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THESIS

EVALUATING THE TAILORED ADAPTIVE PERSONALITY ASSESSMENT SYSTEM ON DELAYED ENTRY PROGRAM ATTRITION

by

Adam R. Turpin

March 2014

Thesis Co-Advisors: Elda Pema
Simona Tick

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The Tailored Adaptive Personality Assessment System (TAPAS) was a test administered from March 2011 to March 2013 by the U.S. Navy to assess the non-cognitive skills of potential recruits. The TAPAS test aims to assess various aspects of recruit behavior that are not captured by typical screening tests, such as schooling and the Armed Forces Qualification Test (AFQT) along with other observable characteristics measured at entry. This thesis estimates whether the TAPAS scores predict recruit attrition in the Delayed Entry Program (DEP), while controlling for schooling, AFQT scores, and demographics. Indeed, the analysis finds that several TAPAS facets are significant predictors of attrition behavior. In particular, dominance, intellectual efficiency, order, adventure seeking, commitment to serve, and situational awareness are significant predictors of DEP attrition. Additionally, conduct waivers proved to be significant predictors of DEP attrition, with alcohol and drug waivers having the largest effects.

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Adam R. Turpin
Lieutenant, United States Navy
B.S., United States Naval Academy, 2007

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March 2014

Author: Adam R. Turpin

Approved by: Elda Pema
Thesis Co-Advisor

Simona Tick
Thesis Co-Advisor

William Gates
Dean, Graduate School of Business and Public Policy

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The Tailored Adaptive Personality Assessment System (TAPAS) was a test administered from March 2011 to March 2013 by the U.S. Navy to assess the non-cognitive skills of potential recruits. The TAPAS test aims to assess various aspects of recruit behavior that are not captured by typical screening tests, such as schooling and the Armed Forces Qualification Test (AFQT) along with other observable characteristics measured at entry. This thesis estimates whether the TAPAS scores predict recruit attrition in the Delayed Entry Program (DEP), while controlling for schooling, AFQT scores, and demographics. Indeed, the analysis finds that several TAPAS facets are significant predictors of attrition behavior. In particular, dominance, intellectual efficiency, order, adventure seeking, commitment to serve, and situational awareness are significant predictors of DEP attrition. Additionally, conduct waivers proved to be significant predictors of DEP attrition, with alcohol and drug waivers having the largest effects.

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TABLE OF CONTENTS

LIST OF FIGURES

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LIST OF TABLES

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LIST OF ACRONYMS AND ABBREVIATIONS

AFQT	Armed Forces Qualification Test
CNRC	Commander, Naval Recruiting Command
DEP	Delayed Entry Program
MEPCOM	Military Entrance Processing Command
MEPS	Military Entrance Processing Stations
TAPAS	Tailored Adaptive Personality Assessment System

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I. INTRODUCTION

A. BACKGROUND

The U.S. Navy puts great effort into recruiting, training, and retaining the most qualified and committed individuals. Traditionally, to predict attrition, retention and job performance, the Navy used recruit demographic characteristics and so-called cognitive skills measures, captured by schooling and Armed Forces Qualification Test (AFQT) scores. However, beginning in April 2011, the Navy administering the Tailored Adaptive Personality Assessment System (TAPAS) test for the recruit cohorts up through March 2013 in an effort to add non-cognitive skill measures to predict attrition, retention, and job performance.

B. PURPOSE AND BENEFITS OF STUDY

The purpose of this research is to evaluate aspects of the Tailored Adaptive Personality Assessment System (TAPAS) administered to Navy Delayed Entry Program (DEP) participants at the Military Entrance Processing Stations (MEPS) from April 2011 to March 2013. The first part of this analysis evaluates the relationship between TAPAS composite scores and DEP attrition. The second part of the analysis evaluates the relationship between individual TAPAS facet scores and DEP attrition. These analyses are first evaluated on demographics alone, then quantitative skills measures are included, and then moral waivers are included.

This research contributes to the understanding of the effect of various personality factors on recruits' decisions to attrite or access from DEP. Manpower professionals could utilize the findings of this thesis to develop better recruiting policies for screening applicants that add non-cognitive measures to other observable characteristics, such as demographics, AFQT, and education level. Such policies, along with further research into more precise personality measures, have the potential to considerably reduce growing attrition costs.

C. ORGANIZATION OF THE THESIS

This thesis is organized into five chapters. Chapter II presents a literature review and covers the most recent studies on attrition and non-cognitive testing. Chapter III describes the data and provides an overview of the data sources and variables used in the analysis. Chapter IV presents the analysis of TAPAS scores on DEP attrition using a probit model to determine what personality characteristics of Navy DEP participants make them more likely to access to initial recruit training. Chapter V presents the conclusions and recommendations.

II. LITERATURE REVIEW

A. OVERVIEW

This chapter reviews the most relevant studies that examine attrition behavior. The Delayed Entry Program has not been as extensively investigated as early term attrition, primarily due to the lack of available data on DEP attrites, especially after they leave DEP (Lane, 2006). However, a few studies utilize data collected at the time of enlistment to evaluate the predictive power of several demographic and cognitive factors of DEP participants.

This chapter reviews attrition studies that have addressed attrition behavior, discusses their approaches, data, and findings. In addition, this literature review addresses the benefits and drawbacks of several explanatory variables in modeling attrition behavior.

B. REGRESSION MODELS

1. Greenamyer, 2009

Greenamyer (2009) utilizes a linear probability model (LPM) to analyze the effects of AFQT percentile score and age on Navy DEP attrition. While dichotomous variables pose no issues, using a continuous variable as a key explanatory variable (AFQT) in a probability model can yield implausible estimates of the dependent variable outside the probability range from zero to one. Using an LPM also assumes the marginal effects of the explanatory variables are constant. While this may be true for certain variables, it is unlikely that this is the case for all of them. For example, it is unlikely that the first day in DEP has the same effect on attrition as the 200th day. The LPM can be useful where marginal effects are constant and the key explanatory variables are dichotomous.

2. Nakada, 1995

Nakada (1995) uses a logit regression to model Navy DEP attrition. Included in its variable list are age dummy variables for ages 17, 18, 19, 20, and 21+ as the control

group. This study also uses high school senior (HSSR) and high school diploma graduate (HSDG) along with AFQT and other demographic, economic, and racial/ethnic dummy variables. Nakada (1995) discusses the use of a probit or logit as more appropriate than OLS because, while "inefficient parameter estimates and discrete distribution problems can be overcome with large enough samples, probit and logit estimation methods, which restrict estimated probabilities to the zero-one interval, are more appropriate (Nakada, 1995, p.12)." Nakada (1995) chose the logit method because of a large sample size (n=296,551).

This study's model choice captures the behavior of DEP attrition more efficiently when compared to OLS. However, the choice of age variables leaves too much information in the control group. By selecting ages 21 and older as the base, it may be confusing effects of several age groups. A better way would have been to make age dummies for every age and select one as the control group so that a more distinct comparison can be made. Although this does not affect the outcome of his estimation on the dependent variable, the effects of the age variables may be underestimated.

3. Buddin, 2005

Buddin (2005) uses a probit regression because most outcomes included in his analysis are discrete, with the exception of time to promotion. Unlike Nakada (1995), Buddin (2005) uses a continuous age variable and considers whether or not the recruit took a trigonometry and/or geometry class, along with AFQT as measures of cognitive ability. Use of a continuous age variable allows for a more meaningful interpretation of a change in age and how that affects DEP attrition. Interestingly, Buddin (2005) includes whether or not the recruit took any trigonometry or geometry classes. This appears to be an early effort to investigate whether AFQT scores are explaining all of the unobservable characteristics of the individual recruits' skills and abilities.

4. Pema, Fahrman, Mehay, and Tick, 2013

Pema et al. (2013) use OLS regressions of non-cognitive test scores on different dependent variables to determine the correlation between TAPAS scores and several

variables already used in previous attrition research. First, the study regresses TAPAS scores on each variable without holding other factors constant. Next, it conducts a multivariate regression to identify any correlation between TAPAS scores and the dependent variable (Pema et al., 2013). This is an improvement from Greenamyer (2009) in that this approach utilizes OLS to identify the unique and significant effect of an explanatory variable rather than to explain attrition behavior in a linear fashion. Furthermore, using both a bivariate and multivariate linear regression Pema et al. (2013) separates how much of the effect is due to the TAPAS scores and how much is due to other factors that are controlled for in the multivariate linear regression.

Pema et al. (2013) also use probit models to estimate the effects of TAPAS on accession probability. It estimated two models, one with "cognitive controls" (i.e., AFQT and Armed Services Vocational Aptitude Battery (ASVAB) categories) and another without the cognitive controls to discern the partial effects of each TAPAS facet and composite scores on accession probability (Pema et al., 2013). It used an appropriate model and validated the premise that non-cognitive individual characteristics explain more of the attrition decision than do cognitive characteristics alone.

C. TAPAS DATA FOR NON-COGNITIVE FACTORS ESTIMATION

Prior research on DEP attrition has primarily utilized observable data collected from the recruits. There is little research using non-cognitive traits as predictors of DEP attrition. Pema et al. (2013) obtained TAPAS composite and facet scores and regressed observable characteristics on these scores to determine if the TAPAS scores yielded new information from what the observables already provided for first term attrition or if they were redundant. It found that a large number of TAPAS facets and composite scores are significantly correlated to some of the demographic characteristics, but weakly correlated to cognitive measures (AFQT, ASVAB, education level). This indicates that TAPAS information may explain more about attrition than previous models (Pema et al., 2013).

