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Effectiveness of the HP3 Screen for Non-High-School-Diploma Graduates: Was FY01 a Better Year?

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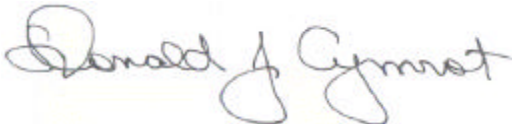

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Effectiveness of the HP3 Screen for Non-High-School-Diploma Graduates: Was FY01 a Better Year?

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In February 1999, in response to increasing recruiting difficulties, the Secretary of the Navy raised the cap on non-high-school-diploma graduates (NHSDGs) from 5 percent to 10 percent of enlisted accessions. Because of concern about the effect that such an increase could have on attrition, Navy Recruiting Command changed the screening tool used to determine NHSDG eligibility. The High Performance Predictor Profile (HP3) replaced the Compensatory Screening Model (CSM) in February 1999.

In August 2001, a CNA Annotated Briefing (CAB)* documented the effectiveness of HP3, the effectiveness of the Academic Capacity Enhancement (ACE) course that was initiated at about the same time, and the overall cost-effectiveness of the policy to increase the cap on NHSDG accessions. That publication covered the period from February 1999 through FY00. The Commander, Navy Recruiting Command (CNRC) asked CNA to continue to monitor the effectiveness of the HP3 screen through FY01. We describe the results of the analysis in this annotated briefing. For additional background information on the screen and our original analysis, we refer readers to the aforementioned CAB.

**Analysis of the Navy's Increased Cap on Accessions of Non-High-School-Diploma Graduates in FY99*, by Peggy A. Golfin and Amanda B. N. Kraus, with Lynda G. Houck, David Gregory, and David L. Reese, August 2001 (CNA Annotated Briefing D0004011.A2).

Summary

- Absolute survival of NHSDGs through 12 months has steadily improved with the HP3 screen
- HSDGS have experienced an even greater improvement in survival through 12 months
- HP3 is not superior to CSM
- Recommend reducing the number of minimum education waivers

We find no evidence that the HP3 screen has improved the survival of NHSDGs through 12 months of service. Although the absolute survival of NHSDGs has improved through Recruit Training Camp (RTC), 180 days, and 12 months since the implementation of the HP3 screen, the increase in survival of HSDGs through the same milestones is at least proportionally as large. In fact, the increase in survival through 12 months is relatively larger for HSDGs than for NHSDGs.

To determine whether the effects of the screen varied in FY01 relative to the first period of the HP3 implementation, we made three comparisons of in-processing and RTC survival:

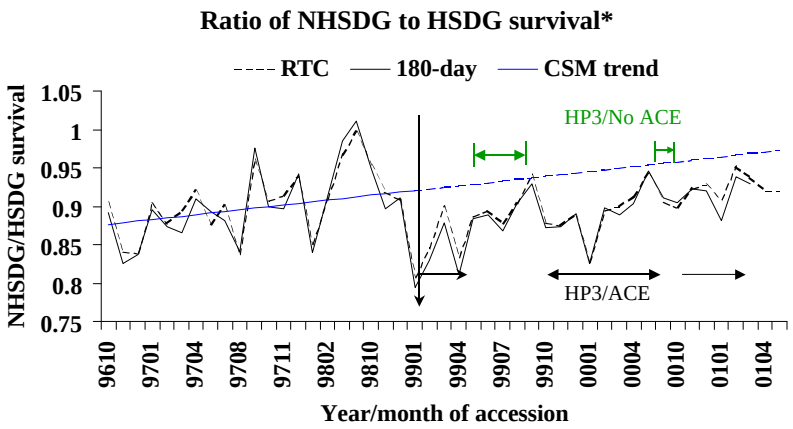
- CSM-screened recruits beginning in FY97 compared with the first period of HP3, defined as February 1999 through FY00
- CSM-screened recruits compared with FY01
- The first period of HP3 compared with FY01.

The survival of NHSDGs through RTC did not improve in the first period of HP3 and increased slightly during FY01, whereas the survival of HSDGs improved in both periods. Thus, relative to HSDGs, the survival of NHSDGs through RTC was no better in either period of the HP3 screen than before the screen was implemented.* We conclude that the HP3 and CSM screens are comparable in their ability to screen out high-risk NHSDG recruits.

