NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

AN ANALYSIS OF PERSONALITY TRAITS AND LEADERSHIP PERFORMANCE AT THE UNITED STATES NAVAL ACADEMY

by

Michael Crawford

March 2021

Thesis Advisor: Simona L. Tick
Co-Advisor: Jeremy A. Arkes

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE	*Form Approved OMB No. 0704-0188*

1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** March 2021	**3. REPORT TYPE AND DATES COVERED** Master's thesis

4. TITLE AND SUBTITLE AN ANALYSIS OF PERSONALITY TRAITS AND LEADERSHIP PERFORMANCE AT THE UNITED STATES NAVAL ACADEMY	**5. FUNDING NUMBERS**
6. AUTHOR(S) Michael Crawford	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000	**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.	**12b. DISTRIBUTION CODE** A

13. ABSTRACT (maximum 200 words)

To maintain its maritime advantage, the Navy must select and develop effective leaders. Organizations widely use information on personality traits of employees to help identify and develop leaders. In this thesis, I investigate whether extroverts are more likely to become leaders, and whether extroverts make better leaders. I use data on U.S. Naval Academy midshipmen who complete the Myer Briggs Test Indicator (MBTI) for personality type awareness. In their senior year, midshipmen have opportunities to be selected for leadership positions in the Brigade. Using data on senior midshipmen who graduated from USNA between 2005 and 2010, I estimate multivariate models to analyze the impact of extroversion on (a) selection for a leadership position and (b) leadership performance. The results show some evidence that extroverts might have a higher probability of selection for key battalion leadership positions, but not at the company leader level or below. The estimates find no difference in leader performance between introverts and extroverts, as measured by peer and senior officer evaluations. Some limitations of this analysis relate to the data: the MBTI might not be the best instrument for measuring extroversion, and the leader performance measures may be "noisy" indicators of true performance. Using the Big 5 personality test recently adopted by USNA, future research could add more insight into the impact of personality on leadership selection and performance.

14. SUBJECT TERMS performance, leadership, extroversion	**15. NUMBER OF PAGES** 81
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	**18. SECURITY CLASSIFICATION OF THIS PAGE**	**19. SECURITY CLASSIFICATION OF ABSTRACT**	**20. LIMITATION OF ABSTRACT**
Unclassified	Unclassified	Unclassified	UU

NSN 7540-01-280-5500 Standard Form 298 (Rev. 2-89) Prescribed by ANSI Std. 239-18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release. Distribution is unlimited.

AN ANALYSIS OF PERSONALITY TRAITS AND LEADERSHIP PERFORMANCE AT THE UNITED STATES NAVAL ACADEMY

Michael Crawford
Lieutenant, United States Navy
BS, U.S. Naval Academy, 2015

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
March 2021

Approved by: Simona L. Tick
Advisor

Jeremy A. Arkes
Co-Advisor

Marigee Bacolod
Academic Associate,
Graduate School of Defense Management

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

To maintain its maritime advantage, the Navy must select and develop effective leaders. Organizations widely use information on personality traits of employees to help identify and develop leaders. In this thesis, I investigate whether extroverts are more likely to become leaders, and whether extroverts make better leaders. I use data on U.S. Naval Academy midshipmen who complete the Myer Briggs Test Indicator (MBTI) for personality type awareness. In their senior year, midshipmen have opportunities to be selected for leadership positions in the Brigade. Using data on senior midshipmen who graduated from USNA between 2005 and 2010, I estimate multivariate models to analyze the impact of extroversion on (a) selection for a leadership position and (b) leadership performance. The results show some evidence that extroverts might have a higher probability of selection for key battalion leadership positions, but not at the company leader level or below. The estimates find no difference in leader performance between introverts and extroverts, as measured by peer and senior officer evaluations. Some limitations of this analysis relate to the data: the MBTI might not be the best instrument for measuring extroversion, and the leader performance measures may be "noisy" indicators of true performance. Using the Big 5 personality test recently adopted by USNA, future research could add more insight into the impact of personality on leadership selection and performance.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

2/C	Second Class or Junior Year
AECA	Athletic Extracurricular Activity
AQPR	Academic Quality Point Rating
CO	Company Officer
ECA	Extracurricular Activity
LCDR	Lieutenant Commander
MBTI	Myers Briggs Test Indicator
MQPR	Military Quality Point Rating
NAECA	Non-athletic Extracurricular Activity
OOM	Overall Order of Merit
SAT	Scholastic Aptitude Test
STEM	Science Technology Engineering and Math Majors

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

I want to acknowledge my wife and daughter for pushing me to get this done finally. Additionally, I would like to thank and acknowledge my advisors for their patience and sage wisdom.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

A. MOTIVATION

The Navy as an organization is interested in producing effective leaders. Some personality traits may be more likely associated with effective leaders (Judge et al., 2002). In some studies, there is a shared belief that relates leadership with extroversion. Hence, some might think that a successful leader must possess extrovert qualities such as communicating outwardly, making quick decisions, and developing extensive networks (Percy, 2019). However, some research shows that introverted leaders have advantageous skills to leadership (Kello, 2012). Their tendency to think about problems deeply before making rash decisions is an advantage to their leadership style. With great skills possessed by leaders in both personality groups, the question must be posed: when compared to extrovert leaders, are introvert Naval Officers disadvantaged in their ability to lead?

My goal for this study is to examine the relationship between personality traits as measured by the Myers Briggs Test Indicator (MBTI) and leadership performance and selection at the United States Naval Academy. The United States Naval Academy's mission is to "graduate leaders who are dedicated to a career of naval service" and become effective leaders (USNA, n.d. -b). There is a cultural myth that successful leaders must be extroverts (Percy, 2019). According to Myer Briggs, approximately 60 percent of the world prefer introversion or identify as an introvert; however, when considering leadership positions, roughly 39 percent identify as introverts ("Setting the Record," 2020). However, to develop trust, effectively manage teams of diverse Sailors, and tackle the challenges of the modern Navy, leaders might be well served by humility, empathy, and perspective-taking as essential traits for effective leadership to successfully manage future complex warfare. While extroverts may hold more leadership positions in the civilian sector, does this relationship hold true at the United States Naval Academy?

First-year students at the United States Naval Academy are administered personality tests to provide self-awareness during their professional development. Additionally, midshipmen are offered leadership opportunities during their senior year in

which, if selected, they can develop their leadership skills. Performance rankings are conducted each semester and are submitted with each midshipman's evaluation report. In order to examine whether there is a relationship between the personality trait of being extrovert or introvert and leadership selection and performance, I analyze the relation between midshipmen introversion, leadership emergence, and peer and company officer rankings.

SECNAV VECTOR 7, CNO FRAGO 01/2019, and NLDF 3.0 outlined the priority to develop warfighters to lead their teams using critical problem-solving skills while fostering an environment of trust throughout the command. The findings of this thesis may contribute to the U.S. Navy efforts to identify officers with potential for effective leadership to improve their leadership development.

B. RESEARCH QUESTIONS

In this thesis, I ask the following research questions.

1. How does the likelihood to occupy high leadership billets within the brigade differ, if at all, between introvert/extrovert midshipmen?
2. How do introvert/extrovert midshipmen, as measured by the Myers-Briggs Test Indicator, perform in peer and company officer evaluations?

The models used to address these research questions fail to identify extroversion as a significant predictor across the board for leadership billet selection and high leadership performance. Significant factors for leadership selection include Military Quality Point Rating and Academic Quality Point Rating. Concerning leadership effectiveness, gender is identified as a significant predictor of leadership performance.

C. SCOPE

The thesis examines whether extroverts are better leaders than introverts. The U.S. Naval Academy data on midshipmen offers an opportunity to test this hypothesis. My analysis focuses on midshipmen who graduated from the Naval Academy during the academic years 2005–2010. This study utilizes MBTI data obtained during the freshmen year at the Naval Academy to measure personality and provide self-awareness. The

research study focuses exclusively on the extrovert and introvert personality traits. It does not consider other markers such as intuitive/sensing, judgment/perception, and thinking/ feeling traits of the Myer Briggs personality profiles.

D. ORGANIZATION OF THESIS

This thesis is divided into six chapters. Chapter II provides background information necessary to understand the Naval Academy organization and ranking structure. Chapter III reviews current literature related to the study of leadership and personality. Chapter IV describes the data set, the variables used in the analysis, presents summary statistics and patterns in the data. Chapter V presents the statistical models and discusses the results. Chapter VI discusses the main findings as well as potential implications and recommendations for further study.

THIS PAGE INTENTIONALLY LEFT BLANK

II. BACKGROUND

A. LEADERSHIP

1. Defining Leadership

The Navy recognizes the continuing need to develop warfighters to lead their teams using critical problem-solving skills, while fostering an environment of trust throughout the command.

Leadership is an abstract concept. It is often easier to describe what leadership looks like when defining leadership. The U.S. Army defines leadership as "influencing people by providing purpose, direction, and motivation, while operating to accomplish the mission and improving the organization" (Department of the Army [DA], 2015). However, the Navy has not defined leadership in any formal doctrine. The closest definition is found in the Fundamental of Naval Leadership.

> The art, science, or gift by which a person is enabled and privileged to direct the thoughts, plans, and actions of others in such a manner as to obtain and command their obedience, their confidence, their respect, and their loyal cooperation. Simply stated, leadership is the art of accomplishing the Navy's mission through people. (Montor et al., 1984).

Based on this definition, one might say that leadership can be taught and reproduced. However, the art and gift of leadership are components that are often elusive in the efforts to teach others.

2. Leadership Trait Theory

The art and gift of leadership components are so elusive, it compels some to believe that leaders are born or at least leaders possess innate qualities that make them more disposed to higher leadership performance. The idea that people have inherent qualities that yield higher leadership performance is the fundamental tenet to the Leadership Trait theory. This theory was first introduced by Thomas Carlyle, a historian who studied the lives of renowned leaders throughout history and developed the idea that certain individuals possess innate qualities that make them great leaders (University of Leicester,

2010). These qualities are often difficult to self-identify. Usually, for leaders to become aware of their traits, psychometric metrics from personality typing tests reveal hidden or unknown characteristics to leaders and develop self-awareness.

3. Personality Typing

In 1921, Carl Jung introduced psychological typing based on observations during his clinical work (Jung et al., 1976). Jung asserted that there are two main psychological types: extroversion and introversion. Additionally, within those types, individuals could possess preferences for a second psychological function, two rational types (Thinking and Feeling) and two irrational types (Sensation and Intuition) (Jung et al., 1976). Jung developed eight psychological types: extroverted thinking, introverted thinking, extroverted feeling, introverted feeling, extroverted sensation, introverted sensation, extroverted intuition, and introverted intuition, also known as the Jungian psychological types (Jung et al., 1976). Jung describes extroversion as an "outward turning of the libido" and introversion as a "turning inwards of the libido." Essentially, everyone who prefers extroversion "thinks, feels, and acts in relation to that object," while those who prefer introversion "think, feel, and act in a way that clearly demonstrates the individual is of greater value than the object" (Jung et al., 1976).

Much of Carl Jung's work in psychological typing is difficult to understand for the layman person in order to gain self-awareness about themselves. However, Isabel Briggs Myers and Katherine Cook Briggs (1998) sought to "enable individuals to grow through an understanding and appreciation of individual differences in their personality." Building upon Jung's work, Myers and Briggs added another element to psychological typing. Myers and Briggs asserted that Jung's works describe the orientation of energy and orientation to the external world. However, Meyer and Briggs considered an additional psychological function to describe people with different attitudes, adding perception and judgment as mental functions. With these other functions, they developed four MBTI dichotomies known as extroversion/introversion, intuition/feeling thinking/sensation, and judging/perceiving. These four dichotomies define the domains of mental functioning. Furthermore, Myers and Briggs asserted that a person's personality type resulted from the

interactions of the four dichotomies resulting in 16 different personality types to describe an individual. Myers and Briggs developed a testing instrument known as the Myers Briggs Test Indicator (MBTI) to support individuals in their quest to understand their personality type. This indicator has undergone several revisions over time, and it is now widely used by a vast array of organizations including education, psychotherapy, career development, and leadership coaching.

B. USNA LEADERSHIP OPPORTUNITIES

1. USNA Background

The United States Naval Academy's mission is to "develop leaders dedicated to a career of naval service" (USNA, n.d.-b). Students who attend the Naval Academy are known as midshipmen.

