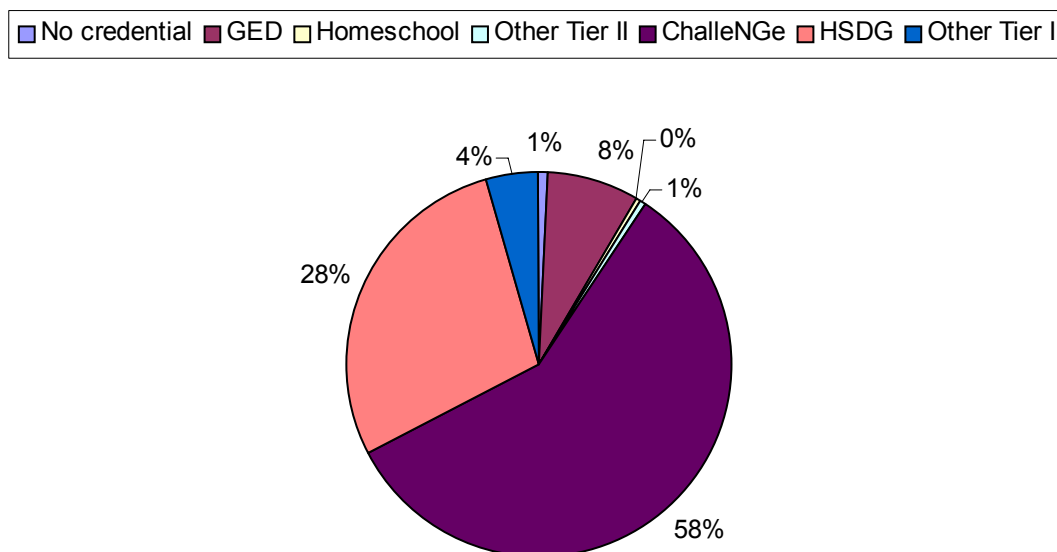
a. About 0.3 percent of ChalleNGe graduates enlist as homeschoolers.

Figure 12 indicates how enlistees are distributed across the four Services, and how that distribution has changed over time. In particular, since the end of the 5-year pilot program, the vast majority of ChalleNGe participants who enlist join the Army. But ChalleNGe participants do enlist in the other Services as well.[18]

18. Over the course of the pilot program, about 10 percent of ChalleNGe enlistees joined the Air Force, but when we examine these enlistees in particular, their education credentials overwhelmingly list a high school diploma. The Air Force, in particular, enlists very few nongraduates.

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Figure 12. ChalleNGe participants enlistment by Service , over time
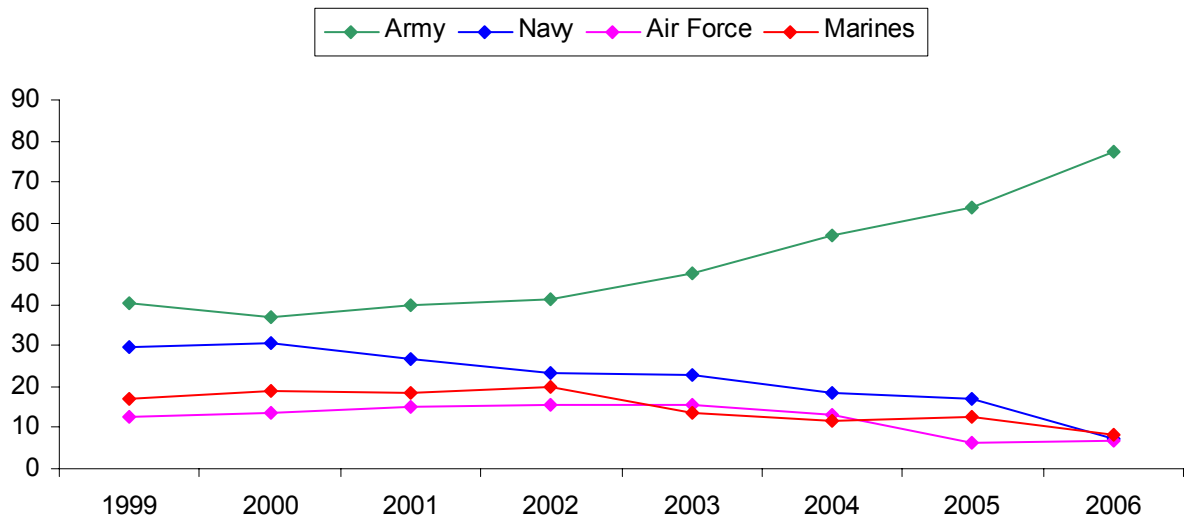
Next, we detail the performance of ChalleNGe enlistees. In terms of attrition, figure 13 demonstrates that ChalleNGe graduates perform far better than those who were terminated from the program.[19]

Our regression results, including individual characteristics of the ChalleNGe participants and indicators for which participants completed the program, were terminated from the program, or did not actually enter the program, are quite similar to those shown earlier.

To further explore how characteristics of ChalleNGe programs affect eventual military success, we examine only ChalleNGe *graduates* who go on to enlist. First, figure 14 shows overall attrition rates among ChalleNGe graduates; we divide the sample into those who enlisted in FY99 through FY01 (essentially, before 9/11), those who enlisted

19. Those who initially expressed some interest in the program but did not enter perform better than those who were terminated, but worse that those who completed the program. While some of this group may have been unqualified for ChalleNGe, it is likely that many others chose instead to complete their high school diploma or earn a GED. Indeed, the data indicate that about 80 percent of those who expressed interest in, but did not enter, ChalleNGe enlisted with either a high school diploma or a GED.

Figure 13. Attrition rates of ChalleNGe enlistees, by graduation status[a]
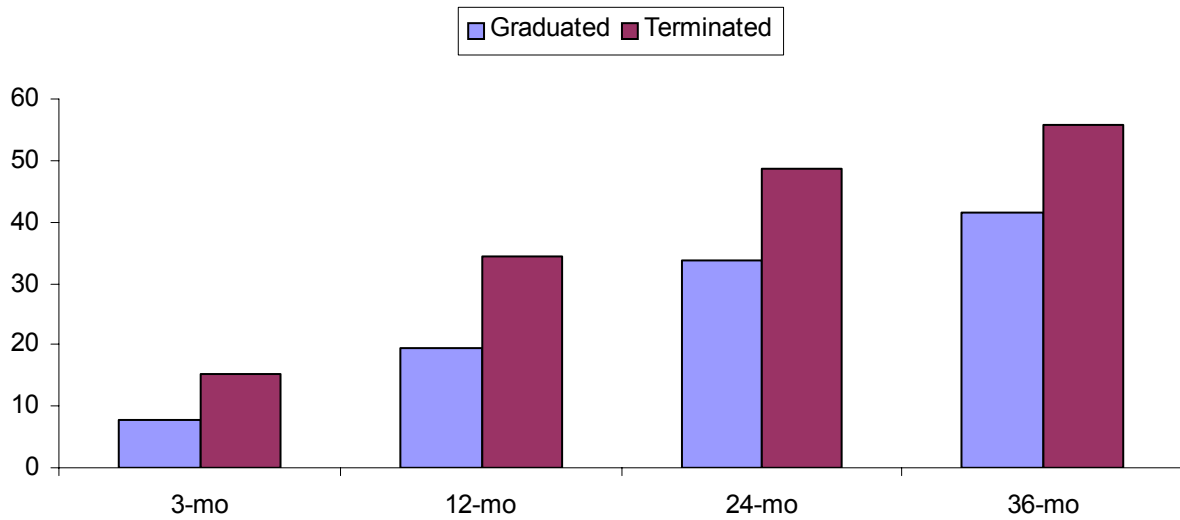
a. Includes data from FY02-FY06; graph using data back to FY98 is very similar. Also, regression-adjusted results including controls for age, gender, ethnicity, marital status, Service, AFQT score, and fiscal year of enlistment are very similar.

Figure 14. Attrition rates of ChalleNGe graduates, by period of enlistment[a]
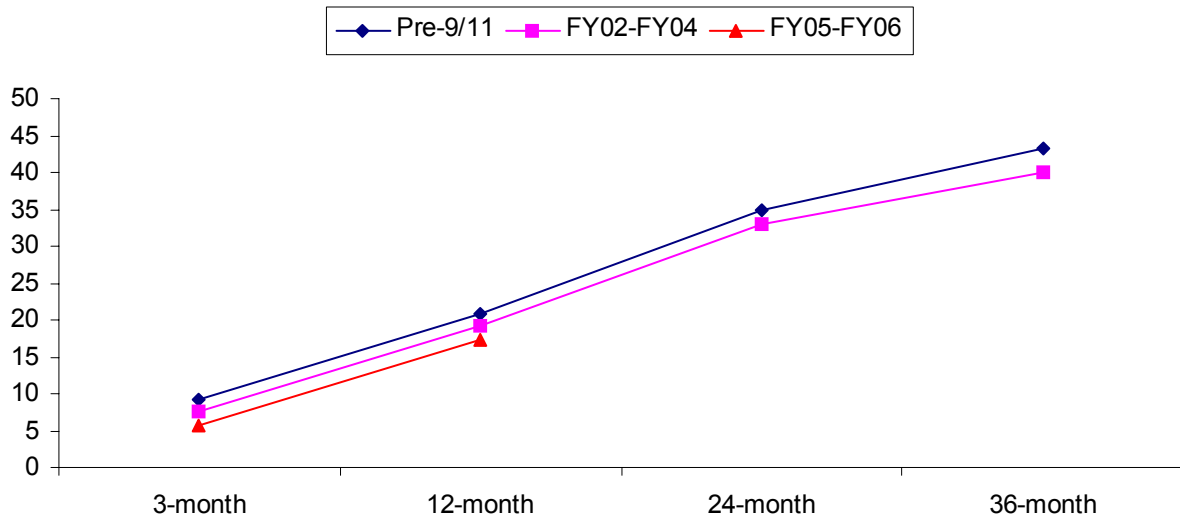
a. At the time our sample was formed, we did not have enough information to calculate 24- or 36-month attrition rates for those who enlisted after FY04.

in FY02 through FY04, and those who enlisted in FY05 through FY06. Figure 14 shows that attrition rates fell during this period. Those who enlisted after 9/11 had lower attrition than those who enlisted before, and those who enlisted in FY05 and FY06 had the lowest 3- and 12-month attrition rates of any group shown.[20]

Next, we present regression results on this same group of ChalleNGe graduates. We modeled 3-, 12-, and 36-month attrition rates; we present marginal effects from the 3-month and 36-month equations in figure 15.[21] The figure indicates that, among ChalleNGe enlistees, men have lower attrition than women. The effect of age, however, is less clear. Those who enlist at age 17 (and who, therefore, graduated from ChalleNGe at age 16 or 17) initially have lower attrition rates than older ChalleNGe graduates; by the 36-month point, however, those who enlisted at age 17 have *higher* attrition rates than older ChalleNGe enlistees. (The attrition rates of those who enlist at 18 or 19 fall between the rates of 17-year-olds and 20-plus-year-olds). This suggests that even though younger cadets are less likely to graduate, those who do graduate and enlist continue to struggle; while they perform well during bootcamp and the preservice phase (the first 12 months), they attrite at higher rates than other cadets over the next 2 years.

Enlistees who exit ChalleNGe more physically fit than the average graduate perform better than less fit ChalleNGe enlistees, and this difference persists over time. Finally, figure 15 shows the effect of having held more leadership positions while in ChalleNGe; those who held more leadership positions perform better during their first term of service. This effect also persists over time. Thus, figure 15 provides evidence that specific elements of the ChalleNGe program have a positive effect on the performance of those who go on to enlist.[22] Figure 15 also shows

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20. Of course, these attrition rates could have been driven by factors that affected only ChalleNGe graduates, or factors that affected all enlistees. In the next section, we explicitly compare ChalleNGe enlistees with others.

21. Complete regression equations appear in appendix A.

22. Our previous research included measures of mentorship, which had a positive effect on performance; in the current data, the variable often is missing. Also, we exclude waiver information due to concerns with the quality of the DMDC waiver data. We include poverty rates in our regressions, and experimented with other measures of neighborhood characteristics, but these variables had no significant effect on attrition.

that the time trends detailed in figure 14 persist even after controlling for other factors; attrition rates of ChalleNGe enlistees decreased over time.