One-fourth of NHSDGs are granted a minimum education waiver primarily because they are under age 19, yet NHSDG recruits who are younger than 19 have significantly lower survival. We recommend, therefore, that CNRC reduce the number of these types of waivers.

*Under the HP3 screen, NHSDG survival through *in-processing* has increased relative to HSDGs. However, NHSDG survival through the rest of RTC has been low enough that the survival of NHSDGs through *all of RTC* was no better.

Small Increase in Relative NHSDG Survival



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

Before presenting our results, we provide some background. The HP3 screen is similar to its predecessor (CSM). Both consider the applicant's age, number of years of education, educational credential (e.g., a GED or certificate of attendance), and Armed Forces Qualification Test (AFQT) score. The HP3 screen expanded on these criteria by taking into account employment history and character references. Appendix A lists the variables used in the HP3 screen.

Our analysis requires us to compare the survival of recruits screened with CSM versus HP3, while controlling for extraneous factors that may also have an impact on survival, such as weather and boot camp policies. Consider a hypothetical case in which a new policy—implemented at Recruit Training Camp at the same time as the HP3 screen—increases RTC survival of all recruits by 5 percent. By looking at NHSDG survival only, we would see a real improvement and would erroneously attribute the improvement to the HP3 screen. So, in our analysis, we control for these extraneous factors by measuring the change in NHSDG survival relative to the change in HSDG survival, during the same time period.

In this graph, we plot the ratio of NHSDG survival to HSDG survival for both RTC and 180 days. If the HP3 screen were superior to the CSM screen, one would expect these ratios to have been consistently on or above the long-term trend line since HP3 was implemented. This has not been the case over the entire period. The ratio fell drastically a few months before the screen was implemented and remained low for about the first year. In about January 2000, however, a positive trend begins. These ratios do not control for any general recruit characteristics that are correlated with survival but are not part of the HP3 screen, and that may have changed over time. We control for these variables in a multivariate analysis.

Multivariate Analysis

- Dependent variables: survival through in-processing, RTC, 180 days, and 12 months
  - In-processing and RTC include accessions through June 2001
    - Separate analyses on the two periods of the HP3 screen
  - 180 days include accessions through March 2001
  - 12 months include accessions through FY00
- Combined HSDG and NHSDG samples
  - All explanatory variables are allowed to vary by education

We estimate logistic regressions of the probability of survival as a function of relevant independent variables using data from PRIDE, NITRAS, and CNA's extract of the Enlisted Master File for accessions during FY97 through June 2001.* We estimate separate models for survival through in-processing, RTC,** 180 days, and 12 months. Appendix B presents our parameter estimates.

Recruits whose last contract with the Navy occurred after 1 February 1999 make up the "after HP3" population, whereas recruits from FY97 through January 1999 are the CSM, or "before HP3," population. As we described in our summary, we seek to determine whether significant improvement occurred in NHSDG in-processing and RTC survival in FY01, relative to the first period of the HP3 screen.*** In these equations, therefore, we calculate separate effects for two time periods. The first period comprises accessions first screened with HP3, from February 1999 through all of FY00. The second period pertains to FY01 accessions through June. For simplicity, we abbreviate these periods as 00 and 01, respectively.

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*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.

**We define RTC survivors as those who successfully graduated from RTC or 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 because of unauthorized absences, legal reasons, and so on.

***The 12-month equations include accessions through FY00 only. For the 180-day estimation, we also include accessions through March 2001, so we do not want to look at fiscal year effects for this milestone. Finally, though we only include accessions through June 2001 for our estimate of in-processing and RTC attrition, almost all FY01 NHSDGs will have accessed by that time.

Unlike the first analysis, we combine NHSDG and HSDG observations into one equation and allow all variables to differ by education. In other words, we include all explanatory variables once, to represent the effect of the variable on HSDG survival, and a second time as an interaction term between a 0,1 dummy variable representing NHSDGs and each independent variable. This latter group of variables measures the additional (or decreased) effect of the independent variable on NHSDG survival. For instance, in the in-processing equation, the estimated coefficient for HSDG males is .04. To calculate the effect for NHSDG males, we must add the coefficient on the variable Male*NHSDG, or .18, to .04.