Each class admits approximately 1000–1200 students per year (USNA, n.d.-a). Admission to USNA is determined by a board that reviews an applicant's high school non-athletic and athletic extracurricular activities, high school academic profile, SAT math and verbal scores, military affiliation, teacher recommendations, medical and physical readiness, and community involvement (USNA, n.d.-a).

Upon arrival to the Naval Academy, midshipmen enter their freshmen year beginning their academic and military studies. As a part of their professional courses, midshipmen take several leadership courses to develop their leadership style. During freshmen year, midshipmen take the MBTI to gain self-awareness about their personality traits.

Additionally, midshipmen are required to participate in an athletic sport. Opportunities are available for midshipmen to participate in varsity and club athletics. These opportunities come with more responsibility as practices and games are mandatory for midshipmen to attend and require additional time commitments. If midshipmen do not desire to compete on this level, intramural sports are available for midshipmen to compete against various other teams in the brigade.

The Naval Academy offers 26 majors for midshipmen to study. Midshipmen are required to take difficult courses, such as thermodynamics and electrical engineering, regardless of their major. All midshipmen receive a bachelor of science due to the required additional technical courses taken. As evidenced in the summary statistics in Chapter IV below, more than half of a midshipmen cohort holds STEM majors.

The student body, known as the Brigade, is comprised of approximately 4000 students. A Brigade is comprised of two regiments, each having six battalions. Within each battalion there are five companies, generating thirty companies in a brigade (USNA, n.d.-b). As seniors graduate, incoming freshmen are added to the company upon completing their summer indoctrination.

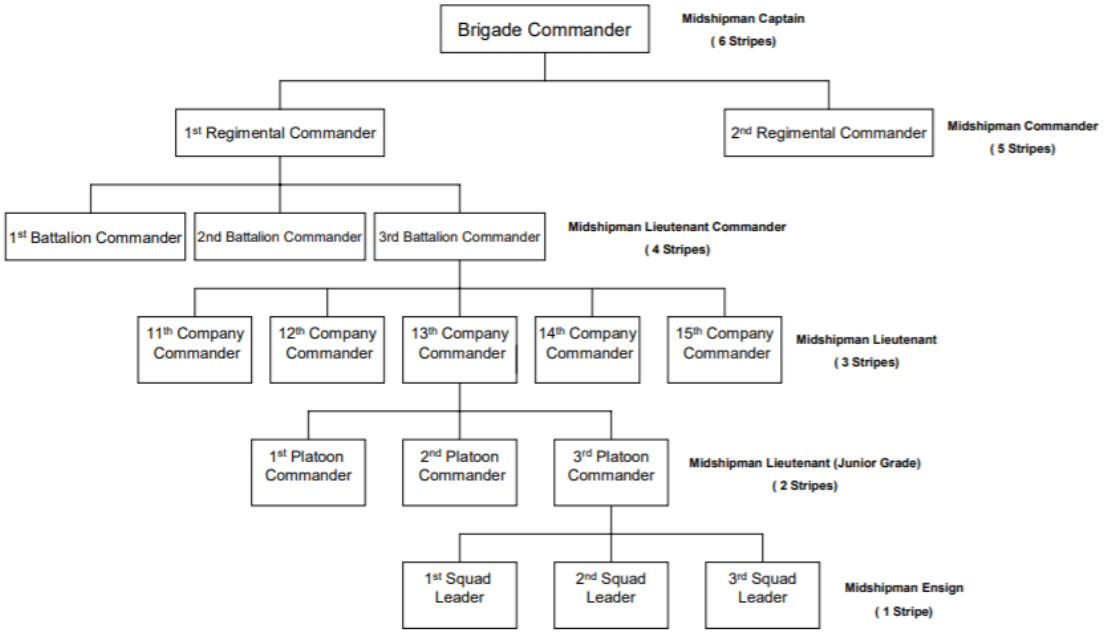
2. Leadership Billets

Each semester, midshipmen are offered opportunities to develop their leadership skills through various leadership billets in the brigade. During senior year, midshipmen are expected to participate in a leadership billet and are offered more opportunities to lead than in previous years. Senior year is the last year midshipmen have an opportunity to fine-tune their leadership style before commissioning to the fleet where their leadership mistakes carry more weight.

Midshipmen are nominated by their chain of command for striper billets. Striper billets are occupied by seniors to offer them opportunities to further develop their leadership before commissioning. Members in the chain of command strive to select midshipmen who represent the Brigade as a whole. Company Officers should select "Midshipmen who set the example, make the chain of command work, delegate and supervise, and maintain the standards" (Unites States Naval Academy [USNA], 2013). Company Officers are free to nominate midshipmen who volunteer for leadership billets. Midshipmen are encouraged to volunteer for leadership billets, but volunteering should not be the only method for nominations. Additionally, academic and military aptitude should not be the sole metrics for identifying potential leaders. Company Officers should strive to select midshipmen who fit the job best and can handle the added responsibility.

After Midshipmen are nominated by their chain of command, a board is held at each respective billet level (Brigade, Regimental, Battalion, Company). Midshipmen who were nominated for brigade positions undergo several boards as they must gain approval from the company and battalion chain of command before being forwarded to the brigade selection board. The board is comprised of a mix of faculty and midshipmen. Once the board adjourns, the striper candidates are submitted to the Commandant of Midshipmen for final approval. Figure 1 displays an organizational chart of the Brigade of Midshipmen.

Figure 1. Brigade Organizational Chart. Source: Stonaker (2005).



There are several leadership positions within the brigade, as illustrated in Figure 1. In this study, I categorized leadership positions into two groups: one for high-level leaders and the other for low-level leaders. The first group (high-level leaders) includes high-level leaders in the brigade at every organizational level (Brigade, Regimental, Battalion, Company) and it contains three subsets. The first subset refers to Commanders, which represent the top leader at each organizational level: Brigade Commander, Regimental Commander, Battalion Commander, and Company Commander. The midshipmen in these billets are in charge of 150–1200 midshipmen, based on their billet description. The second

subset is the Triad. The triad represents the top three midshipmen at each organizational level (Brigade, Regimental, Battalion, and Company) and includes the organizational Commander, Executive Officer, and Operations Officer. The last subset is the Midshipmen Lieutenant Commander (MIDN LCDR) and above. At the Naval Academy, midshipmen receive ranks based on the billet they hold. The higher ranks, LCDR and above, are highly selective and carry great responsibility. The majority of LCDR and above billets are not shown in Figure 1, as they are primarily supporting leadership billets for the regimental commander and brigade commander. The only position at the battalion level that merits the rank MIDN LCDR is the battalion commander.

These groups define different high-level leadership billets as they differ in responsibilities and selection board criteria. Commanders represent high-level leadership by definition and in selectivity and responsibility as Commanders are accountable for the hundreds of midshipmen subordinate to them. This group represents billets that are difficult to obtain as the higher the organizational level, the larger the pool of applicants that apply for that billet. Midshipmen can only be selected to command for the organization they are a part of. For example, a midshipman in First Company can only apply to be First Company Commander, First Battalion Commander, First Regimental Commander, or Brigade Commander. If this midshipman is nominated for First Battalion Commander, they are competing with other midshipmen in the Battalion, composed of five other companies.

The triad defines high leadership billets that include the top three positions. While the triad includes Commanders, it also includes Executive and Operations Officers. The additional billets form the first level of support for the Commanders. However, the Commanders' responsibilities only fall on these additional positions should the Commander become temporarily unavailable. To be entrusted with filling in for a top-level position is a good indicator of leadership responsibility and difficulty.

Lastly, the LCDR and above billets represent the billets that merit the rank MIDN LCDR and above. These staff and command billets are high-level leadership billets as they are at the highest organizational levels in the brigade. The majority of the billets are at the Regimental and Brigade Level, with only one billet at the Battalion level.

The second group of leadership billets is based on the company chain of command. The chain of command flows down from the company commander to the platoon commander to the squad leader at the company level. The company commander leads the entire company composed of approximately 150 midshipmen. Each company has three to four platoons based on company size lead by a platoon commander. In each platoon, there are approximately three to four squads based on company size. Each squad has approximately 12–14 midshipmen. The number of midshipmen at each level of command at the company level is far less than the number of midshipmen high-level leaders are accountable for. These three positions will be examined separately to determine the relationship between personality and leadership at the company level.

3. Rankings

Midshipmen rankings are conducted semi-annually, in November and April. Rankings are an assessment of a midshipman's overall performance within the Brigade. Midshipmen receive rankings from their peers, upperclassmen, and their Company Officer. Raters are instructed to consider the semester performance of each midshipman with respect to their aptitude (USNA, 2018). Senior midshipmen only receive rankings from peers and company officers. Midshipmen do not receive a ranking for that semester for billets which require midshipmen to reside out of company such as Brigade or Regimental Commanders. Midshipmen do not receive an objective metric to use when ranking other midshipmen. They are encouraged to rank the top five and bottom five midshipmen, providing comments for their reasons and then instructed to rank the remaining midshipmen in between, offering comments as they see fit.

THIS PAGE INTENTIONALLY LEFT BLANK

III. LITERATURE REVIEW

A. THE LINK BETWEEN PERSONALITY TRAITS AND LEADERSHIP

According to Myer Briggs, personality traits, such as extroversion, are believed to provide an advantage in leadership positions due to the nature and role of the position. Most leaders need to communicate with a team, be able to enjoy being in the company of others, and make decisions quickly. These requirements yield opportunities for extroverts to excel. Extroverted leadership involves being self-assured, confident, controlling the focus of the group, conversational, and dominant (Grant et al., 2011). Extroverted leaders are viewed by their team as gregarious, friendly with a loose attitude, and even transformational (Stephens-Craig et al., 2015; Judge, 2004). Extroversion has been shown to be correlated with leadership emergence (Bono and Judge, 2004).

However, other studies claim that if successful leaders are those who contribute the most to advancing the mission of an organization, introvert leaders have their set of advantages. Introverted people can make more thoughtful leaders who encourage their team to take initiatives, be innovative, and share their ideas to advance the organization's mission. Introverted leadership depicts quiet leaders who sit back and think and seldom take careless and thoughtless actions. These leaders are often mistakenly referred to as shy when they are rather more introspective, cautious, detail orientated, and data-driven exhibiting a preference for solitary work (Kello, 2012). Their teams see introvert leaders as leaders who think before they speak and talk about facts more than emotions (Stephens-Craig et al., 2015).

B. LEADERSHIP EMERGENCE VS LEADERSHIP EFFECTIVENESS

Many studies attempted to measure the relation between personality traits and leadership. Leadership trait theory has been reviewed broadly regarding effectiveness and emergence (Hogan et al., 1994). Leadership emergence describes the point of view in which we determine what measures are required to become a leader. Leadership effectiveness views the effectiveness of an established leader. Several studies have used surveys, others use meta-analytic models to determine if personality is related to leadership

emergence or leadership effectiveness. Dana Stephens-Craig (2015) conducted a study to connect the positive traits of introverts to desirable leadership roles. She interviewed 31 voluntary participants who were recruited based on their leadership positions. These 31 participants offered their opinion concerning the qualities of leadership against personality. Concerning which personality was more likely to determine an effective leader, only 5 of 31 participants stated that individuals who prefer extroversion make capable leaders. The majority of the panel believed that both personality types could become effective leaders based on their experience working with and observing leaders of both personality types. Grant et al. (2011) conducted a field study in which managers and employees at 130 franchises of a U.S. pizza company completed a questionnaire to determine the effectiveness of extroverted leaders who lead proactive teams. Pizza stores with leaders who identified as preferring extroversion achieved higher profits when paired with a passive team. Proactive teams work better with introverted leaders.

Judge et al. (2002) conducted a qualitative and quantitative review of the leadership trait theory. In their study, the authors noted 222 correlations between leadership and extroversion in 73 samples. They concluded that "extroversion consistently correlated with leadership" (Judge et al., 2002). In their review, Judge et al. (2002) separated leadership into two categories: "leadership emergence and leadership effectiveness." They used a broad definition of leadership however excluded articles that based leadership on salary or were based on self-reports. When comparing leadership emergence and effectiveness, extroversion was more strongly related to leadership emergence (Judge et al., 2002).