Figure 15. ChalleNGe enlistee attrition rates, by personal characteristics and enlistment period[a]
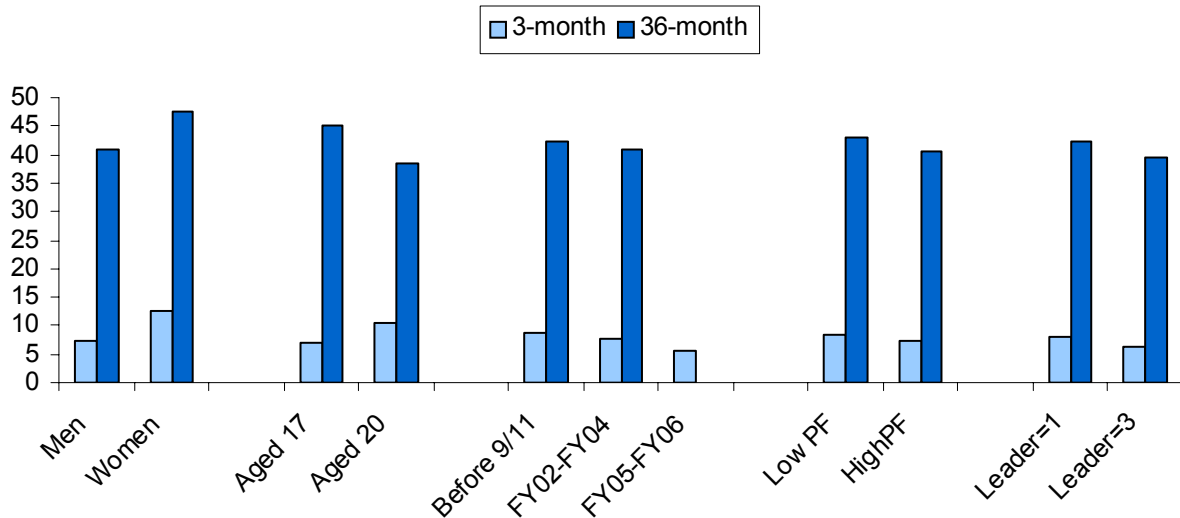
a. Regressions include controls for ethnicity, Service, AFQT score, poverty rate, and program in addition to the variables listed in the figure. We clustered the errors on "program." No 36-month data are yet available for those who enlisted in FY05 and FY06. See figure 16 for marginal effects of specific programs.

One important focus in this research is the program-specific differences. In figure 16, we present marginal effects from each program; the horizontal lines represent the average attrition rates across all programs. As in our previous research [7], we find substantial variation across the programs. This variation still exists even though we have controlled for neighborhood poverty rates.

We examine one other subgroup—enlistees who graduate from ChalleNGe programs that award a high school diploma.[23] Figure 17 shows that attrition rates are lower for those who complete ChalleNGe at a program that awards high school diplomas.

23. Six programs award a high school diploma: CA, FL, HI, MS, NJ, and OR. A note of caution: While the differences in the raw data (in figure 17) are statistically significant, the differences in regressions do not achieve significance. This could be due to the relatively small sample size.

Figure 16. Program-specific attrition rates, controlling for personal characteristics[a]

Figure 17. Attrition rates of ChalleNGe graduates, by credential awarded[a]
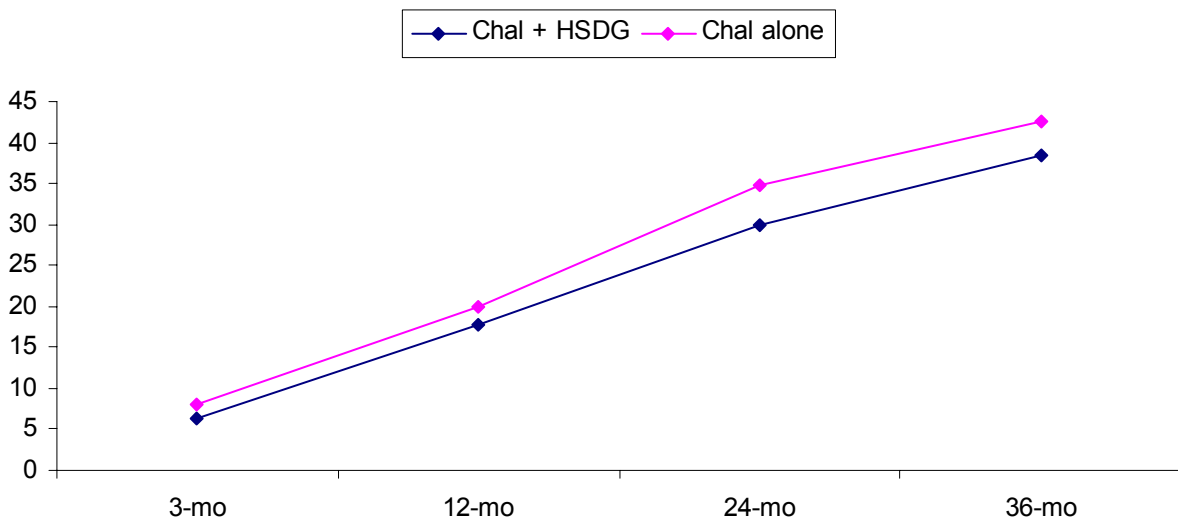
Program-level differences and survey results

We examine the program-level differences in light of differences in graduation targets. We define a program's *graduation rate* as the percentage of entrants who graduate. Our definition is based on that used by high schools and colleges. The graduation rate expresses how successful programs are in retaining cadets through graduation. ChalleNGe staff, however, use a definition based on each program's target graduation rate. When they talk about a program's graduation rates, they are referring to the ratio of graduates to the target. This ratio does not depend on the number of entrants at all. For clarity, we refer to this ratio as the *target rate.*

It is not unusual for a program to graduate fewer cadets than the target, and it seems reasonable that some of the program-level differences we discovered may be related to the program targets. For example, a program that is striving to meet a relatively high target may admit more cadets, or less prepared cadets. In this case, we would expect to see a relatively low graduation rate.

Figure 18 divides the ChalleNGe programs based on their average target rate (ratio of graduates to target) over the last 5 cycles (classes 25 through 29). This is an unorthodox graph because it includes a variety of measures in various units. However, this figure allows us to compare programs based on several characteristics at once.

The average number of graduates and the average target appear at the right side of the graph according to each program's success at achieving its target rate. As shown, the larger programs tend to either exceed their target rate or miss it by no more than 10 percent. In contrast, the programs that tend to miss their target rate by a larger margin are smaller programs, as shown by the blue bars.

The bars on the left side of the chart indicate the graduation *rate* (as opposed to the number of graduates.[24] These bars indicate that the programs that struggle to meet their targets have lower graduation rates than the other programs. Thus, it seems that the programs that

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24. In each case, regression-adjusted graduation rates are quite similar to graduation rates.

find it most difficult to meet the target rate also struggle to retain cadets (or, perhaps, these programs admit cadets who are less likely to succeed for some reason).

Figure 18. Program characteristics, by target rate[a]
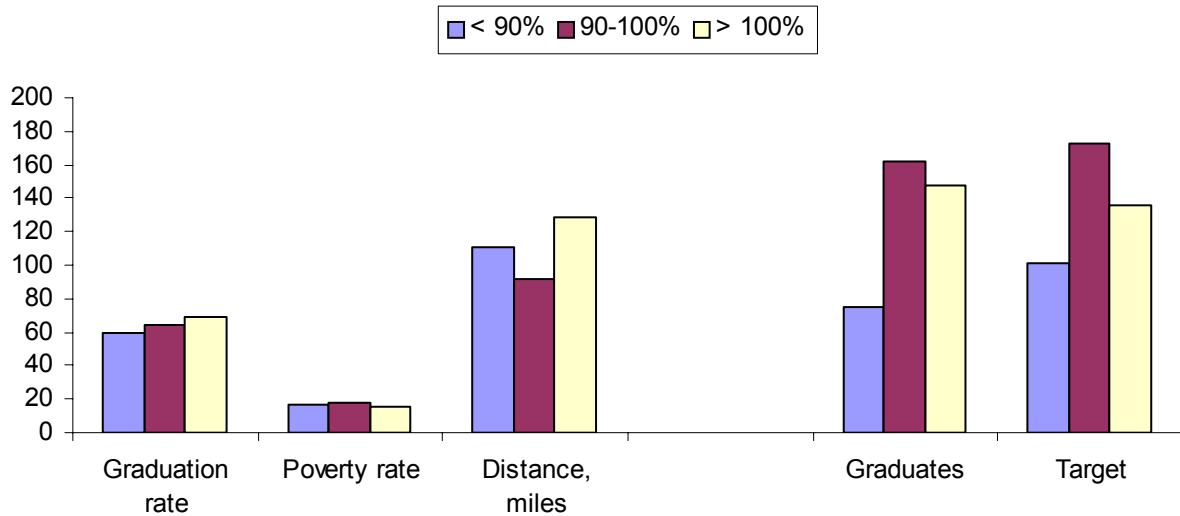
a. A list of the programs in each category appears in appendix B.

Cadets in all types of programs come from similar backgrounds in terms of poverty rates. However, when we look at average distance traveled, we find an interesting pattern between those programs that exceed their target rate and those that miss it by at least 10 percent. Programs that exceed their target rate are located in relatively large states, and their cadets travel the farthest. Programs that struggle to meet the target are located in smaller states, but their cadets travel nearly as far. Thus, it seems that the programs that struggle draw cadets from a relatively wide area, but they do not retain those cadets.

DMDC longitudinal data—how do ChalleNGe enlistees compare with other enlistees?

The results from the previous subsection indicate that ChalleNGe graduates have much lower attrition than those who leave the

program and that program-level differences, as well as some attributes of the ChalleNGe program, influence success among graduates. Also, we found that attrition rates of ChalleNGe graduates fell over the period covered in our data. However, the previous discussion focused solely on ChalleNGe participants and included no information on other enlistees. In this subsection, we look at how ChalleNGe enlistees compare with other enlistees.

At this point, we switch from our previous sample of ChalleNGe participants based on the ChalleNGe program files and use our DMDC longitudinal file instead. The DMDC longitudinal file includes information on all non-prior-service enlistees whose records indicate that they were high school diploma graduates (HSDGs), GED-holders, ChalleNGe graduates, or had no credential ("dropouts") at the time of enlistment.[25] The advantage of this file is that it allows us to compare the performance of ChalleNGe enlistees with that of other recruits. A disadvantage is that this file does not include some ChalleNGe graduates, primarily those whose programs award high school diplomas. Figure 11 indicates that about 40 percent of ChalleNGe graduates who enlist have another credential on their record; figure 17 indicates that ChalleNGe graduates who come from programs awarding high school diplomas have lower attrition rates than other ChalleNGe graduates. Thus, our longitudinal file is likely to undercount the number of ChalleNGe graduates and may indicate slightly higher attrition rates than our matched sample (presented earlier). However, this group of "official" ChalleNGe graduates is important; it is the group that will represent ChalleNGe in all research done using only the DMDC data.

For the FY99–06 period, we have information on over 1.2 million enlistees; of these, over 90 percent held high school diplomas. In figure 19, the blue line indicates the number of official ChalleNGe graduates who enlisted each year. Figure 19 also includes the numbers from our matched file. The brown line indicates the total number of ChalleNGe *participants* who enlisted (the same numbers also appear in figure 11); the pink line represents the number of

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25. For simplification, our file does *not* include information on those who enlisted with other credentials.

ChalleNGe *graduates* in our matched sample. The difference between the brown and the pink lines is made up of ChalleNGe nongraduates who enlisted. The difference between the pink and the blue lines is due to two factors: (1) many ChalleNGe graduates have other education credentials, and (2) some ChalleNGe graduates have incorrect SSNs in the program files.