Only Relative Improvement Is Through In-Processing

	CSM to FY00				CSM to FY01		FY00 to FY01	
	In-proc	RTC	180 days	12 months	In-proc	RTC	In-proc	RTC
Absolute change - NHSDG	+95%	none	+9%	+11%	+204%	+25%	+56%	+28%
Absolute change - HSDG	+70%	+14%	+16%	+21%	+156%	+34%	+50%	+18%
NHSDG relative to HSDG	+	-	same	-	+	same	same	same

In this slide, we provide the estimated changes in the absolute survival of NHSDGs and HSDGs through in-processing, RTC, 180 days, and 12 months.* The last row indicates whether the magnitude of the change for NHSDGs is statistically different from the magnitude of the change for HSDGs. In other words, this is the test of whether there has been any change in the relative survival of NHSDGs. For instance, in the CSM to FY00 in-processing category, we test whether the 95-percent estimated increase in NHSDG survival is significantly different from the estimated 70 percent increase in HSDG survival, and it is.**

The good news is that both categories of recruits have experienced an absolute improvement in survival since February 1999 through all milestones up to and including 12-months. The first period after HP3 experienced an improvement in all milestones except NHSDG RTC survival, and FY01 experienced additional improvements.

*The percentage change is derived from the coefficients in appendix B, and is calculated as 1 minus e raised to the coefficient (or difference in coefficients, if we are looking at NHSDGs). For instance, the change in survival for NHSDGs through in-processing between FY00 and FY01 is e raised to the power (1.73-1.29), which is equal to 1.56. In percentage terms, this is a 56-percent increase.

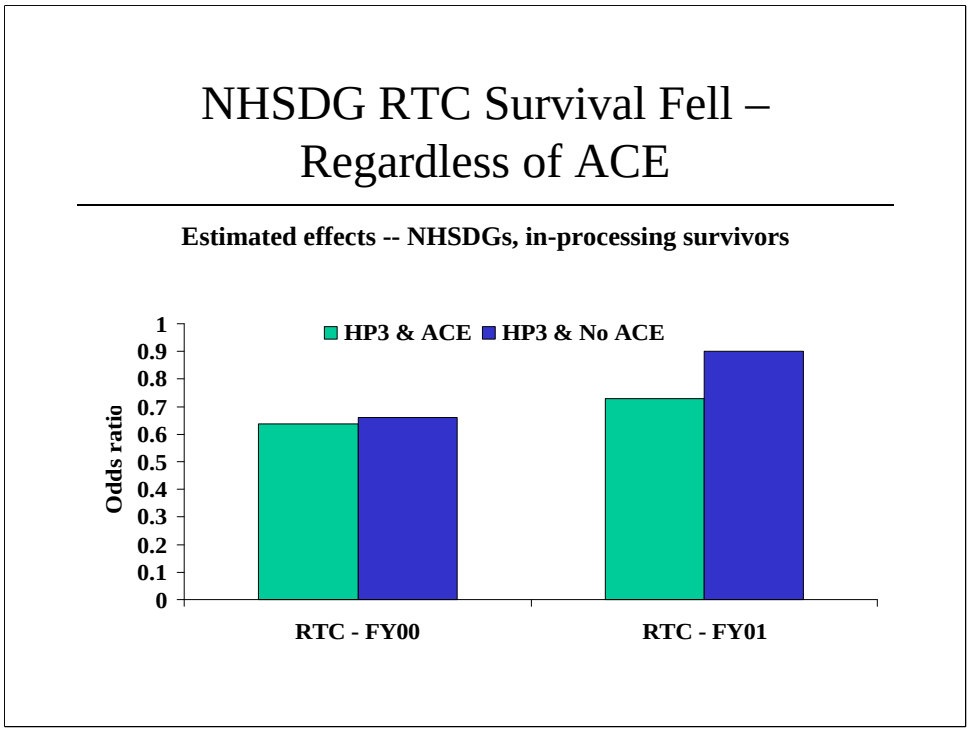
** Where either the estimated absolute change or the test of relative change was not statistically significant at the .05 level, we note no change.