In a later study, Judge and Bono (2004) found extroversion highly correlated with transformational leadership. The authors focused on leadership because leaders can be transformational or transactional in their leadership style. Transformational leadership is based on the five dimensions as noted by Bass (1985). These dimensions include idealized influence, inspirational motivation, intellectual stimulation, individual consideration. Transactional leadership is based on "conditional rewards, active management by exception, passive management by exception" (Bass, 1985). Extroversion was found to be highly correlated amongst both styles of leadership. Concerning transformational leadership, extroversion was linked to the charisma dimension, intellectual stimulation, and

individualized consideration. However, extroversion was not strongly related to transactional leadership. Passive management by exception was the only dimension negatively correlated to extroversion (Judge and Bono, 2004).

Derue et al. (2011) conducted a meta-analysis study to explore the combined effects of leadership behavior and leadership traits on leadership effectiveness. Leadership effectiveness is defined as "individual leader effectiveness, group performance, follower satisfaction with leader, and follower job satisfaction" (Derue et al., 2011). They found that leadership traits and behavior combined "explain a minimum of 31 percent of the variance in leadership effectiveness from a sample of 105 studies." Leadership traits are defined as gender, intelligence, and the Big Five personality traits. Leadership behavior is defined as select dimensions of transformational and transactional leadership. Extroversion as a trait explained 27.9 percent of the variance in leadership effectiveness as defined by job follower satisfaction and 35.3 percent for overall leader effectiveness.

C. NAVAL ACADEMY LEADERSHIP EMERGENCE AND EFFECTIVENESS

In the military, leadership is a key attribute to a successful service member. Several studies have investigated the relationship between personality traits, such as introversion/ extroversion, and leadership capability.

At the Naval Academy, each midshipman is developed to become a leader of Sailors and Marines. Many of the midshipmen who attend the Academy are leaders in their own communities before they arrive. Since all midshipmen have the potential to lead and are thrust into numerous leadership exercises to develop their leadership skills, it stands to reason that all midshipmen are leaders but have yet to prove that they can become naval leaders. Midshipmen become naval leaders upon commissioning after completing the requirements for graduation. In this sense, I assert that leadership emergence can be studied regarding the persistence of midshipmen. Midshipmen who do not attrite from the Naval Academy become leaders of sailors and marines. With this metric, I can investigate the relationship between personality and leadership emergence.

The Naval Academy, on average, accepts 10.9 percent of all applicants; thus, those who are admitted should have enough merits to graduate. Roush (1989) conducted a study to determine the relationship between personality and attrition at the United States Naval Academy. With a sample of 105 midshipmen in the class of 1991 and 134 midshipmen in the class of 1992, Roush used a Selection Ratio Type Table Comparison to determine that most midshipmen who did not persist were Introverted, Intuitive, Feeling, and Perceptive types. Specifically, the study found that midshipmen who were rated with the feeling type, as determined by the MBTI administered during their freshmen year, were twice as likely to attrite from the Naval Academy, compared to the midshipmen with a preference for thinking. The only personality type significantly more persistent, when compared to all 16 types, and less likely to resign, was the ESTJ type. Roush asserted that introvert midshipmen were forced to live out of type daily. The rigor and demand of the Naval Academy force midshipmen to live in tight quarters with one another and constantly interact with other midshipmen.

The notion that the ESTJ type is more likely to succeed at the Naval Academy is echoed in other studies. Murray (2001) and Panesh (2002) both found that the majority of midshipmen are ESTJ. Murray (2001) conducted a study using a sample of 1568 female midshipmen admitted to the Naval Academy during 1988–1996 to evaluate whether "personality type was predictive of attrition." Murray discovered that both ISFP and ENFP types were more likely to attrite. Murray (2001) asserts that due to the "retiring, quiet, sensitive and modest nature of the ISFP type, they generally do not care leadership roles and are often relaxed about accomplishing tasks." Panesh (2002) conducted a logistic regression study to examine if the MBTI and other personality measures could predict attrition better than career interest inventory. With a sample of 5691 midshipmen from 1995–2000, Panesh found that the E, T, and J types were powerful predictors for attrition. The ESTJ types tend to be practical, realistic, decisive, avoiding abstract theories, preferring direct and immediate application (Murray, 2001). The midshipmen who persist, the leadership candidates who survived, performed well by quickly adapting to the rigor of military leadership and persisting to graduation.

Concerning the relationship between Personality and leadership effectiveness in the Military, McCormack and Mellor (2002) conducted a study with 99 Australian Commissioned Army Officers. The authors used a prediction model to determine if the five-factor model or personality provided accurate predictors for leadership effectiveness. Leadership effectiveness in this study was defined into two categories. The authors surmise that individuals who could attain admission into the Army Command Staff College show competency in their jobs and are deemed by the organization as effective leaders. Additionally, officers obtained annual evaluations from their respective senior officers evaluating their performance. Utilizing both metrics as a means for leadership effectiveness, the authors determined that personality traits had a 76 percent success rate in determining which officers attended or graduated from the staff college and which officers did not. Additionally, the authors noted that only 60 percent of the personality study were identified as significant predictors of admittance at the Army Command Staff College. For this model, the three personalities that were identified were personality traits, extroversion, openness, and conscientiousness. Similarly, extroversion and conscientiousness were the only two out of the five personality traits that were identified as significant predictors of evaluations scores

Alsina (2005) conducted a study to determine the difference in success at the Naval Academy between Hispanic and various other groups, including personality groups. With a sample of 7127 midshipmen, Alsina defined success by graduation and other performance metrics such as Military aptitude and occupation of senior leadership positions. Alsina determined that personality types ESTJ, ISTJ, ESFJ, ISFJ were more likely to receive the grade of an A in military aptitude when compared to the other 12 personality groups. Alsina defined this group as guardians who typically were composed of members that "gravitate towards civil servant posts and maintained a high sense of institutional customs and culture," attributes that are important in a military setting.

While there is a substantial amount of literature that analyzes leadership emergence through the persistence of midshipmen at the Naval Academy, few studies analyze the leadership effectiveness of the students who remained. This thesis aims to measure the leadership effectiveness of those who persisted at the Naval Academy.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. DATA AND SUMMARY STATISTICS

A. DATA

1. Data Overview

The data used for this study were obtained from the Naval Academy's Institutional Research Department. The sample includes data on six consecutive cohorts of USNA students who entered the Naval Academy between 2001 and 2006 and were seniors between 2005 and 2010. The data set contains information from their admissions and cumulative semester (Fall and Spring) information from their freshman, junior, and senior years. The data include information on demographic characteristic (race, gender), high school background (high school extracurricular activities), admission information, class year, MBTI personality type, athletic status (club, varsity athlete, intramural), academic major, military and academic aptitude, leadership position occupied, if any, and ranking received from peers and senior officers in the senior year. The total sample size includes observations on 6106 male and female midshipmen. Table 1 displays a summary of class size by graduation class year.

Table 1. USNA Cohort size

Class Year	Class Size
2005	967
2006	989
2007	1033
2008	1039
2009	1050
2010	1028

2. Outcome Variables

To investigate the first research question on whether extroverts are more likely to be selected as leaders, I categorize leadership billets into two groups: high-level leaders and

low-level leaders. The first group includes high-level leaders in the brigade at every organizational level (Brigade, Regimental, Battalion, Company), which are more difficult to obtain selection. Within this first group, I define three subsets of leadership positions with the definitions shown in Table 2: Commanders, Triad, and LDCR and above. Dummy (binary) variables are created for the three groups of leadership positions, with the dummy variable for Commanders, Triad, and LDCR and above taking a value of 1 if a midshipman is occupying that respective billet or rank and 0 otherwise.

Table 2. High Level Leadership Outcome Variables

Variable	Definition
(Fall/Spring) Commander	Midshipmen selected for one of the following positions: Company Commander, Battalion Commander, Regimental Commander, Brigade Commander during the fall or spring semester =1; 0 otherwise
(Fall/Spring) Triad	Midshipmen selected for one of the following positions: (Company, Battalion, Regimental, Brigade) Commander, Executive Officer, Operations Officer during the fall or spring semester =1; 0 otherwise
(Fall/Spring) LCDR and above	Midshipmen selected for one of the following positions: Battalion Commander, Regimental Commander, Brigade Commander during the fall or spring semester =1; 0 otherwise

The second group of leadership billets is based on the chain of command at the Company level. Table 3 outlines how Company level leadership is defined in this thesis. Each dummy variable, for Company Commander, Executive Officer, and Platoon Commander, takes a value of 1 if a midshipman occupies that respective billet, and 0 otherwise.

Table 3. Low Level Leadership Outcome Variables

Variable	Definition
(Fall/Spring) Company Commander	Midshipmen selected for Company Commander during the fall or spring semester =1; 0 otherwise
(Fall/Spring) Company Platoon Commander	Midshipmen selected for Company Platoon Commander during the fall or spring semester =1; 0 otherwise
(Fall/Spring) Company Squad Leader	Midshipmen selected for Company Squad Leader during the fall or spring semester =1; 0 otherwise

To address research question two, I use peer rankings and company officer rankings as measures of each leader's effectiveness in a given billet. The model is specified to examine the likelihood of ranking in the top quartile of the company on each evaluation. This will be discussed further in the methodology chapter. However, the dependent variable for research question two will be a binomial variable that takes a value of 1 if a midshipman was ranked highly (in the top quartile) in their respective company by their peers and company officers, and 0 otherwise. Table 4 provides definitions of four different performance variables based on rankings by peers and company officers.

Table 4. Company Officer and Peer Ranking Variables

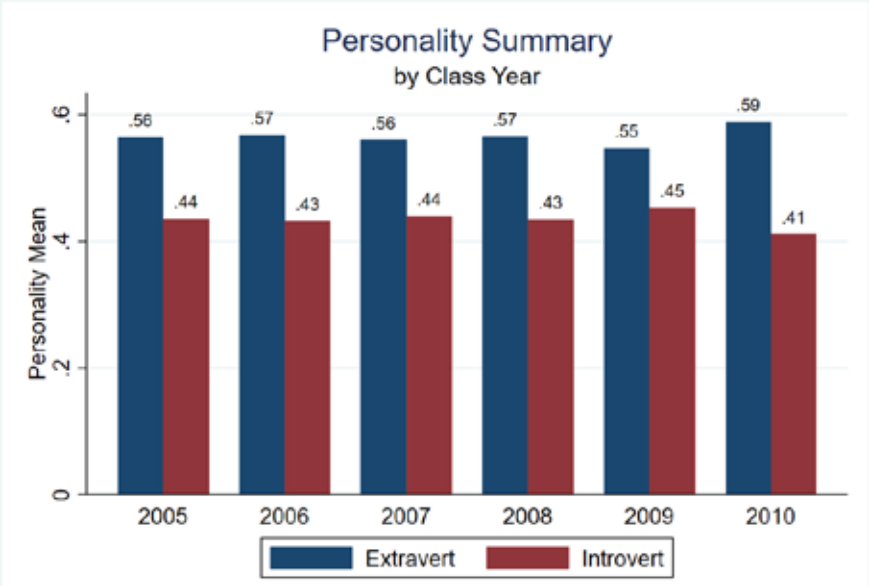
Variable	Definition
Fall Top Quartile CO Rankings	Midshipmen ranked in the top quartile of Company by Company Officer during Fall Semester=1; 0 otherwise
Fall Top Quartile Peer Rankings	Midshipmen ranked in the top quartile of Company by Peers during Fall Semester =1; 0 otherwise
Spring Top Quartile CO Rankings	Midshipmen ranked in the top quartile of Company by Company Officer during Spring Semester =1; 0 otherwise
Spring Top Quartile Peer Rankings	Midshipmen ranked in the top quartile of Company by Peers during Spring Semester =1; 0 otherwise

3. Main Explanatory Variable

Extroversion is the main explanatory variable in the models estimated in this study. The MBTI offers information about a person's full personality profile. As mentioned in the Background in Chapter II, different personality combinations exist for each individual. For this study, we will on focus on the extroversion/introversion scale. The MBTI test examines what personality a person prefers based on the response to a series of questions. As each question is answered, a point value is either added to or subtracted from an initial base of 0. If an individual answers questions that favor extroversion, positive values are added to the score. If a person answers questions that favor introversion, points are deducted from the total score. If the final score is positive, a person is rated as having a preference for extroversion; conversely, if the total score is negative, that person prefers introversion. Based on this scoring, the MBTI reveals to the test taker their personality preference. For this study, the final preference assigned was used to create a dummy variable that takes a value of 1 if an individual identified as an extrovert, and 0 otherwise.