Figure 19. Number of ChalleNGe enlistees across the four Services, FY98 through FY06
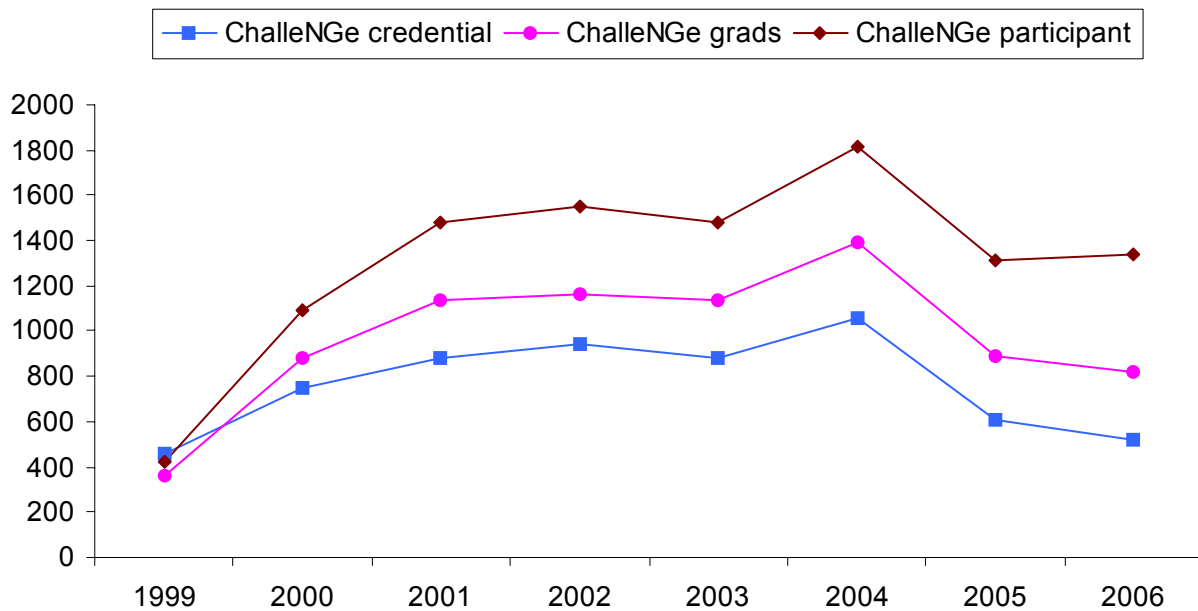
We do not know how many "bad" SSNs we have in the program data. If there were none, however, the blue line would be about 40 percent below the pink line because we know that about 40 percent of ChalleNGe graduates have other credentials. Instead, the blue line is about 20 percent below the pink line; this indicates that there are official ChalleNGe graduates in the DMDC file who do not appear in our matched file—most likely due to bad or missing SSNs. The lines get farther apart over time, which is consistent with improvement in the quality of the SSN data. Finally, the dropoff in the number of ChalleNGe enlistees over the last few years accords with the ChalleNGe credential no longer being considered Tier I for enlistment purposes.

Reconciling our data sets, our longitudinal sample indicates that about 6,100 enlistees are ChalleNGe graduates, according to official records. Our matched sample indicates that about 46 percent of ChalleNGe participants who enlist have a ChalleNGe education credential. On this basis, we estimate that some 13,260 ChalleNGe participants have enlisted in the four Services between FY99 and FY06. Not all of these participants actually completed the ChalleNGe program, but our data indicate that over 75 percent of ChalleNGe participants who enlisted were graduates. Thus, it is likely that at least 10,000 ChalleNGe graduates enlisted before the end of FY06.

As was the case in the previous section, most whose official education credential indicates that they completed ChalleNGe enlisted in the Army; this trend has become more pronounced in recent years.

Neighborhood poverty rates

In this subsection, we examine the neighborhood poverty rates of enlistees in more detail. We present poverty rates in a slightly differ manner than before. Rather than simply compare average poverty levels, we focus on the entire distribution and use the national distribution to put the poverty rates into context. We characterize neighborhoods as follows: least poor, less poor, average, poor, and poorest. These characterizations are based on how a neighborhood's poverty rate compares with those of all other U.S. neighborhoods. To come up with the characterization, we first calculate the average poverty rate for all neighborhoods and then rank all neighborhoods by poverty rate. We split this ranking into fifths (or quintiles) and characterize them as follows: neighborhoods with the highest poverty rates—"poorest," the next highest poverty rates—"poor," the next highest—"average," and so on. If enlistees with a particular education credential are proportionately drawn from all types of neighborhoods, we would expect to see 20 percent of enlistees from each type. If more than 20 percent are from a particular type of neighborhood, enlistees are disproportionately drawn from that neighborhood.

We analyze female and male enlistees separately; figures 20 and 21 show the results. A clear stair-step pattern emerges for women with high school degrees, who are much more likely to be drawn from the poorest neighborhoods and much less likely to be drawn from the

least poor. Patterns across the other education credentials are not as clear. Female enlistees with ChalleNGe education credentials are disproportionately drawn from both less poor and most poor neighborhoods. One would expect ChalleNGe enlistees to be disproportionately drawn from the poorest neighborhoods since states with ChalleNGe enlistees are disproportionately made up of poor and poorest neighborhoods. It is surprising that almost a quarter of female ChalleNGe enlistees come from relatively well-off neighborhoods, while female GED enlistees are disproportionately from the average to the poorest neighborhoods.

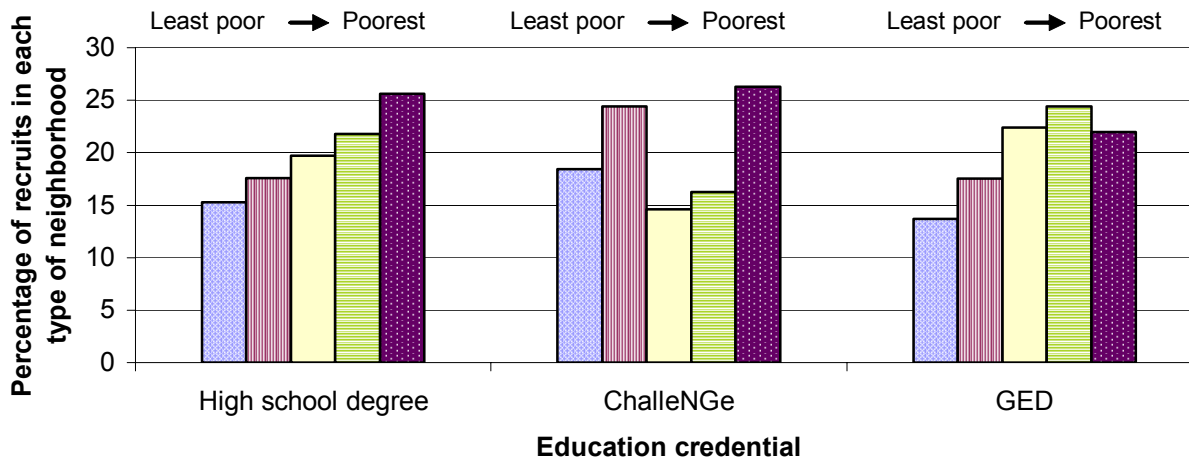Figure 20. Neighborhood poverty levels for female enlistees by education credential

Figure 21. Neighborhood poverty levels for male enlistees by education credential
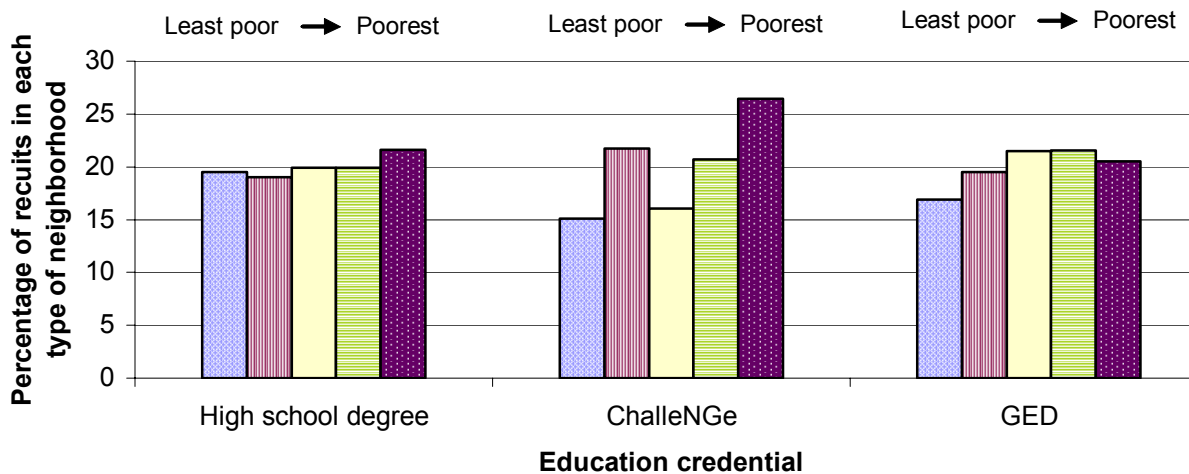
The education group that is most different between male and female enlistees is HSDGs. While female HSDGs were more likely to be drawn from the poorest neighborhoods, male HSDGs are roughly equally likely to be drawn from all types of neighborhoods. (They are slightly more likely to come from the poorest neighborhoods, but this difference is relatively small.) Like female GED-holders, male GED-holders are disproportionately drawn from the poorest ZIP codes, although the pattern is less pronounced. The pattern for those with ChalleNGe education credentials is similar across gender; both men and women are most likely to be from the poorest neighborhoods. However, male ChalleNGe enlistees are more likely than other male enlistees to come from the poorest neighborhoods.

As noted earlier, ChalleNGe enlistees are most likely to join the Army. We examined the neighborhood poverty level across the Services for male enlistees. ChalleNGe enlistees are not randomly distributed among the Services; those who enlist in the Army and Navy are more likely than those who enlist in the USMC to come from the neighborhoods classified as poor and poorest. Those who enlist in the USMC are more likely to come from neighborhoods classified as less poor. Across all three Services, though, ChalleNGe enlistees are disproportionately drawn from the poorest neighborhoods and, in fact, are more likely to come from these neighborhoods than any other education credential group (see figures 22, 23, and 24).

Figure 22. Neighborhood poverty levels for male Army enlistees by education credential
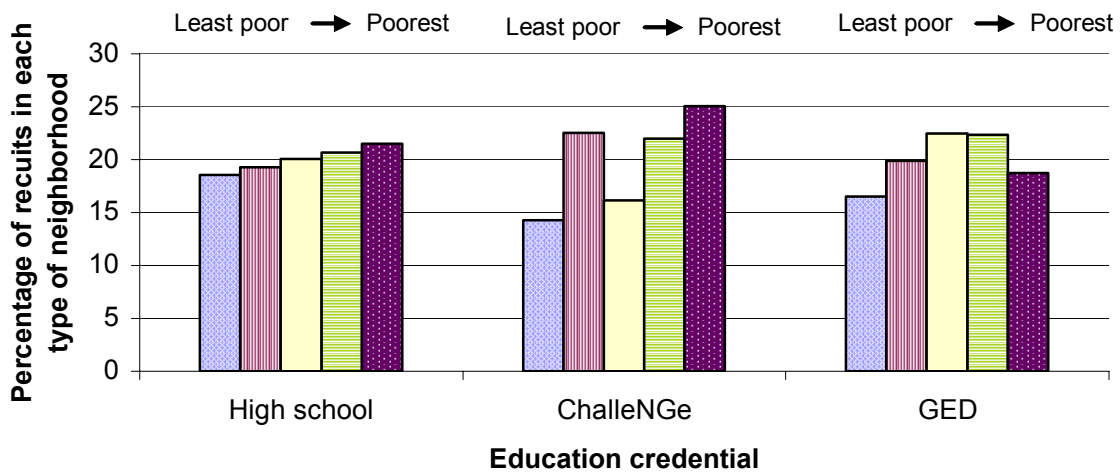
Figure 23. Neighborhood poverty levels for male Navy enlistees by education credential
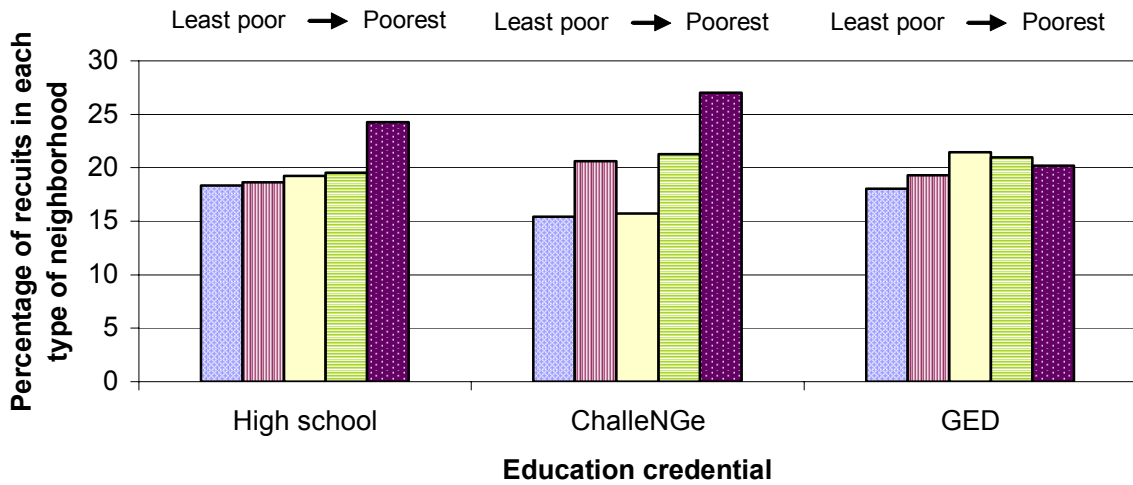
Figure 24. Neighborhood poverty levels for male USMC enlistees by education credential
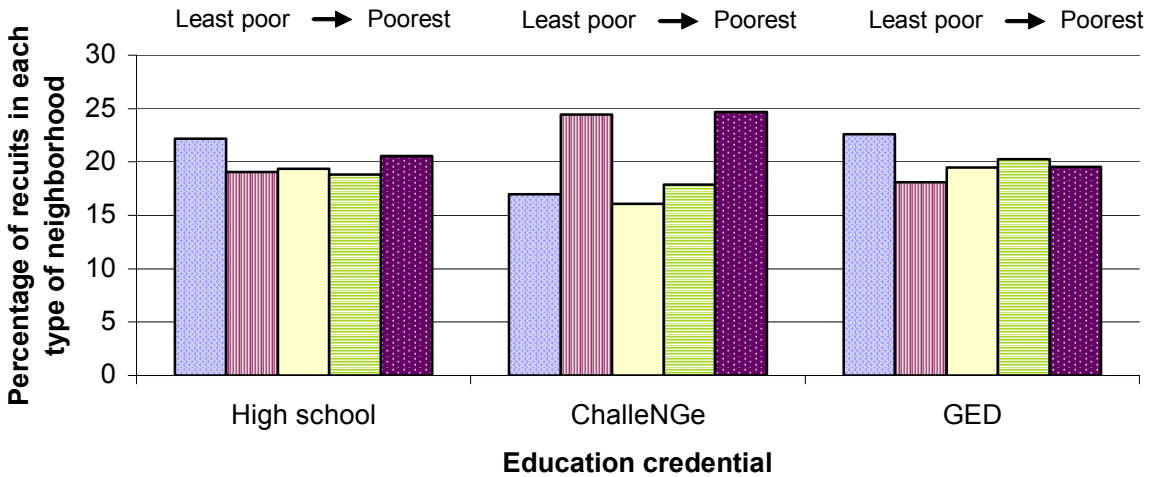
Attrition rates

