CAB D0004011.A2 / Final
August 2001

Analysis of the Navy's Increased Cap on Accessions of Non-High-School-Diploma Graduates in FY99

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Approved for distribution: August 2001

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Analysis of the Navy's Increased Cap on Accessions of Non-High-School-Diploma Graduates in FY99:

Did HP3 and ACE Help, and Is a 10-Percent Cap a Cost-Effective Long-Term Strategy?

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with
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In FY98, the Navy failed to meet its enlisted recruiting goal by 7,000 recruits, or 12 percent. Early in FY99, it appeared that the recruiting difficulties would continue. All of the military services were facing a tight recruiting market because of such factors as low unemployment, a decreased propensity of youth to enlist, and increasing college enrollments. The Secretary of the Navy responded in February 1999 by increasing the cap on the recruitment of non-high-school-diploma graduates (NHSDGs) from 5 to 10 percent of enlisted accessions. Although NHSDGs are less costly to recruit than high-school-diploma graduates (HSDGs), both in terms of recruiter time and in marketing, the military services limit the number of NHSDG recruits because they have much higher attrition than high school graduates.

Because the Navy was concerned about how the increased numbers of NHSDGs would affect overall recruit survival, it initiated the following two programs:

- Navy recruiting modified the Compensatory Screening Model (CSM), the screen used to determine NHSDG eligibility. The new screen, called the High Performance Predictor Profile (HP3), was implemented with new contracts during February 1999.
- Commander, Navy Education and Training (CNET) developed a 1-week course for NHSDG recruits called Academic Capacity Enhancement (ACE). ACE began in March 1999, was discontinued during the summer surge, and returned as a fully revised course in October 1999.

Commander, Navy Recruiting Command (CNRC) asked CNA to analyze (a) the survival of NHSDGs under these two new policies and (b) the overall cost-effectiveness of the policy to increase the cap on NHSDG accessions. This annotated briefing presents our findings.

Summary

- ACE does not improve RTC or 180-day survival
- NHSDG *and* HSDG survival through in-processing have improved since Feb 99
- NHSDG RTC and 180-day survival have not improved since Feb 99
- A 10-percent NHSDG recruiting strategy costs the Navy between $10 million and $21 million annually

A summary of our conclusions follows:

- Because of significant changes in the ACE curriculum beginning in FY00, we have confined our analysis of ACE to FY00 accessions only. We find no statistical evidence that ACE improves the survival of NHSDG recruits through either Recruit Training Command (RTC) or the 180-day milestone.
- When we control for relevant variables, we find that survival through in-processing has increased for NHSDGs and HSDGs since the implementation of HP3. However, the magnitude of the increase in NHSDG survival is proportionally larger than that of HSDGs. Although some of the improvement in NHSDG survival may be attributable to HP3, it seems likely that some other factor(s) is also responsible—one that affects both NHSDG and HSDG survival, but to varying degrees.
- In spite of the improvements in NHSDG survival through in-processing, when controlling for relevant variables, we find no measurable improvement in the RTC or 180-day survival of NHSDGs after the implementation of HP3 (i.e., there is no statistical evidence that recruits screened under HP3 survive longer than those screened under CSM). In contrast, HSDG survival—both through RTC and 180 days—was significantly higher after HP3.
- The fact that we cannot see any beneficial impact of HP3 on NHSDG survival beyond in-processing may be attributed to lax application of the screen. When we compare NHSDG recruits screened using CSM with recruits screened under HP3, we find no statistical difference in average recruit characteristics, such as AFQT scores, years of education, age, or percentage receiving a waiver. The latter, which is associated with higher attrition, represents 42 percent of all NHSDG accessions. The fact that the share of recruits receiving waivers is so high under both screens indicates that neither has been strictly applied.

- We estimate that, in the long run, maintaining the NHSDG cap at 10 percent instead of 5 percent of accessions will cost the Navy between $10 million and $21 million per year. This estimate of the overall cost to the Navy of recruiting high-attrition NHSDGs includes actual monetary components, such as lower expenditures for recruiting and higher expenditures for training, as well as a nonmonetary component that measures the cost of reduced readiness. Therefore, although the 10-percent cap imposes a cost on the Navy, we can't recommend an immediate return to the 5-percent cap because it's not clear how such a step would be funded. The difficulty with returning to a 5-percent cap is that the nonmonetary costs of reduced readiness are not visible or accessible to Navy planners, but the savings for recruiting are.

Background

- The cap was increased to ensure that the recruiting mission would be met
- What else could have been done?
- Attrition mitigation measures: HP3 and ACE
- Other policy changes: BEST

The Navy raised the cap on NHSDG accessions in FY99 because persistent recruiting difficulties made it seem likely that the Navy would not meet either its enlisted recruiting goal or, consequently, the congressionally mandated endstrength floor established for the fiscal year. Increasing the NHSDG cap was not the only policy tool available. Other means to bring in more recruits include increasing enlistment bonuses, increasing the number of recruiters (a longer term strategy), lowering other recruiting standards, such as weight restrictions or other medical standards, or decreasing minimum standards for the Armed Forces Qualification Test (AFQT). A different strategy could be to decrease the recruiting goal by adopting policies aimed at increasing retention. Such policies include increasing the selective reenlistment bonuses (SRBs) or relaxing reenlistment standards (such as weight or high-year tenure policies).

Some of these policies were implemented to varying degrees, but they were not expected to be sufficient to meet the Navy's congressionally mandated endstrength of 310,000. Thus, the Secretary of the Navy (SECNAV) chose to increase the recruiting cap on NHSDG accessions from 5 to 10 percent of enlisted accessions as an additional strategy to achieve endstrength. Not only would this policy have timely results, it would not require an in-year budget increase. However, Congress originally set the DoD-wide NHSDG cap at 10 percent of enlisted accessions because of the significantly higher attrition that these recruits experience. Attrition is costly to the Navy in terms of recruiting, training, and readiness, so, at the same time that the cap was increased, a new recruit screening tool and a new course at RTC were developed to help mitigate any increase in overall attrition that might result from the policy.

Relative to CSM, HP3 was designed to improve the NHSDG screening process by requiring potential recruits to provide proof of stable employment and character references. Otherwise, the two instruments screen on very similar predictors of attrition, such as age, number of years of education, and AFQT score.

The Navy implemented HP3 in February 1999, which coincided with the introduction of ACE, a 1-week remedial course developed by CNET to reduce the attrition of NHSDG recruits. ACE is conducted immediately following the first week of in-processing. Although all NHSDG recruits are supposed to take ACE, the course is discontinued during the summer months because of constraints on RTC berthing during the summer surge and because relatively few NHSDG accessions occur during the summer.

Finally, at the same time that these other policies were being implemented, the Navy ceased to use the BEST screen during in-processing. BEST is a psychological screen used to separate recruits from the Navy by identifying those with psychological profiles that are considered incompatible with military service.

Analysis of ACE

- Defining the sample – Include only FY00 accessions who survived in-processing
- Defining control groups – Some NHSDGs do not take ACE
- Defining attrition – Attrites include those who have been identified for separation from the Navy

Our first analysis addresses the effects of ACE on the survival of NHSDG recruits. The Navy implemented the Academic Capacity Enhancement course in March 1999. It is a 1-week required course for all NHSDG accessions and immediately follows the first week of in-processing.

Because the course was not offered continuously, and because the curriculum changed significantly between FY99 and FY00, CNRC asked us to confine our analysis of the effects of ACE on NHSDG survival to the FY00 cohort. The sample is further limited to include only accessions who made it past in-processing (P-days) because only those who survive in-processing can ever be enrolled in ACE.* Finally, because of berthing constraints and low NHSDG accessions, ACE is discontinued during the summer surge months. Thus, the sample includes NHSDG recruits who accessed in October through May FY00 and survived in-processing.

The best method to evaluate the effects of ACE on NHSDG survival would be with a controlled experiment, in which all NHSDG accessions are divided into either an experimental group (who would attend ACE) or a control group (who would not attend ACE). Selection into each group would be completely random to ensure equivalent representation by race/ethnicity, gender, age, and other important factors. In that way, we would be able to isolate the effects of ACE from all other factors that affect survival. However, such a planned experiment was not possible. Instead, our control group comprises NHSDG recruits who, for a number of reasons, were never enrolled in ACE. Overwhelmingly, these recruits either accessed in early October, before ACE was fully implemented, or are women. The preponderance of women results from the fact that companies

* Recruits who have survived in-processing are defined as those who have an Under Instruction personal event code (PEC) in the RTC CDP other than 322 or 321. Note that this definition will capture recruits who were allowed to continue with training while waiting for the Navy to process waivers that were requested during P-days.

were formed entirely of NHSDG recruits for the purpose of attendance in ACE. If sufficient recruits were not processed within a day or two to form a company, they were sent directly to training rather than spend days awaiting instruction. Far fewer female than male NHSDGs access, so a larger proportion of female than male NHSDGs was never enrolled in ACE. In our analysis, we control for both gender and month of accession, so this nonrandomness of selection into ACE does not present a problem.

Finally, it is important to accurately count the Sailors who attrite and those who survive. Sailors who are identified for separation may take several days or weeks to process (especially those in an unauthorized absence category). To include those who have not officially been separated from the Navy but who are in a processing-out phase, we define RTC attrition to include those with a nonacademic attrition code on the Navy Integrated Training Resources and Administration System (NITRAS) plus those with any one of the following codes as a last personal event code (PEC): Unauthorized Absence (PEC 289, 585), Legal (PEC 030), Pending Attrition (PEC 039), or Admin (PEC 033).