Employing TAPAS data to model DEP attrition should yield more information on the behavior of DEP attrites. This will add important and meaningful information to the field of attrition research as well as benefit the Navy in its recruiting efforts. Being able

to more accurately identify those with a higher propensity to attrite from DEP can be a significant cost saver to the Navy.

D. DEP ATTRITION PREDICTORS

1. Time Spent in DEP

Time spent in DEP has consistently been indicated as a key predictor of attrition from the Delayed Entry Program. Several studies find a strong positive correlation between length of time in DEP and DEP attrition. In 1994, the Navy Personnel and Research Development Center found that an increase of one month in DEP correlates with a 1.4 percentage point increase in the probability of a participant attriting (Nakada, 1994). A similar finding comes from a 2005 Rand study by Buddin, investigating trends in Army attrition where an extra month spent in DEP was linked to a 1.8 percentage point increase in DEP attrition. Of note, this study also shows that from fiscal year 1995 to fiscal year 2001 the Army shortened DEP length by two months for non-high school seniors and experienced an average DEP attrition decline of 2.5 percentage points over this period.

2. Age of Recruits

Age of the recruit at the time of enlistment is found by many studies to be a significant predictor of DEP attrition as well. Buddin (2005) finds a one percentage point increase in DEP attrition for a two year increase in average age of recruits. Greenamyer (2009) also finds a significant positive correlation with age and DEP attrition, albeit the effect is very small (0.27 percentage points). These previous findings show that age might explain some of the DEP attrition behavior.

3. Cognitive Skills and Abilities

a. AFQT

The Navy has been using the Armed Forces Qualification Test (AFQT) since 1976 as a way to measure a potential recruit's intelligence and cognitive abilities. It has long been the assumption that measures of cognitive abilities were the major indicators of

performance and retention. In 2005, Buddin evaluated not only whether or not AFQT scores are correlated with attrition, but it also investigated if taking mathematics classes such as trigonometry and geometry had any relation with Army DEP attrition. While the study found all three to be significant, the effects were so small as to be effectively zero. The AFQT is highly correlated with job performance but not necessarily correlated with DEP attrition (Buddin, 2005). Baykiz (2007) found that amongst Marine Corps enlistees that were high school seniors and high school graduates there was a negative correlation between AFQT score and the probability of attriting from DEP Greenamyer (2007) interacts age and AFQT scores and finds that, on average, individuals younger than 21 years of age attrite at lower rates as AFQT increases.

Lane (2006) comments on this interesting notion that DEP attrition may in fact be undesirable not only because it is costly, but also because there is evidence that individuals attriting from DEP are of a higher quality:

> The finding that DEP attrites had higher AFQT scores is especially important in discriminating among these groups, because this finding contradicts the notion that DEP attrition is "wanted" attrition of lower quality recruits who would eventually fail anyway. Research has consistently shown cognitive ability as the best predictor of job performance (Hunter & Hunter, 1984; Schmidt & Hunter, 1998). The military uses the ASVAB, of which the Armed Forced Qualification Test (AFQT) is a part, as its measure of cognitive ability; research shows that cognitive ability, as measured by the ASVAB, is useful in predicting job performance in the military (Ree, Earles, & Teachout, 1994). Therefore, the finding that DEP attrites had higher cognitive ability scores than individuals who shipped to training translates into the fact that the U.S. Navy is losing higher, not lower, quality candidates to attrition before they enter training. (Lane, 2006, p. 8)

Previous studies findings suggest that AFQT scores are only a small predictor of DEP attrition behavior and suggests that there might be other factors that predict DEP attrition that cognitive tests are not able to capture.

b. Schooling

Education level has consistently been a strong predictor of attrition. Individuals that did not graduate from high school are twice as likely to attrite in the first term when

compared to those that achieved a high school diploma (Knapik, 2004). Specifically, Ogren (1999) found that education level had a strong effect on DEP attrition behavior. This supports earlier work that identified education and cognitive ability as the best predictors of attrition (Lockman and Warner, 1977). Lane (2006) also lists education as one of the more prominent factors in predicting DEP attrition behavior. Of note, Buddin (2005) found that while having a high school diploma is significant to predicting attrition, those having a GED had no statistically different attrition rates from those who had no education credentials at all.

4. Gender

Gender has always been identified as an indicator of DEP attrition. Nakada (1994) provides evidence that, all else held constant, males attrite at lower rates when compared to females. It shows males attrited from DEP at a rate of 13 percent while females attrited at a rate of 22 percent. Buddin (2005) finds similar effects, with men attriting at a lower rate of 14 percent, while women attrite at a rate of 19 percent.

5. Race and Ethnicity

Race and ethnicity have been shown to be key predictors of DEP attrition. Blacks and other minorities attrite at lower rates when compared to whites (Nakada, 1995). Buddin (2005) finds that minorities, in general, attrite from DEP at lower rates than whites. Conversely, Neuhalfen (2007) found that attrition rates for blacks were actually higher for tier I recruits but mirrored previous study results for tier II and III recruits. This indicates that race and ethnicity may explain some attrition behavior, but also that this behavior may also be based on the quality of recruit as modeled by AFQT score and education level.

6. Other Variables

There are several variables previous studies on attrition behavior have found to be either insignificant or of little "practical significance." Nakada (1994) found significant negative effects for unemployment rate on DEP attrition, but the coefficient was so small (-0.12) that it was of little practical use. While this study found many individual

characteristics meaningful, it found most recruiter characteristics to be insignificant. The one exception was the variable indicating if the recruiter was in paygrade E-7 or above, which had a small negative effect on DEP attrition. Furthermore, Buddin (2005) confirms Nakada's (1994) findings that unemployment rate and recruiter characteristics have negligible effects on attrition rates. Buddin (2005) also finds that age, while significant, has only a minor effect on attrition, with a two years increase in age being correlated with a one-percentage point drop in DEP attrition.

AFQT is also generally regarded as a good predictor of trainability and of attrition behavior. This is substantiated by Wegner and Hodari (2004) who assert that there is an association between AFQT scores and attrition. Lane (2006) suggests AFQT is a key factor in determining which individuals will attrite from DEP as it finds recruits with higher AFQT scores were more likely to attrite. While it is quite likely that AFQT scores yield valuable information on attrition behavior, it is also plausible that non-cognitive traits can add further insight as to why some recruits attrite and some do not. Pema et al. (2013) find that the Tailored Adaptive Personality Assessment System (TAPAS), a non-cognitive test given to all recruits during 2011-2013, enhances our understanding of why some applicants enlist and some do not. TAPAS scores appear significant even after controlling for gender, race, and waiver status, AFQT scores, and education category. This indicates there are some recruit characteristics that AFQT is not efficient at capturing but that may be captured by non-cognitive tests, such as TAPAS.

E. SUMMARY

Previous studies on DEP attrition have generated consistent findings. These studies find that time-in-DEP has a significant positive correlation with DEP attrition. This is most likely due to the additional time a recruit has to reconsider his/her decision to join the military. Also, previous studies indicate that gender, specifically being female, is associated with higher attrition levels. This might be explained by women having additional domestic duties and not being the primary wage earners (Wegner and Hodari, 2004). Whites are more likely to attrite than any other race/ethnicity. At this point, it is unclear why this is the case other than to hypothesize that there may be

inherent racial and ethnic differences causing whites to attrite at higher rates. Singles as well, demonstrated higher attrition levels than compared to their married counterparts. Singles, especially young singles that make up the majority of the recruiting pool, may feel less pressure to make it to basic training than their married counterparts for a couple of reasons: (1) they do not have the financial pressures of providing for a family and (2) they do not have the support from a spouse to encourage them to make it through to basic training. Education level and AFQT scores garnered mixed opinions. Some found evidence that education level was positively correlated with attrition while others believed it to be only a negligible effect. The same is true about AFQT with the military using it as a key predictor for decades while many researchers believe non-cognitive testing is more efficient at capturing certain recruit characteristics.

Others variables such as unemployment and recruiter characteristics have been shown to either have minimal or insignificant effects that explain DEP attrition. Probit is the estimation technique of choice by those studying attrition. Using OLS to estimate probabilities can lead to inefficiencies and probabilities outside of the zero to one interval. Current research also asserts that personality characteristics can yield valuable information about individual behavior both in first term and DEP attrition.

III. DATA DESCRIPTION

A. INTRODUCTION

This chapter presents the data utilized in this thesis, describing the dependent and independent variables used in the multivariate analysis.

B. DATA SOURCES

The data for this thesis were obtained from multiple sources. The Defense Manpower Data Center (DMDC) provided demographic data from the Department of Defense's Military Entrance Processing Command (MEPCOM). The Navy's Personalized Recruiting for Immediate and Delayed Enlistment Modernization (PRIDE-MOD) database provided DEP attrition data as well as the TAPAS scores. The dataset used was created by merging these two sources.

C. SAMPLE

1. Sample Characteristics

Sampling criteria for the target population includes Navy enlisted applicants between 17 and 34 years of age that had TAPAS scores, enlisted between April 2011 and March 2013, and participated in DEP for no more than 455 days. The usual maximum time an individual is allowed to remain in DEP is 365 days. However, the Navy allows for a three-month DEP extension for individuals in high school who are scheduled to graduate in the next school year that enlist during the months of May, June, or July. The sample excluded individuals that immediately enlisted without entering DEP. The sample size after these restrictions is 31,257.