Next, we detail attrition rates for these official ChalleNGe graduates (represented by the blue line in figure 19) and compare them with the rates of enlistees with other education credentials. In the previous subsection, we found that attrition rates of ChalleNGe graduates have fallen over time, so we divide our data into the same periods to see if the trend holds across other education credentials. Table 3 gives the

overall attrition rates of ChalleNGe enlistees and those with other education credentials over time. Table 3 suggests that, while the trend toward lower attrition rates includes enlistees with other credentials, the trend among ChalleNGe enlistees has been particularly strong. In fact, during the last period included, official ChalleNGe graduates had lower 3-month attrition rates than those holding any of the other three credentials. Attrition rates of ChalleNGe graduates tend to increase especially sharply between 12 and 36 months. We see some evidence of that here, but table 3 still suggests a substantial decrease in the overall attrition rates of ChalleNGe graduates over time.[26]

Table 3.   Attrition rates, by education credential, over time

Attrition rate	ChalleNGe	HSDG	GED	Dropout
FY99–FY06:				
3-month	9.0	7.8	12.4	14.8
12-month	21.0	14.6	26.3	26.1
24-month	35.8	20.6	37.1	35.6
36-month	43.4	25.2	41.2	44.5
FY099–FY01				
3-month	11.5	8.6	14.5	18.8
12-month	22.9	15.5	26.9	29.5
24-month	37.5	21.5	38.0	39.9
36-month	45.7	25.8	42.4	46.6
FY02–FY04				
3-month	8.5	7.3	13.0	10.8
12-month	20.5	13.9	26.5	20.5
24-month	34.6	19.6	35.9	30.5
36-month	~	~	~	~
FY05+				
3-month	5.3	6.9	8.2	8.7
12-month	17.1	14.2	23.9	19.9
24-month	~	~	~	~
36-month	~	~	~	~

26. Table 3's rates are slightly higher than those found with our matched sample (see figure 16)—probably due to the better performance of ChalleNGe graduates with high school diplomas, as shown in figure 17.

Figure 25 presents some of the information shown in table 3. Figure 25 indicates that the attrition rates of ChalleNGe enlistees, as well as GED-holders, fell over time; the rates of HSDGs decreased as well, but the change is quite small compared with the drop in those holding other credentials. The data we have suggest that the trend of lower attrition rates may continue. (We exclude dropouts from figure 25 for visual clarity; their attrition rates are similar to those of GED-holders as shown in table 3.)

Figure 25. Trends in attrition rates over time, by education credential[a]
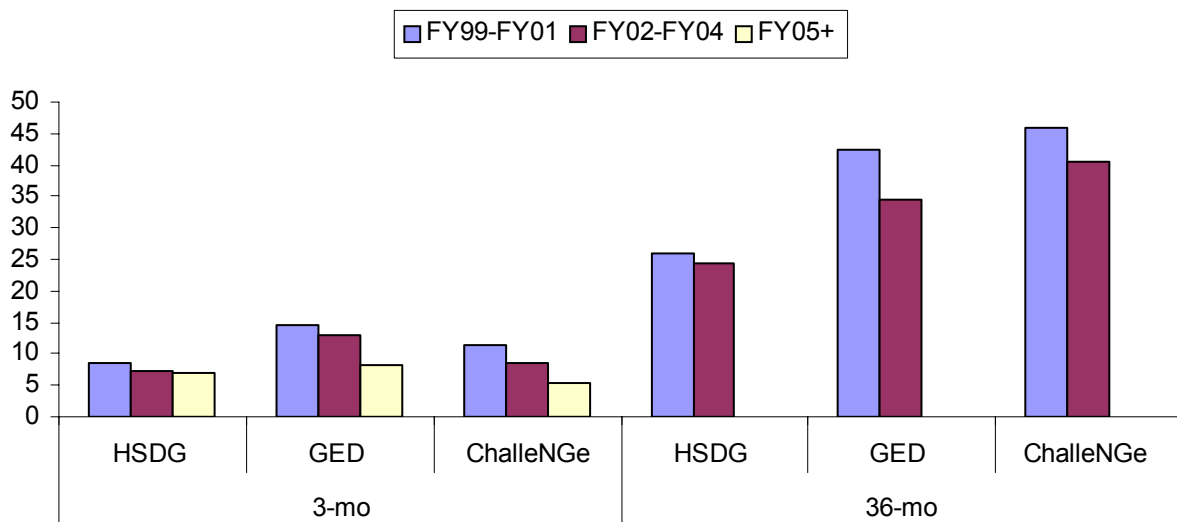
a. Unadjusted attrition rates. Trend in 12-month attrition rates is similar to that in 3-month rates.

Attrition rates vary across time and Services as well as between education credentials. In recent years, ChalleNGe enlistees have been increasingly likely to enlist in the Army. Therefore, measuring the true difference in attrition between ChalleNGe graduates and others requires controlling for the fiscal year of accession and the Service, as well as for personal characteristics. To control for many characteristics at once, we next run regressions to explain attrition rate. Our regressions include the following controls: gender, race/ethnicity, age, AFQT category, marital status at accession (single versus other), Service, fiscal year of accession, and education credential We also

include a measure of the poverty rate in the enlistees' neighborhood.Many of the regression results confirm those of earlier studies: men have lower attrition rates than women, racial/ethnic minorities have lower attrition rates, older enlistees have slightly higher attrition rates, while those with higher AFQT scores have somewhat lower attrition rates.

Those from high-poverty neighborhoods have slightly higher attrition rates than those from low-poverty neighborhoods. This is an interesting result because our regressions also control for AFQT score; this result is consistent with the poverty effects present in the ChalleNGe program data. However, the effect sizes here are quite small; enlistees coming from relatively poor neighborhoods have attrition rates that are 0.2 to 0.5 percentage point higher than similar enlistees from relatively well-off neighborhoods. This result could be caused by differences in school quality.[27]

We focus on the trends in attrition rates over time, and our regression results confirm the results show in table 3 and figure 25: attrition rates of ChalleNGe enlistees trended downward over the period. In fact, adjusted 3- and 12-month rates are very close to those of HSDGs by the end of the period (see figure 26).

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27. We define *poor* neighborhoods as those with poverty rates of 21 percent and *well-off* neighborhoods as those with poverty rates of 9 percent; these neighborhoods are poorer than three-quarters and one-quarter of enlistee neighborhoods, respectively. Appendix A contains complete regression results.

Figure 26. Regression-adjusted attrition rates by education credential, over time[a]
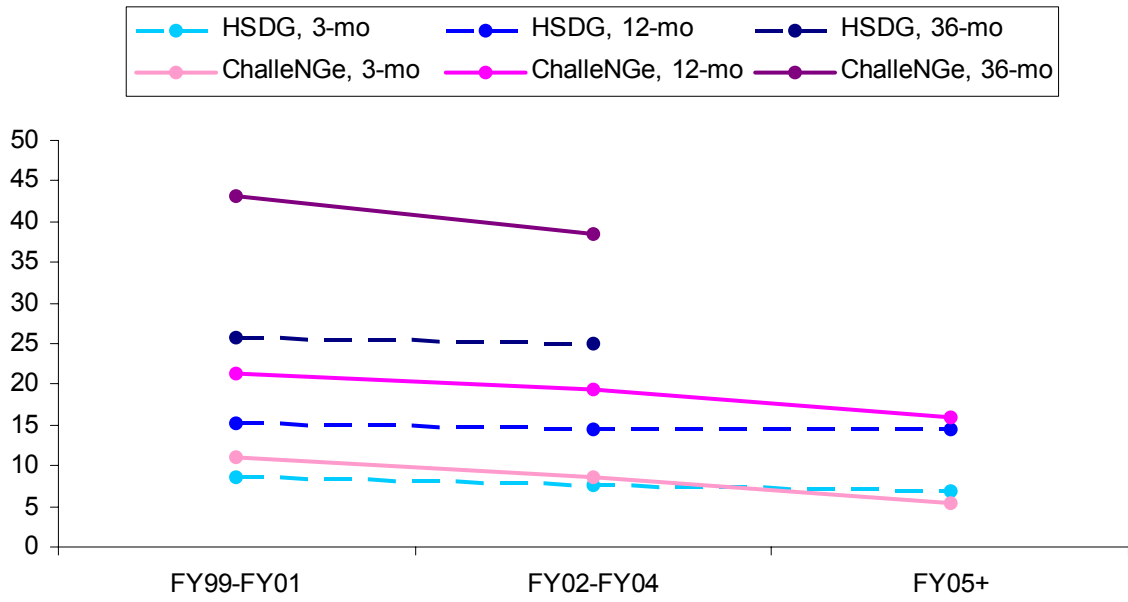
a. Regressions also include measures of age, gender, ethnicity, marital status, poverty of home neighborhood, AFQT score, Service, and fiscal year of accession. See appendix A for complete regression results.

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Results from ChalleNGe program staff survey

Our internet-based survey of the ChalleNGe program staff included a variety of questions about each program's capacity, policies, activities, and staff environment. We asked that the Director and Deputy Director as well as the lead instructor, lead cadre, and lead counselor at each ChalleNGe site fill out the survey. We had responses from program staff at 31 different programs. On average, 4 people from each site responded; the number of responses per site ranged from 1 to 7.[28] On most questions, agreement across staff members from a given program was fairly high; we note exceptions below.

Most of the questions on the survey focused on various aspects of program philosophy and implementation. For example, we asked respondents to rate the level of militarization at the program and to respond to specific questions about militarization; we also asked about program philosophy and specific details to do with retaining cadets who express a desire to leave the program. In addition, we asked how platoons are formed and about the existence of a club to provide interested cadets with more information about the military. We asked questions about other aspects of the program, such as when and how often drug testing occurs. Finally, we asked several questions about staff, turnover, and benefits.

Responses to survey questions

Using survey responses, we calculated the following measures:

- *Militarization:* One question asked respondents to indicate the degree of militarization of their program (low, medium, or high). Another question asked whether male cadets heads' are

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28. At some of the newly established programs, staffing is not complete, so we would expect fewer responses.

shaved at entry; a final question asked whether the program uses physical training as a discipline tool. We rated the overall level of each programs' militarization based on the responses to these questions.

— At no program did staff consistently rate the level of militarization as "low."

— At 13 programs, staff consistently rated the level of militarization at or close to "high."

— At 6 programs, staff consistently rated the level of militarization between "medium" and "high."

— At 9 programs, staff consistently rated the level of militarization as "medium."

— At 1 program, staff consistently rated the level of militarization between "medium" and "low."[29]

— At the majority of programs, most staff indicated that male cadets' heads are shaved; at the vast majority of programs, most staff indicated that physical training is used as a disciplinary tool.

• *Beliefs about retaining cadets:* We asked whether those cadets who wish to leave the program should be free to do so or whether programs attempt to persuade cadets to stay. We also asked about the specific steps taken when a cadet wishes to leave the program.

— The vast majority of respondents (89 percent) indicated that, when cadets requested to leave the program, they believed it was best to try to persuade the cadets to stay.