Different data sets yield different samples

Gender/Tier/ACE status	Sample sizes PRIDE	EMR
Female/Tier 2/ACE	128	144
Female/Tier 2/No ACE	73	65
Female/Tier 3/ACE	94	94
Female/Tier 3/No ACE	54	43
Male/Tier 2/ACE	2,029	2,085
Male/Tier 2/No ACE	389	379
Male/Tier 3/ACE	1,615	1,454
Male/Tier 3/No ACE	429	293
Total NHSDG - ACE	3,866	3,777
Total NHSDG - No ACE	945	780
Females not attending ACE	36%	31%
Males not attending ACE	18%	16%

We found significant discrepancies between data from CNA's extract of the Enlisted Master File (the EMF, which we refer to as the EMR) and Personalized Recruiting for Immediate and Delayed Entry (PRIDE). For some individuals, the two data sets may show different education levels, different birth dates, and/or different AFQT scores. CNA has documented discrepancies in these databases in the past. For instance, Quester et al.* found in a study of 5,536 FY96 boot camp attrites that 32.8 percent of the losses were coded as medical or physical reasons in NITRAS, whereas only 24.7 percent of these losses were coded for the same reason in the DoD coding scheme that is included on the EMF. It is beyond the scope of this study to determine which database is the most accurate. Because the analysis is sensitive to the definition of who is an NHSDG,** we conduct separate analyses using each data source and report all results in two forms—one based on PRIDE and one on the EMR.

The table above shows the total number of observations used in the multivariate analyses by data source. The numbers stated for the EMR are total accessions with the given characteristics. However, AFQT on the EMR was missing for some of these NHSDG recruits, so the analysis could be conducted only on those with a valid AFQT. None of the observations for PRIDE were missing AFQT values.

We also show the percentage of NHSDG accessions that were not enrolled in ACE by gender. As we discussed previously, the percentage of women who were not enrolled in ACE is about twice that of men.

The next slide summarizes the results of the multivariate logistic regressions that estimate the effect of ACE on both RTC and 180-day*** NHSDG survival.

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* Aline O. Quester et al. *Final Report for CNA Study on Answering Decision-Maker's Questions: Organizing Training Information for Policy Analysis.* CNA Research Memorandum 98-76, Jun 1998.

** Including HSDGs in the control group of NHSDGs who did not attend ACE would bias their attrition to be lower than it actually is.

*** 180 days is the longest period of time for which we can follow recruits who accessed as late as May 2000.

ACE does not improve NHSDG survival

- None of the coefficients on ACE are statistically significant
- Consistent across equations:
  - Men and African Americans have higher survival
  - October, January, and February are worst months
  - Citizens and those with less than 12 years of education do worse
  - Those younger than 19 do worse in long-term survival

Appendix A presents the results from the logistic regressions. We summarize the results here.

None of the coefficients on ACE attendance are statistically significant—regardless of whether we use data from PRIDE or the EMR, or whether we estimate RTC or 180-day survival. In other words, when we control for relevant recruit characteristics, we have no evidence that ACE has a positive impact on NHSDG survival, either in the short term or the longer term. More data may help refine the estimates. However, while we continue to track the progress of HP3-screened recruits throughout FY01, we have not been tasked to continue an analysis of ACE beyond FY00.

Some additional findings are worth noting because they are consistent across all NHSDG equations (i.e., across both data sets and for both short-term and longer-term survival):

Being male and being African American both improve survival. For instance, in our estimates based on data from PRIDE, men are 38 percent* more likely to survive RTC than women, while African Americans are 60 percent more likely to survive than all other race/ethnic groups. In contrast, being young hurts survival. According to PRIDE, NHSDGs who are younger than 19 years of age (and thus often require a waiver) are 20 percent less likely than older NHSDG recruits to survive to 180 days. Furthermore, the months in which most NHSDG accessions occur are also the worst months in terms of survival, and citizens and those with fewer than 12 years of education also have lower survival.

Finally, we note that a number of HSDGs were also enrolled in ACE—253 and 321, according to PRIDE and the EMR, respectively. Because ACE is intended for NHSDG recruits only, we are not certain why these recruits were enrolled. However, because their selection into ACE may be nonrandom (e.g., they exhibited some behavioral anomalies during in-processing), we have not conducted an analysis of the effects of ACE on their survival.

* This is the odds ratio, calculated as e raised to the power of the coefficient from the logistic regression.

Analysis of HP3

- Background
- The multivariate model and general approach

We turn now to an analysis of HP3. As we noted previously, the HP3 screen is very similar to the previously used CSM screen. Appendix B contains a list of HP3 screening variables.

In general, both the CSM and HP3 screens consider a combination of age, number of years of education, educational credential (e.g., a GED or certificate of attendance), and AFQT. For example, an 18-year-old recruit with 10 years of education who scores between 65 and 92 would require a waiver for enlistment under HP3, but an otherwise similar recruit who scored between 93 and 99 on the AFQT would not.

In our analyses of ACE, we confined our sample to FY00 accessions because that year contained both control and experimental observations. For our analyses of HP3, we do not have a contemporaneous control group and, therefore, must look at survival behavior over time. In other words, all NHSDG recruits were screened using HP3 after February 1999, so we must compare their survival to NHSDGs accessed before that date. The need to compare across fiscal years adds some complexity to the analysis because we cannot control for factors that affect survival and change over time, such as Navy boot camp policies, leadership, weather, and civilian factors (such as unemployment rate). To control for these factors, we compare the relative survival of NHSDGs with that of HSDGs between FY97 and FY00. The next section describes the analysis and our results.

Historical data provide analytical baseline

FY	Historical survival rates and cohort size					
	# of accessions		RTC survival		180-day survival	
	HSDG	NHSDG	HSDG	NHSDG	HSDG	NHSDG
97	45,970	2,362	85.9	74.6	84.4	72.4
98	44,080	2,675	83.9	75.8	82.7	74.3
99	43,869	4,989	84.3	73.4	83.1	71.4
00	45,985	5,176	86.9	75.5	84.2*	74.1*

* Survival rates are for October through June accessions only.

By increasing the cap on NHSDG accessions from 5 to 10 percent, the Navy understood that overall survival would most likely decrease because NHSDG survival has always been lower than HSDG survival. However, the Navy did not know whether the average survival for NHSDGs would decrease simply by doubling their numbers. In other words, would the survival of the second 5 percent of NHSDGs be lower than that of the first 5 percent? This could happen if the characteristics of the first 5 percent were significantly different from those of the second 5 percent—in terms of AFQT score, educational credential, years of education, and so on.

On this slide, we report the RTC and 180-day survival for NHSDG* accessions beginning in FY97. For FY99 and FY00, we are including all NHSDG accessions, regardless of whether they were screened using HP3 or CSM. The 180-day survival for FY00 is for October through June accessions only.**

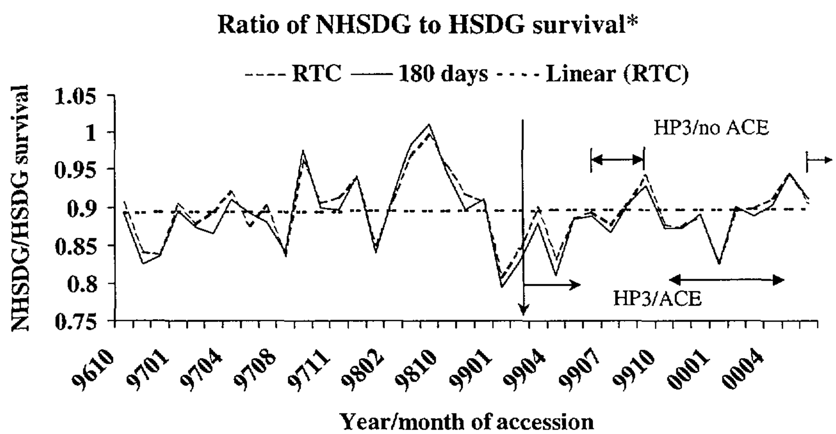
The data show that NHSDG RTC survival decreased in FY99, but returned to FY98 levels during the second year of the 10-percent cap. The same appears to be true for 180-day survival, but we can't be sure because we don't have a full year of data. Nor can we draw conclusions about the effects of a larger NHSDG cohort size because we are not controlling for other relevant factors, such as AFQT score.

The slide also includes data on HSDG survival. The data show that, although NHSDG survival decreased from FY98 to FY99, HSDG survival increased. A different trend for the two groups of recruits indicates that different factors were affecting their survival. Again, however, we can't be sure whether the changes in NHSDG survival were caused by the larger cohort size or by something else.

* For our analysis of the HP3 screen, we define recruits to be NHSDGs based on their education code in PRIDE.

** Data are from the EMR.

No change in relative NHSDG survival



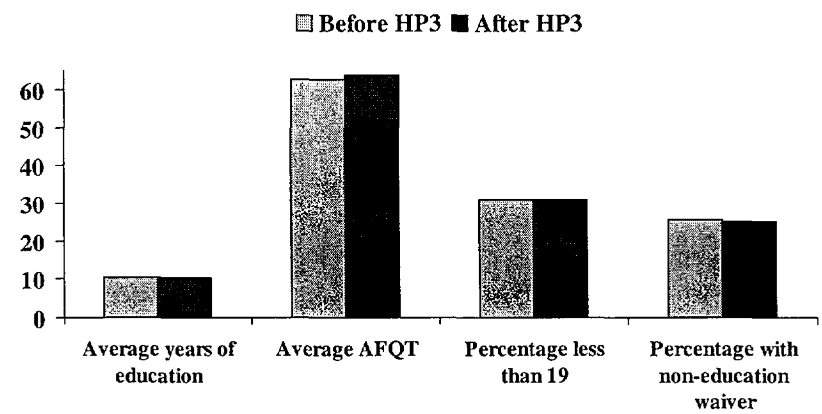
* Months in which fewer than 40 NHSDGs accessed have been eliminated.