As we stated earlier, only if there has been an improvement in the relative survival of NHSDGs can we conclude that HP3 is an improved screening tool. Looking at the last row, we see that the relative survival of NHSDGs through in-processing is the only milestone that has improved significantly since HP3 was first implemented, and this is true for both periods under consideration. As we stated in our first analysis, because both categories of recruits have experienced a large increase in in-processing survival, it is difficult to attribute all of the NHSDG increase to the HP3 screen alone. Other factors, such as the cessation of the BEST screen used during in-processing to identify recruits for separation from the Navy, may be responsible for some or all of the improvement.*

Other evidence seems to support the conclusion that the HP3 screen is not completely responsible for the relative improvement of NHSDGs through in-processing. We conclude that no improvement has taken place in the relative survival of NHSDGs through RTC. For this ratio to remain constant while in-processing survival increased dramatically, NHSDG RTC survival must have decreased sharply in the period after in-processing. In other words, HP3-screened recruits are surviving the one week of in-processing at a much higher rate than CSM-screened recruits, but these survivors are attriting from the remaining portion of boot camp at a much higher rate than before HP3 was implemented. We will return to this point later.

Finally, we have found no relative improvement in 180-day survival, but we note a decrease in the relative survival of NHSDGs through 12 months.

*For the cessation of the BEST screen to be responsible for all of the improvement in both HSDG and NHSDG survival, the screen would have had to identify NHSDG recruits for separation disproportionately more than HSDG recruits. Because we do not have information as to who was identified by BEST for separation, we cannot determine the impact of this policy on survival through in-processing.



A 1-week remedial course developed by CNET to reduce the attrition of NHSDG recruits began at the same time the HP3 screen was being implemented. This course, Academic Capacity Enhancement (ACE), is conducted right after the first week of in-processing. All NHSDG recruits are supposed to take ACE, but there are at least two exceptions. First, ACE is discontinued during the summer surge months, so NHSDGs who access then do not take the course. Second, NHSDGs who access in slow periods (i.e., when an insufficient number access within a few days to form an NHSDG company) will be sent on without going through ACE. The latter affects female NHSDG recruits disproportionately.

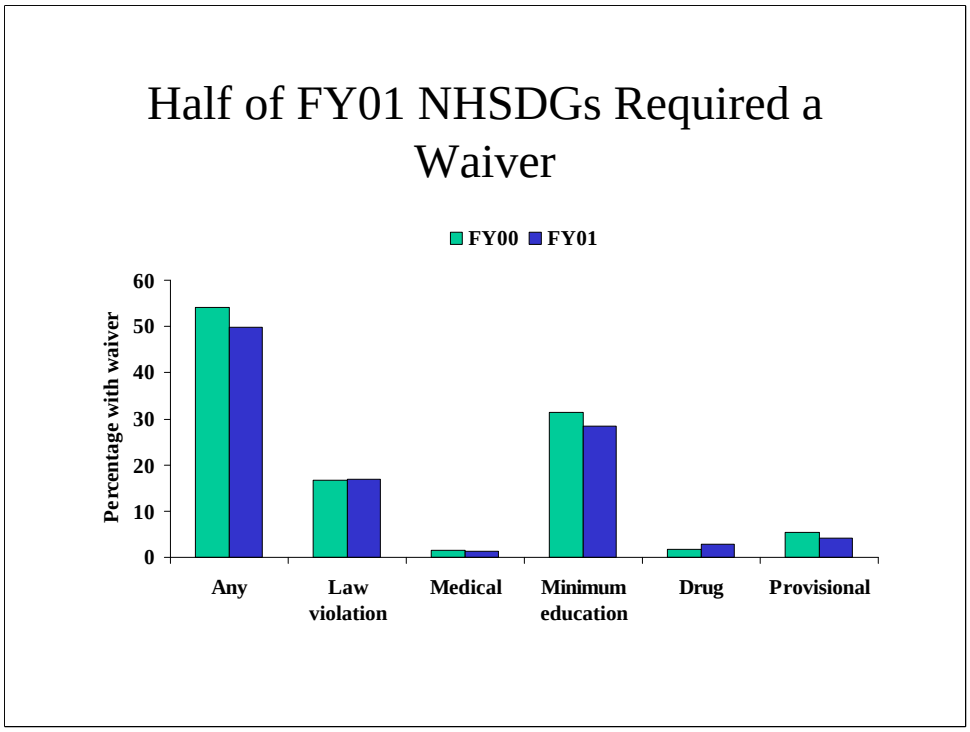
Our original analysis included a separate estimation of the effect of ACE on NHSDG survival. We concluded that ACE did not improve RTC or 180-day survival of either Tier 2 or Tier 3 NHSDG recruits. Although we were not tasked to continue that analysis through FY01, we must control for the effects of ACE in evaluating the effectiveness of HP3. In other words, because we have already concluded that survival of NHSDGs past in-processing and through the remainder of RTC has fallen, we need to determine whether the drop is a result of HP3 or of ACE.