— There was some disagreement within programs on this point, but at the majority of programs all staff members felt that it was best to attempt to retain cadets, and at all programs at least some staff members felt it was best to attempt to retain cadets.

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29. At 2 programs, no staff member answered this question.

- We asked each program staff member to indicate which specific steps their program takes when a cadet requests to leave the program. Staff members could indicate any (or all) of the following steps:

  - Contact mentor (1)

  - Cadet speaks with a member of the cadre (2)

  - Cadet speaks with counselor (3)

  - Cadet speaks with Deputy Director (4)

  - Cadet speaks with Director (5)

  - Contact parents (6)

- We coded the number of required steps (0–6) and took the average across staff responses at each program. The average program requires 4 to 5 of the above steps. At all programs, staff indicated that at least 3 of the steps are used.

- *Platoon formation:* We focus on two main alternatives: platoons that are formed randomly versus those that are formed nonrandomly.

  - Our sample split fairly evenly. At 15 programs, Directors indicated that platoons were formed nonrandomly; at 14 programs, Directors indicated that platoons were formed randomly.

  - At programs where platoons were not formed randomly, the following criteria were used most frequently (Directors could choose multiple criteria):

    - Ethnicity—to achieve diversity in each platoon

    - Home region of the state

    - Cadets' age

    - TABE score

- *Existence of a military club for those interested in learning more about the military:* Nine programs indicated that they have such a club. In nearly every case, these clubs meet weekly.

- *Timing and frequency of drug testing:* We separated programs based on whether drug testing occurs in the first week. Slightly fewer than half of programs reported testing in week 1.

- *Staff employment and turnover; certification of teachers:* We asked whether staff are state employees, whether they receive specific employee benefits, and why employees choose to leave the ChalleNGe program. We also asked whether instructors are state certified.

  — We found nearly perfect agreement within programs on the state employee questions; everyone seemed to understand clearly whether or not staff are state employees.

    – Overall, in 25 programs, staff are state employees, while they are not in 4 programs (respondents in other programs did not answer this question).

  — We also asked about available benefits. Nearly one-third of respondents indicated that they receive health, dental, and retirement benefits. All who indicated receiving such benefits were state employees, but fewer than half of all state employees received these benefits.

  — We asked why staff members chose to leave ChalleNGe. We required that respondents pick one of the following categories: Pay, Benefits, Burnout, Dissatisfaction with Senior Staff, Other, Don't Know. Half of respondents indicated that staff members left because of the pay. Nearly 20 percent indicated that staff members left for other unspecified reasons. Fewer than 10 percent of the respondents picked each of the other potential reasons.

  — In most cases, instructors are certified, although responses varied somewhat within programs. Comments indicated that this is because some instructors within a program may be certified while others are not. But the vast majority of respondents indicated that instructors are certified in about two-thirds of programs.

- We also asked how long the current director had held the job, allowing respondents to pick one of the following categories:

0 year, 1–2 years, 3–4 years, 5 or more years. In most cases, Directors and Deputy Directors agreed on this answer; when they did not, they always picked contiguous categories, suggesting an issue of rounding off the number of years. We also know how long each *program* has been in place. About half of programs indicate that their director has no more than 2 years' experience on the job, but at one-quarter of programs the Director has been in the job at least 5 years. The median age for the programs is approximately 10 years.

How do these program-level differences relate to cadet outcomes?

This question has a six-part answer:

1. The level of militarization is positively associated with several outcomes.

   a. Programs with higher levels of militarization have higher graduation rates.

      – This effect does not seem to be driven either by shaving male cadets' heads or by using push-ups as a disciplinary tool, but rather by the overall level of militarization of the program as judged by the staff.

   b. Militarization could affect some long-term outcomes. Eventual military enlistment is higher and eventual attrition is lower among cadets who come from programs where male cadets' heads are shaved.

      – Attrition rates are also lower at programs with overall higher levels of militarization, although the difference across programs is not always statistically significant.[30]

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30. At this point in our analysis, we are looking at program-level data, so we have fewer than 30 observations in most cases. Thus, relatively large and precise relationships between variables are required to achieve statistical significance.

c. At programs with higher levels of militarization, graduation rates are more likely to approach or exceed the target rate than at other programs.

d. The level of militarization does not seem to be related to the length of time the Director has served; programs with more experienced Directors do not report systematically lower or higher levels of militarization.

2. Retention philosophy is consistent with day-to-day policies; retention philosophy affects some measures of attrition.

a. At programs where more staff members indicated that it was preferable to try to retain cadets, cadets were required to go through more steps before leaving.

b. There is some evidence that at programs in which cadets must go through more steps before leaving, those cadets who enlist have lower attrition rates. (Although the relationship between before leaving and eventual attrition is always negative, the correlations do not always exceed standard levels of significance.)

3. Graduation rates are lower at programs where platoons were formed randomly.

4. There is no indication that military clubs either increase the proportion of cadets who enlist or affect military performance of those who enlist.

— This does not suggest that such clubs lack value; the clubs could affect outcomes other than those we measured.

5. Drug testing policies were not reflected in any of the outcomes we measured. We stress, however, that we looked only at when drug testing occurred, not at any other differences in drug testing policies across programs.

6. State employment cannot be directly tied to most outcomes, although there is a consistent negative relationship between having staff who are state employees and eventual military attrition. It does not achieve statistical significance, but in each case attrition rates are lower for programs where staff are state employees than those where staff are contract employees.

To summarize our survey results, we found that some aspects of the program influence cadets' outcomes. In particular, programs with a relatively high level of militarization have higher graduation rates, and have graduation rates that are more likely to approach or exceed the target rate, than other programs. There is evidence that militarization also serves to lower eventual attrition. This result seems quite sensible; cadets who attend ChalleNGe programs that more closely mimic the military experience are likely to be better prepared for bootcamp and other first-term experiences. Thus, the military aspect of the ChalleNGe program appears to be central to its success.

Retention philosophy has important effects on day-to-day policies. Also, our results suggest that making cadets go through many steps before leaving the program can have a positive effect on graduates, in terms of eventual military attrition.

When platoons are formed randomly, graduation rates are lower. This suggests that strategically forming platoons has a positive effect on cadets. It is not clear what drives this result; it is possible that when platoons are formed randomly, all cadets in the "weaker" platoons perform less well. This result does suggest that cadets are influenced by their peers.

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What do other sources tell us about noncognitive factors?

Using our large survey of civilian adolescents, the National Educational Longitudinal Study of 1988 (NELS:88) dataset, we next examine the relationship between dropping out of high school and a specific noncognitive measure—locus of control. We are interested not only in those students who actually drop out but also in those students who are likely to drop out but do not. The NELS:88 dataset identifies six factors that make a student "at risk" of dropping out:

1. Having a single parent

2. Having a parent without high school diploma

3. Having a sibling who dropped out

4. Spending 3 or more hours per day at home alone

5. Having limited English proficiency

6. Having low family income.

A little less than half of both boys and girls have none of the above risk factors (see figure 27), and approximately one-fifth have exactly one of these risk factors.[31] If exactly one risk factor is present, the most common risks are:

- Having a single parent (24.5 percent of girls, 27.5 percent of boys)

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31. We use the weights provided in the NELS:88 dataset so that these estimates are for the population of 8th graders in 1988. In all of our figures in this section, we show both the estimate (denoted by a yellow diamond in the graph) and the 95-percent confidence interval of the estimate (denoted by the lines extending from the diamond).

- Spending 3 or more hours at home alone (26.7 percent of girls, 29 percent of boys)

- Having low family income (22.1 percent of girls, 18.8 percent of boys).

When more than one factor is present, the most common risks are:

- Having a single parent (40.1 percent of girls, 39.2 of boys)

- Having a parent without a high school diploma (32.2 percent of girls, 25.5 percent of boys)

- Having low family income (69.5 percent of girls, 61.1 percent of boys).

Figure 27. Percentage of 8th grade population with dropout risk factors, by gender
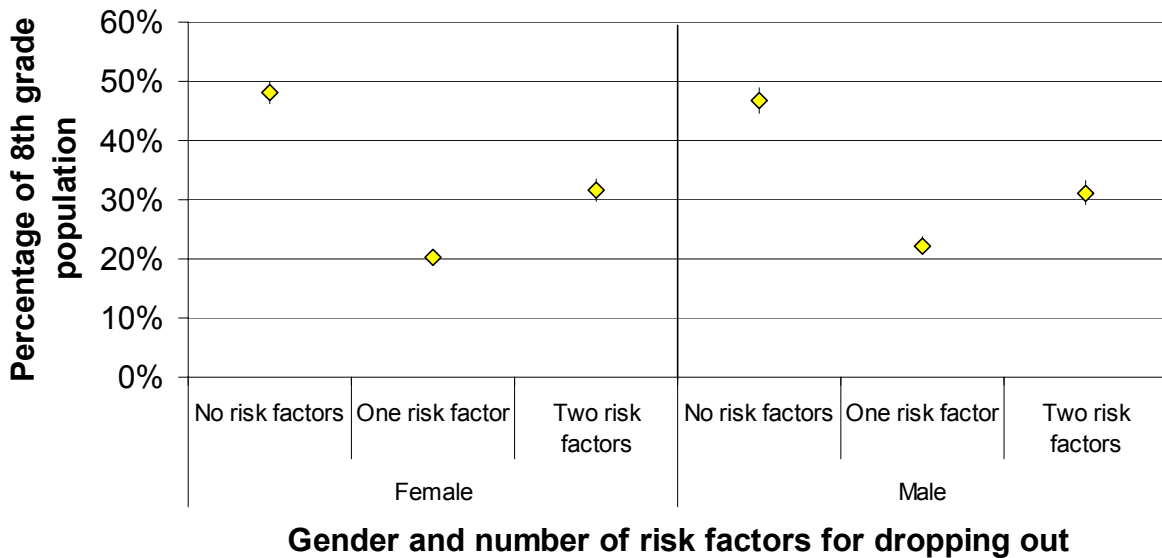
The presence of a risk factor dramatically increases the probability of dropping out. For both boys and girls, going from zero to one risk factor doubles the dropout rate (for girls, from 8.4 to 16.3 percent; for boys, from 8.2 to 18.7 percent), and going from zero to two risk factors more than triples the dropout rate (for girls, from 8.4 to 30.7 percent; for boys, from 8.2 to 28.8 percent).

Students with risk factors differ from students without risk factors in terms of their locus of control. In figure 28, we show the average locus of control by gender, grade, and number of risk factors along with the 95-percent confidence interval. Locus of control is measured in each grade, while risk factors are measured in the 8th grade.

Figure 28. Locus of control by gender, grade, and number of risk factors

Measures of locus of control for girls

Measures of locus of control for boys
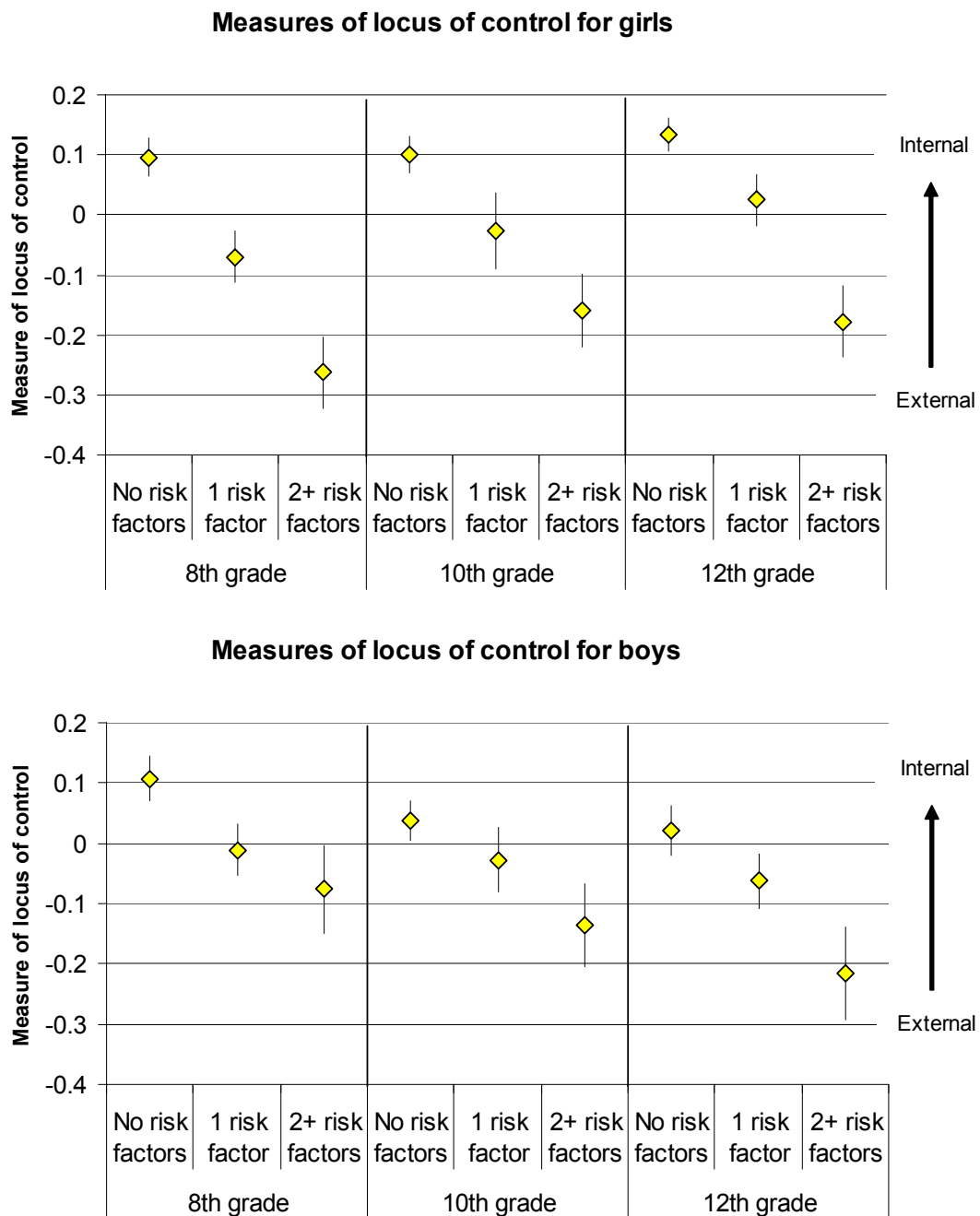
For girls, those without any risk factors have a more internal locus of control than those with one risk factor, who have a more internal locus of control than those with two or more risk factors. These differences are statistically significant at every grade level. For boys, those with no risk factors have a statistically significantly different locus of control than those with two or more risk factors at every grade level. In 12th grade, the differences between each group are statistically significant.