We cannot measure many of the factors that drive year-to-year differences in overall (i.e., not just NHSDG) survival. For instance, weather and changes in RTC policies can affect RTC survival for all groups. To control for fluctuations in unmeasurable factors that would affect all recruits' survival behavior between fiscal years, we have calculated the ratio of NHSDG survival to HSDG survival for each month in each fiscal year since FY97. The monthly ratios are plotted in the graph above, along with the ratio's long-term trend line.* Ratios with values less than 1 mean that the survival of NHSDGs is lower than that of HSDGs. Changes in policies and conditions that affect both groups equally (such as an exceptionally cold winter month) will leave the ratio unchanged. However, policies directed at reducing NHSDG attrition only (such as the new HP3 screen or the ACE program) should lead to an increase in this ratio. The trend line is nearly a straight line (the slope is .0001), indicating that for the last 3 years this ratio has remained relatively unchanged. The average of this ratio over this time period is .89.

This graph shows that the ratios for both RTC and 180-day survival have not been consistently on or above the long-term trend line since HP3 was implemented, as would be the case if the HP3 screen were superior to the CSM screen. However, other general recruit characteristics that are correlated with survival but are not part of the HP3 screen may have changed during this time period, such as citizenship, time in the Delayed Entry Program (DEP), and years of obligated service. Significant changes in any of these types of NHSDG characteristics would mask any real effect of the HP3 screen. Therefore, we need to conduct multivariate analyses that will control for these additional factors.

* Large fluctuations in this ratio occur during the summer months because so few NHSDG recruits are accessed during the summer surge. Therefore, we have removed these months from the graph.

Basic characteristics are the same



The CSM and HP3 screens are similar in their criteria concerning age, AFQT, number of years of education, and requirements for granting waivers. Because of these similarities, we include measures of these four characteristics as independent variables in the multivariate analysis. This allows the HP3 variable to capture only the effects of the differences between the two screens, such as employment history.

Before reporting the results of the multivariate analysis, we show the differences in average personal characteristics of recruits screened with the CSM (FY97 through January 1999 accessions) and recruits screened with HP3 (March 1999 through September 2000 accessions) in these basic characteristics. The data presented above show that average NHSDG recruit quality did not change with the implementation of HP3.

Multivariate analysis – regression specification

- **Dependent variables:** survival through in-processing, RTC, 180 days
- **Explanatory variables:**
  - **Continuous:** AFQT, years of education
  - **Categorical:** less than 19 years of age, DEP less than 31 days, non-minimum-education waiver, citizen, race, gender, school guarantee, month of accession, long enlistment (> 4 years)
- **HP3/ACE variables:**
  - HP3 = 1 if observations are after Feb 99
  - For those who survived in-processing, we differentiate accessions after Feb 99 by whether they attended ACE*
  - The omitted category in all cases is for observations before Feb 99

* The population who did not make it past in-processing and accessed on or after Feb 99, by definition, did not attend ACE.

We estimate logistic regressions of the probability of survival as a function of relevant independent variables using data for FY97 through FY00. We estimate separate models for in-processing, RTC,* and 180-day survival, and, because certain characteristics may affect HSDG recruits differently, we estimate each of these equations separately for HSDGs and NHSDGs. Appendix C presents our parameter estimates.

For our analysis, we define an HP3-screened recruit as any NHSDG accession whose last contract with the Navy occurred after 1 February 1999. A statistically significant coefficient on the HP3 variable in each equation will indicate a change (positive or negative) in absolute survival since the implementation of HP3 for that class of recruit (NHSDG or HSDG), for that particular milestone (in-processing, RTC, 180 days). In addition, we are interested not just in whether a change has occurred in NHSDG survival, but in whether their survival has increased relatively more than HSDGs since HP3. This will require a comparison of HSDG and NHSDG HP3 coefficients, which we explain in the next slide.

Other data notes: We have included TARS but excluded prior service accessions. We dropped home-schooled recruits from the analysis because they were considered to be NHSDGs before FY99 and HSDGs in FY99 and beyond. Also, there are discrepancies between important variables in PRIDE—the enlisted reservation database—and the EMR. For our analyses of HP3, we based demographic characteristics, such as age, gender, AFQT, and degree status, on data from PRIDE.**

* We define RTC survivors as those who successfully graduated from RTC or who are still in RTC. All others are considered to have attrited from RTC. This group includes nonacademic attrites, as well as those whose attrition is pending due to unauthorized absences, legal reasons, and so on.

** We have eliminated observations for which the absolute value of the difference between Active Duty Service Date (ADSD) and cancellation date in PRIDE exceeds 15 days, as well as home-schoolers, prior service, and CSM-screened recruits who shipped after 1 February 1999.

Controlling for multiple policy changes

- Control for BEST and other unmeasured factors – Compare changes in NHSDG survival to changes in HSDG survival.
- Control for ACE – Use subsample that includes in-processing survivors only.

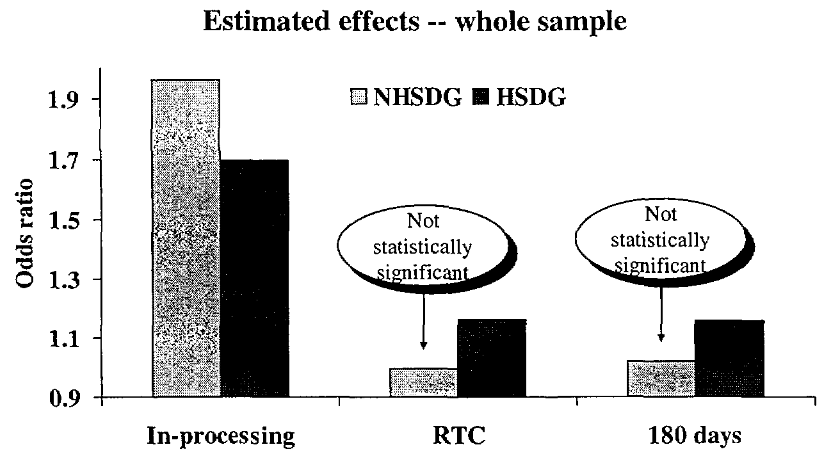
Having shown how each logistic regression is specified, this slide gives some additional detail on how to interpret the regression results and our analytical procedure.

First, because of the way it is defined, the coefficient on the HP3 variable will capture the effects not only of HP3 but also of any other changes that occurred after February 1999 but are not captured in the other explanatory variables. For instance, we have previously noted the phasing out of BEST that occurred at about the same time. We can partially control for changes in conditions that affect both HSDG and NHSDG survival, by comparing estimated changes in survival across the two groups.

ACE also began simultaneous with the implementation of HP3. Our previous analyses concluded that ACE has not had a significant impact on survival; however, because ACE was revised for FY00, that analysis was confined to FY00. We are including observations for a number of fiscal years, so we want to control for the effects of ACE in FY99 as well as FY00 in this analysis. To control for the effect of ACE, we use the fact that only recruits who survive in-processing are eligible for enrollment in ACE. Specifically, we estimate our regression models using two different samples. First, we estimate the models using data for all accessions from FY97 to FY00. Using the whole sample, the models estimate the overall impact of all polices—not just HP3—on the three measures of survival. Next, we estimate the models using a subsample of the data set that includes only those recruits who survived in-processing. Within this subsample, recruits can be differentiated by whether they attended ACE. This specification allows us to determine whether those who were screened using HP3, survived in-processing, and did not attend ACE differ in survival from otherwise similar NHSDG recruits who did attend ACE.

To understand why we do this last analysis, it's useful to consider a hypothetical scenario. If we find that survival through in-processing has improved for NHSDGs, but that survival to 180 days has not, we cannot determine whether the survival after in-processing and through 180 days has decreased because HP3 has a positive effect only in the very short term or because some other policies that were implemented, such as ACE, have a compensating negative impact on survival.

NHSDG survival increased – but so did HSDG survival



In this slide, we plot the estimated odds ratios of the HP3 variables for the entire sample (i.e., the odds of survival for recruits after HP3 relative to recruits before HP3). A ratio greater than 1 indicates that recruits after HP3 are more likely to survive; a ratio less than 1 indicates that recruits after HP3 are less likely to survive. For instance, the odds ratio for surviving in-processing for NHSDGs after HP3 is 1.96 (see appendix C for the estimated logit coefficients).* This means that when we control for relevant NHSDG recruit characteristics, NHSDGs who accessed after HP3 was implemented were 96 percent more likely to survive in-processing than those who accessed before HP3. Similarly, HSDGs are 70 percent more likely to survive in-processing since HP3 was implemented than HSDG recruits accessed before HP3.

As noted previously, the variables used to capture the effects of HP3 in the multivariate analyses will measure the effects of any changes after February 1999 that are not captured by the other variables in the model—and not just the effects of HP3. If no other policy had been put into effect at the same time as HP3, and HP3 were effective, we would expect to see the coefficient on HP3 to be positive and significant in the NHSDG equations, but not significant in the HSDG equations.

For survival through in-processing, this is not the case. The coefficients on the HP3 variables in both the HSDG and NHSDG equations are positive and statistically significant, which means that both categories of recruits have experienced real increases in in-processing survival since the advent of HP3. However, the increase in survival for NHSDGs is larger than that for HSDGs, and this difference is statistically significant. Given that both categories of recruits have experienced an increase in survival through in-processing, it is difficult to attribute all of the NHSDG increase to the HP3 screen, rather than to the cessation of BEST or some other policy change.