Our analysis is based on the fact that only recruits who survive in-processing are eligible for enrollment in ACE. Thus, we estimate a logistic regression of the probability of survival through RTC only on the population of NHSDGs who survived in-processing. Appendix C presents the results.

In these equations, the HP3 variables compare the survival of HP3-screened recruits who survived in-processing and attended ACE with those who survived in-processing and did not attend ACE. We separate the effects of ACE and HP3 for the FY00 and FY01 periods previously defined. The graph on the opposite page shows the estimated odds ratios** by attendance in ACE and by time period. The comparison group is CSM-screened recruits from FY97 through January 1999.

Though it appears that those who did not attend ACE in FY01 had higher survival through the remainder of RTC than those who did, this difference is not statistically significant at the .05 level (it is, however, significant at the .10 level). The difference is not large or significant in the earlier period. Thus, from the time the HP3 screen was implemented, there has been a real decline in the survival of all NHSDGs through the portion of boot camp following in-processing, regardless of attendance in ACE.

**An odds ratio is calculated as e raised to the power of the coefficient from the logistic regression, and it measures the probability of survival of one group relative to another. For instance, the coefficient on FY01 NHSDGs who attended ACE is -0.31; e raised to -0.31 is .72, which means that, compared with CSM-screened NHSDGS who survived in-processing (the omitted category), FY01 NHSDG recruits who survived in-processing and attended ACE were 28 percent less likely to survive RTC, holding all other factors constant.



As we reported in our original analysis, a significant number of NHSDG recruits are granted waivers, in spite of the HP3 screen requirements. We also found that NHSDGs with waivers have lower survival than those without. In that document, we reported that 42 percent of FY00 NHSDG recruits required some type of waiver. That calculation was based on the accession waiver variable in PRIDE. In this slide, we are reporting the percentage of recruits who had either a DEP or an accession waiver.* For FY00 and FY01, the values are 64 percent and 50 percent, respectively.

The category with the most waivers in both years is minimum education. This waiver is required for NHSDGs under age 19 who either have too few years of education or scored below a certain cutoff on the AFQT, according to HP3 screening criteria. For instance, an 18-year-old NHSDG who had 10 years of education and scored in Category I of the AFQT does not require a minimum education waiver, but an otherwise identical recruit whose AFQT score was in Category II would need one. Because this type of waiver is unique to NHSDG recruits, anyone granted such a waiver has been selected for active duty in spite of the HP3 screening requirements. In FY01, more than one in four NHSDG recruits required this type of waiver. In addition, our analysis concludes that NHSDGs who are under age 19 have significantly lower survival than older NHSDGs—through all milestones.** For instance, NHSDGs under age 19 are 8 percent less likely than older NHSDGs to survive RTC, holding all other factors constant.

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*We believe that this new definition of waivers is a better measure of the total proportion of recruits requiring any type of waiver because DEP waivers are not consistently repeated in the accession waiver field.

**The coefficients on the age<19*NHSDG variables are all negative, statistically significant, and larger in absolute value than the age coefficients for HSDGs.

Recommendations

- Continue using HP3
- Reduce the number of minimum education waivers

Our analysis has shown that the HP3 and CSM screens are comparable in their ability to screen out high-risk NHSDGs. Unless CNRC wants to invest in a new, improved screen to further improve the survival of NHSDGs, the most cost-effective option is to continue using the HP3 screen currently in use.

However, we also note that half of all NHSDG recruits are granted some type of waiver; the most common is a minimum education waiver. Further, we have found that NHSDG recruits who are younger than 19 have significantly lower survival than older NHSDGs. We recommend, therefore, that CNRC consider reducing the number of minimum education waivers granted to NHSDGs.

Appendix A
HP3 Screening Variables*

Secondary Education Credential	Age	Education											
		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 scores 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.