Not all students with risk factors eventually drop out. In figure 29, we graph locus of control for those with any risk factors by dropout status. Especially for girls, a clear pattern is evident. Regardless of the number of risk factors, female dropouts have a more external locus of control than female completers. For boys, the 8th and 10th grade locus-of-control variables are significantly more external for dropouts versus completers with one risk factor, as is the 10th grade measure for those with two or more risk factors.

To further investigate the relationship between locus of control and dropping out, we ran a logistic regression with dropout status as the dependent variable. We include controls for each of the risk factors, a variable measuring cognitive ability as of the 8th grade, and an 8th grade locus-of-control measure. We run this separately for boys and girls. Full results are available in appendix A.

Figure 30 shows the predicted probabilities from the logistic regression for the cognitive and noncognitive measures. We denote statistical significance with the use of a star (*).

For girls, locus of control is not statistically significant once the cognitive measure is added. For boys, locus of control is statistically significant even with the cognitive measure included; boys with a more internal locus of control in the 8th grade are less likely to drop out, holding cognitive ability and dropout risk factors constant. Predicted probabilities are shown by quartile of the measure.[32] For boys, there is

32. The 1st quartile is the point at which 25 percent of that gender's population has a more external locus of control and 75 percent of that gender's population has a more internal locus of control. The 3rd quartile is the point at which 75 percent of that gender's population has a more external locus of control and 25 percent has a more internal locus of control.

a greater decrease in the probability of dropping out from moving from the 1st quartile to the 3rd quartile in terms of locus of control than from moving from the 1st quartile to the 3rd quartile in terms of the composite test score.

Figure 29. Locus of control by gender, number of risk factors, and dropout status

Measure of locus of control for girls

Measure of locus of control for boys
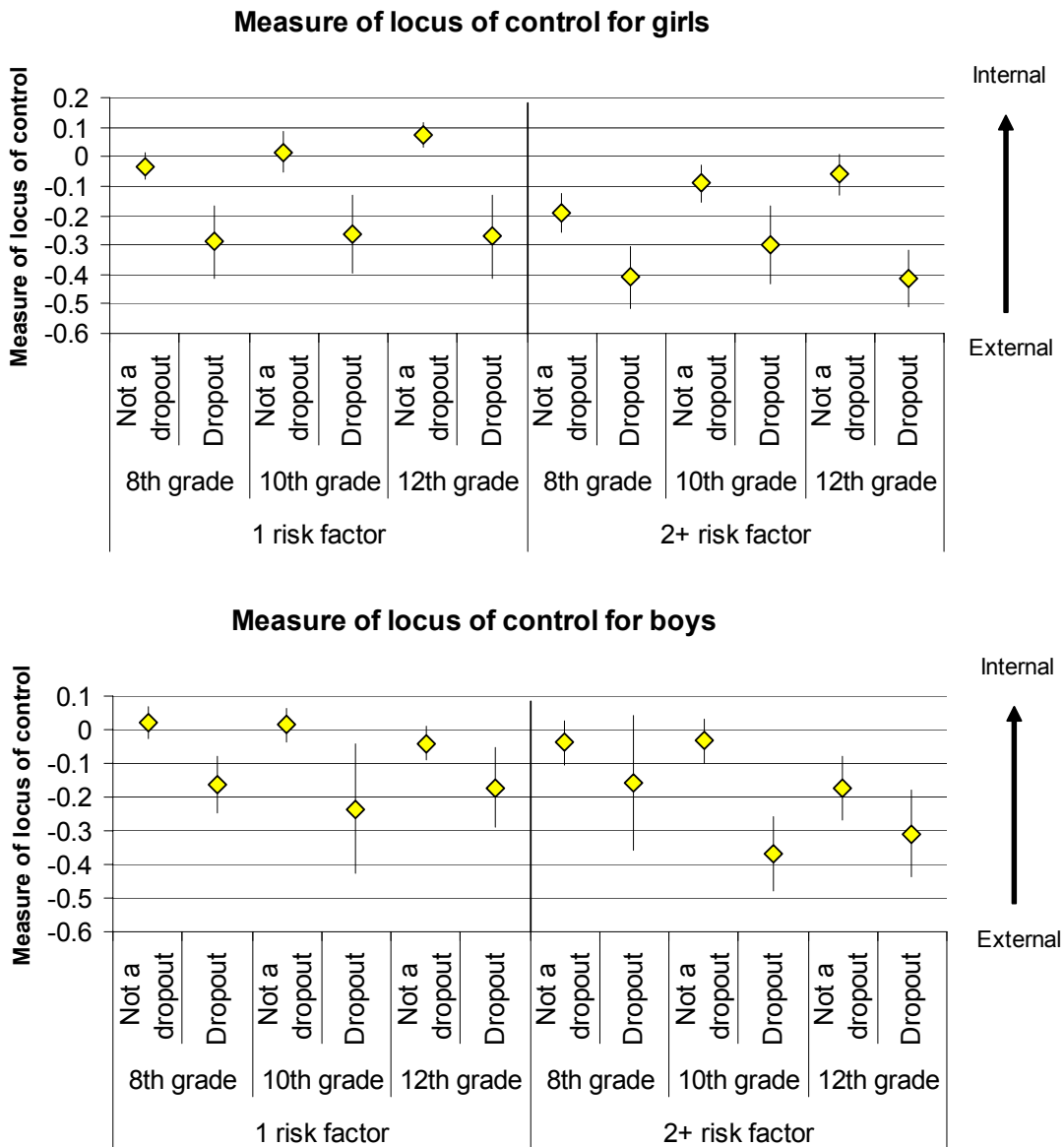
Figure 30. Predicted dropout rate by composite test score and locus of control measure

Predicted dropout rate for girls

Composite test score*: 1st quartile 19.0%, Median 13.0%, 3rd quartile 8.0%
Locus of control: 1st quartile 15.2%, Median 14.3%, 3rd quartile 13.4%

Predicted dropout rate for boys

Composite test score: 1st quartile 16.9%, Median 15.0%, 3rd quartile 13.0%
Locus of control*: 1st quartile 17.4%, Median 14.3%, 3rd quartile 11.5%
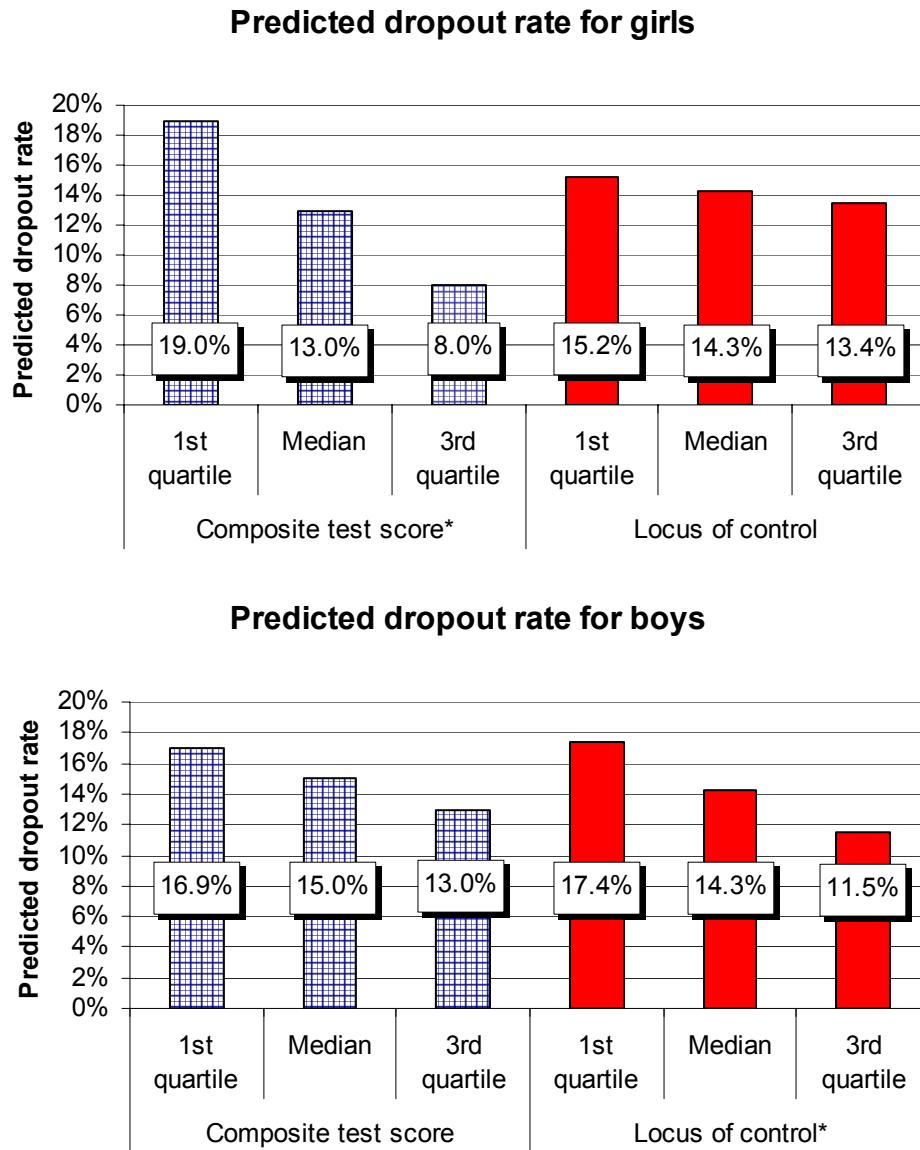
Using the NELS:88 dataset, we have shown that locus of control varies by the presence of dropout risk factors and by dropout status. For boys, we have shown that those with a more external locus of control are more likely to drop out regardless of cognitive ability and the presence of dropout risk factors. All of this suggests that most ChalleNGe cadets, particularly male cadets, are likely to have an external locus of

control. In future research, we will examine whether locus of control can be changed (i.e., are there programs that can be implemented that will lead to a more internal locus of control?). Also, we will investigate whether a more external locus of control affects completion of other commitments (i.e. do those with a more external locus of control attrite from the military at a higher rate?).

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Conclusion and recommendations

In this analysis of the ChalleNGe program, we focus on program-level differences and likely reasons for those differences. But we also include information on overall rates of graduation from ChalleNGe programs and military enlistment, as well as detailed analysis of the performance of those ChalleNGe participants who go on to enlist in the active-duty military.

We incorporate measures to describe the neighborhoods where ChalleNGe participants and other enlistees lived before joining the program or enlisting; the neighborhood poverty rate is our primary measure. We find that many ChalleNGe cadets come from poor neighborhoods; moreover, poverty rates affect graduation rates and other performance measures. Even after we control for standardized test scores, we find that those who lived in the poorest neighborhoods are less likely than others to complete ChalleNGe successfully.