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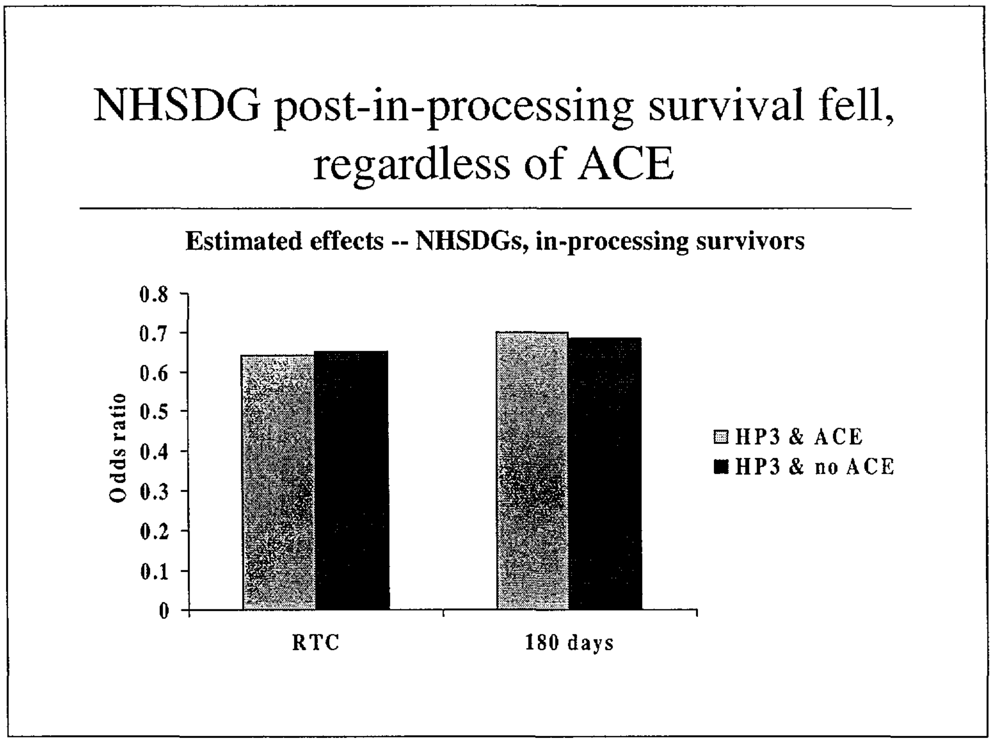
* Recall that the odds ratio is e raised to the power of the coefficient from the logistic regression.

We also estimate that RTC and 180-day survival increased significantly only for HSDGs after the implementation of HP3. Again, it is difficult to conclude that HP3 is driving the increase in NHSDG survival through in-processing given the lack of any increase in HSDG survival beyond in-processing.

We turn to the censored sample analyses in the next slide.



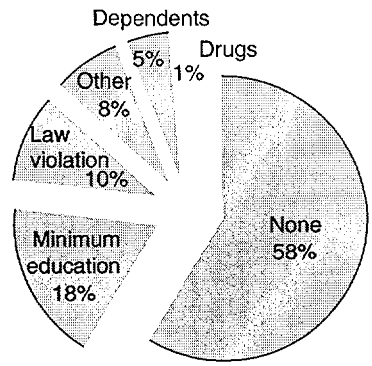
On this slide, we report the estimates of the effect of HP3 on NHSDG survival, holding constant the effects of ACE. These estimates are based on the subsample of in-processing survivors.

In these equations, the HP3 variables compare the survival of HP3-screened recruits who survived in-processing and attended ACE with HP3-screened recruits who survived in-processing and did not attend ACE. The data show that, for both RTC and 180-day survival, the probability of survival is virtually the same, regardless of attendance in ACE. In fact, both are estimated to have about a 30-percent lower probability of survival after in-processing than NHSDG recruits screened with CSM. The coefficients underlying the odds ratios are statistically significant in both equations, but within each equation, the magnitudes of the coefficients are not statistically different. Thus, we cannot conclude that attendance in ACE negates the effects of the HP3 screen.

We can learn more by comparing the results in this slide with the results in the previous slide. Recall that absolute survival through in-processing improved for NHSDG accessions since February 1999, but there was no improvement in overall RTC or 180-day survival. For this to hold, it had to be the case that survival after in-processing and through the end of RTC (indeed through 180 days) decreased. This slide shows by just how much.

Fewer waivers would increase survival

Percentage of FY00 NHSDG recruits with waivers



NHSDG recruits with waivers for law violation, dependents, drug use, or other are 10 percent less likely to survive 180 days than recruits with no waiver.

Our analysis concludes that the HP3 screen has not had a positive impact on NHSDG survival through the first 180 days. In actual practice, however, the widespread granting of waivers means that the HP3 screen has not been strictly applied.* For instance, the odds ratio on the waiver variable (for waivers other than minimum-education) for NHSDG 180-day survival is .90. In other words, NHSDG recruits who enter with a non-minimum-education waiver are 10 percent less likely to survive to 180 days than NHSDGs who enter without such a waiver. And, as this slide illustrates, almost 1 in every 4 NHSDG recruits enters with this type of waiver.** Clearly, NHSDG survival would be higher in the absence of waivers.

* As we noted previously, the HP3 screen is very similar to the earlier CSM screen, except for employment history.

** There may be more NHSDG recruits with each of these waivers because we are capturing data only on the primary waiver for each recruit. It could be the case that recruits have multiple waivers, which would increase the percentage in each category, but not the total number with any type of waiver.

Costs and benefits of the 10% cap

- Issues
- Approach
- Recruiting savings
- Attrition costs
- Readiness issues
- Summary
- Recommendations

We now turn to a cost-benefit assessment of the Navy's 10-percent NHSDG cap. This slide indicates the organization of this section.

The main issue:
10% cap means early benefits & later costs

Recruiting savings

- NHSDGs are cheaper to recruit
- Achieve endstrength

Now

Attrition costs

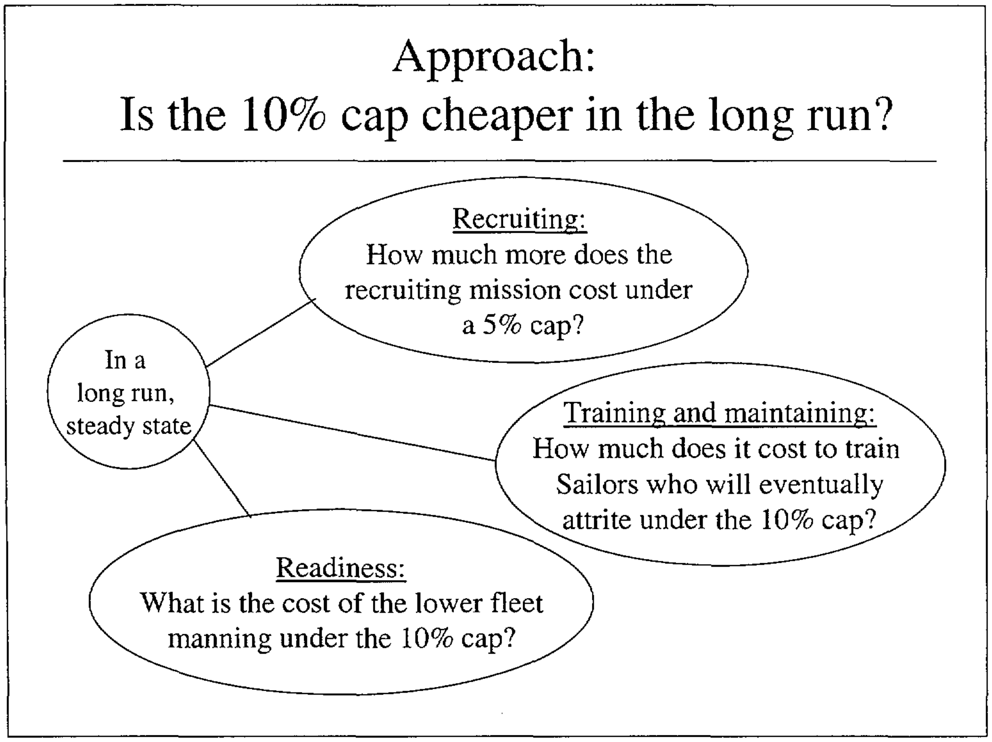
- Larger accession goal
- More Sailors to train
- Lower fleet manning

Later

Increasing the NHSDG cap to 10 percent of accessions involves both costs and benefits. On the benefits side, nongraduates cost less to recruit than graduates, so recruiting relatively more nongraduates saves money up front. On the cost side, because nongraduates have higher attrition, accessing more of them means that the Navy must increase the overall number of accessions to achieve the same endstrength. Therefore, the 10-percent cap results in increased training and administration costs later on.

In addition to these direct, measurable costs and benefits, changing the graduate-nongraduate mix of accessions also has indirect costs and benefits, the values of which are more difficult to quantify. These indirect effects bear on readiness, and may be more important than the direct effects. First of all, the decision to increase the NHSDG cap was based on an assessment of the risk that the annual endstrength requirement might not be met if the cap remained at 5 percent. Therefore, the savings side of the issue has a readiness component. Recruiting more NHSDGs, however, also affects readiness on the other side of the ledger. Lower first-term survival for NHSDGs means that, for a given endstrength, there will always be fewer Sailors in the fleet and more in training under the 10-percent cap. In addition, recruiting more nongraduates lowers the average "quality" of the fleet by lowering the average education and experience levels, and may also have implications for filling billets in critical technical ratings.

In the current environment, therefore, we have a trade-off between meeting today's endstrength requirements and achieving future readiness requirements.