Appendix B
Logit Coefficients—All Recruits

	In-processing	RTC	180-days	365-days
Intercept	1.35**	0.33**	0.27**	-0.06
NHSDGs before	0.62	0.24	0.25	0.55*
NHSDGs 00	1.29**	0.21	0.34	0.65*
NHSDGs 01	1.73**	0.46	-	-
HSDGs 00	0.53**	0.13**	0.15**	0.19**
HSDGs 01	0.94**	0.29**	-	-
Male	0.04	0.33**	0.30**	0.25**
Male*NHSDG	0.18	0.01	0.06	0.05
AFQT	0.01**	0.01**	0.01**	0.01**
AFQT*NHSDG	0	0	0	0
Hispanic	0.07	0.15**	0.14**	0.12**
Hispanic*NHSDG	0.16	0.09	0.13	0.14
African American	0.02	0.08**	0.09**	0.08**
African American*NHSDG	0.25*	0.17*	0.19*	0.15
Caucasian	-0.24**	-0.20**	-0.22**	-0.23**
Caucasian*NHSDG	0.10	0.13*	0.15*	0.13*
No SG	-0.08**	-0.08**	-0.08**	-0.10**
No SG*NHSDG	-0.04	-0.03	0	0.05
Waiver	-0.31**	-0.19**	-0.19**	-0.21**
Waiver*NHSDG	0.23**	0.10*	0.10*	0.12**
Citizen	-0.83**	-0.65**	-0.64**	-0.72**
Citizen*NHSDG	-0.33	-0.09	-0.13	-0.11
Age < 19	0.17**	0.15**	0.14**	0.10**
Age < 19*NHSDG	-0.25**	-0.23**	-0.19**	-0.29**
Years of education	0.12**	0.11**	0.10**	0.13**
Years of ed*NHSDG	-0.10**	-0.05**	-0.06**	-0.08**
Long enlistment	0.15**	0.08**	0.06**	0.01
Long enlistment*NHSDG	0	-0.12**	-0.12**	-0.10*
DEP < 30 days	-0.17**	-0.23**	-0.25**	-0.29**
DEP < 30 days*NHSDG	0.07	0.15**	0.14**	0.09*
January	0.28**	0.02	0.09**	0.07*
January*NHSDG	0.05	-0.20*	-0.20*	-0.23**
February	0.22**	-0.02	0.05	0.02
February*NHSDG	0.12	0.03	0.04	0
March	-0.07	-0.12**	-0.04	-0.07*
March*NHSDG	0.16	0.05	0.01	-0.12
April	-0.10*	-0.15**	-0.13**	-0.13**
April*NHSDG	-0.09	0	-0.09	-0.07
June	0.27**	0.10**	0.12**	0.14**
June*NHSDG	-0.28	-0.01	-0.04	-0.12
July	0.59**	0.21**	0.26**	0.25**
July*NHSDG	-0.38*	-0.13	-0.21	-0.22*
August	0.55**	0.20**	0.25**	0.23**
August*NHSDG	-0.33	-0.17	-0.18	-0.29*
September	0.46**	0.19**	0.23**	0.19**
September*NHSDG	-0.18	0.22	0.2	0.07
October	0.28**	0.08*	0.14**	0.10**
October*NHSDG	0.09	-0.14	-0.11	-0.23**
November	0.05	-0.03	0.05	0.06
November*NHSDG	-0.02	-0.08	-0.08	-0.20*
December	0.15**	0	0.07*	0.04
December*NHSDG	0.10	0	0.03	-0.1
Number of Observations	225,669	225,669	214,229	194,118

*Statistically significant at the .05 level.

**Statistically significant at the .01 level.

Appendix C
Logit Coefficients
RTC Survival - Only NHSDG Recruits Past In-Processing

	RTC
Intercept	.85**
ACE - FY00	-0.45**
ACE - FY01	-0.31**
No ACE - FY00	-0.41**
No ACE - FY01	-0.10
Male	0.40**
AFQT	0.008**
Hispanic	0.22**
African American	0.23**
Caucasian	-0.034
No SG	-0.09
Waiver	-0.08
Citizen	-0.53**
Age < 19	-0.08
Years of Education	0.06**
Long Enlistment	-0.14**
DEP < 30 days	-0.06
January	-0.17*
February	0.11
March	0.12
April	0.09
May	0.21*
June	0.34**
July	0.24
August	0.19
September	0.78**
November	0.12
December	0.15
Number of observations	17,850

*Statistically significant at the .05 level.
**Statistically significant at the .01 level.