In the academic literature, the MBTI score has been criticized as an unreliable indicator of an individual determining a personality profile (Pittenger, 1993). Pittenger highlights that observed differences in profiles assigned when an individual retakes the test raises doubts about the validity of the test. Additionally, Pittenger asserts that the number of personality types associated with the MBTI is far from the original eight Jungian personality types. Pittenger and others have pushed for adopting newer personality inventories, such as the Five-Factor Model, also called the Big 5. The Big 5 focuses on five personality spectrums and has been praised for providing more accurate assessments of individual personality profiles. However, it is still unclear if the Big 5 has better prediction ability than the MBTI at this moment. Currently, the only personality data available from the Naval Academy is from the MBTI. Figure 2 displays the personality distribution by class year and shows that the majority of midshipmen are classified as extroverts

Figure 2. Distribution of Personality Type by Class Year



4. Control Variables

The control variables for the leadership selection model will include race, gender, athletic status, major, military and academic aptitude, high school profile, prior-enlisted service, and class year. The leadership effectiveness models will omit the high school profile information as this information is not made available to midshipmen when they make their rankings. Figures 3 and 4 describe the gender and race profile of the brigade by class year. Gender and race variables were defined as dummy variables where the value 1 indicates that the midshipmen belonged to that category and 0 indicates the midshipmen belongs to the comparison category. For all models, Caucasians and males were the comparison categories. Table 5 outlines how the binomial variables for race and gender were defined in the model. Figure 3 shows that the representation of women at USNA has grown from 15 percent in 2005 to 21 percent in 2010. Figure 4 shows that most midshipmen are Caucasian, accounting for approximately 78 percent of the sample, with the next largest group being Hispanic at 9.1 percent.

Table 5. Demographic Variables

Variable	Definition
Male	1 = Midshipmen is male; 0 otherwise
African American	1 = Midshipmen is African American; 0 otherwise
Caucasian	1 = Midshipmen is Caucasian; 0 otherwise
Hispanic	1 = Midshipmen is Hispanic; 0 otherwise
Asian	1 = Midshipmen is Asian; 0 otherwise
Other	1 = Midshipmen is Native American, Native Hawaiian, or mixed-race; 0 otherwise

Figure 3. Gender Profile Summary by Class Year

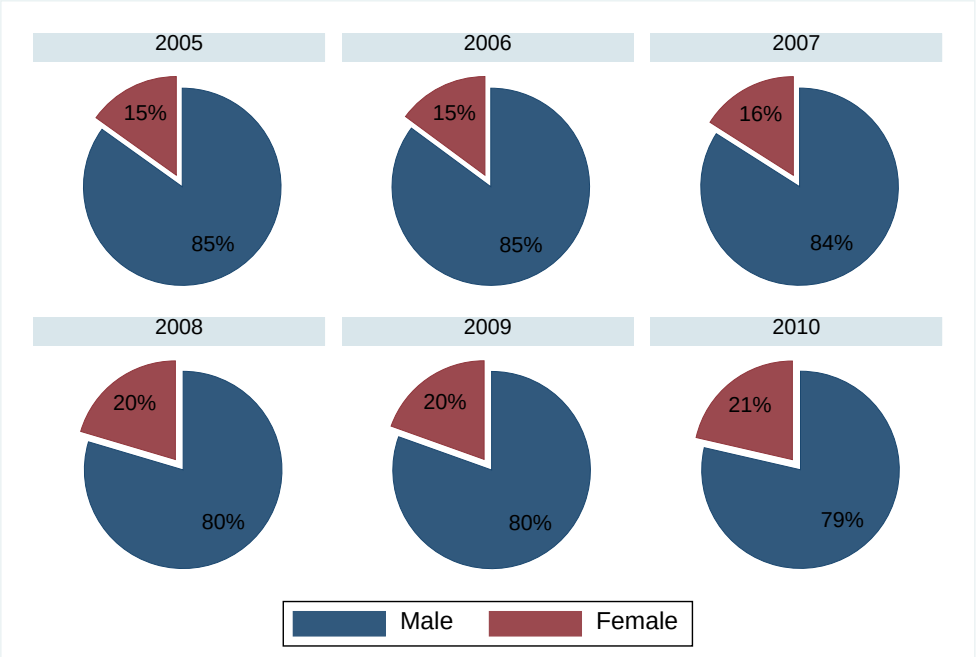
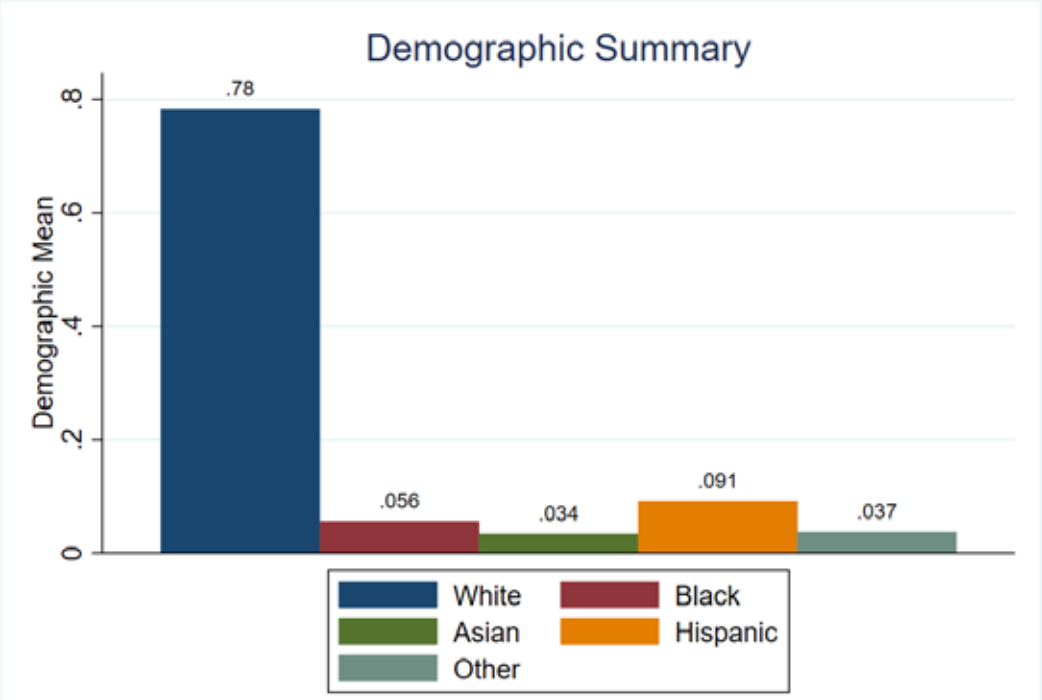


Figure 4. Race Demographic Summary



Each midshipman is required to participate in a sport. Midshipmen are afforded the opportunity to participate in varsity, club, or intramural activities. Varsity and club athletics are more demanding than intramural activities as they require scheduled practice time and scheduled travel. Intramural activities are conducted at the Naval Academy and are more similar to friendly competition amongst the companies in the brigade. Table 6 outlines the definition for each binary variable that captures the three different athletic participation categories to use in the regression models.

Figure 5 describes the distribution of athletic status by class year and shows most midshipmen participate in intramural sports. Table 7 displays a t-test of the difference in means between varsity, club, and intramural Athletics by personality. The t-test shows that extroverts are more likely to participate in Varsity and Intramural sports than are introverts.

Table 6. Definition of Midshipmen Athletic Participation Variables

Variable	Definition
Junior Varsity Athlete	1 = Midshipmen participated in a Varsity sport during Junior Year; 0 otherwise
Junior Club Athlete	1 = Midshipmen participated in a Club sport during Junior year; 0 otherwise
Junior Intramural Athlete	1 = Midshipmen participated in an intramural sport during Junior year; 0 otherwise

Figure 5. Athletic Summary by Class Year

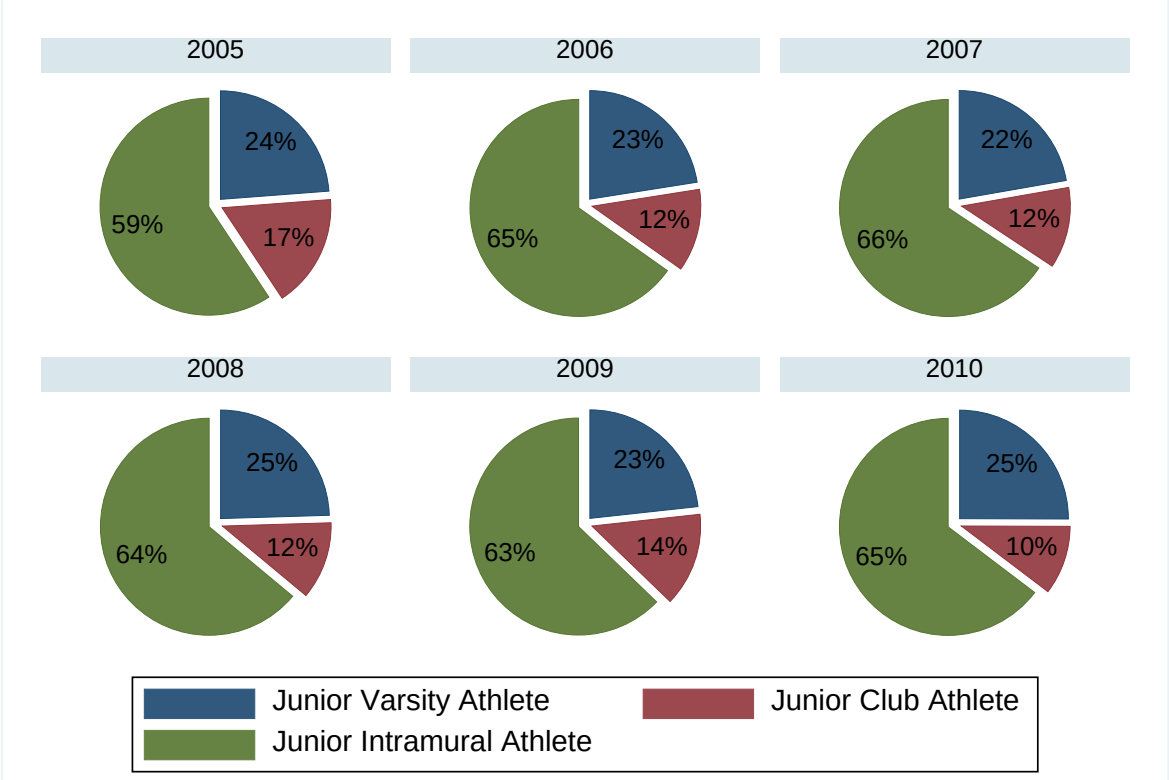


Table 7. Junior Athletic Status T-Test, by Personality Type

Variable	Extrovert	Introvert	T-test
Varsity Athlete (n=5840)	0.259 (n=3307)	0.195 (n=2533)	-5.74***
Club Athlete (n=5840)	0.131 (n=3307)	0.124 (n=2533)	-0.82
Intramural Athlete (n=5840)	0.612 (n=3307)	0.681 (n=2533)	5.45***

***Significant at one percent level.

In total, the Naval Academy offers 26 academic majors for midshipmen to select for an undergraduate degree. For the analysis, academic majors are categorized into STEM majors or Non-STEM majors, categorized by the Naval Academy (USNA, n.d.-c). Approximately 58 percent of midshipmen pursue a STEM major.

Additionally, some applicants who are prior enlisted can apply to the Naval Academy. Approximately 7.6 percent of midshipmen were prior enlisted before arriving at the Naval Academy. Their experience in the military potentially adds an advantage in terms of leadership emergence and effectiveness as they have been exposed to practical military leadership and have begun to develop their own leadership styles.