To analyze the true cost-effectiveness of increasing the NHSDG cap, we need to identify some counter-scenario: increasing the cap was or was not cost-effective relative to what? As mentioned in the introduction, many other policy options were available, and it's beyond the scope of this study to cost out all of these potential counter-scenarios. Furthermore, given that the decision has already been made and acted on, a more relevant question is, should the cap stay at 10 percent? Therefore, the approach we take in this study is to compare the long-run, steady-state (LRSS) costs of recruiting, training, and maintaining the requisite number of Sailors under each cap, holding endstrength constant.

Specifically, we estimate the following:

(1) The LRSS difference in annual recruiting costs under the two caps

(2) The LRSS costs of the 10-percent cap measured in terms of additional dollars spent on maintaining Sailors with low survival rates

(3) The readiness costs of lower levels of fleet manning under the 10-percent cap.

In the remaining slides in this section, we present our results and describe the methodologies we used to derive them.

10% cap requires more accessions per year

Recruit quality	Accessions required to maintain constant endstrength		
	5% Cap	10% Cap	10% - 5%
A cell, non-NF	32,062	29,617	-2,445
B cell	2,918	5,922	3,003
C cell	20,424	20,724	300
A cell, NF*	2,950	2,950	0
Total	**58,354**	**59,213**	**859**

* Accession requirement for the Nuclear Field (NF) assumed to be invariant with respect to the NHSDG cap.

The starting point for all of our calculations is the difference in accession requirements for different kinds of recruits under the two caps. This slide shows the numbers of accessions that are required to keep endstrength constant at 310,000 under each NHSDG cap, and in long-run, steady-state conditions.

The differences between the two accession requirements result from differences in annual continuation rates of recruits in four quality groups: A cells in the Nuclear Field, A cells not in the Nuclear Field, B cells, and C cells.* We used cohort continuation rates that were calculated by comparing the number of Sailors at Length of Service (LOS) = t (t = 1 to 30) in March 1999 with the number of Sailors at LOS = t + 1 in March 2000. (See appendix D for continuation data.)

The estimates are based on the assumptions that the share of B cells entering with waivers is the same under each cap and that additional B cells are replacing A cells only—not A cells and C cells. We adopted the former assumption because it reflects what actually happened** and because we have no data that would allow us to estimate the difference between the cost of recruiting a B cell who requires a waiver and the cost of one who does not. We adopted the latter assumption because the Navy wants to maintain each accession cohort's share of upper-AFQT recruits at no less than 65 percent of total.

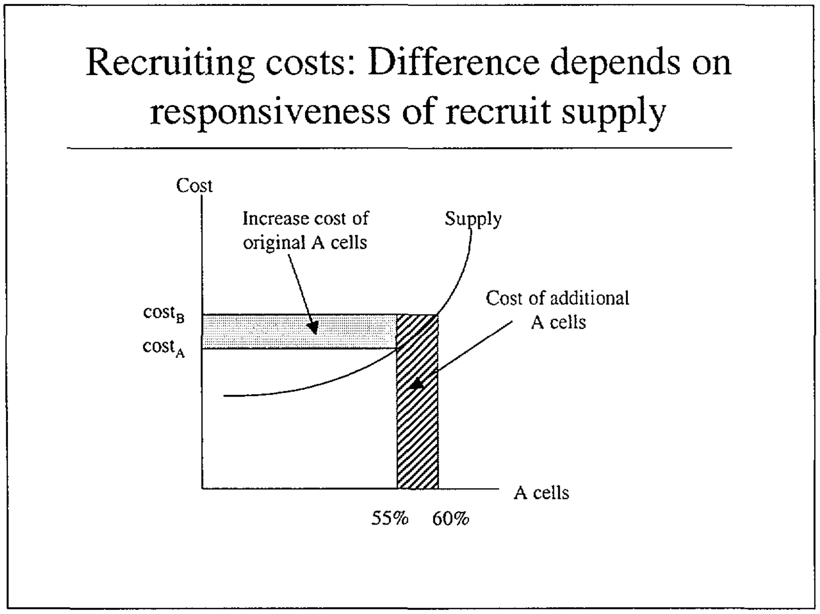
It's very important to understand the implications of using the long-run, steady-state approach. Specifically, by construction, we are assuming that Sailors with LOS 30

* A cells are HSDGs with AFQT scores greater than or equal to 50; B cells are NHSDGs with AFQT scores greater than or equal to 50; and C cells are HSDGs with AFQT scores less than 50 but greater than 35. We separate recruits entering in the Nuclear Field from other A cells because NHSDGs are not allowed to enter Nuclear Field ratings and therefore, cannot substitute for this subset of the A cell accession cohort.

** See slide number 19.

came in under the same cap as Sailors with LOS 1. In other words, we're assuming that in each scenario, the relevant cap has been in place for 30 years.

Finally, note that of the 859 additional accessions under the 10-percent cap, 559 are B cells and 300 are C cells. We will use these numbers to calculate the attrition costs of more nongraduates.



We begin with recruiting costs. The figure above illustrates the extra costs associated with recruiting more A cells, and shows that the difference in recruiting costs under the two caps depends on the responsiveness of potential recruits to changes in recruiting strategies and recruitment incentives (i.e., it depends on the elasticity of labor supply, or the elasticity of enlistment*).

A new paper titled, "Enlistment Supply in the 1990s: A Study of the Navy College Fund and Other Enlistment Incentive Programs,"** provides estimates of the elasticity of A cell supply with respect to changes in the levels of different recruiting resources. Specifically, the authors present estimates of enlistment elasticities with respect to: the number of recruiters; total advertising expenditures; the expected size of an Enlistment Bonus (EB); and the expected present value of college benefits (Navy College Fund, or NCF). Of these four, the strategies that we can most effectively cost out are those of increasing the number of recruiters and increasing the value of educational benefits, so it's on these options that we focus our analysis.***

Warner et al. estimate the A-cell enlistment elasticities to be 0.64 for increasing the number of recruiters and 0.23 for increasing the expected value of NCF awards. We'll use these elasticity estimates combined with actual Navy recruiting expenditures to estimate two differences in the cost of recruiting under a 10-percent cap and the cost of recruiting under a 5-percent cap. The first estimate will assume that the additional A cells were attracted by offering larger NCF awards; the second estimate will assume that the additional A cells were brought in by increasing the number of recruiters.

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* The elasticity of supply is equal to the percentage change in the quantity of labor supplied resulting from a given percentage change in the wage or other type of incentive.

** Source: John T. Warner, Curtis J. Simon, and Deborah M. Payne, "Enlistment Supply in the 1990's: A Study of the Navy College Fund And Other Enlistment Incentive Programs," DMDC Report No. 2000-015 April 2001.

*** According to Warner et al., increasing the number of recruiters is the most cost-effective strategy, all else equal, and results of a recent CNA recruiting study indicate that increasing educational benefits is likely to be an effective way to attract high-quality recruits. See Amanda Kraus, Henry Griffis, and Peggy Golfin, *Choice-Based Conjoint Study of Recruitment Incentives*, August 2000 (CNA Research Memorandum D0001428.A2).

Estimates based on actual expenditures and costs that vary with the A-B cell mix

FY00 recruiting budget*

Variable costs**		**Fixed costs****	
Recruiter pay (production only)	$194,186	Other military pay	$45,269
College fund	$22,292	Civilian pay	$23,889
Enlistment bonus	$73,760	Advertising	$63,733
Loan repayment	$90	Support	$70,852
Total	$290,328	Total	$203,743

* Source: CNRC, Summary of Recruiting Manpower Data, REC: DD-FM&P 946.
** FY00 dollars in thousands.

We start by using actual FY00 expenditures and actual FY00 accessions to estimate average variable recruiting costs (AVC) by quality cell and by budget category. These values serve as baseline recruiting costs under the 10-percent cap, and are then modified to reflect the hypothetical strategy used to bring in the additional A cells required under the 5-percent cap. We used data from FY00 because it's the first fiscal year during which the 10-percent cap was in place for all 12 months.

We focus on AVC because, although we're considering a long-run planning horizon over which all items might be considered variable, we want to include only those costs that will vary with the quality mix of recruits. Using this criterion, we divided the budget items into those that could be considered variable costs and those that should be considered fixed costs. In the variable cost category, we chose pay for production recruiters and expenditures required for the enlistment incentive programs: enlistment bonuses (EB), the Navy College Fund (NCF), and loan repayment. All other budget items, including advertising and pay for non-production recruiting staff, were treated as fixed.*

The benefits of using actual expenditures are twofold. First, they represent a realistic starting point. Assuming that the recruiting mission was carried out efficiently, overall average variable costs reflect the real costs of the mission that was achieved. Second, actual expenditures in FY00 reflect the current recruiting environment. For example, the size of the EB program reflects recently increased EB amounts and recently adopted changes in the types of recruits who qualified for them.

* By treating the other budget items as fixed, we are implicitly assuming that accomplishing the larger recruiting mission under the 10-percent cap does not require additional fixed resources or a significant change in the recruiting infrastructure.

AVC by budget item and quality cell*

Budget item	A cell (NF)	A cell (non-NF)	B cell	C cell
NCF	$630	$807	$52	$8
EB	$4,416	$1,493	$1,120	$962
Loan repayment	$1	$3	$0	$0
Recruiter pay**	$5,114	$5,114	$1,023	$2,557
AVC	**$10,161**	**$7,417**	**$2,195**	**$3,527**

* FY00 dollars in thousands.

** Assumes A cells require five times more recruiter time than B cells and twice as much time as C cells.

The data on this slide show our baseline estimates of AVC and each element of AVC by quality cell. The following paragraphs explain how these estimates were generated.