Poverty rates also predict military performance, though the size of the effect is smaller than in the case of ChalleNGe graduation. We find that ChalleNGe enlistees are more likely than enlistees with other education credentials to come from the poorest neighborhoods; coming from a poor neighborhood is associated with higher attrition rates, even after controlling for AFQT score, age, ethnicity, and gender.

A potential explanation for these results is the importance of school quality. Our regressions control for standardized test scores, but a single standardized test is unlikely to measure all aspects of school quality. Thus, we might expect poverty or school quality to affect performance even after controlling for TABE or AFQT scores, and that is what we find.

It is quite possible that school quality affects performance as much through noncognitive skills as through cognitive; the importance of

noncognitive skills is well established in the civilian world and is thought to explain the difference in military performance between high school diploma graduates and those holding alternate credentials. The ChalleNGe program has a focus on noncognitive skills. We suspect, however, that different programs produce graduates with different levels of noncognitive skills and that this explains some of the program-specific differences we see in each outcome measured (neighborhood poverty rates explain some program-level differences, but substantial differences remain even after we add these measures to our models).

We recommend that future research on ChalleNGe focus on the development of noncognitive skills. Locus of control is likely to be an appropriate measure of noncognitive skills. Using a nationally representative dataset, we found that dropouts have a more external locus of control than graduates. Thus, it is likely that most ChalleNGe cadets enter the program with a relatively external locus of control. We recommend that the ChalleNGe program staff begin to measure changes in cadets' locus of control during the course of the ChalleNGe program.

We find a relationship between graduation rates and the distance a ChalleNGe cadet travels from his or her home to the program. Those who travel farthest graduate at higher rates. We recommend additional analysis on the location of ChalleNGe programs and specific analysis comparing the density of high school dropouts with the location of ChalleNGe programs. Such analysis could assist in the placement of new programs, as well as suggest areas where established programs should advertise.

Our research adds more evidence to our past findings that aspects of the ChalleNGe program have effects lasting beyond the end of the program. Among those who enlist, ChalleNGe *graduates* have much lower attrition rates than ChalleNGe *terminates.* Also, physical fitness and leadership experience are associated with lower military attrition.

Many ChalleNGe participants/graduates continue to enlist; the majority join the Army, and this trend has strengthened over time. The ChalleNGe program data remain an important resource for tracking the progress of those who complete ChalleNGe. Official

records of many ChalleNGe enlistees often indicate other credentials; this is not surprising given that several ChalleNGe programs award high school diplomas. We also find that those who complete ChalleNGe with a high school diploma perform better in the military than other cadets. Thus, DMDC's official records indicate slightly higher rates of attrition than our matched sample because official records are based on those whose records indicate their ChalleNGe credential. The difference is fairly small, but it provides another reason to continue to maintain the program data and to continue to match the program data against DMDC's records on a regular basis.

Looking at the DMDC data, we find a notable downward trend in the attrition rates of ChalleNGe graduates who enlist. Over the last few years, attrition has trended downward among high school diploma graduates and GED-holders—and among dropouts, too. The trend among ChalleNGe graduates, however, is larger than that of high school diploma graduates and at least as large as the trend in the other groups. During the most recent years, the performance of ChalleNGe enlistees compares favorably with these other groups. We recommend continued tracking of this trend because past cohorts of ChalleNGe enlistees have struggled between the 12- and 36-month marks in terms of attrition. However, the current trend suggests an improvement in ChalleNGe enlistees' military performance.

The ChalleNGe credential is evolving. The program is still fairly young, and ChalleNGe staff work specifically to prepare interested cadets for military enlistment. Therefore, it is not surprising that performance of ChalleNGe graduates in the military should improve over time.

Our survey of ChalleNGe staff indicates that several previously unmeasured aspects of the ChalleNGe program influence cadets' outcomes. In particular, programs with high levels of militarization have higher graduation rates, and are more likely to approach or exceed their program target rates. There is evidence that militarization also serves to lower the attrition rates of those who eventually enlist. Thus, the military aspect of the program appears to be central to its success. However, other policies are important as well. There is some evidence that working hard to retain cadets has positive effects

on those who go on to enlist. Our survey also suggests that programs where staff are state employees may see positive effects from this, perhaps due to lower turnover levels (note that we have no direct measure of staff turnover).

Overall, our results indicate that the influence of the ChalleNGe program lasts well beyond graduation. In particular, for those cadets who go on to enlist, the ChalleNGe experience has positive effects throughout their first term of service.

Appendix A: Regression results

ChalleNGe sample

Our dependent variables are all indicator variables; they indicate whether each cadet completed ChalleNGe, enlisted in the military, or attrited from the military during a set period. Therefore, we model these variables using logistic (logit) regressions. The interpretation of the coefficients from logistic regressions is not straightforward because the relationship between the coefficient and the marginal effect is nonlinear. In the main text, therefore, we present marginal effects, calculated at or near the mean; in this appendix, we present complete regression results.

Statistical significance indicates how likely it is that a regression result occurred by chance. Unless we specifically indicate otherwise, the results we discuss in the main text all attain a level of significance of 5 percent or better; this implies that the result would occur by chance less than once in 20 trials. In most cases, the results exceed this standard substantially. In the tables that follow, we mark those results that attain a level of significance of 5 percent or better.

In our attrition regressions, we experimented with a number of specifications, including such factors as distance from home to program site, leadership positions held while in ChalleNGe, physical fitness while in ChalleNGe, and initial and final test scores, as well as Service, age, gender, and ethnicity and program-specific indicators.

When we use ChalleNGe program data or data from our DMDC matched file, we cluster the errors in all of our regressions at the program level. Without this correction, the standard errors would be incorrect because some of our variables are measured at the individual level and others are measured at the program level.

Because the number of observations is fairly small, especially at the 36-month point, we chose a parsimonious specification; for example,

our final attrition model does not include distance measures because those had no effect on attrition in earlier specifications. Also, we include AFQT scores rather than TABE scores. We have too few observations on cadets from the South Carolina Camp Long program who enlisted to include that program in this part of the analysis; we have too few observations from the New Mexico program to include them at the 36-month period. Finally, because of the lag between data collection and reporting, we do not have enough information to calculate 3-month attrition rates for those who enlisted during July through September 2006.

NELS:88 sample

As with the regressions using the ChalleNGe sample, the dependent variable in the regression using the NELS:88 sample is an indicator variable - it indicates whether the student dropped out from high school. Therefore, we also use a logistic regression for this sample.

We denote significance at the 5 percent with the use of a star. The logistic regression take into account the NELS:88 sampling scheme.

Table 4.   Regression result explaining ChalleNGe graduation[a,b]

Variable	Coefficient	Standard error
Age <= 16	-0.051*	0.0208
Age >= 18	0.001	0.0185
Male	0.053	0.0330
Black	0.101	0.0770
Hispanic	0.319*	0.0976
Black male	-0.269*	0.0444
Hispanic male	-0.192*	0.0932
Asian/Pacific Islander	-0.221	0.146
American Indian	0.324*	0.126
"Other"	-0.279*	0.150
Poverty rate	-0.883*	0.224
Poverty rate missing	0.233*	0.0881
Family income $25K–$35K	0.111	0.0982
Family income $35K–$45K	0.149	0.104
Family income > $45K	0.261*	0.119
Family income < $15K	-0.101	0.0851
Initial physical fitness	0.097	0.151
Initial TABE score	0.040*	0.0151
Distance, home to ChalleNGe	0.0013*	0.00017
Distance very large	-1.828*	0.877
Distance missing	-0.684*	0.197
2000	0.0874	0.0953
2001	0.104	0.0716
2002	0.0927	0.0878
2003	0.0576	0.0730
2004	0.0413	0.0767
2005	-0.178	0.117
2006	-0.159	0.0328
Second class	0.0185	0.0328
Constant	0.333*	0.178

a. Excluded categories: female, white (Caucasian non-Hispanic), age 17, family income $15,000 to $25,000, 1999, first class of the year, and NC program. Regression includes 76,685 observations.
b. * Indicates statistical significance at the level of 5 percent or better.

Table 5. Regression result explaining military enlistment [a,b]

Variable	Coefficient	Standard error
Graduate of ChalleNGe	1.29*	0.110
Earned GED or other credential	0.971*	0.104
Credential information missing	0.558*	0.106
Age <= 16	-0.103*	0.041
Age >= 18	0.066*	0.035
Male	0.943*	0.579
Black	-0.522*	0.127
Hispanic	-0.454*	0.103
Black male	-0.151	0.090
Asian/Pacific Islander	-0.671*	0.266
American Indian	-0.502*	0.088
"Other"	-0.186*	0.087
Poverty rate	-1.192*	0.258
Family income $25K–$35K	-0.095	0.112
Family income $35K–$45K	0.121	0.114
Family income > $45K	0.135	0.083
Family income < $15K	-0.0018	0.060
Initial physical fitness	0.228*	0.044
Initial TABE score	0.182*	0.011
Distance, home to ChalleNGe	0.00041*	0.00017
Distance very large	-0.503	0.60
Distance missing	-0.261*	0.117
2000	0.061*	0.051
2001	-0.169*	0.082
2002	-0.417*	0.062
2003	-0.689*	0.064
2004	-1.162*	0.0827
2005	-2.08*	0.108
2006	-5.22*	0.514
Second class	-0.138*	0.033
Constant	-4.87*	0.114

a. Excluded categories: female, white (Caucasian non-Hispanic), age 17, family income $15,000 to $25,000, 1999, first class of the year, and GA program. Regression includes 74,483 observations.

b. * Indicates statistical significance at the level of 5 percent or better.

Table 6.   Regression results xplaining military attrition of ChalleNGe enlistees
            (DMDC matched sample) [a,b]

Variable:	3-month		12-month		36-month	
	Coeff.	Std. error	Coeff.	Std. error	Coeff.	Std. error
Male	-0.629*	.0144	-0.538*	0.092	-0.275*	0.110
Black	-0.148	0.129	-0.047	0.085	0.075	0.087
"Other"[c]	-0.265	0.232	0.034	0.120	-0.151	0.162
Hispanic	-0.258	0.162	-0.328*	0.144	-0.426*	0.183
Aged 17	-0.162*	0.084	0.036	0.054	0.259*	0.058
Age >= 20	0.333*	0.170	0.114	0.105	-0.030	0.131
Navy	0.508*	0.124	0.264*	0.069	0.463*	0.069
Air Force	-0.106	0.194	0.106	0.097	0.171	0.107
Marine Corps	0.446*	0.123	0.0014	0.102	-0.178*	0.936
AFQT <= 30	-0.348	0.474	-0.209	0.327	-0.070	0.287
AFQT 31-49	0.297*	0.086	0.133	0.086	0.048	0.074
AFQT 65-92	0.232*	0.110	-0.026	0.094	-0.063	0.101
AFQT >= 93	-0.047	0.641	-0.643	0.047	-0.221	0.382
FY99-FY01	0.415*	0.124	0.137	0.130	0.059	0.062
FY02-FY04	0.284*	0.140	0.103	0.110	~	~
Leadership positions	-0.136*	0.053	-0.100*	0.038	-0.061	0.034
Poverty rate	-0.206	0.487	-0.591	0.541	-0.011	0.474
Poverty rate missing	0.041	0.129	0.019	0.107	0.071	0.073
Initial physical fitness	-0.442*	0.146	-0.370*	0.078	-0.245	0.162
Constant	-2.514*	0.177	-1.104*	.0171	-0.232	0.144

a. Excluded categories: Female, White, Asian/Pacific Islander, American Indian, Aged 18 or 19, Army, AFQT 50 to
   64, FY05-FY06, MI program. Number of observations: 7,533 in 3-month equation.
b. * Indicates statistical significance at the level of 5 percent or better.
c. "Other" category includes those of other ethnicities, and those with unknown ethnicity.