Military and Academic Aptitude are based on the cumulative Military Quality Point Rating (MQPR) and Academic Quality Point Rating (AQPR). AQPR is the cumulative grade point average on a 4.0 scale in all academic courses. MQPR is the cumulative grade point average on a 4.0 scale based on performance in five different areas: professional courses, military performance conduct, military aptitude, and physical education (USNA, 2017). Table 8 below displays the value each area is assigned. In each MQPR area, midshipmen receive a letter grade which corresponds to a point value,

A=4 B=3 C=2 D=1 F=0

The point values are multiplied by the coefficient shown in Table 8 and averaged based on available points to determine the MQPR. AQPR scores on calculated similarly except that there are no additional coefficient tables to multiply letter grade points. Points from grades are sum and averaged over available points to determine AQPR score. Table 9 displays a t-test of differences in the means for Junior Spring Cumulative AQPR and MQPR by personality type. For academic aptitude, midshipmen who prefer extroversion have a lower AQPR compared to midshipmen who prefer introversion. The difference in means between extrovert and introvert midshipmen concerning MQPR is not significant.

Table 8. Military Order of Merit Coefficient. Source: USNA (2017)

	4/C		3/C		2/C		1/C		Total	Percent
Factor	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring		
Aptitude	7	7	8	8	9	9	10	10	68	44.56%
Conduct	3	3	3.5	3.5	4	4	4.5	4.5	30	19.66%
Professional Courses	2	2	2	2	2	2	2	2	16	10.48%
Physical Education	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	25.6	16.78%
Athletic Performance	3		3		3		4		13	8.52%
Total									152.6	100%

Table 9. T-Test for Junior Cumulative AQPR and MQPR

Variable	**Extrovert**	**Introvert**	**T-test**
Junior Cumulative AQPR (n=5840)	2.97 (n=3307)	3.04 (n=2533)	5.42***
Junior Cumulative MQPR (n=5840)	3.14 (n=3307)	3.13 (n=2533)	1.31

***Significant at one percent level.

Lastly, in the models, binary variables are included for the class year to control for the unobserved difference between class years.

Company Officers strive to nominate midshipmen who best represent the brigade. Fox (2003) outlines a qualitative study interviewing various military faculty regarding leadership billet selection. His work found that measures such as performance in sports, academics, military courses inform the board about the performance of an individual and may influence their decision to select that midshipmen for a billet. If variables like AQPR, MQPR, athletic participation are correlated with extroversion, in order to estimate the direct impact of personality type of leadership selection and performance, they have to be included as control variables in the estimating equations.

B. SUMMARY STATISTICS

Table 10 displays the sample summary statistics for the variables included in the models. The sample is 82.1 percent male, 78.2 percent white, and 56.6 percent extrovert. The majority, at 64 percent of the sample, is involved in intramural sports. The largest number of leadership positions are offered at the company level, representing about 8.5 percent of the sample in either the Fall or Spring semester. Only about 3 percent of the sample is selected at the higher-ranked leadership positions of LCDR and above. About 7.5 percent of the sample if prior-enlisted, having served before attending the Naval Academy. More than half of the graduating midshipmen, at 58 percent of the sample, graduate with STEM degrees. The cumulative academic scores for the graduating class are, on average, at 2.9 out of 4 points, while the cumulative military score at, on average, at 3.1 out of 4 points in this sample.

Table 10. Summary Statistics for the Full Sample

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	Mean	Standard Deviation	Min	max
Male	6,106	0.821	0.384	0	1
Female	6,106	0.179	0.384	0	1
Black	6,089	0.0558	0.230	0	1
Asian	6,089	0.0337	0.180	0	1
White	6,089	0.782	0.413	0	1
Hispanic	6,089	0.0913	0.288	0	1
Other	6,089	0.0368	0.188	0	1
Average Company Size	5,753	33.38	2.791	26	41

	(1)	(2)	(3)	(4)	(5)
High School Athletic ECA	6,097	553.6	146.5	300	1,439
Extrovert	5,840	0.566	0.496	0	1
Introvert	5,840	0.434	0.496	0	1
High School Non Athletic ECA	6,089	533.5	150.6	300	1,725
2/C FALL Cumulative Academic QPR	6,106	2.971	0.531	1.870	4
2/C FALL Cumulative Military QPR	6,106	3.130	0.363	1.890	3.950
2/C SPRING Cumulative Academic QPR	6,106	2.992	0.522	1.860	4
2/C SPRING Cumulative Military QPR	6,106	3.129	0.351	2	3.930
Junior Varsity Athlete	6,106	0.236	0.425	0	1
Junior Club Athlete	6,106	0.128	0.335	0	1
Junior Intramural Athlete	6,106	0.638	0.481	0	1
Prior Enlisted	6,106	0.0766	0.266	0	1
STEM	6,106	0.580	0.494	0	1
Fall TRIAD	6,106	0.112	0.316	0	1
Spring TRIAD	6,106	0.110	0.313	0	1
Fall Commander	6,106	0.0378	0.191	0	1
Spring Commander	6,106	0.0375	0.190	0	1
Fall LCDR and above	6,106	0.0310	0.173	0	1
Spring LCDR and above	6,106	0.0318	0.175	0	1
Fall Company Triad	6,106	0.0863	0.281	0	1
Spring Company Triad	6,106	0.0847	0.278	0	1
Fall Company Commander	6,106	0.0290	0.168	0	1
Spring Company Commander	6,106	0.0290	0.168	0	1
Fall Platoon Commander	6,106	0.114	0.318	0	1
Spring Platoon Commander	6,106	0.112	0.315	0	1
Fall Squad Leader	6,106	0.266	0.442	0	1
Spring Squad Leader	6,106	0.208	0.406	0	1

Figures 6–9 display the distribution of personality types for each leadership group. Extroversion is the majority personality type at the Naval Academy. This finding is concurrent with other studies as well (Roush, 1989)

Figure 6. Personality Distribution for Fall Higher Leadership Group

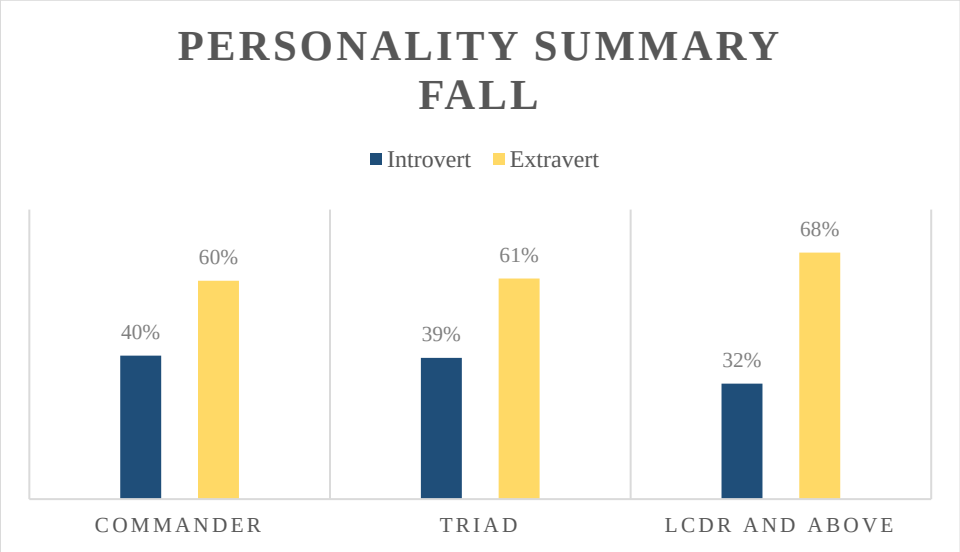


Figure 7. Personality Distribution for Spring Higher Leadership Group

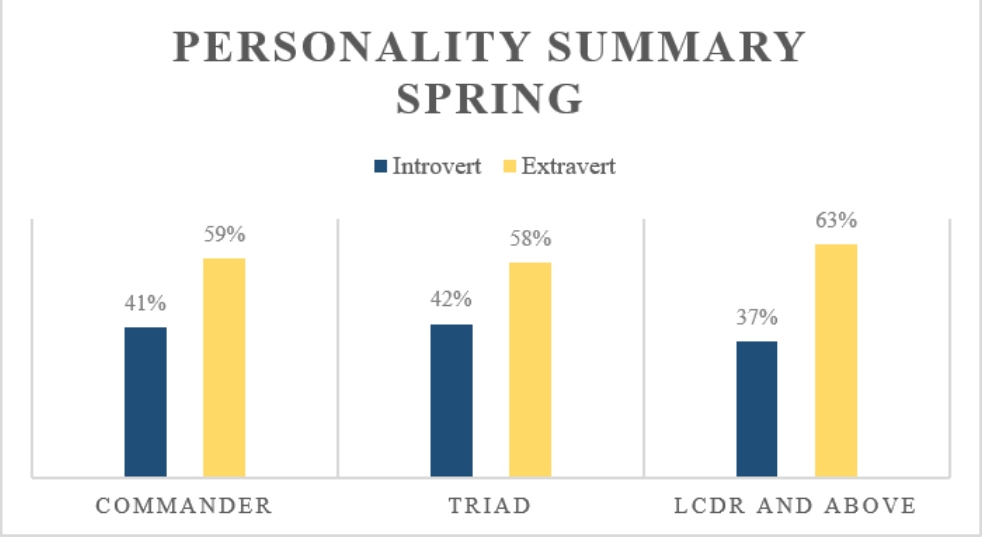


Figure 8. Personality Distribution for Fall Lower Leadership Group

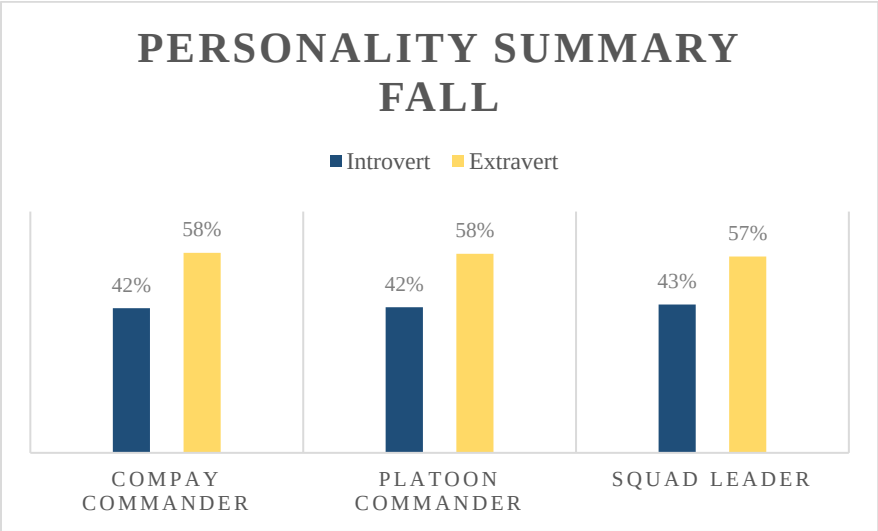
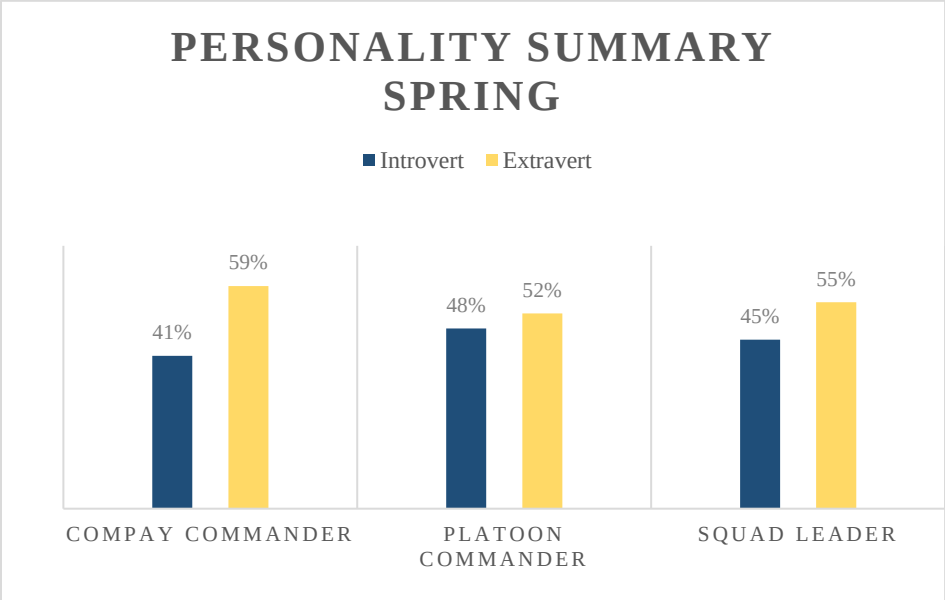
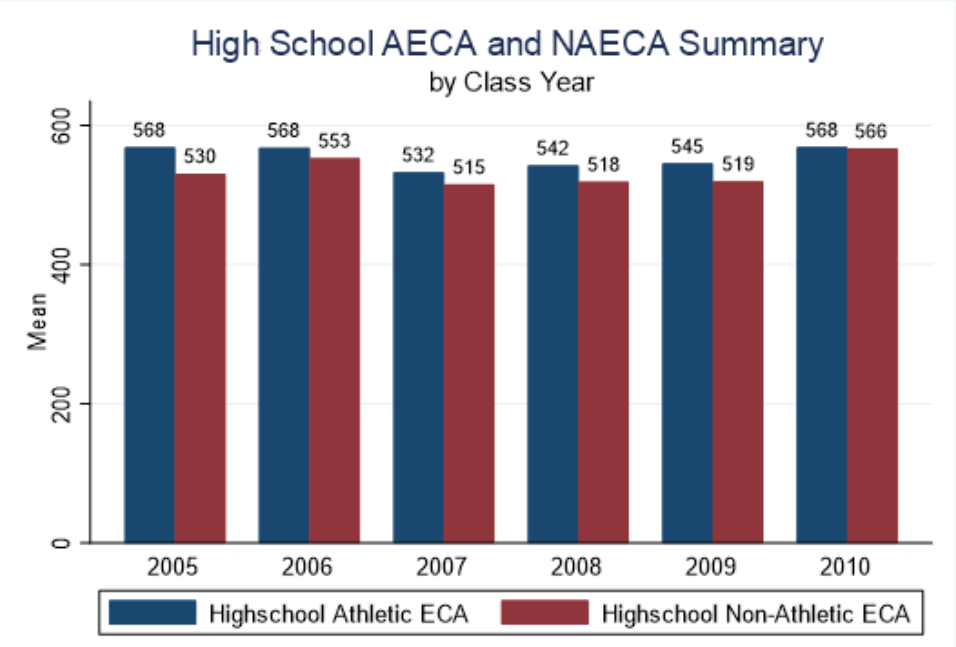