2. Descriptive Statistics

Table 1 provides summary statistics of the DEP attrition dataset used in the multivariate analysis. As shown in Table 1, almost 87 percent of DEP participants accessed to basic training, while 13 percent attrited from DEP. Those with AFQT scores less than 35 were dropped from the sample. Table 1 also indicates that the average AFQT score is 69.53, with a standard deviation of 16.56 points. The sample is somewhat

diverse with 25.13 percent female and 50.3 percent of individuals identifying with some race other than white. The average DEP participant is 20.73 years old with a standard deviation of 2.98 years.

Table 1. Descriptive Statistics of Analysis Dataset

Variable	Obs	Mean	Std. Dev.	Min	Max
Accessed	31254	0.87	0.34	0	1
Attrite	31254	0.13	0.34	0	1
Age	31254	20.73	2.98	17	34
Days in DEP	31254	139.96	78.50	0	403
Female	31254	0.25	0.43	0	1
Male	31254	0.75	0.43	0	1
Married	31254	0.06	0.24	0	1
Single	31254	0.94	0.24	0	1
White	31254	0.48	0.50	0	1
Black	31254	0.14	0.34	0	1
Hispanic	31254	0.14	0.35	0	1
Asian	31254	0.04	0.20	0	1
Other Race	31254	0.18	0.39	0	1
No Race Response	31254	0.02	0.12	0	1
AFQT Score	31254	69.53	16.56	35	99
No Education Credentials	31241	0.00	0.05	0	1
Alternative Education Credentials	31241	0.01	0.08	0	1
GED	31241	0.01	0.08	0	1
High School Student	31241	0.18	0.39	0	1
High School Diploma Graduate	31241	0.73	0.44	0	1
College	31241	0.07	0.25	0	1
Traffic Waiver	29461	0.01	0.12	0	1
Non-traffic Waiver	29461	0.01	0.11	0	1
Alcohol Waiver	29045	0.01	0.11	0	1
Drug Waiver	29045	0.10	0.86	0	1
Medical Waiver	29045	0.06	0.24	0	1

3. Dependent Variable

Accession is defined as the point at which a DEP participant successfully reports to initial recruit training and is removed from the DEP inventory. Conversely, not

accessing, or attriting, is voluntarily or involuntarily being removed from the DEP program with the expressed intentions of not continuing to basic training. To analyze accession and attrition from DEP, the dependent variable used in the analysis is accession, defined as a binary variable that is equal to "1" if the individual accessed, and "0" if they attrited. According to Table 1, the average DEP accession rate in this sample is 87 percent.

4. Independent Variables

TAPAS composite and facet scores are the independent variables of interest as this thesis wants to test whether the TAPAS scores can explain any variation in the DEP attrition rates. Other independent variables used in the multivariate analysis include demographic variables such as age, male, female, married, single, race categories (White, Black, Hispanic, other race), schooling level (no high school diploma, high school student, high school diploma graduate, some college, and college degree), AFQT score, and waiver status. Year dummy variables (for the years 2011, 2012, and 2013) are used in the analysis to control for any unobserved factors that vary over time and may affect the accession decision of recruits. Each independent variable is discussed below.

a. TAPAS Facet Scores

The TAPAS test evaluates 15 unique personality attributes, or facets, and gives a numerical score to each of these attributes. Table 2 displays the summary statistics for each of the 15 facets. Certain facets, such as *optimism*, were renamed to *wellbeing* in later versions of TAPAS. Therefore, these scores were merged into one variable. As the test developed, certain facets, such as *excitement*, were added to the test (Fahrman, 2013). The original facets have values for every observation in the sample while newer facets only have values for more recent observations.

Table 2. Descriptive Statistics of TAPAS Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Can-Do	31254	108.342	18.490	33.62	178.5
Will-Do	31254	109.653	19.743	22.47	183.7
Achievement	31254	0.212	0.502	-2.09	2.38
Adjustment	31254	0.029	0.458	-1.82	2.91
Cooperation	22448	0.093	0.497	-1.86	2.82
Dominance	31254	0.217	0.534	-2.23	1.96
Even temper	31254	0.259	0.469	-2.11	2.58
Excitement/Attention Seeking	31254	-0.270	0.557	-2.42	2.35
Intelligence Efficiency	31254	0.114	0.554	-2.13	2.49
Nondelinquency	31254	0.141	0.516	-2.43	2.68
Order	22448	-0.315	0.538	-2.27	1.86
Physical Motivation	31254	0.118	0.596	-2.57	2.22
Self-Control	22414	-0.168	0.516	-2.05	1.97
Sociability	22414	-0.156	0.567	-2.04	2.06
Tolerance	22414	0.013	0.530	-2.13	2.81
Selflessness/Generosity	22448	-0.040	0.468	-2.17	2.04
Optimism/Wellbeing	31254	0.226	0.435	-1.97	2.68

b. TAPAS Composite Scores

The TAPAS test combines the results of some of the facets and creates two composite scores called “will do” and “can do.” “will-do” is a measure of an individual’s predisposition to achieving higher physical fitness scores, on-the-job effort, and attrition. “can-do” forecasts intermediate training performance and an individual’s knowledge of his or her job (Heffner, White, and Kilcullen, 2010).

Based on the literature review, it is hypothesized that there exists a strong correlation between DEP attrition and the “will do” composite score. The analysis chapter will test this hypothesis.

c. Age

The sample was restricted to individuals between 17 and 34 years of age, inclusive. According to the Navy’s recruiting website, www.navy.com, “You must be no older than 34 but at least 17 years old. If you are not yet 18, you must have parental consent [to enlist].” Age was computed as of the day the individual was administered the

TAPAS test. Age is a continuous variable with a mean of 20.59 years old. Figure 1 shows the age distribution.

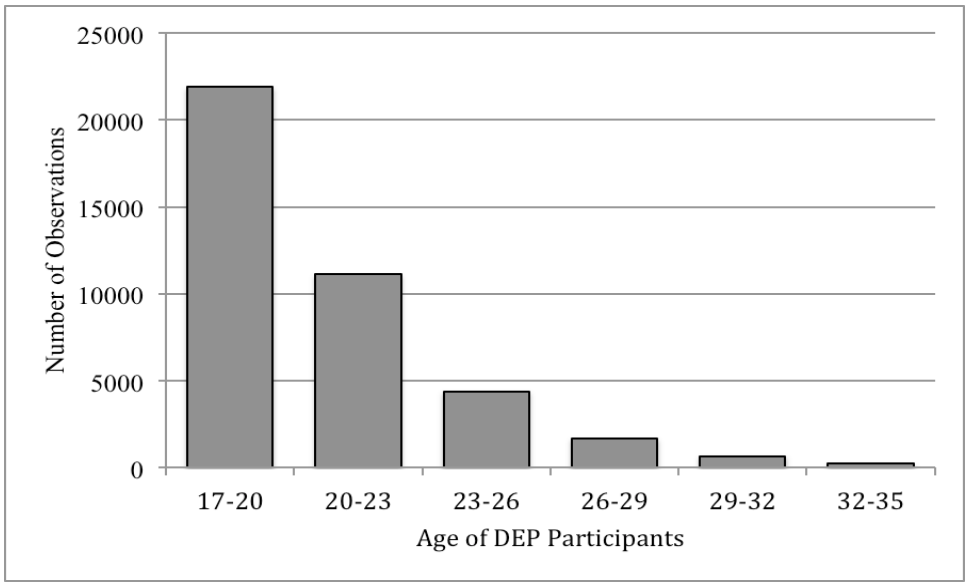

Figure 1. Age Distribution of DEP Participants in Sample

d. Gender (Female)

The gender variable "female" is a binary variable that equals "1" if the individual is a female and "0" if they are a male. Females made up approximately 24.7 percent of the sample and males 75.3 percent.

e. Marital Status (Married)

The marital status variable "married" is a binary variable that equals "1" if the individual is married and "0" otherwise. Married individuals account for only six percent of the sample, as the majority of enlistees are young and just completing or still attending high school.

f. Race

Race comprises dummy variables for black, white, Hispanic, Asian, Pacific Islander, Native American, and other races. Blacks make up about 13.5 percent of the

sample. Whites constitute 49.4 percent of the sample. Hispanics compose about 13.9 percent of the sample. Asians are approximately 4.1 percent of the sample. Other races including Pacific Islanders, Native Americans, and individuals identifying with another race other than those listed, are categorized as "other race" and represent 17.4 percent of the sample. Observations with no race response are identified by the variable "no race response" and comprised 1.7 percent of the sample. Figure 2 shows the racial distribution.