Navy College Fund and Loan Repayment

Total expenditures on NCF and on the loan repayment program were distributed across quality cells according to the shares of recruits who were promised awards under these programs. For example, the total FY00 expenditure on NCF was equal to $22.3 million and, of all those who were promised NCF in FY00, 90 percent were non-NF A cells. Ninety percent of $22.3 million divided by the 24,724 non-NF A cell accessions yields an AVC of $807 for the NCF component of non-NF A cells' AVC. Note that this methodology does not consider the fact that the amount of the NCF (or loan repayment) incentive probably varies across quality cells; unfortunately, data on incentive amounts were not available. However, this isn't a major problem for these incentive programs because so few B or C cells actually participate in them: of all those promised NCF, only 1 percent were B cells and 0.65 percent were C cells.

Enlistment Bonus

In contrast, many B and C cells get bonuses. Therefore, for the EB budget category, we did take into account differences in amounts across quality cells. We did this by adjusting the percentages of recruits who were promised bonuses by the relative sizes of the average bonus for recruits in that quality group. For example, A cells in the Nuclear Field historically get bonuses that are, on average, 1.6 times greater than the bonuses that non-NF A cells receive. Therefore, the actual share of NF A cells promised EBs was inflated by 1.6 to generate the share of the total EB budget going to NF A cells.

Recruiter Pay

Recruiter pay was calculated somewhat differently. We began by calculating the number of recruiters needed to recruit one A cell. This calculation was based on the actual numbers of recruiters and accessions in FY00 and the following assumptions about the recruiter time required to bring in an A cell relative to the time required to bring in recruits from the other groups: Nuclear Field A cells were assumed to require the same amount of time as non-NF A cells, C cells were assumed to require half the time of an A cell, and B cells were assumed to require only one-fifth the amount of time of an A cell. This last assumption comes from CNRC planning guidelines as of 1995.* Having calculated the number of recruiters per A cell, we could then calculate the number of recruiters required to bring in one of each other recruit type.

We calculated the cost of one recruiter by dividing total expenditures on production recruiters by the number of production recruiters.

The average variable recruiting cost by type of recruit is then the cost of one recruiter times the number of recruiters necessary to bring in one of each type of recruit.

(Note that the relative average variable recruiting cost of an A cell is five times that of a B cell and twice that of a C cell.)

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* Source: Donald J. Cymrot, *Rethinking the Recruiting of High School Dropouts: The B-Cell/C-Cell Tradeoff*, December 1995, p. 6 (CNA Annotated Briefing 95-105).

Recruiting under 10% cap saves from $18-$26 million

Scenario	TVC in millions	Difference from baseline
10% cap – baseline	$335.7	--
5% cap w/ higher average NCF	$362.1	**$26.3**
5% cap w/ more recruiters	$353.7	**$17.9**

* Costs are long-run steady-state (LRSS) savings per year measured in FY00 dollars.

As stated previously, our approach in this section is to compare LRSS recruiting costs under the 5- and 10-percent caps. The data in this slide show our estimates of total variable recruiting costs (TVC) under the 10-percent cap and under the 5-percent cap, assuming two different strategies for recruiting additional A cells. The table shows that our estimate of TVC under the 10-percent cap is $335.7 million per year. The cost of recruiting under the 5-percent cap depends on the strategy used to attract the additional A-cell recruits. We estimate that recruiting under the 5-percent cap costs about $26.3 million more per year than recruiting under the 10-percent cap if the policy is to raise the expected present value of NCF awards. And, recruiting under the 5-percent cap costs about $17.9 million more per year if the policy is to increase the number of recruiters.

Important assumptions that went into creating these estimates follow:

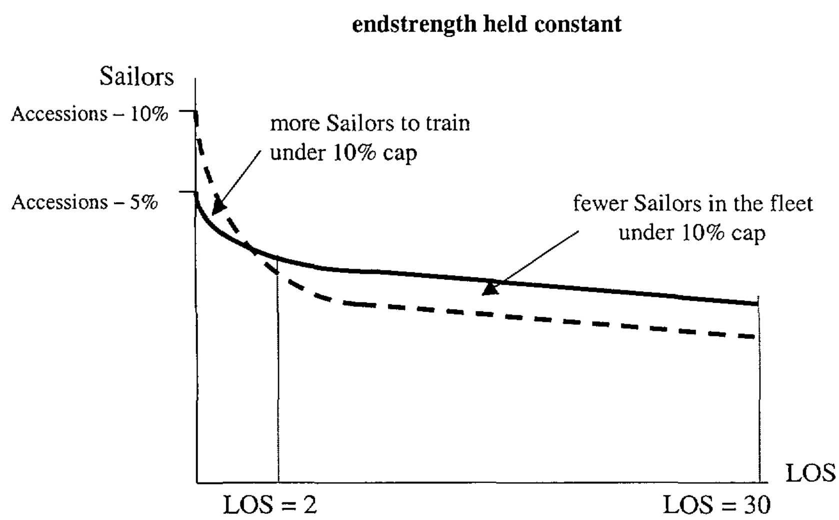
(1) The enlistment elasticities with respect to educational benefits and number of recruiters are as estimated by Warner et al.

(2) The baseline TVC is equal to the baseline AVCs from the previous slide times the numbers of LRSS accessions for each group of recruits under the 10-percent cap.

(3) In the scenario in which NCF awards are increased, ***all*** additional A cells take NCF.

(4) In the scenario in which the number of recruiters is increased, we calculated an effective number of A cell recruiters and increased that number (as opposed to the total number of recruiters) by the appropriate percentage.

Attrition costs: More accessions, but fewer Sailors in the fleet



Now we move to estimating the attrition costs associated with the 10-percent cap. The figure in this slide shows how higher NHSDG attrition requires more accessions to achieve the same endstrength, but leaves fewer Sailors in the fleet.

The figure also motivates our approach to calculating the costs of higher NHSDG attrition. Recall that each LRSS accession cohort under the 10-percent cap has 859 more recruits than each LRSS accession cohort under the 5-percent cap—559 more B cells and 300 more C cells. However, given historical continuation rates for each type of recruit, the relative cohort sizes under each cap are reversed by LOS 2 (i.e., the LRSS LOS 2 cohort is *smaller* under the 10-percent cap than under the 5-percent cap, and the point at which the two lines in the figure cross is just before LOS 2). Therefore, we measure one component of attrition costs by calculating the costs to train and maintain 859 additional recruits, many of whom will attrite before reaching the fleet.

The difference in the LOS distribution under the two caps has two other important implications. First, with both endstrength and the paygrade structure held constant, the total MPN bill will be less under the 10-percent cap because the force will be more junior. The amount by which the MPN bill is less under the 10-percent cap will slightly offset the additional training costs. Second, to the extent that Sailors with LOS greater than 2 years represent those who have completed training and are in the fleet, the fact that fewer Sailors survive beyond this point under the 10-percent cap means that the fleet is less well manned. Therefore, we measure the second component of attrition costs by attaching a dollar value to the lost productivity associated with lower fleet manning. This value is our measure of the readiness costs imposed by recruiting more NHSDGs.

It is important to point out that this approach assumes that the B cells who stay and effectively replace the A cells who weren't recruited are perfect substitutes for those A cells. Specifically, it assumes that the Navy can fill its manning requirements in all ratings with the B cells, that it doesn't cost more to train a B cell in any given rating than to train an A cell in the same rating, and that A and B cells are equally productive in the fleet. In other words, for the purposes of this analysis, we are assuming that the only difference in overall quality for A and B cells is the attrition rate.

If this is not the case and there is, in fact, a difference in overall productivity, either by type of Sailor or across the Navy due to secondary effects of having more B cells in the fleet,* the costs we have calculated are underestimates of the true costs. It's beyond the scope of this study to determine to what extent the A-cell/B-cell quality difference goes beyond attrition; however, earlier CNA research shows that A cells advance across paygrades more rapidly than do B cells, which indicates that A cells are more productive in the fleet.** Furthermore, CNA work on readiness shows that having a larger share of HSDGs in a crew improves ship readiness as measured by several different metrics. Specifically, as the number of HSDGs in a crew increases, the number of new casualty reports (CASREPs) and the time it takes to correct a CASREP fall, while scores in all four of the Status of Resources and Training Systems (SORTS) areas rise.*** (The four SORTS areas are personnel, supply, equipment, and training.)

* Such secondary effects might exist if an increase in the number of NHSDG Sailors lowers the morale and motivation of HSDG Sailors, or if NHSDG Sailors have significantly more discipline problems.

** See Donald J. Cymrot, *Rethinking the Recruiting of High School Dropouts: The B-Cell/ C-Cell Tradeoff,* December 1995, p. 6 (CNA Annotated Briefing 95-105).

*** See Laura J. Junor and Jessica S. Oi, *A New Approach to Modeling Ship Readiness*, April 1996, (CRM 95-239). 1

Costs based on "unproductive" days

Attrition category	Average days* from accession to attrition or the fleet	
	B cells	C cells
RTC attrites	33	35
A school attrites	352	317
Fleet survivors	234	171

* Days = days under instruction or in any other non-full-duty status.

Our methodology for calculating the training and maintenance costs is to count the number of "unproductive" days each of the 859 extra accessions can be expected to have spent in the Navy from the time he or she accessed to the time he or she reached the fleet* or attrited. Once we have counted unproductive days, we then assign a cost to each day and calculate a total. The data on this slide show the average number of "unproductive" days for B and C cells in different attrition status categories.

One notable fact revealed by the data is that Sailors who attrite after RTC but before reaching the fleet spend more "unproductive," paid time in the Navy than do Sailors who complete their training pipelines.** This is because A-school attrites are likely to have been in longer training pipelines than fleet attrites and because Sailors who have been identified to leave the Navy frequently spend many days waiting to be processed out.

* We stop counting days once the Sailor reaches the fleet because, once in the fleet, the Sailor's time must be considered productive.