Figure 9. Personality Distribution for Lower Leadership group



During the USNA application process, the admission board assigns numerical point values for various athletic and non-athletic extracurricular activities. These points are assigned to identify midshipmen who have greater valuable experience in their high school ECA. A team captain of a particular sport will be assigned additional points to denote the applicant demonstrated leadership potential. An applicant who participates in multiple activities will receive more points to denote how active an applicant is compared to less active applicants. Figure 10 shows the summary for high school nonathletic ECA (NAECA) and high school athletic ECA (AECA). The minimum each applicant can receive is 300 for both NAECA and AECA. Midshipmen continue to earn points for every activity they report to the board.

Figure 10. High School Athletic and Non-athletic Extracurricular Activity Summary



THIS PAGE INTENTIONALLY LEFT BLANK

V. ANALYSIS AND DISCUSSION OF RESULTS

A. METHODOLOGY

In the study, I use multivariate regression models to estimate if extroversion is a significant predictor of being selected for leadership billets and on the effectiveness of those selected as leaders. Multivariate models are needed to hold constant the correlation of other factors that may affect the dependent variable in each model and to isolate the direct impact of extroversion

Given that the outcome variables that are binary (taking only values of 1 or 0), representing the probability of either selection into a leadership position, or the probability of being ranked in the top quartile of the graduating class, I use probit multivariate analysis techniques designed to handle binary outcomes. The estimated results from probit models can offer information about the direction of the likelihood of each explanatory variable on the probability of the outcome, but they do not allow one to assess the magnitude of the likelihood. To be able to determine the effect of a one-unit change in the explanatory on the probability of selection (or of being ranked in the top quartile) variable, I estimate marginal effects from the probit models. The results section presents the marginal effects for all the estimated probit models presented in this thesis.

The two research questions will be examined by estimating two different multivariate models. The first model will examine the relationship between personality and the probability of being selected for a striper position. The second model uses the sample of midshipmen selected for striper positions to examine the relationship between personality and the probability of being ranked in the top quartile by peers and company officers.

I first estimate a baseline regression model for each outcome, which uses only the extroversion dummy as the independent variable. The purpose of this model is to establish a baseline to determine if extroversion is a significant predictor of leadership selection. Next, I estimate a second, expanded model that includes control variables that might be partially correlated with the personality type. Additionally, the leadership performance

model may be subject to sample selection bias since the sample includes only those midshipmen who are chosen for senior year leadership positions. In another study, Fox (2003) gives an overview of the selection board process. In this overview, Fox (2003) highlights that the board attempts to select midshipmen with "proven leadership skills" for leadership billets. While it is difficult to quantify what qualifies as "proven leadership skills," one way to reduce the bias is to include variables that capture the selection factors that are used by the boards. Fox (2003) asserts the selection boards attempt to select capable midshipmen. While military and academic aptitude are not only factors of nomination used by selection boards, they reflect a midshipman's natural capability for difficult tasks. These factors will be included in the leadership performance model to control for sample selection bias.

B. RESULTS

This section discusses the findings of the multivariate data analysis. For research question one, leadership emergence is measured by the probability of being selected in a leadership billet through leadership selection boards. Each midshipman nominated for a leadership billet must undergo a board process to be selected as a leader. Leadership billets higher in the brigade require a more extensive selection process with additional boards convened with officers higher in the chain of command. To determine if extroversion is a significant predictor of leadership selection, the outcome (dependent) variable is one of the binary variables representing each one of the six leadership groups as defined above in Chapter IV. Control variables included in the model are based on similar approaches in studies by Alsina (2005) and Fox (2003). These authors included academic and military aptitude as it is possible that midshipmen who are high performing may be perceived as good nominees for leadership selection by the boards. Additionally, midshipmen who were active in high school ECA may be more likely to volunteer for nomination for a leadership billet as they have been exposed to positions with similar qualities. Race and gender variables were included as the selection board strives to select midshipmen who represent the brigade (USNA, 2013).

In answering the first research question concerning the likelihood of selection for a leadership position, I estimate 12 models to determine if personality is an important factor in predicting leadership selection. The first six models estimate the likelihood of leadership selection between personality, while the next six models estimate the direct if the main explanatory variable (extroversion) after controlling for other important factors that may affect selection. Tables 11–16 display the results for the selection models into both leadership groups, for the Spring and Fall semesters of the senior year.

Table 11. Marginal Effects for Selection for High Level Leadership Positions

	Fall			Spring		
VARIABLES	Commander	Triad	LCDR+	Commander	Triad	LCDR+
Extrovert	0.0059	0.0200**	0.0148***	0.0041	0.0076	0.0084*
	(0.0050)	(0.0083)	(0.0045)	(0.0050)	(0.0083)	(0.0046)
Observations	5,840	5,840	5,840	5,840	5,840	5,840

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12. Marginal Effects for Selection for Lower-Level Leadership Positions

	Fall			Spring		
VARIABLES	Company Commander	Platoon Commander	Squad Leader	Company Commander	Platoon Commander	Squad Leader
Extrovert	0.0017	0.0053	0.0038	0.0032	-0.0211**	-0.0142
	(0.0045)	(0.0084)	(0.012)	(0.0044)	(0.0084)	(0.0108)
Observations	5,840	5,840	5,840	5,840	5,840	5,840

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Tables 11 and 12 show the likelihood of leadership selection with extroversion only without other controls. In Table 11, the estimates show that extroverts have a 1.48- and 0.8-percentage-points higher likelihood of being selected to a high-level leadership position of LCDR and above, in the Fall, and Spring semester, respectively. Table 10 shows that the average probability of selecting into a LCDR and above billet is about 3 percent in either semester. An additional 1.5-percentage-point higher probability of section into a

LCDR and above position for extroverts, in the fall semester, represents about a 50 percent higher chance of selection when compared with introverts. There is some weaker evidence that extroverts have a higher likelihood of leadership emergence for Triad, in the Fall semester only, which might be driven by the LCDR and above. Recall that the Triad outcome includes Triad at the LCDR and above level and the Triad positions at the Company level. However, the marginal effect estimates in Table 11 show no evidence that extroverts and introverts have any difference in the probability of selecting into a Commander or Triad leadership position.

Furthermore, estimates shown in Table 12 fail to provide evidence that extroverts and introverts have different chances of selection into lower-level leadership. The only exception is the Spring platoon leaders, where the estimated marginal effect shows a 2-percentage-points smaller chance of selection for extroverts when compared with introverts.

Next, I estimate if extroversion is a significant predictor of leadership selection with the addition of race and demographic variables only. I include these variables to compare with the models in Tables 15 and 16 that include all control variables. One can argue that including other various control variables like academic aptitude and military aptitude could introduce bias into the model. Extroversion may be related to factors like aptitude and including them in a model may introduce effects that are estimated incorrectly. However, another independent study would need to be conducted to verify the relationship between personality and various other control variables. The results for the intermediary step are below. The models' output is similar to the results in tables 15 and 16 as extroversion is identified as a significant predictor in only three leadership groups.

Table 13. Marginal Effects of Personality with Limited Control Variables for High Level Leaders

VARIABLES	Fall Commander	Fall TRIAD	Fall LCDR and above	Spring Commander	Spring TRIAD	Spring LCDR and above
Extrovert	0.0059	0.0182**	0.0136***	0.0035	0.0052	0.0069
	(0.0050)	(0.0083)	(0.0044)	(0.0050)	(0.0083)	(0.0045)
Female	-0.0006	0.0324***	0.0238***	0.0137*	0.0503***	0.0196***
	(0.0066)	(0.0117	(0.0071)	(0.0073)	(0.0121)	(0.0070)
Black	-0.0089	-0.0498***	0.0161	0.0067	-0.0164	0.0271**
	(0.0098)	(0.0143)	(0.0117)	(0.0118)	(0.0171)	(0.0133)
Hispanic	-0.0034	-0.0327***	-0.0101	-0.0083	0.0014	0.0003
	(0.0083)	(0.0125)	(0.0065)	(0.0079)	(0.0144)	(0.0080)
Asian	-0.0051	-0.0196	0.0123	0.0018	-0.0125	0.0099
	(0.0129)	(0.0207)	(0.0141)	(0.0140)	(0.0215)	(0.0143)
Other	-0.0261***	-0.0385**	-0.0174**	0.0092	0.0309	0.0035
	(0.0083)	(0.0183)	(0.0079)	(0.0148)	(0.0245)	(0.0129)
d05	0.0012	0.0122	-0.0058	0.0026	0.0134	0.0009
	(0.0089)	(0.0149)	(0.0070)	(0.0088)	(0.0149)	(0.0080)
d06	0.0018	0.0094	0.0007	0.0009	0.0063	0.0045
	(0.0089)	(0.0147)	(0.0076)	(0.0086)	(0.0144)	(0.0083)
d07	-0.0005	0.0002	0.0026	-0.0003	0.0041	0.0035
	(0.0086)	(0.0142)	(0.0077)	(0.0085)	(0.0142)	(0.0081)
d08	-0.0007	-0.0019	0.0020	-0.0021	-0.0065	-0.0013
	(0.0085)	(0.0140)	(0.0076)	(0.0083)	(0.0137)	(0.0076)
d09	0.0058	0.0051	0.0023	0.0006	0.0042	0.0013
	(0.0096)	(0.0151)	(0.0081)	(0.0090)	(0.0149)	(0.0083)
Observations	5,824	5,824	5,824	5,824	5,824	5,824
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Table 14. Marginal Effects of Personality with Limited Control Variables for Low Level Leaders