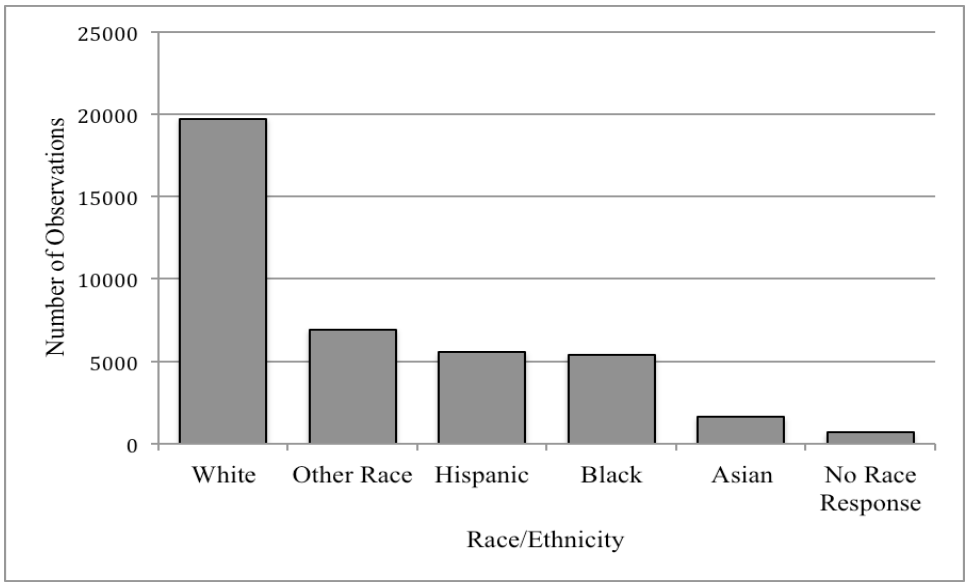

Figure 2. Race/Ethnicity Distribution of DEP Participants in Sample

g. Education

Individuals' education levels are identified by seven categories. All of these education levels are recorded at the time of processing. "No Credentials" indicates that the individual either is a high school dropout, failed the high school exit exam, or is pursuing, but not yet obtained a GED. "HS Student" indicates that person was enrolled in high school at the time of enlistment. "Alt Credential" means the individual participated in an alternative credential program such as a correspondence course, adult education, occupational program certification, home school diploma, received an attendance certification from high school, and other non-traditional credentials. "GED"

indicates a person has passed the General Educational Development (GED) test and earned a Certificate of High School Equivalency. "HS Diploma" indicates that individual is a high school graduate. "Some College" indicates an individual attended and completed at least one semester of college but less than what is required for a degree. "College Graduate" includes individuals with associates, bachelors, masters, doctorate, and other professional degrees. For analysis purposes, individual education levels are placed into four categories: No High School Diploma (composed of GED, Alternative Credentials, and No Credentials), High School Diploma Graduate, High School Student, and College (comprised of Some College and College Degree). While education level was recorded at the time of enlistment, which is after the TAPAS test, it is not likely that an individual's education level would increase significantly from the relatively short time between taking the TAPAS test and enlistment. Figure 3 is a graphical depiction of the educational distribution.

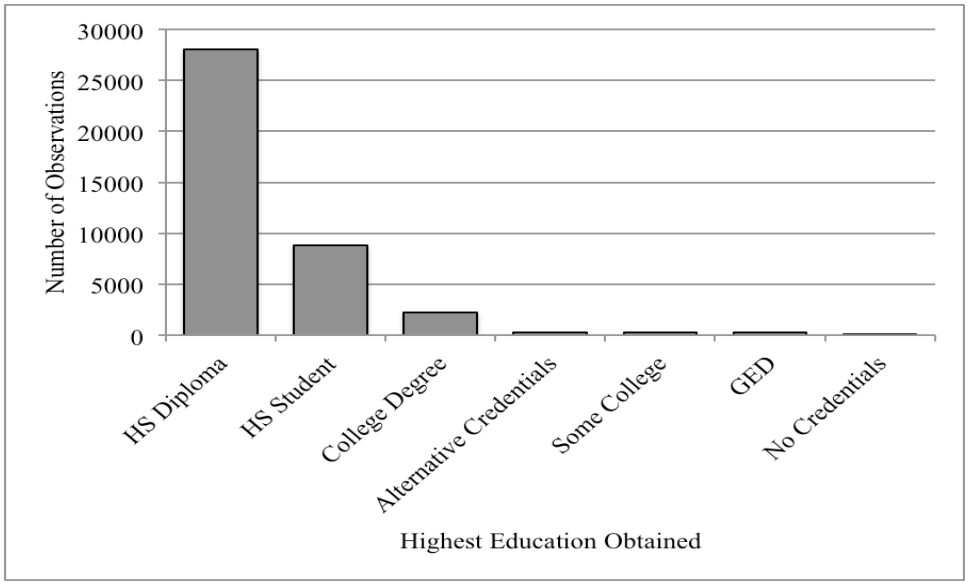

Figure 3. Education Levels of DEP Participants in Sample

h. AFQT Score (Afqtscore)

The Armed Forces Qualification Test is a measure of the individual's aptitude and potential to perform well in a given task. Test scores range from 0 to 99 and are divided

into eight categories. Only categories IIIB, IIIA, II, and I are currently eligible for naval service. The Navy stipulates that an AFQT score of less than 35 is ineligible for service. Therefore, observations with scores 34 and lower were dropped from the sample. The Navy also considers an AFQT score 50 or higher, combined with a high school diploma, to be a "high quality" recruit. Figure 4 shows the distribution of AFQT scores for the sample, divided by AFQT categories.

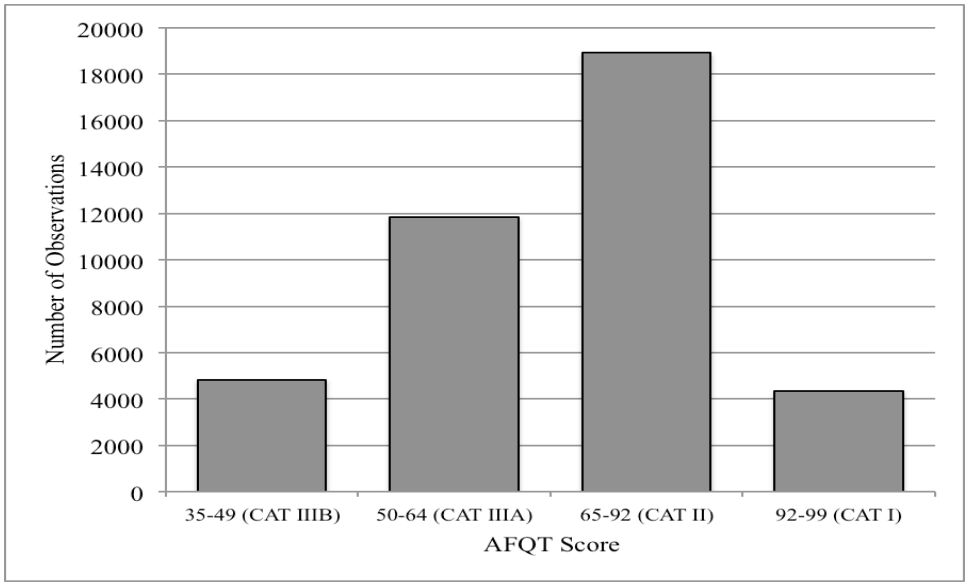

Figure 4. AFQT Score Distribution of DEP Participants in Sample

i. Days in DEP (Dep_days)

"Days in DEP" is a continuous variable that indicates how many days an individual spent in DEP before they either attrited or accessed to basic training. If the individual was still in DEP at the time the data were collected, "days in DEP" indicates how many days in DEP the individual had up to that point. DEP allows most individuals to participate in the program for a maximum of 365 days. However, the Navy allows for a three month extension for individuals in high school that are scheduled to graduate in the next school year that enlist during the months of May, June, or July. Therefore, observations in the sample were dropped if "Days in DEP" was greater than 455.

All new high school seniors (scheduled to graduate at the completion of the next school year) entering DEP during the months of May, June and July are authorized to remain in DEP for a maximum of 455 days (15 months). Figure 5 shows the distribution of time spent in DEP by participants.

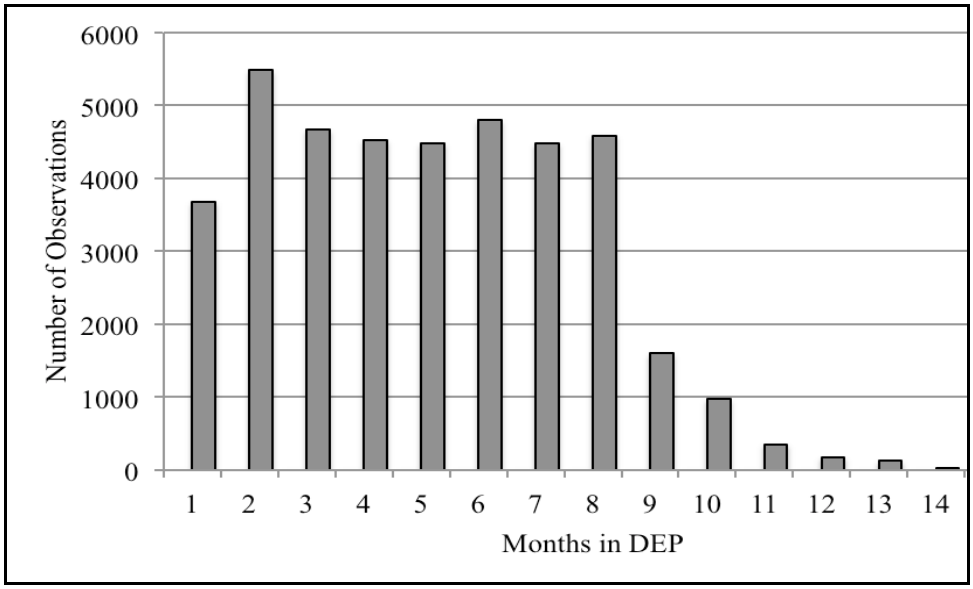

Figure 5. Time in DEP for DEP Participants in Sample

j. Waiver Status

Waivers for behavior are common means by which a recruit can enter the Navy with an otherwise disqualifying condition. The Navy allows recruits with waivers because they may have other valuable traits or skills that outweigh the disqualifying condition(s). The original categorized the waivers into two separate variables, namely "conductwaiverlist_2" and "nonconductwaiverlist_2." These codes were compared with the Navy Recruiting Manual-Enlisted (COMNAVCRUITCOMINST 1130.8(series)) Volume III and eight waiver categories were developed.