** Note that the data do not indicate that A school attrites spend more total time in the Navy than do fleet attrites, but only that they spend more "unproductive" time.

859 attrites under 10% cap cost about $9.9 million

Navy status	Costs*
RTC attrites**	$.5 million
School attrites**	+ $2.1 million
Fleet attrites**	+ $10.3 million
Subtotal	+ $12.9 million
MPN savings	- $3.0 million
Total attrition costs	**$9.9 million**

* FY00 dollars.
** These costs are based on MPN direct costs from COMET.

This slide shows the total dollar costs of the unproductive days from the previous slide. Adding all costs together yields an estimated cost to the Navy of about $12.9 million.

To assign dollar values to unproductive days, we assumed that Sailors were in paygrades E1 through E3, and used corresponding MPN direct costs for these paygrades from the Cost of Manpower Estimating Tool (COMET) developed by the Naval Center for Cost Analysis (NCCA).* These costs include basic pay and other compensation and benefits, plus administrative costs for accession and separation, as well as training. COMET reports these direct costs to be $29,933 per year for all three paygrades (measured in FY2000 dollars). Disaggregating into daily costs yields rates of $82.01.

However, we must also take into account the fact that, for a given paygrade distribution, a more senior force is more expensive. We calculate that the LRSS average LOS is 5.56 years under the 10-percent cap, and 5.58 years under the 5-percent cap. Applying the methodology used in CNA's study of the costs and benefits of aging the Force, we estimate that an increase of 0.02 years in the average experience level of the force, holding paygrade constant, costs the Navy about $3 million per year.** This extra cost partially offsets the extra training and maintenance costs, so that total cost of additional accessions is estimated to be approximately $9.9 million.

* To find out more about COMET, visit the NCCA website: http://www.ncca.navy.mil/comet.

** See Henry S. Griffis, Heidi L. Golding, and Carol S. Moore, *Costs and Benefits of Aging the Navy's Enlisted Force,* October 1997 (CNA Annotated Briefing 95-105), and Carol S. Moore, Heidi L. Golding, and Henry S. Griffis, *Manpower and Personnel IWAR 2000: Aging the Force* (CNA Annotated Briefing 01-3079).

10% cap results in lower Fleet manning

Difference in fleet manning under two caps
(measured by number of Sailors with LOS > 2 years)

Quality cell	5% cap	10% cap	Difference
A-non-NF	104,110	96,169	7,941
A-NF	10,004	10,004	0
B	6,230	12,644	-6,413
C	64,973	65,928	-956
Total	185,316	184,745	**572**

* Endstrength held constant.

We now address the readiness costs. The data on this slide show that, for an LRSS endstrength of 310,000, nearly 600 more Sailors have an LOS greater than 2 years under a 5-percent cap than under a 10-percent cap. As mentioned above, this difference in the experience distribution of the enlisted force translates into a difference in fleet manning: at any given time, the fleet will be better manned under a 5-percent cap than under a 10-percent cap.*

We can assign a notional cost to this difference in manning in the following way. If the average filled billet for Sailors with 2 or more years of service costs the Navy about $45,800 per year,** and if this cost represents the productivity benefit the Navy realizes from the average filled billet, the yearly cost of the 572-Sailor difference in fleet manning is about $26.2 million.***

* 572 Sailors is roughly equivalent to the number required to man 1.5 cruisers or destroyers.

** This number is a weighted average of COMET rates for paygrades E3 through E9, where the weights are equal to the distribution of Sailors across the relevant paygrades in FY00, and values are in FY00 dollars.

*** Note that this $26.2 million may be an underestimate of LRSS readiness costs because it doesn't take into account differences in A and B cell quality other than attrition rates.

Bottom Line:
The 10% cap costs more per year

Summary of annual costs and savings in FY00 $M			
Recruiting Savings		**Attrition Costs**	
NCF scenario	$26.3	Unproductive days	$12.9
- or -		*Plus* lost productivity	+ $26.2
Recruiter scenario	$17.9	*Minus* extra seniority	- $3.0
		Attrition total	$36.1
Total Cost to the Navy			
Lowest	**$9.8**	**Highest**	**$20.7**

Using simple techniques and a long-run, steady-state approach, we have estimated the difference in LRSS recruiting costs under 5- and 10-percent NHSDG caps, and we have imputed training and readiness costs to the difference in average attrition.

We find that the 10-percent cap costs the Navy from $9.8 million to $20.7 million more per year than the 5-percent cap, with most of this variation depending on the strategy for attracting extra A cells under the 5-percent cap.

Sensitivity analysis

Our estimate of recruiting savings relies heavily on the Warner et al. estimates of enlistment elasticities with respect to NCF and the number of recruiters. To give some idea of how important these point elasticity estimates are to our conclusion that the 10-percent cap results in a net cost to the Navy, we estimated how much *less* responsive to changes in recruiting resources labor supply must be to lead to a different conclusion. We calculate that both elasticity estimates would have to be approximately 50 percent smaller to make recruiting savings larger than the sum of training and readiness costs, depending on how readiness costs are measured. This means that instead of leading to a 2.3-percent increase in A-cell accessions, as initially estimated, a 10-percent increase in NCF awards would lead to an increase of only 1.1 or 1.2 percent. Similarly, a 10-percent increase in the number of recruiters would lead, not to a 6.4-percent increase in A-cell accessions, but to a 3.2-percent increase.

Alternative methodology

Because it can be argued that labor costs don't accurately capture the productivity of public sector workers, we present an alternative method for calculating attrition costs that does not require us to evaluate Sailors' productivity. Specifically, we ask what it would take to *avoid* the lost productivity by buying higher endstrength. To make this estimate, we re-calculated the annual LRSS accession requirements for the 10-percent cap holding constant (at the 5-percent level) the number of Sailors with LOS greater than 2 years. In this scenario, endstrength is higher by 954 Sailors, and the number of accessions under the 10-percent cap is now 1,042 greater than under the 5-percent cap (as opposed to 859 in the constant endstrength scenario). Because we have allowed endstrength to increase, it is no longer the case that the MPN bill is lower under the 10-percent cap than under the 5-percent cap. Using the COMET MPN rate for Sailors in paygrades E1 through E3, we estimate that the additional accessions and higher endstrength would cost the Navy approximately $37.9 million—$1.8 million more than our combined estimate of maintenance costs and lost productivity.

To calculate the total cost to the Navy using this alternative methodology, we must also take into account the fact that the higher accession requirement reduces the recruiting savings. The decrease in recruiting savings is equal to the difference between the costs of recruiting with a 10-percent cap under the constant-endstrength scenario and the costs of recruiting with a 10-percent cap under the constant-manning scenario. The difference in accession requirements under the two "10-percent" scenarios is 183 recruits—101 more A cells, 18 more B cells, and 64 more C cells. Using the same methodology used to calculate the costs of moving from the 10-percent cap to the 5-percent cap by increasing the number of recruiters, we estimate that recruiting to maintain constant manning would reduce recruiting savings by $1.3 million.

Together, the $1.8-million increase in costs and the $1.3-million decrease in savings increase the lower bound on our estimate of total costs to the Navy by $3.1 million to $12.9 million.

Recommendations

Based on cost-effectiveness, should return to 5% cap on NHDGs once recruiting climate eases

- Readiness and training savings don't yield dollars to fund CNRC's move back to the 5-percent cap

Factor motivating later return to 5% cap

- Pre-drawdown experience under a 10-percent cap
- Future force requirements call for higher test scores
- Strict application of screen may decrease readiness costs

Factors motivating earlier return to 5% cap

- If Navy weighs future risk of lower readiness more heavily than immediate risk of missing endstrength
- Future force requirements call for more educated Sailors

Although we have shown that the 10-percent cap imposes a net cost on the Navy in the long run, we do not recommend an immediate return to the 5-percent cap. Here are some additional issues to overlay on our quantitative analysis:

- In today's tough recruiting environment, it's necessary to determine how the risks of failing the recruiting mission and not making endstrength compare with the risks of lower readiness in the future due to higher attrition and lower fleet manning. Our analysis does not address the risk of missing a given year's endstrength requirement, though clearly the decision to increase the NHSDG cap was based on some assessment that the risk was indeed quite high.
- We have noted that, in addition to having higher attrition, NHSDGs may be of lower quality along other dimensions and, therefore, may be less productive in the fleet than are their HSDG counterparts. However, it's also true that the Navy did not adopt the 5-percent NHSDG cap until the beginning of the 1990s. In fact, the Navy fought and performed admirably during Desert Storm with a force that was recruited almost entirely before the adoption of the 5-percent cap. So, readiness may still be adequate under the 10-percent cap. On the other hand, future requirements are projected to drive the Navy toward a higher quality, more educated enlisted force. If these projections are correct, a 10-percent cap may not serve the Navy well in the future, despite the experience of Desert Storm.
- The analysis in this paper was based on the assumption that the Navy would maintain the current 35-65 ratio of lower- to upper-AFQT recruits. And, as mentioned above, future requirements for a higher quality force could drive up education requirements, thus precipitating an early return to the 5-percent NHSDG cap. However, the Navy could also buy higher force quality in the form of higher average test scores by

decreasing the share of lower-AFQT recruits. Whether the Navy can adopt both strategies simultaneously will depend on the recruiting environment and on the recruiting budget. If conditions require choosing one strategy or the other, it's possible that maintaining the B cell cap at 10 percent and lowering the C cell cap to something like 30 percent may be the better choice. This issue bears further investigation.

•The analysis of the HP3 screen showed that NHSDG recruits who do not require a waiver have significantly lower attrition than NHSDG recruits who do. Therefore, it would be possible to reduce the readiness costs of staying at the 10-percent cap by granting fewer or no waivers for future B cell accessions. However, while this strategy would reduce readiness costs, it's also likely to reduce recruiting savings, since B cells who do not require a waiver are almost certainly more costly to recruit than those who do.