VARIABLES	Fall Company Commander	Fall Platoon Commander	Fall Squad Leader	Spring Company Commander	Spring Platoon Commander	Spring Squad Leader
Extrovert	0.0019	0.0051	0.0048	0.0028	-0.0209**	-0.0107
	(0.0044)	(0.0084)	(0.0118)	(0.0044)	(0.0084)	(0.0106)
Female	-0.0070	-0.0142	-0.0132	0.0087	-0.0087	-0.0484***
	(0.0053)	(0.0106)	(0.0152)	(0.0063)	(0.0106)	(0.0129)
Black	-0.0154**	-0.0370**	0.0251	-0.0050	-0.0246	-0.0058
	(0.0071)	(0.0161)	(0.0263)	(0.0089)	(0.0166)	(0.0221)
Hispanic	0.0001	0.0205	0.0534**	-0.0101	-0.0154	-0.0201
	(0.0075)	(0.0154)	(0.0214)	(0.0065)	(0.0136)	(0.0177)
Asian	-0.0157*	0.0016	0.0751**	-0.0055	0.0156	0.0305
	(0.0085)	(0.0234)	(0.0343)	(0.0109)	(0.0239)	(0.0298)
Other	-0.0168**	-0.0009	0.0124	0.0069	0.0268	-0.0579**
	(0.0080)	(0.0225)	(0.0326)	(0.0129)	(0.0242)	(0.0251)
d05	0.0008	0.0076	0.127***	0.0032	0.0099	0.292***
	(0.0077)	(0.0148)	(0.0224)	(0.0080)	(0.0147)	(0.0253)
d06	0.0016	0.0027	0.114***	0.0008	0.0007	0.274***
	(0.0078)	(0.0145)	(0.0221)	(0.0077)	(0.0142)	(0.0251)
d07	-0.0001	-0.0060	0.102***	0.0003	-0.0001	0.268***
	(0.0076)	(0.0140)	(0.0217)	(0.0076)	(0.0141)	(0.0248)
d08	-0.0004	-0.0022	0.0926***	-0.0007	-0.0017	0.0348
	(0.0075)	(0.0142)	(0.0216)	(0.0075)	(0.0140)	(0.0219)
d09	0.0047	0.0093	-0.148***	0.0024	0.0007	-0.0277
	(0.0084)	(0.0154)	(0.0176)	(0.0082)	(0.0148)	(0.0214)
Observations	5824	5824	5824	5824	5824	5284
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Next, I estimate the likelihood of leadership selection between extroversion and introversion by including several controls for gender and race, academic and military ability, athletic behavior, and cohort year. Table 15 shows that the estimates for the extroversion variable are slightly changed in magnitude, as compared with those from the baseline model shown in Table 11. Concerning Commanders, the baseline and the expanded models do not identify extroversion as a significant predictor in both the fall and the spring semester. The estimates also show that females are more likely to be selected for

leadership positions, both in the Fall and Spring semester. Another finding is that a higher 2/C Fall MQPR predicts a higher chance of leadership selection, while Varsity Athletes are less likely to occupy leadership positions, compared with intramural athletes, the left out group in this model. In the fall Triad leadership group model, Varsity Athletes are the only group identified as being less likely to be selected for this leadership group. Females and midshipmen with high 2/C Fall MQPR were identified as being more likely to be selected for this leadership group. During the spring, midshipmen with high 2/C Spring AQPR and Varsity Athletes were less likely to be selected for this leadership group, while Females and midshipmen with high 2/C Spring MQPR were more likely to be selected for Triad positions. For the group LCDR and above, in the fall, Females, African Americans, midshipmen with high 2/C Fall AQPR and 2/C Fall MQPR, and higher High School NAECA scores were more likely to be selected for LCDR and above positions. Midshipmen who majored in STEM and Varsity Athletes were less likely to be selected for this group. During the spring, Females, African Americans, midshipmen with high 2/C Spring MQPR, and higher High School NAECA were more likely to be selected for this leadership group. Midshipmen with higher High School AECA were less likely to be selected for this group.

Table 15. Marginal Effects for Selection for High Level Leadership Emergence

	Fall			Spring		
VARIABLES	Commander	TRIAD	LCDR and above	Commander	TRIAD	LCDR and above
Extrovert	0.0039	0.0225***	0.00778***	0.0032	0.0082	0.00621*
	(0.0032)	(0.0075)	(0.0023)	(0.0043)	(0.0081)	(0.0033)
Female	0.0002	0.0377***	0.0140***	0.0148**	0.0567***	0.0151***
	(0.0042)	(0.0112)	(0.0043)	(0.0066)	(0.0122)	(0.0055)
Black	0.0303*	0.0203	0.0875***	0.0357**	0.0284	0.0782***
	(0.0165)	(0.0226)	(0.0243)	(0.0171)	(0.0223)	(0.0221)
Hispanic	0.0105	-0.0070	0.0054	0.0003	0.0162	0.0129
	(0.0076)	(0.0134)	(0.0057)	(0.0081)	(0.0154)	(0.0086)
Asian	-0.0026	-0.0159	0.0079	0.0037	-0.0118	0.0090
	(0.0083)	(0.0186)	(0.0085)	(0.0127)	(0.0208)	(0.0113)
Other	-0.0106*	-0.0174	-0.0013	0.0154	0.0439*	0.0126
	(0.0062)	(0.0188)	(0.0065)	(0.0148)	(0.0256)	(0.0132)
2/C FALL AQPR	-0.0131***	-0.0095	0.00853***			
	(0.0043)	(0.0101	(0.0032)			

	Fall			Spring		
VARIABLES	Commander	TRIAD	LCDR and above	Commander	TRIAD	LCDR and above
2/C FALL MQPR	0.0909***	0.203***	0.0465***			
	(0.0074)	(0.0150)	(0.0057)			
2/C SPRING AQPR				-0.0176***	-0.0271**	0.0072
				(0.0059)	(0.0110)	(0.0046)
2/C SPRING MQPR				0.0816***	0.151***	0.0500***
				(0.0087)	(0.0163)	(0.0070)
STEM	-0.00754**	-0.0117	-0.0102***	-0.0024	0.0134	-0.0018
	(0.0035)	(0.0079)	(0.0027)	(0.0045)	(0.0082)	(0.0035)
Junior Varsity Athlete	-0.0157***	-0.0651***	-0.00465*	-0.0168***	-0.0428***	-0.0018
	(0.0032)	(0.0075)	(0.0024)	(0.0044)	(0.0089)	(0.0042)
Junior Club Athlete	0.0051	-0.0014	0.0017	-0.0010	-0.0175	0.0035
	(0.0050)	(0.0107)	(0.0034)	(0.0060)	(0.0109)	(0.0053)
Prior Enlisted	0.0037	0.0040	0.0095	0.0067	0.0152	0.0183*
	(0.0070)	(0.0150)	(0.0067)	(0.0095)	(0.0165)	(0.0096)
High school AECA	1.27e-07	-2.69e-06	-1.62e-05*	2.74e-05*	-5.17e-06	-4.03e-05***
	(1.18e-05)	(2.83e-05)	(8.35e-06)	(1.58e-05)	(3.01e-05)	(1.30e-05)
High school NAECA	9.07e-06	-7.62e-06	2.12e-05***	-6.43e-06	2.98e-05	5.01e-05***
	(1.01e-05)	(2.53e-05)	(6.73e-06)	(1.46e-05)	(2.69e-05)	(1.00e-05)
2005	0.0076	0.0295**	0.0007	0.0077	0.0280*	0.0069
	(0.0067)	(0.0149)	(0.0041)	(0.0084)	(0.0155)	(0.0070)
2006	0.0040	0.0191	0.0017	0.0037	0.0143	0.0090
	(0.0060)	(0.0140)	(0.0041)	(0.0078)	(0.0145)	(0.0071)
2007	-0.0011	-0.0005	0.0011	0.0009	0.0074	0.0044
	(0.0052)	(0.0128)	(0.0038)	(0.0074)	(0.0141)	(0.0063)
2008	-0.0009	-0.0013	0.0007	-0.0005	-0.0040	0.0005
	(0.0053)	(0.0127)	(0.0037)	(0.0073)	(0.0135)	(0.0058)
2009	0.0005	-0.0027	0.0003	-0.0004	0.0027	0.0020
	(0.0056)	(0.0131)	(0.0038)	(0.0075)	(0.0145)	(0.0063)
Observations	5,815	5,815	5,815	5,815	5,815	5,815
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Table 16 outlines the results of leadership selection models for the lower-level leadership group. For the group Company Commanders, extroversion was not identified as a significant predictor in both the fall and spring. In the fall, midshipmen with high 2/C Fall AQPR, majored in STEM, and Varsity Athletes were less likely to be selected for Company Commanders, while midshipmen with high 2/C Fall MQPR were more likely to be selected for Company Commander. In the spring, midshipmen with high 2/C Spring

AQPR and Varsity Athletes were less likely to be selected for leadership billets, while midshipmen with high 2/C MQPR were more likely to be selected.

For the group Platoon Commanders, extroversion identifies as a significant predictor in the spring semester only. For the Platoon Commanders selection in the fall, significant variables in the fall Company Commander were similar to the Platoon commander model. The exceptions in the fall were STEM was not identified as a significant predictor for Platoon Commanders, but prior-enlisted service was included as a significant predictor, significantly decreasing the likelihood of leadership selection. For the spring, African Americans were the only significant predictor with a decreased likelihood of leadership selection.

For the group Squad leader, extroversion was not identified as a significant predictor in the fall or the spring. In the fall Asian, STEM, and Varsity Athletic status were identified as significant predictors having increased likelihoods on leadership selection. 2/C Fall AQPR and 2/C Fall MQPR were factors that significantly decreased the likelihood of leadership selection. In the spring, Females, races categorized as Other, 2/C Spring MQPR, STEM, and High school NAECA were factors that significantly decreased the likelihood of leadership selection

For these models, the outcomes Females observe are relative to the outcome of males. For race, all race and ethnicity variables are relative to the outcome observed by Caucasian midshipmen. Lastly for athletic status outcomes observed are in relation to the outcome of intramural athletes.

Table 16. Marginal Effects for Selection for Low Level Leadership Emergence

	Fall			Spring		
VARIABLES	Company Commander	Platoon Commander	Squad Leader	Company Commander	Platoon Commander	Squad Leader
Extrovert	0.0011	0.0059	0.0015	0.0023	-0.0206**	-0.0172
	(0.0030)	(0.0084)	(0.0120)	(0.0039)	(0.0086)	(0.0108)
Female	-0.0043	-0.0133	-0.0168	0.0105*	-0.0102	-0.0482***
	(0.0036)	(0.0106)	(0.0153)	(0.0059)	(0.0106)	(0.0130)
Black	0.0035	-0.0197	-0.0358	0.0107	-0.0340**	-0.0158
	(0.0102)	(0.0186)	(0.0244)	(0.0123)	(0.0159)	(0.0223)
Hispanic	0.0072	0.0192	0.0250	-0.0054	-0.0210	-0.0239
	(0.0066)	(0.0155)	(0.0212)	(0.0064)	(0.0135)	(0.0177)
Asian	-0.0097*	0.0030	0.0740**	-0.0038	0.0159	0.0363
	(0.0055)	(0.0232)	(0.0345)	(0.0098)	(0.0240)	(0.0303)
Other	-0.0074	-0.0008	-0.0083	0.0108	0.0205	-0.0603**
	(0.0063)	(0.0224)	(0.0316)	(0.0127)	(0.0237)	(0.0247)
2/C FALL AQPR	-0.0147***	-0.0228**	-0.0322**			
	(0.0041)	(0.0114)	(0.0161)			
2/C FALL MQPR	0.0700***	0.0759***	-0.1060***			
	(0.0065)	(0.0164)	(0.0229)			
2/C SPRING AQPR				-0.0158***	-0.0154	0.0126
				(0.0053)	(0.0114)	(0.0146)
2/C SPRING MQPR				0.0589***	-0.0043	-0.0593***
				(0.0078)	(0.0167)	(0.0210)
STEM	-0.0075**	-0.0130	0.0238**	-0.0049	0.0081	-0.0218**
	(0.0033)	(0.0087)	(0.0121)	(0.0040)	(0.0085)	(0.0110)
Junior Varsity Athlete	-0.0153***	-0.0559***	0.0355**	-0.0166***	0.0048	-0.0191
	(0.0030)	(0.0091)	(0.0153)	(0.0037)	(0.0107)	(0.0130)
Junior Club Athlete	0.0024	-0.0006	-0.0043	-0.0059	0.0144	-0.0055
	(0.0045)	(0.0123)	(0.0182)	(0.0048)	(0.0134)	(0.0160)
Prior Enlisted	-0.0014	-0.0427***	-0.0740***	0.0002	-0.0224	-0.0323*
	(0.0056)	(0.0132)	(0.0199)	(0.0077)	(0.0144)	(0.0186)
High School Athletic ECA	0.0000	-0.0000	-0.0001	0.0000**	-0.0000	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
High School Non Athletic ECA	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
d05	0.0057	0.0134	0.1207***	0.0070	0.0072	0.2870***
	(0.0062)	(0.0151)	(0.0226)	(0.0077)	(0.0147)	(0.0255)