Conduct waivers included those for traffic violations, non-traffic violations, and no conduct waivers. Traffic waivers (traffic_waiver) include both moving and non-moving traffic violations not resulting in a felony and comprise 1.38 percent of the sample. Non-Traffic waivers (nontraffic_waiver) include any violations of the law not

involving a vehicle that resulted in one or more misdemeanor or felony charges or where a vehicle was involved that resulted in a felony charge. These waivers are rare, due to the seriousness of the actions being waived and thus represent only 1.17 percent of the sample.

Non-conduct waivers included those for alcohol abuse, drug abuse, and medical conditions. Alcohol abuse waivers (alcohol_waiver) indicate the individual had abused alcohol in the past and comprised 1.17 percent of the sample. Drug abuse waivers (drug_waiver) indicate the individual had abused illegal or prescription drugs in the past. These individuals made up 10.22 percent of the sample. Medical conditions waivers (med_waiver) are for individuals who have medical issues that would normally be disqualifying for naval service. They composed 5.87 percent of the sample.

k. Year Dummies (Yr20XX)

Calendar years are identified by year dummy variables to capture year effects that may vary over time. These year dummies are created from the year in which the individual made the decision to access or attrite from DEP. Dummies for yr2011, yr2012, and yr2013 were created. Year 2011 is used as the control group.

IV. DEP ATTRITION ANALYSIS

To address the question "Do TAPAS scores predict whether or not a recruit will attrite from the Delayed Entry Program?" this thesis uses a multivariate analysis approach to identify the variables that explain the variations in the DEP attrition rates. Specifically, this analysis uses a probit model to determine the probability that a DEP participant will access to basic training based on TAPAS scores while controlling for other explanatory variables. The analysis investigates the predictive power of both, the composite scores and the 15 facet scores. Five new facets created specifically for military attrition studies are also investigated for their predictive abilities (Drasgow et al., 2012). Findings from this analysis indicate how likely a DEP participant is to access to basic training based on the composite scores and the facets.

Three probit models evaluate each TAPAS score. The first model includes only demographic information. The second adds quantitative controls for education and cognitive ability (AFQT score). The third model adds controls for waivers.

A. PROBIT ANALYSIS USING COMPOSITE TAPAS SCORES

The first set of probit regressions estimates the effects of the TAPAS composite scores on DEP accession probability. The probit coefficient indicates direction and significance, while the partial effect shows magnitude of the effect these composite scores have on the probability of accessing to basic training from the DEP.

1. Can-do

The first column of Table 3 describes the results of the composite score can-do on DEP accession when only controlling for demographics. Can-do has a statistically significant partial effect of -0.0003. This suggests that an additional point of the can-do composite score decreases the likelihood a recruit will access by 0.03 percentage points. The second column adds quantitative controls for education level and AFQT scores. The can-do effect is largely unchanged in both magnitude and significance. Including waivers in the regression produces an insignificant can-do coefficient. Waivers,

specifically those for drugs, alcohol, and traffic violations, appear to be significant predictors of DEP behavior.

Table 3. The Effect of TAPAS Composite Can-Do on DEP Attrition, Controlling for Demographic Characteristics, Quantitative Skills, and Waivers

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
Can-Do	-0.0012**	-0.0003**	-0.0014***	-0.0003***	-0.0009	-0.0001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Female	-0.2245***	-0.0499***	-0.2198***	-0.0486***	-0.2024***	-0.0287***
	(0.020)	(0.005)	(0.020)	(0.005)	(0.025)	(0.004)
Married	0.1504***	0.0291***	0.1645***	0.0315***	0.0358	0.0046
	(0.042)	(0.007)	(0.042)	(0.007)	(0.049)	(0.006)
Age	0.0091***	0.0019***	-0.0027	-0.0006	-0.0004	-0.0000
	(0.003)	(0.001)	(0.004)	(0.001)	(0.005)	(0.001)
Days in DEP	0.0017***	0.0004***	0.0019***	0.0004***	0.0021***	0.0003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	0.0705**	0.0143***	0.0822***	0.0165***	0.0852**	0.0107**
	(0.028)	(0.006)	(0.029)	(0.006)	(0.036)	(0.004)
Asian	0.2613***	0.0473***	0.2589***	0.0468***	0.2963***	0.0317***
	(0.053)	(0.008)	(0.053)	(0.008)	(0.069)	(0.006)
Hispanic	0.0375	0.0077	0.0405	0.0083	0.0520	0.0066
	(0.027)	(0.006)	(0.028)	(0.006)	(0.034)	(0.004)
Other Race	0.0122	0.0025	0.0158	0.0033	-0.0025	-0.0003
	(0.025)	(0.005)	(0.025)	(0.005)	(0.030)	(0.004)
No Race Response	-0.0089	-0.0019	-0.0131	-0.0027	-0.0784	-0.0109
	(0.074)	(0.016)	(0.074)	(0.016)	(0.086)	(0.013)
AFQT Score			0.0010*	0.0002*	0.0009	0.0001
			(0.001)	(0.000)	(0.001)	(0.000)
HS Graduate			0.2209**	0.0488**	0.3141***	0.0462***
			(0.091)	(0.021)	(0.104)	(0.017)
HS Student			0.0451	0.0092	0.1039	0.0130
			(0.093)	(0.019)	(0.108)	(0.013)
College			0.2539***	0.0464***	0.4267***	0.0423***
			(0.098)	(0.016)	(0.115)	(0.008)
Alcohol Waiver					2.9516***	0.0725***
					(0.824)	(0.002)
Drug Waiver					-0.4098***	-0.0538***
					(0.103)	(0.013)
Medical Waiver					0.0853*	0.0106*
					(0.050)	(0.006)
Traffic Waiver					-0.2413***	-0.0375**
					(0.087)	(0.016)
Non-traffic Waiver					-0.1493	-0.0218
					(0.098)	(0.016)

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
yr2012	0.1655***	0.0356***	0.1596***	0.0342***	0.0663*	0.0088*
	(0.027)	(0.006)	(0.027)	(0.006)	(0.035)	(0.005)
yr2013	0.1103***	0.0223***	0.0891***	0.0180***	-0.1720***	-0.0242***
	(0.031)	(0.006)	(0.032)	(0.006)	(0.039)	(0.006)
Constant	0.7220***		0.7126***		0.9882***	
	(0.087)		(0.135)		(0.163)	
Observations	31,254	31,254	31,241	31,241	28,963	28,963
Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

2. Will-do

Table 4 describes the results of the composite score will-do on DEP accession. Unlike the can-do composite, the will-do composite score is not observed to have any significance in predicting DEP attrition outcomes.

Table 4. The Effect of TAPAS Composite Will-Do on DEP Attrition, Controlling for Demographic Characteristics, Quantitative Skills, and Waivers

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
Will-Do	0.0001	0.0000	0.0000	0.0000	0.0006	0.0001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Female	-0.2273***	-0.0506***	-0.2235***	-0.0495***	-0.2062***	-0.0293***
	(0.020)	(0.005)	(0.020)	(0.005)	(0.025)	(0.004)
Married	0.1469***	0.0285***	0.1603***	0.0308***	0.0301	0.0039
	(0.042)	(0.007)	(0.042)	(0.007)	(0.049)	(0.006)
Age	0.0080**	0.0017**	-0.0035	-0.0007	-0.0012	-0.0002
	(0.003)	(0.001)	(0.004)	(0.001)	(0.005)	(0.001)
Days in DEP	0.0018***	0.0004***	0.0019***	0.0004***	0.0021***	0.0003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	0.0734***	0.0149***	0.0835***	0.0168***	0.0887**	0.0111***
	(0.028)	(0.006)	(0.029)	(0.006)	(0.036)	(0.004)
Asian	0.2702***	0.0487***	0.2681***	0.0482***	0.3064***	0.0325***
	(0.053)	(0.008)	(0.053)	(0.008)	(0.069)	(0.006)
Hispanic	0.0394	0.0081	0.0417	0.0085	0.0546	0.0070