Table 7.   Regression results explaining military attrition (DMDC long sample) [a,b]

Variable	3-month attrition		12-month attrition		36-month attrition	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Male	-0.541*	0.008	-0.564*	0.007	-0.505*	0.006
Black	-0.282*	0.010	-0.307*	0.008	-0.172*	0.007
Asian/Pacific Islander	-0.623*	0.025	-0.588*	0.019	-0.660*	0.018
American Indian	-0.1058*	0.023	-0.090*	0.020	-0.024	0.019
"Other"[C]	-0.164*	0.017	-0.142*	0.013	-0.186*	0.014
Hispanic	-0.486*	0.013	-0.447*	0.010	-0.441*	0.010
Poverty rate	0.423*	0.052	0.037*	0.040	0.210*	0.039
Poverty rate missing	0.107*	0.008	0.144*	0.007	0.103*	0.006
Percent rural	0.0533*	0.010	0.027*	0.008	0.037*	0.008
Rural measure missing	-0.065*	0.028	-0.099*	0.023	-0.019	0.022
Aged 17	0.001	0.018	0.069*	0.013	0.139*	0.012
Age 19	0.169*	0.009	0.145*	0.007	0.121*	0.007
Age 20	0.233*	0.011	0.188*	0.009	0.155*	0.008
Age >= 21	0.289*	0.010	0.195*	0.008	0.137*	0.007
Single	-0.230*	0.011	-0.149*	0.009	-0.134*	0.009
Navy	0.223*	0.009	-0.125*	0.007	-0.001	0.007
Air Force	-0.329*	0.011	-0.585*	0.009	-0.413*	0.008
Marine Corps	0.211*	0.010	-0.057*	0.008	-0.153*	0.008
AFQT <= 30	-0.001	0.036	0.134*	0.028	0.036	0.029
AFQT 31-49	0.121*	0.009	0.113*	0.007	0.078*	0.007
AFQT 65-92	-0.194*	0.009	-0.174*	0.007	-0.181*	0.007
AFQT >= 93	-0.421*	0.020	-0.427*	0.016	-0.437*	0.015
HS diploma, FY02-04	-0.134*	0.008	-0.070*	0.006	-0.032*	0.006
HS diploma, FY05-06	-0.255*	0.010	-0.054*	0.010	~	~
GED, FY99-01	0.507*	0.016	0.557*	0.013	0.641*	0.011
GED, FY02-04	0.442*	0.019	0.585*	0.014	0.534*	0.015
GED, FY05-06	-0.156*	0.026	0.403*	0.024	~	~
Dropout, FY99-01	0.082*	0.033	0.888*	0.028	0.906*	0.026
Dropout, FY02-04	0.208*	0.056	0.418*	0.043	0.623*	0.042
Dropout, FY05-06	-0.089	0.082	0.439*	0.115	~	~
ChalleNGe, FY99-01	0.294*	0.070	0.420*	0.053	0.810*	0.045
ChalleNGe, FY02-04	0.0052	0.068	0.289*	0.047	0.608*	0.048
ChalleNGe, FY05-06	-0.506*	0.142	0.054	0.109	~	~
Constant	-1.88*	0.018	-1.042*	0.143	-0.444*	0.014

a. Excluded categories: female, white, Asian/Pacific Islander, American Indian, age 18 or 19, Army, AFQT 50 to 64, FY05–FY06, married, HSDG enlisting pre-9/11. Number of observations: 1,193,607 in 3-month equation.
b. * Indicates statistics significance at the level of 5 percent or better.
c. "Other" category includes those of other ethnicities and those with unknown ethnicity

Table 8.   Program-level effects: graduation, enlistment, attrition[a]

Program	ChalleNGe graduation	Military enlistment	Attrition		
			3-month	12-month	36-month
AK	61.8	8.5	8.5	20.3	45.7
AR	53.5	8.1	11.7	29.5	55.8
AZ	55.6	10.6	6.7	17.4	44.1
CA	59.4	11.1	3.7	12.6	30.0
CL	61.4	9.4	~	~	~
CM	68.5	10.9	20.0	36.7	~
FG	67.6	10.4	3.7	12.5	38.5
FL	76.6	8.7	5.4	20.6	48.5
GA	65.2	10.2	7.7	17.6	30.1
GL	68.8	7.5	9.4	21.4	44.3
HI	63.3	14.3	2.0	9.6	29.6
IL	54.8	11.6	9.6	20.6	41.6
KY	56.5	10.2	7.2	20.3	42.9
LA	75.9	7.1	11.0	24.3	45.5
MD	65.3	11.9	4.7	17.6	43.8
MI	60.4	8.3	6.4	17.1	42.7
MS	79.9	9.1	11.3	27.6	48.1
MT	57.8	12.0	8.8	18.7	38.8
NC	63.6	12.4	9.0	19.6	49.3
NJ	73.2	16.9	8.1	18.6	40.6
NM	68.8	8.0	9.5	19.7	~
OK	55.2	13.1	5.9	17.4	38.4
OR	71.0	10.9	3.9	10.8	36.3
PR	80.3	~	~	~	~
SC	70.0	11.0	8.9	24.1	44.5
TX	59.8	11.6	6.2	21.1	40.2
VA	74.3	14.7	5.9	17.8	41.9
WI	62.8	10.7	9.1	19.3	36.8
WV	65.4	12.1	5.6	21.7	39.2
WY	54.4	11.6	~	~	~

a. This table presents regression-adjusted rates of graduation (defined as graduates to entrants), military enlistment, and military attrition. The military attrition equations include only graduates. This table summarizes the results presented in figures 6, 9, and 16. There were too few enlistees from the CL, PR, or WY programs to calculate attrition rates and too few enlistees from the NM program who had reached the 36-month point in their term to calculate 36-month attrition rates.

Table 9.   Regression results explaining dropout status

Variable	Male Coefficient		Male Standard error	Female Coefficient		Female Standard error
Parent is single	0.306		0.175	-0.107		0.156
At least one parent is a dropout	0.991	*	0.255	0.707	*	0.172
Sibling is a dropout	0.818	*	0.198	0.933	*	0.187
Spend more than 3 hours alone a day at home alone	0.251		0.169	0.229		0.168
Limited English proficient	-0.581		0.365	0.100		0.318
Low family income	0.681	*	0.179	0.734	*	0.155
Locus of control - 8th grade	-0.658	*	0.173	-0.210		0.151
Composite math and reading test score	-0.020		0.015	-0.062	*	0.010
Constant	-1.228		0.715	0.876		0.548

Appendix B: Data and measurement

This appendix includes additional information on the data we use throughout the analysis. We also include a brief summary of the locus-of-control measure.

Locus-of-control measure

Locus of control is measured by testing a person's agreement with a series of statements. In each case, the respondent was directed to choose from two statements the one he or she believed more strongly to be true. Examples include the following pairs:

- "In my case, getting what I want has little or nothing to do with luck"
  versus
  "Many times, we might just as well decide what to do by flipping a coin"

- "As far as world affairs are concerned, most of us are the victims of forces we can neither understand or control"
  versus
  "By taking an active part in political and social affairs, people can control world events"

- "People are lonely because they don't try to be friendly"
  versus
  "There's not much use in trying too hard to please people, if they like you, they like you"

- "Sometimes I can't understand how teachers arrive at the grades they give"
  versus
  "There is a direct connection between how hard I study and the grades I get."

Distance data

We calculated the distance from each participant's home to the ChalleNGe program, based on ZIP codes of each. One concern with these data is that the distance will be incorrect if the ZIP code is incorrect. As a check, we flagged observations with 1,000 or more miles between the home and the program. The programs included only a few such observations, probably due to incorrect home ZIP codes.

Program data

Our data include indicators of gender, ethnicity, and age on all cadets. The data also include a categorical indicator of family income. However, the family income variable is missing for about a third of participants. Moreover, while the quality of the data generally improves over time (incidence of missing variables decreases), the reverse is true in the case of family income. In the most recent years of data, the family income variable is missing in the majority of observations. We suspect that this stems from increased sensitivity about private information. Therefore, we analyze this variable only briefly.

In terms of the cadet's performance in ChalleNGe, we have a number of indicators. First, the data include an initial score on the Test of Adult Basic Education (TABE). Those who complete the program also have a posttest TABE score. TABE scores are reported in grade-level equivalents.

The ChalleNGe program stresses physical fitness. All cadets are given an initial (diagnostic) physical fitness test as they enter the program, and those who complete the program also have a final physical fitness score at the end of the program. The physical fitness test includes a number of measures on such activities as pushups, pullups, and flexed arm hang. The physical fitness measures, however, are often incomplete. Therefore, we standardize the measures as follows: For those with multiple scores on the same test (i.e., multiple scores on diagnostic pushups), we keep the highest score. Next, we standardize the measures most often included in records: v-sit, pushups, and pull-ups. We do this by separating men and women and then, for each group, creating variables that are scaled in the same manner so the

average cadet's score is 0. Finally, we average these 3 scores for each cadet. We do this separately for diagnostic and final tests. Therefore, a male or female cadet who entered at the average fitness level compared with other entering cadets would have a standardized diagnostic score of 0; a cadet who graduated with the average fitness level compared with other graduating cadets would have a standardized final score of 0. A disadvantage of this method is that the scores no longer have meaning in terms of the number of pushups performed; also, it is not clear from the standardized scores how much a person's fitness improved in terms of the number of pushups, etc. However, the advantage of this method is that we can now compare the score of men versus women, and the initial diagnostic scores of those who complete the program versus those who do not, in a meaningful way.

Another program measure is the number and type of leadership positions held by each cadet. This measure is problematic, however, because the types of positions are not coded, but are simply entered as text fields in the data. Thus, it is difficult to compare positions across programs. Also, we found that the vast majority of cadets hold at least one leadership position. Therefore, we use a simple count variable that measures the number of leadership positions held by each cadet.

In our previous research [7], we also detailed the attainment of a GED (or other credential) among those cadets who completed the ChalleNGe program. We originally intended to perform similar analyses on these more up-to-date program data, but, when we examined the program data closely, we discovered that the variable indicating the cadet had passed the GED or earned another credential was missing for a large minority of those who completed the program ("graduates"). We performed a number of tests on the data. Credential information is missing in a way that does not conform to any obvious pattern (i.e., it is missing across most programs, most years, and most classes). Also, we found the available, or nonmissing, data to be somewhat suspect. The credential information matched fairly closely with our previous dataset in cases for which we had information from both sources, but in those cases for which we had only information from the current program data, the data often indicated no credential for the cadet. This differential served to lower the calculated rate

at which cadets receive GEDs or other credentials by nearly 10 percentage points; we have no other evidence that such a shift has occurred. This difference occurred not just in the most recent years but also in data from earlier periods that had possibly been updated, Thus, we determined these data to be suspect and performed no additional analyses on GED or credential attainment rates.

We dropped observations with missing corpsmember IDs (without the corpsmember ID, we couldn't tell which observations were duplicates). We also dropped duplicate observations. About 1 percent of cadets were missing information on gender; we assumed they were male. About 2 percent had unlikely ages (i.e., 6, 36, 107); we coded those with ages outside the 15–19 range as "missing." Our data included information on those who attended ChalleNGe programs during the 1998–2007 period, but we have very few observations from the 2007 class. We dropped the 1998 data due to quality concerns, as well as the 2006 class 2 data and the 2007 data (on which we have no graduation information).

We dropped records on 48 people whose records indicated that they both graduated and were terminated (during the same course). We dropped 73 observations whose records indicated that they attended a program called "IS." We believe these may be Illinois participants, but we are not sure. If they are, they make up a very small proportion of Illinois participants and are unlikely to change results.

About 8 percent of the sample had obviously bad SSNs (i.e., 111-11-1111). These observations are scattered across the years in our sample There is quite a bit of variation across programs in terms of the number/proportion of obviously bad SSNs. The following programs had the highest proportion of obviously bad SSNs:

- AZ (9.5 percent)

- FL (8.9 percent)

- LA (9.7 percent)

- MI (38 percent)

- OK (11.3 percent)

- OR (34.8 percent)

- TX (10.9 percent)

- WV (35.8 percent).

The following programs had the lowest rate of obviously bad SSNs:

- AR (0.22 percent)

- GA (0.52 percent)

- IL (0.046 percent)

- KY (0.13 percent)

- PR (0.36 percent)

- SC (0.77 percent)

- WI (0.95 percent).

We do note that some programs that evidenced significant problems with SSN quality have improved. For example, nearly all of the obviously bad SSNs from the AZ, MS, and LA programs occurred by 2002; since then, the SSNs recorded for these programs have improved.

Target graduation rates

We divide the programs into three groups, based on their average target graduation rate. (Recall that the target graduation rate indicates the ratio of actual graduates to the graduation target.) We use the average rates over the last 5 classes. The three groups follow:

1. Programs graduating less than 90 percent of target: AR, AZ, CL, KY, MD, MT, NM, OK, SC, TX, WI, WV, and WY

2. Programs graduating 90 to 100 percent of target: GL, HI, IL, MI, MS, and NC

3. Programs graduating more than 100 percent of target: AK, CA, CM, FG, FL, GA, LA, NJ, OR, and VA.

DMDC data

We define attrition as the failure to complete the first term of service. In a parallel manner, we define 3-month attrition as the failure to complete the first 3 months of service; this period correlates roughly with bootcamp, although the exact length of bootcamp varies across the Services. Of course, those who do not complete the first 3 months of service also fail to complete the first 12 months; thus, attrition rates increase over time.

We do not include some specific cases in our tally of attrition. For example, those who leave the enlisted ranks to become officers are not considered to have attrited. Likewise, those who leave the ranks due to injury or death are not considered to have attrited. Thus, attrition represents a specific decision on the part of the enlistee and/or the Services.

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