•Finally, to do this analysis, we examined the issues from a Navy-wide perspective, not from the Recruiting Command perspective. Specifically, we identified two sources of costs imposed by recruiting more NHSDGs. The first was the cost of training and maintaining recruits who will eventually attrite. Although the Navy would not incur these costs under a 5-percent cap, there is no mechanism for transferring dollars from the training and MPN budgets to the recruiting budget in order to finance the more expensive recruiting mission. Nor would this transfer be enough to fully compensate CNRC even if such a mechanism did exist. How to make up the difference? The other source of costs was a reduction in readiness, but the dollars in which the readiness costs are measured are hypothetical dollars—either the value of lost productivity or costs that would be avoided under the 5-percent cap. Thus, it's not clear how a return to the 5-percent cap could be funded out of the projected benefits.

With all these considerations in mind, we recommend that the Navy continue with the 10-percent cap until it has sufficient certainty that it can make the recruiting mission under the 5-percent cap or until it is willing to boost the recruiting budget enough to support recruiting more HSDGs.

Appendix A
Logit results for ACE analyses

Statistically significant coefficients are highlighted
Yellow = positive effect on survival
Green = negative effect on survival

	RTC Attrition		180-day Attrition	
Variable	PRIDE	EMR	PRIDE	EMR
Intercept	2.78	2.73	2.68	2.74
Male	0.32	0.41	0.37	0.46
AFQT	0.01	0.01	0.01	0.01
Hispanic	0.23	0.22	0.34	0.20
African American	0.47	0.76	0.53	0.70
Caucasian	-0.03	0.05	0.02	-0.04
No School Guarantee	-0.11	-0.11	-0.05	-0.07
Accession month				
October	-0.46	-0.55	-0.45	-0.59
November	-0.28	-0.26	-0.28	-0.33
December	-0.22	-0.43	-0.22	-0.47
January	-0.59	-0.62	-0.59	-0.64
February	-0.44	-0.49	-0.41	-0.53
March	-0.34	-0.43	-0.38	-0.48
April	-0.31	-0.34	-0.35	-0.35
Non-education waiver	-0.10	-0.15	-0.07	-0.12
Citizen	-0.91	-0.96	-1.01	-1.01
Age <19	-0.20	-0.16	-0.23	-0.19
Educ <12	-0.62	-0.61	-0.67	-0.64
>4 YOS	-0.18	-0.15	-0.13	-0.12
DEP<30	-0.13	-0.15	-0.11	-0.15
Tier 2/ACE	-0.09	0.13	-0.07	0.13
Tier 3/ACE	-0.08	0.05	-0.02	0.12
Tier 2/No ACE	-0.10	-0.11	-0.10	-0.10
Sample size	4,633	3,707	4,633	3,707

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Appendix B
HP3 screening variables*

Secondary Educaton Credential	Age	Years of Education Attended											
		9 Years or Less			10 Years			11 Years			12 Years or More		
		AFQT TSC			AFQT TSC			AFQT TSC			AFQT TSC		
		IIIA	II	I	IIIA	II	I	IIIA	II	I	IIIA	II	I
G.E.D. Diploma	18	K	K	W	W	W	Q	W	Q	Q	Q	Q	Q
	19+	W	W	Q	W	Q	Q	Q	Q	Q	Q	Q	Q
No Credential	18	K	K	W	K	W	Q	W	W	Q	Q	Q	Q
	19+	K	W	Q	W	Q	Q	Q	Q	Q	Q	Q	Q
H.S. Certificate of Attendance or Completion	18										Q	Q	Q
	19+										Q	Q	Q
Occupational Certificate of Attendance or Completion	18							Q	Q	Q	Q	Q	Q
	19+							Q	Q	Q	Q	Q	Q
Correspondence School, Distance Learning or Independent Study Diploma or Certificate	18	K	K	W	W	W	Q				Q	Q	Q
	19+	W	W	Q	W	Q	Q	Q	Q	Q	Q	Q	Q

* Source: COMNAVCRUITCOMINST 1130.8F Exhibit 2-12. High Performance Profile Predictor (HP3) selection table. Effective date 9/28/00.

Key:

Q = Qualified for Enlistment as an HP3

W = Qualified with Documentation of Youth Program Participation

or

Qualified with Enlistment Eligibility Determination Interview (by CO, XO, or EPO)

K = Qualified with CO, NRD Waiver

Reference: Test Score Category (TSC) I = AFQT scores between 93-99; TSC II = AFQT scores between 65-92; TSC IIIA=AFQT scoress between 50-64

Note: The level of waiver authority has changed since implementation of HP3. As of 8/99, the level of authority for W was the NRD CO, and for those in category K, it required a CNRC full waiver kit.

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Appendix C
Logit results for HP3 analyses—all recruits

Statistically significant coefficients are highlighted
Yellow = positive effect on survival
Green = negative effect on survival

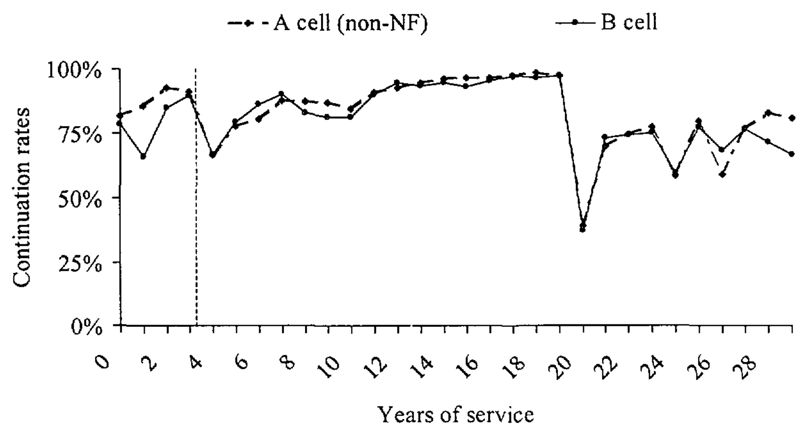
	NHSDG			HSDG		
	In-processing	RTC	180 days	In-processing	RTC	180 days
Intercept	2.55	0.84	0.72	1.57	0.48	0.49
After HP3	0.67	0.00	0.02	0.53	0.15	0.14
Male	0.18	0.34	0.35	0.01	0.31	0.28
AFQT	0.01	0.01	0.01	0.01	0.01	0.01
Hispanic	0.25	0.27	0.27	0.05	0.13	0.13
African Am	0.22	0.30	0.30	0.01	0.08	0.11
Caucasian	-0.15	-0.05	-0.06	-0.25	-0.21	-0.21
No SG	-0.11	-0.08	-0.06	-0.09	-0.09	-0.10
Waiver	-0.11	-0.11	-0.10	-0.33	-0.20	-0.19
Citizen	-1.19	-0.85	-0.85	-0.81	-0.66	-0.65
Age < 19	-0.06	-0.12	-0.09	0.16	0.13	0.12
Years of ed	0.00	0.04	0.04	0.12	0.11	0.10
Long YOS	0.14	-0.04	-0.05	0.14	0.08	0.06
DEP < 31	-0.09	-0.14	-0.15	-0.17	-0.24	-0.24
Accession month						
JAN	0.03	-0.21	-0.19	0.04	-0.08	-0.07
FEB	0.00	-0.06	-0.02	-0.02	-0.15	-0.13
MAR	-0.27	-0.14	-0.15	-0.34	-0.27	-0.24
APR	-0.51	-0.22	-0.23	-0.34	-0.31	-0.29
MAY	-0.30	-0.04	-0.01	-0.26	-0.18	-0.16
JUN	-0.33	0.05	0.08	0.03	-0.06	-0.03
JUL	-0.11	0.06	0.07	0.35	0.08	0.09
AUG	-0.10	0.01	0.01	0.30	0.07	0.08
SEP	-0.05	0.37	0.39	0.21	0.06	0.09
NOV	-0.27	-0.10	-0.12	-0.19	-0.10	-0.09
DEC	-0.04	-0.03	0.01	-0.10	-0.13	-0.11
Sample size	14,760	14,760	14,713	179,414	179,414	160,699

Appendix C (cont.)
Logit results for HP3 analyses—only NHSDG recruits past in-processing

Statistically significant coefficients are highlighted
Yellow = positive effect on survival
Green = negative effect on survival

	RTC	180 days
Intercept	1.15	0.98
After HP3/ACE	-0.44	-0.36
After HP3/No ACE	-0.43	-0.38
Male	0.40	0.40
AFQT	0.01	0.01
Hispanic	0.25	0.27
African Am	0.32	0.32
Caucasian	0.00	-0.02
No SG	-0.05	-0.03
Waiver	-0.10	-0.08
Citizen	-0.64	-0.66
Age < 19	-0.14	-0.09
Years Ed	0.05	0.06
Long YOS	-0.14	-0.15
DEP < 31	-0.15	-0.16
Accession month		
JAN	-0.35	-0.30
FEB	-0.09	-0.02
MAR	-0.05	-0.09
APR	-0.05	-0.08
MAY	0.09	0.14
JUN	0.22	0.27
JUL	0.14	0.12
AUG	0.07	0.13
SEP	0.65	0.66
NOV	0.04	0.00
DEC	-0.03	0.04
Sample size	13,209	13,166

Appendix D
Continuation rates for HSDGs & NHSDGs



This slide shows continuation rates for NHSDGs and for HSDGs who are not in the Nuclear Field. The fact that continuation rates for graduates and dropouts are essentially the same after reaching 4 years of service allowed us to focus on the costs of first term only.

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