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
	(0.027)	(0.006)	(0.028)	(0.006)	(0.034)	(0.004)
Other Race	0.0128	0.0027	0.0161	0.0033	-0.0011	-0.0001
	(0.025)	(0.005)	(0.025)	(0.005)	(0.030)	(0.004)
No Race Response	-0.0078	-0.0016	-0.0124	-0.0026	-0.0770	-0.0107
	(0.074)	(0.016)	(0.074)	(0.016)	(0.086)	(0.013)
AFQT Score			0.0008	0.0002	0.0007	0.0001
			(0.001)	(0.000)	(0.001)	(0.000)
HS Graduate			0.2233**	0.0494**	0.3146***	0.0463***
			(0.091)	(0.021)	(0.104)	(0.017)
HS Student			0.0495	0.0101	0.1071	0.0134
			(0.093)	(0.019)	(0.108)	(0.013)
College			0.2563***	0.0468***	0.4267***	0.0423***
			(0.098)	(0.015)	(0.115)	(0.008)
Alcohol Waiver					2.9283***	0.0725***
					(0.824)	(0.002)
Drug Waiver					-0.4066***	-0.0534***
					(0.103)	(0.013)
Medical Waiver					0.0851*	0.0106*
					(0.050)	(0.006)
Traffic Waiver					-0.2404***	-0.0374**
					(0.087)	(0.016)
Non-traffic Waiver					-0.1493	-0.0218
					(0.098)	(0.016)
yr2012	0.1613***	0.0347***	0.1547***	0.0331***	0.0644*	0.0086*
	(0.027)	(0.006)	(0.027)	(0.006)	(0.035)	(0.005)
yr2013	0.1048***	0.0212***	0.0828***	0.0168***	-0.1745***	-0.0246***
	(0.031)	(0.006)	(0.031)	(0.006)	(0.039)	(0.006)
Constant	0.6059***		0.5919***		0.8463***	
	(0.088)		(0.136)		(0.164)	
	31,254	31,254	31,241	31,241	28,963	28,963
Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

B. PROBIT ANALYSIS USING TAPAS FACETS SCORES

Table 5 depicts the probit and partial effects of each of the 15 TAPAS facet scores on the probability a recruit will access from DEP. According to Table 6, dominance, intelligence efficiency, and order are highly significant predictors of DEP accession behavior. After demographics, education, AFQT scores, and waivers have been controlled for, these three facets remain significant. Dominance has a partial effect of -0.0149. This means that for every additional point scored in the dominance facet, the probability of accessing to initial recruit training from DEP decreases by 1.49 percentage points, or 2.8 percent[1]. Intelligence efficiency also reveals a negative correlation with DEP accession of -1.10 percentage points, or -1.98 percent. Finally, order has the smallest, but still significant effect on accessing from DEP of -0.0085, or -1.58 percent.

Table 5. The Effect of TAPAS Facets Scores on DEP Attrition

Accessed	Demographics Controls		Demographics and Quantitative Skills		Demographics, Quantitative Skills and Waivers Controls	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
Achievement	0.0012	0.0002	0.0003	0.0001	-0.0196	-0.0023
	(0.031)	(0.006)	(0.031)	(0.006)	(0.040)	(0.005)
Adjustment	0.0228	0.0046	0.0251	0.0051	0.0336	0.0039
	(0.028)	(0.006)	(0.028)	(0.006)	(0.037)	(0.004)
Cooperation	-0.0142	-0.0029	-0.0130	-0.0026	0.0027	0.0003
	(0.033)	(0.007)	(0.033)	(0.007)	(0.042)	(0.005)
Dominance	-0.1270***	-0.0259***	-0.1238***	-0.0252***	-0.1247***	-0.0145***
	(0.028)	(0.006)	(0.029)	(0.006)	(0.037)	(0.004)
Eventemper	0.0286	0.0058	0.0227	0.0046	-0.0016	-0.0002
	(0.034)	(0.007)	(0.034)	(0.007)	(0.043)	(0.005)
Excitement/ Attention-Seeking	-0.0475	-0.0097	-0.0572*	-0.0116*	-0.0190	-0.0022
	(0.030)	(0.006)	(0.030)	(0.006)	(0.039)	(0.005)
Intelligence Efficiency	-0.0464*	-0.0094*	-0.0680**	-0.0138**	-0.0943***	-0.0110***
	(0.026)	(0.005)	(0.028)	(0.006)	(0.036)	(0.004)
Nondelinqu	0.0255	0.0052	0.0286	0.0058	0.0535	0.0062

[1] Percent change was calculated by dividing the partial effect by the TAPAS test standard deviation.

Accessed	Demographics Controls		Demographics and Quantitative Skills		Demographics, Quantitative Skills and Waivers Controls	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
ency						
	(0.031)	(0.006)	(0.031)	(0.006)	(0.040)	(0.005)
Order	-0.0620**	-0.0126**	-0.0564**	-0.0115**	-0.0719**	-0.0084**
	(0.027)	(0.005)	(0.027)	(0.005)	(0.035)	(0.004)
Physical Motivation	-0.0084	-0.0017	-0.0070	-0.0014	0.0056	0.0007
	(0.025)	(0.005)	(0.025)	(0.005)	(0.032)	(0.004)
Self-Control	-0.0212	-0.0043	-0.0227	-0.0046	-0.0047	-0.0005
	(0.028)	(0.006)	(0.028)	(0.006)	(0.036)	(0.004)
Sociability	-0.0259	-0.0053	-0.0173	-0.0035	0.0195	0.0023
	(0.028)	(0.006)	(0.028)	(0.006)	(0.036)	(0.004)
Tolerance	0.0104	0.0021	0.0044	0.0009	-0.0026	-0.0003
	(0.028)	(0.006)	(0.028)	(0.006)	(0.037)	(0.004)
Selflessness / Generosity	-0.0274	-0.0056	-0.0248	-0.0050	-0.0233	-0.0027
	(0.032)	(0.007)	(0.032)	(0.007)	(0.042)	(0.005)
Optimism/ Wellbeing	-0.0208	-0.0042	-0.0192	-0.0039	-0.0008	-0.0001
	(0.035)	(0.007)	(0.035)	(0.007)	(0.045)	(0.005)
AFQT Score			0.0021**	0.0004**	0.0027**	0.0003**
			(0.001)	(0.000)	(0.001)	(0.000)
HS Graduate			0.0701	0.0145	0.2438	0.0309
			(0.137)	(0.029)	(0.158)	(0.022)
HS Student			-0.0717	-0.0149	0.0738	0.0083
			(0.141)	(0.030)	(0.163)	(0.018)
College			0.0978	0.0189	0.4060**	0.0358***
			(0.148)	(0.027)	(0.177)	(0.011)
Alcohol Waiver					5.1001***	0.0648***
					(1.213)	(0.003)
Drug Waiver					-0.6789***	-0.0790***
					(0.151)	(0.018)
Medical Waiver					0.0411	0.0046
					(0.078)	(0.009)
Traffic Waiver					-0.2738**	-0.0391*
					(0.137)	(0.023)
Nontraffic Waiver					-0.1577	-0.0207
					(0.141)	(0.021)
Female	-	-	-0.2479***	-0.0540***	-0.2509***	-0.0322***

Accessed	Demographics Controls		Demographics and Quantitative Skills		Demographics, Quantitative Skills and Waivers Controls	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
	0.2562***	0.0560***				
	(0.032)	(0.008)	(0.033)	(0.008)	(0.042)	(0.006)
Married	0.1740***	0.0324***	0.1862***	0.0343***	0.1342	0.0142*
	(0.065)	(0.011)	(0.066)	(0.011)	(0.085)	(0.008)
Age	0.0075	0.0015	-0.0041	-0.0008	-0.0021	-0.0002
	(0.005)	(0.001)	(0.006)	(0.001)	(0.008)	(0.001)
Days in DEP	0.0012***	0.0002***	0.0013***	0.0003***	0.0014***	0.0002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	0.0753*	0.0149*	0.0952**	0.0186**	0.1028*	0.0113*
	(0.043)	(0.008)	(0.044)	(0.008)	(0.057)	(0.006)
Asian	0.2108***	0.0383***	0.2119***	0.0383***	0.3180***	0.0294***
	(0.078)	(0.012)	(0.078)	(0.012)	(0.111)	(0.008)
Hispanic	0.0953**	0.0186**	0.1042**	0.0202**	0.1430**	0.0153***
	(0.044)	(0.008)	(0.044)	(0.008)	(0.058)	(0.006)
Other Race	0.0265	0.0053	0.0313	0.0063	0.0118	0.0014
	(0.039)	(0.008)	(0.039)	(0.008)	(0.049)	(0.006)
No Race Response	0.0477	0.0095	0.0494	0.0098	-0.0290	-0.0035
	(0.114)	(0.022)	(0.114)	(0.022)	(0.139)	(0.017)
yr2012	0.1632***	0.0341***	0.1545***	0.0322***	0.0581	0.0069
	(0.035)	(0.008)	(0.035)	(0.008)	(0.046)	(0.006)
yr2013	0.1666***	0.0314***	0.1512***	0.0287***	-0.1210*	-0.0151*
	(0.053)	(0.009)	(0.053)	(0.009)	(0.064)	(0.009)
Constant	0.6921***		0.7284***		0.9697***	
	(0.116)		(0.196)		(0.243)	
Observations	13,608	13,608	13,606	13,606	12,432	12,432
Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

C. PROBIT ANALYSIS USING TAPAS VERSIONS 7 AND 8, DEVELOPED SPECIALLY FOR TESTING ATTRITION

Tables 6 and 7 display the results of five newer facets that were developed specifically for the military to use in evaluating attrition and other manpower models (Drasgow et al., 2012). These facets are adventure seeking, commitment to serve, courage, team orientation, and situational awareness. Adventure seeking, commitment to serve, and situational awareness were only administered in version 7 of the TAPAS test while ourage and team orientation were only administered in version 8. These versions were given to Navy recruits across the country during the same time frame as the rest of the TAPAS versions.

Table 6 displays the results of version 7 of the TAPAS test. All three of the unique facets (adventure seeking, commitment to serve, and situational awareness) reveal some significance. Adventure seeking is significant at the 5 percent level and has an effect of -1.32 percentage points, or -2.18 percent, per additional point scored in the adventure seeking facet on the probability of accessing from DEP to initial recruit training. Not controlling for waivers, commitment to serve was highly significant. After controlling for waivers however, commitment to serve's predictive power decreased from a 1 percent significance level to a 10 percent significance level. After all controls, its effect is a positive 1.08 percentage points, or 2.14 percent. This is interpreted as an additional point scored in the commitment to serve facet increases a recruit's probability of accessing from DEP to initial recruit training by 1.08 percentage points, or 2.14 percent. Situational awareness increased in significance as controls when waivers were controlled for. Situational awareness is significant at the 5 percent level and has an effect of -1.26 percentage points, or -2.51 percent on DEP accession.

Table 6. The Effect of TAPAS Version 7 Facet Scores on DEP Attrition

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills, and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
Adventure Seeking	-0.0756**	-0.0166**	-0.0785**	-0.0171**	-0.0926**	-0.0132**
	(0.031)	(0.007)	(0.031)	(0.007)	(0.038)	(0.005)
Commitment	0.1229***	0.0270***	0.1303***	0.0285***	0.0756*	0.0108*
	(0.034)	(0.007)	(0.034)	(0.007)	(0.042)	(0.006)
Situational Awareness	-0.0620*	-0.0136*	-0.0607*	-0.0133*	-0.0882**	-0.0126**
	(0.036)	(0.008)	(0.036)	(0.008)	(0.044)	(0.006)
Achievement	-0.0315	-0.0069	-0.0353	-0.0077	-0.0326	-0.0047
	(0.039)	(0.008)	(0.039)	(0.008)	(0.047)	(0.007)
Adjustment	-0.0869*	-0.0191*	-0.0896*	-0.0196*	0.0027	0.0004
	(0.047)	(0.010)	(0.047)	(0.010)	(0.057)	(0.008)
Attention Seeking	-0.0486	-0.0107	-0.0582*	-0.0127*	-0.0426	-0.0061
	(0.031)	(0.007)	(0.031)	(0.007)	(0.038)	(0.005)
Cooperation	-0.0313	-0.0069	-0.0371	-0.0081	-0.0468	-0.0067
	(0.035)	(0.008)	(0.035)	(0.008)	(0.043)	(0.006)
Dominance	-0.0495	-0.0109	-0.0491	-0.0107	-0.0201	-0.0029
	(0.038)	(0.008)	(0.038)	(0.008)	(0.046)	(0.007)
Eventemper	-0.0174	-0.0038	-0.0232	-0.0051	0.0049	0.0007
	(0.040)	(0.009)	(0.040)	(0.009)	(0.049)	(0.007)
Intelligence Efficiency	-0.0891***	-0.0196***	-0.0946***	-0.0206***	-0.0708	-0.0101
	(0.034)	(0.007)	(0.037)	(0.008)	(0.044)	(0.006)
Optimism	0.0203	0.0045	0.0180	0.0039	0.0143	0.0020
	(0.040)	(0.009)	(0.040)	(0.009)	(0.049)	(0.007)
Order	-0.0359	-0.0079	-0.0354	-0.0077	0.0090	0.0013
	(0.032)	(0.007)	(0.033)	(0.007)	(0.040)	(0.006)
Physical Motivation	-0.0376	-0.0083	-0.0341	-0.0075	-0.0133	-0.0019
	(0.031)	(0.007)	(0.031)	(0.007)	(0.038)	(0.005)
Selflessness	0.0134	0.0029	0.0181	0.0039	0.0660	0.0094
	(0.042)	(0.009)	(0.042)	(0.009)	(0.051)	(0.007)
Nondelinquency	0.0141	0.0031	0.0140	0.0031	0.0701*	0.0100*
	(0.035)	(0.008)	(0.035)	(0.008)	(0.043)	(0.006)
AFQT Score			0.0001	0.0000	-0.0005	-0.0001
			(0.001)	(0.000)	(0.001)	(0.000)
HS Graduate			0.2259	0.0525	0.2769	0.0438
			(0.172)	(0.042)	(0.198)	(0.035)
HS Student			-0.0342	-0.0076	-0.0125	-0.0018
			(0.177)	(0.040)	(0.205)	(0.030)
College			0.2761	0.0526*	0.4527**	0.0484***
			(0.186)	(0.030)	(0.218)	(0.017)

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills, and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
Alcohol Waiver					0.1222	0.0160
					(1.948)	(0.232)
Drug Waiver					-0.0575	-0.0082
					(0.244)	(0.035)
Medical Waiver					0.2084**	0.0260**
					(0.095)	(0.010)
Traffic Waiver					0.1315	0.0171
					(0.190)	(0.022)
Non-traffic Waiver					0.0347	0.0048
					(0.203)	(0.028)
Female	-0.2583***	-0.0609***	-0.2593***	-0.0608***	-0.2296***	-0.0357***
	(0.041)	(0.010)	(0.041)	(0.010)	(0.050)	(0.008)
Married	0.1001	0.0210	0.1145	0.0236	-0.0919	-0.0139
	(0.077)	(0.015)	(0.077)	(0.015)	(0.086)	(0.014)
Age	0.0205***	0.0045***	0.0062	0.0014	0.0016	0.0002
	(0.006)	(0.001)	(0.007)	(0.002)	(0.009)	(0.001)
Days in DEP	0.0021***	0.0005***	0.0024***	0.0005***	0.0027***	0.0004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	0.0262	0.0057	0.0378	0.0081	0.0247	0.0035
	(0.054)	(0.012)	(0.055)	(0.012)	(0.067)	(0.009)
Asian	0.1386	0.0284	0.1290	0.0264	0.2062*	0.0256**
	(0.095)	(0.018)	(0.095)	(0.018)	(0.120)	(0.013)
Hispanic	0.0129	0.0028	0.0123	0.0027	0.0295	0.0041
	(0.049)	(0.011)	(0.050)	(0.011)	(0.061)	(0.008)
Other Race	0.0064	0.0014	0.0089	0.0019	0.0113	0.0016
	(0.045)	(0.010)	(0.045)	(0.010)	(0.055)	(0.008)
No Race Response	-0.0111	-0.0024	-0.0197	-0.0044	-0.0470	-0.0069
	(0.138)	(0.031)	(0.138)	(0.031)	(0.162)	(0.025)
yr2012	0.5402***	0.1301***	0.5548***	0.1332***	0.5929***	0.0973***
	(0.105)	(0.027)	(0.106)	(0.028)	(0.126)	(0.024)
yr2013	0.4430***	0.0893***	0.4289***	0.0861***	0.2964**	0.0394**
	(0.107)	(0.020)	(0.108)	(0.020)	(0.128)	(0.016)
Constant	-0.0748		-0.0118		0.3583	
	(0.172)		(0.256)		(0.302)	
Observations	8,840	8,840	8,834	8,834	8,226	8,226
Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Table 7 displays the results of version 8 of the TAPAS test. In this version, none of the newly introduced facets (courage and team orientation) are significant. However, attention seeking and intelligence efficiency were significant. Attention seeking revealed a -1.24 percentage point, or 2.13 percent, effect on DEP accession. Intelligence efficiency has a -2.02 percentage point, or -3.78 percent, effect.

Table 7. The Effect of TAPAS Version 8 Facet Scores on DEP Attrition

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills, and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
Courage	0.0127	0.0025	0.0151	0.0030	-0.0026	-0.0003
	(0.034)	(0.007)	(0.034)	(0.007)	(0.041)	(0.005)
Attention Seeking	-0.0483	-0.0095	-0.0523	-0.0103	-0.0939**	-0.0124**
	(0.033)	(0.007)	(0.034)	(0.007)	(0.040)	(0.005)
Team Orientation	0.0343	0.0068	0.0449	0.0088	0.0718	0.0094
	(0.040)	(0.008)	(0.040)	(0.008)	(0.048)	(0.006)
Achievement	-0.0466	-0.0092	-0.0473	-0.0093	-0.0651	-0.0086
	(0.041)	(0.008)	(0.041)	(0.008)	(0.049)	(0.006)
Adjustment	-0.0391	-0.0077	-0.0344	-0.0067	-0.0090	-0.0012
	(0.050)	(0.010)	(0.050)	(0.010)	(0.060)	(0.008)
Dominance	-0.0313	-0.0062	-0.0259	-0.0051	-0.0003	-0.0000
	(0.040)	(0.008)	(0.040)	(0.008)	(0.049)	(0.006)
Eventemper	0.0445	0.0088	0.0310	0.0061	0.0276	0.0036
	(0.039)	(0.008)	(0.039)	(0.008)	(0.047)	(0.006)
Intelligence Efficiency	-0.1145***	-0.0226***	-0.1540***	-0.0302***	-0.1536***	-0.0202***
	(0.035)	(0.007)	(0.038)	(0.007)	(0.045)	(0.006)
Optimism	0.0391	0.0077	0.0331	0.0065	0.0433	0.0057
	(0.043)	(0.009)	(0.043)	(0.009)	(0.052)	(0.007)
Responsibility	0.0252	0.0050	0.0171	0.0034	-0.0128	-0.0017
	(0.041)	(0.008)	(0.041)	(0.008)	(0.049)	(0.006)
Self-Control	-0.0649	-0.0128	-0.0568	-0.0111	-0.0310	-0.0041
	(0.043)	(0.008)	(0.043)	(0.008)	(0.051)	(0.007)
Physical Motivation	-0.0240	-0.0047	-0.0242	-0.0047	-0.0146	-0.0019
	(0.031)	(0.006)	(0.031)	(0.006)	(0.037)	(0.005)
Sociability	-0.0448	-0.0088	-0.0302	-0.0059	-0.0145	-0.0019
	(0.035)	(0.007)	(0.035)	(0.007)	(0.042)	(0.006)
Tolerance	-0.0372	-0.0073	-0.0469	-0.0092	-0.0222	-0.0029
	(0.036)	(0.007)	(0.036)	(0.007)	(0.042)	(0.006)
Nondelinquenc	0.0564	0.0111	0.0642*	0.0126*	0.0263	0.0035

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills, and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
y						
	(0.036)	(0.007)	(0.037)	(0.007)	(0.044)	(0.006)
AFQT Score			0.0038***	0.0008***	0.0038***	0.0005***
			(0.001)	(0.000)	(0.001)	(0.000)
HS Graduate			0.5287***	0.1209***	0.5366***	0.0868**
			(0.178)	(0.046)	(0.203)	(0.039)
HS Student			0.3294*	0.0565**	0.2900	0.0331
			(0.184)	(0.027)	(0.210)	(0.021)
College			0.5696***	0.0817***	0.5197**	0.0486***
			(0.192)	(0.019)	(0.220)	(0.014)
Alcohol Waiver					-0.2243	-0.0346
					(0.178)	(0.032)
Drug Waiver					-0.2435	-0.0381
					(0.194)	(0.035)
Medical Waiver					0.0595	0.0081
					(0.074)	(0.010)
Traffic Waiver					-0.3736**	-0.0636**
					(0.146)	(0.031)
Nontraffic Waiver					-0.2511	-0.0395
					(0.189)	(0.035)
Female	-0.2312***	-0.0488***	-0.2158***	-0.0450***	-0.1913***	-0.0270***
	(0.041)	(0.009)	(0.042)	(0.009)	(0.050)	(0.007)
Married	0.1340*	0.0246*	0.1534*	0.0277**	0.0681	0.0086
	(0.078)	(0.013)	(0.079)	(0.013)	(0.096)	(0.012)
Age	0.0095	0.0019	-0.0054	-0.0011	0.0037	0.0005
	(0.007)	(0.001)	(0.008)	(0.001)	(0.009)	(0.001)
Days in DEP	0.0021***	0.0004***	0.0022***	0.0004***	0.0021***	0.0003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	0.1122**	0.0211**	0.1510***	0.0277***	0.1541**	0.0186**
	(0.056)	(0.010)	(0.058)	(0.010)	(0.070)	(0.008)
Asian	0.4358***	0.0669***	0.4357***	0.0663***	0.2937**	0.0315***
	(0.116)	(0.013)	(0.116)	(0.013)	(0.134)	(0.011)
Hispanic	-0.0095	-0.0019	0.0004	0.0001	-0.0010	-0.0001
	(0.051)	(0.010)	(0.051)	(0.010)	(0.062)	(0.008)
Other Race	0.0028	0.0006	0.0127	0.0025	-0.0225	-0.0030
	(0.047)	(0.009)	(0.047)	(0.009)	(0.056)	(0.007)
No Race Response	-0.1079	-0.0226	-0.1144	-0.0239	-0.2023	-0.0307
	(0.138)	(0.031)	(0.138)	(0.031)	(0.155)	(0.027)
yr2012	0.6797***	0.1538***	0.6982***	0.1575***	0.8089***	0.1322***

Accessed	Demographics		Demographics and Quantitative Skills		Demographics, Quantitative Skills, and Waivers	
	Probit	Partial Effect	Probit	Partial Effect	Probit	Partial Effect
	(0.117)	(0.030)	(0.117)	(0.030)	(0.131)	(0.026)
yr2013	0.6212***	0.1070***	0.6179***	0.1057***	0.5831***	0.0664***
	(0.119)	(0.018)	(0.120)	(0.018)	(0.134)	(0.013)
Constant	0.0461		-0.4211		-0.3880	
	(0.186)		(0.277)		(0.336)	
Observations	8,806	8,806	8,801	8,801	8,305	8,305
Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

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V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This thesis examined whether or not TAPAS composite and facet scores predict DEP attrition for Navy recruits that took the TAPAS test between March 2011 and March 2013. Using probit regression analysis, and controlling for demographics, quantitative skills, and waivers, the main findings revealed several traits as significant predictors of a recruit's successful accession out of the DEP.

After controlling for demographics, quantitative skills, and waivers, the TAPAS composite scores are found to not be significant predictors of DEP attrition behavior, therefore not adding any additional screening information to that offered by schooling and AFQT scores. Probit coefficients on schooling and AFQT, after controlling for demographics and waivers, show that higher AFQT scores and higher education significantly increases the probability a recruit will access from the DEP to initial recruit training. Additionally, waivers consistently proved to be significant predictors of DEP attrition.

However, individual TAPAS facets, namely dominance, intellectual efficiency, and order were consistently found to be significant predictors of DEP attrition for Navy recruits. In version 7 of the TAPAS test, which included facets specifically designed to test for attrition behavior, facets adventure seeking and situational awareness were highly significant in predicting DEP attrition, while facet commitment to serve was the only positive predictor, albeit of weak significance after controlling for waivers.

The largest single TAPAS predictor of DEP attrition is the dominance facet. This trait identifies recruits who have a propensity to "take charge" and are "natural leaders" (Drasgow et al., 2012). Recruits scoring high in the dominance facet may view waiting to go to initial recruit training as a passive option, thereby opting to take action and make another employment decision where they feel more in control. Another view is that dominance is an unwanted personality characteristic for a Navy recruit. Having this type of personality may make them more disdainful of authority figures. In this case, this

analysis is highlighting "good" attrition characteristics. These are the recruits the Navy wants to attrite in DEP, before more money and resources are wasted once they enter the training pipeline.

Another significant TAPAS facet predicting DEP attrition is intellectual efficiency. Intellectual efficiency characterizes individuals that "make decisions quickly" and are analytical in nature (Drasgow et al., 2012). Recruits scoring high in this facet might be at a higher risk of attriting from DEP because they have time after the initial enlistment decision to reconsider their choice to enlist. The individual may also feel they made a decision too quickly without having a clear understanding of their future job in the Navy.

The TAPAS facet order is also a significant predictor of DEP attrition behavior. Order describes individuals that "tend to organize tasks and activities" and "desire to maintain neat and clean surroundings" (Drasgow et al., 2012). These individuals may not be able to tolerate waiting in DEP for long periods of time because they are more accustomed to working by a schedule. They may leave DEP because the program is not structured enough for them.

B. RECOMMENDATIONS

Can TAPAS scores predict DEP attrition beyond the traditional screening variables used, such as schooling and AFQT?

1. Based on the findings on dominance, Commander, Naval Recruiting Command (CNRC) could consider implementing a policy where recruiters in charge of DEP pools are notified of individuals who score high in the dominance facet. This policy would enable recruiters to appoint these recruits to positions of authority within the DEP pool that best aligns with their personalities.
2. Based on the findings on intellectual efficiency, CNRC could consider implementing a policy that reduces the time spent in DEP for recruits scoring high in this facet. If this is not feasible, another option CNRC could consider is encouraging recruiters to interact more with these recruits and quickly provide them with as much information on their job choice as possible so the individual can be sure he or she made an informed decision.

3. Based on the findings on order, CNRC could direct local recruiters to develop a detailed monthly DEP activity schedule with both mandatory and optional events. This would be useful to all DEP recruits, and those with high order scores could organize and plan their routines around a known, set schedule of events while waiting to access to basic training.

4. The unique facets in TAPAS versions 7 and 8 should be evaluated more to better understand their predictive abilities for attrition behavior. As time progresses and more DEP attrition decision data are available, further research should be focused on these test versions and their five distinctive facets. Additionally, TAPAS developers, MEPCOM, CNRC, and researchers could work together to further revise these specialty facets.

5. Further research should be commissioned to investigate the predictive power of conduct and non-conduct waivers on DEP attrition. Although these waivers are observed to be significant in this analysis, further research should be conducted to validate this premise.

6. Understanding why some recruits attrite from DEP and others go on to basic training is critical if the Navy desires to lower recruiting costs. Employing TAPAS as a selection tool may aid decision makers in their efforts to identify recruits that are more likely to attrite earlier in the application process. Because attrition is a significant cost to recruiting, it would be beneficial to continue observing these recruits throughout basic training and their first-term to determine what is the long range predictive power of the TAPAS test. Non-cognitive skills and abilities are difficult to measure accurately and completely. Further research must be conducted on this subject to ensure the Navy is receiving the most accurate and complete information on its recruits. The TAPAS test should continually be reevaluated and updated to ensure it is providing the best and most precise depiction of the non-cognitive abilities of future sailors.

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