	Fall			Spring		
VARIABLES	Company Commander	Platoon Commander	Squad Leader	Company Commander	Platoon Commander	Squad Leader
d06	0.0038	0.0053	0.1114***	0.0029	-0.0002	0.2719***
	(0.0057)	(0.0145)	(0.0222)	(0.0070)	(0.0142)	(0.0251)
d07	-0.0001	-0.0070	0.1049***	0.0011	-0.0027	0.2747***
	(0.0051)	(0.0139)	(0.0220)	(0.0068)	(0.0140)	(0.0251)
d08	-0.0000	-0.0008	0.0935***	0.0004	-0.0041	0.0392*
	(0.0051)	(0.0141)	(0.0218)	(0.0067)	(0.0139)	(0.0221)
d09	0.0009	0.0039	-0.1439***	0.0012	-0.0021	-0.0245
	(0.0054)	(0.0150)	(0.0179)	(0.0070)	(0.0148)	(0.0217)
Observations	5,815	5,815	5,815	5,815	5,815	5,815
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

To determine if a link existed between Fall Triad and Fall LCDR, I estimate two additional models, as a robustness check, to determine if the higher leadership billets contain the variation to cause the models to identify extroversion as a significant predictor. The results are displayed in Table 17. The additional models separated the Fall Triad variable into Higher Triad and Lower Triad. Higher Triad represents midshipmen selected for Triad positions at the Battalion level and above, while Lower triad represents the company triad only. The higher triad model identified extroversion as a significant predictor of leadership emergence amongst this group.

Table 17. Comparison between Higher and Lower Triad

	Fall		
VARIABLES	TRIAD	Higher Triad	Lower Triad
Extrovert	0.0225***	0.0068***	0.0117*
	(0.0075)	(0.0022)	(0.0068)
Female	0.0377***	0.0104***	0.0210**
	(0.0112)	(0.0040)	(0.0098)
Black	0.0203	0.0458**	-0.0180
	(0.0226)	(0.0186)	(0.0161)
Hispanic	-0.0070	0.0031	-0.0106
	(0.0134)	(0.0053)	(0.0114)
Asian	-0.0159	0.0021	-0.0196
	(0.0186)	(0.0068)	(0.0158)
Other	-0.0174	-0.0050	-0.0112
	(0.0188)	(0.0049)	(0.0170)
2/C FALL AQPR	-0.0095	0.0064**	-0.0210**
	(0.0101)	(0.0031)	(0.0092)

	Fall		
VARIABLES	TRIAD	Higher Triad	Lower Triad
2/C FALL MQPR	0.2031***	0.0432***	0.1374***
	(0.0150)	(0.0054)	(0.0135)
STEM	-0.0117	-0.0043*	-0.0040
	(0.0079)	(0.0024)	(0.0071)
Junior Varsity Athlete	-0.0651***	-0.0045*	-0.0587***
	(0.0075)	(0.0024)	(0.0066)
Junior Club Athlete	-0.0014	0.0002	-0.0028
	(0.0107)	(0.0031)	(0.0095)
Prior Enlisted	0.0040	0.0104	-0.0098
	(0.0150)	(0.0068)	(0.0123)
High School Athletic ECA	-0.0000	-0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)
High School Non Athletic ECA	-0.0000	0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)
d05	0.0295**	0.0049	0.0196
	(0.0149)	(0.0047)	(0.0132)
d06	0.0191	0.0030	0.0136
	(0.0140)	(0.0043)	(0.0126)
d07	-0.0005	-0.0018	0.0016
	(0.0128)	(0.0034)	(0.0117)
d08	-0.0012	-0.0004	-0.0014
	(0.0127)	(0.0036)	(0.0115)
d09	-0.0027	-0.0011	-0.0015
	(0.0131)	(0.0036)	(0.0119)
Observations	5,815	5,815	5,815
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Since this outcome is only observed in the fall and not the spring, there is the question of what makes the fall and the spring different. Midshipmen can be selected for leadership in the fall and the spring, as the leadership selection in the fall does not disqualify them for selection in the spring. I speculate that there might be some systematic differences between fall and spring that might explain the difference in estimates between the two semesters. For example, some midshipmen are known to start graduate courses in the spring of the senior year, focusing away from leadership billets.

Given the estimates presented in this chapter, I cannot find evidence across the board that extroverts are more likely to be selected as leaders, except for the LCDR and

above in the fall semester. More research is needed to clarify the relation between personality traits and leadership emergence.

While personality was not identified as a significant predictor in the majority of the models, MQPR and AQPR were shown as significant predictors across spring and fall semesters in nearly all leadership groups. MQPR scores were identified as having a positive impact on leadership selection, while AQPR was identified as negatively impacting leadership selection in nearly all leadership groups. It appears that the selection process is weighted in favor of midshipmen with strong military performance, as opposed to those with strong academic performance. Additionally, for high leadership billets, Varsity athletes are less likely to be chosen as leaders when compared to intramural athletes.

Research question two seeks to identify if extroversion is a significant predictor of performance, conditional on a midshipman being selected for a leadership billet. The dependent variable for this research question will be based on midshipmen being ranked in the top quartile of their company by their peers or company officers. As referenced earlier in the methodology portion, this model may be subject to sample selection bias in that only midshipmen who are nominated and selected are included in the sample for model 2. The midshipmen who have been selected have proved themselves as having the qualities necessary to hold a leadership billet with great responsibility. These midshipmen are more likely to be performing well in other areas since that fact, or indicator, communicates to the board that they can lead themselves well. Because these high-performing midshipmen are the only midshipmen in the sample, absent any control for ability, extroversion may be identified erroneously as a significant predictor of effectiveness. This may occur as the majority of midshipmen in the sample demonstrate the necessary attributes to be ranked in the top quartile of their company. In order to account for their previous high performance, the junior AQPR and MQPR were included in the model as well.

Control variables from the first model were included for similar reasons stated in the first portion of this chapter. However, high school ECA variables were omitted as midshipmen in the company are not aware of the various ECA other midshipmen in the company participated in during high school.

To answer research question two, 12 models were estimated to examine leadership effectiveness amongst the company chain of command the company. Tables 18 and 19 display the simple correlation output from the fall and spring leadership performance models. Both models failed to identify extroversion as a significant predictor of leadership effectiveness.

Table 18. Fall Peer and Company Officer Rankings

	Fall Company Commander		Fall Platoon Commander		Fall Squad Leader	
VARIABLES	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings
Extrovert	-0.0245	-0.0457*	-0.0434	0.0374	-0.0256	-0.0328
	(0.0659)	(0.0272)	(0.0364)	(0.0381)	(0.0193)	(0.0203)
Observations	174	174	677	677	1,585	1,585

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 19. Spring Peer and Company Officer Rankings

	Spring Platoon Commander		Spring Company Commander		Spring Squad Leader	
VARIABLES	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings
Extrovert	-0.0425	0.0276	-0.0224	0.0510	2.65e-06	0.0103
	(0.0327)	(0.0361)	(0.0770)	(0.0417)	(0.0230)	(0.0225)
Observations	652	652	172	172	1,235	1,235

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tables 20 and 21 display the results from leadership effectiveness models with additional control variables. For the group Company Commanders, extroversion was not identified as a significant predictor for ranking in the top quartile of the company by both peers and Company Officer in both the fall and spring. Female Company Commanders were less likely to be ranked in the top quartile by peers in the spring. While Asian Company Commanders were more likely to be ranked in the top quartile when compared to White Company Commanders.

For the group Platoon Commanders, extroversion was not identified as a significant predictor for ranking in the top quartile of the company by both peers and Company Officer in both the fall and spring. Female Platoon Commanders were less likely to be ranked in the top quartile by peers when compared to Male Platoon Commanders for the fall and spring semesters. Additionally, Platoon Commanders with higher AQPR were less likely to be ranked in the top quartile of the company by peers. For Company Officer rankings in the fall and spring, Platoon Commanders with higher MQPR scores were more likely to be ranked in the top quartile.

For the group Squad leader, extroversion was identified as a significant predictor of being ranked in the top quartile for only the spring semester and by only company officers. For this group, extroversion is identified as having a negative effect on Company Officer Rankings. Female Squad leaders are less likely to be ranked in the top quartile of the company by peers when compared to male Squad leaders in both the fall and spring semesters. Additionally, Squad leaders with higher MQPR scores were more likely to be ranked in the top quartile by peers in the spring and fall semesters. Squad leaders in the fall with higher AQPR scores were less likely to be ranked in the top quartile by peers. Additionally, Squad leaders who were varsity athletes were less likely to be ranked in the top quartile by peers when compared to intramural athletes was not identified as a significant predictor in the fall or the spring. For Company Officer rankings in the Fall, Female Squad leaders were more likely to be ranked in the top quartile. Squad Leaders with higher AQPR and MQPR were more likely to be ranked in the top quartile. Lastly, Squad leaders who were varsity athletes were more likely to be ranked in the top quartile when compared to intramural athletes. In the Spring Squad leaders with high AQPR were

less likely to be ranked in the top quartile by company officers, the relationship exhibited in the fall remained the same in the spring for MQPR scores. Lastly, the outcome seen in the Fall for Varsity Athletes is reversed in the spring. The reason for the reversal in outcomes between the spring and fall semesters is unknown but warrants future study.

Table 20. Marginal Effects for Leadership Performance, Fall

	Fall Company Commander		Fall Platoon Commander		Fall Squad Leader	
VARIABLES	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings
Extrovert	-0.0178	-0.0051	-0.0550	0.0558	-0.0259	-0.0460**
	(0.0688)	(0.0193)	(0.0379)	(0.0401)	(0.0161)	(0.0191)
Female	0.0402		-0.2141***	0.0890	-0.0688***	0.0987***
	(0.0961)		(0.0380)	(0.0553)	(0.0158)	(0.0296)
Black	-0.3481	-0.1276	-0.0088	0.1527	0.0241	0.0498
	(0.2638)	(0.2362)	(0.1037)	(0.1088)	(0.0485)	(0.0565)
Hispanic	-0.0743	-0.0338	-0.0279	-0.0686	0.0672*	0.0374
	(0.1274)	(0.0575)	(0.0603)	(0.0640)	(0.0346)	(0.0361)
Asian			0.0422	0.1127	-0.0404	-0.0213
			(0.1072)	(0.1116)	(0.0305)	(0.0417)
Other	0.0269		-0.0356	0.0006	0.0351	0.0064
	(0.2428)		(0.0949)	(0.1054)	(0.0535)	(0.0556)
2/C SPRING AQPR	-0.0144	0.0219	0.0509	0.0534	-0.0003	-0.0511**
	(0.0711)	(0.0309)	(0.0384)	(0.0412)	(0.0164)	(0.0200)
2/C SPRING MQPR	0.0680	0.0017	-0.1772***	0.0100	-0.0427**	0.0562**
	(0.0993)	(0.0292)	(0.0501)	(0.0536)	(0.0216)	(0.0250)
STEM	-0.0157	0.0734	0.6197***	0.4818***	0.4820***	0.4142***
	(0.2113)	(0.0700)	(0.0852)	(0.0895)	(0.0349)	(0.0382)
Junior Varsity Athlete	-0.1018	-0.1758	-0.0689	-0.1074**	-0.0489***	-0.0647***
	(0.1303)	(0.1783)	(0.0488)	(0.0534)	(0.0161)	(0.0194)
Junior Club Athlete	0.0389	-0.0062	-0.0226	0.0533	-0.0377*	-0.0403
	(0.0901)	(0.0334)	(0.0519)	(0.0584)	(0.0199)	(0.0250)
Prior Enlisted	-0.0069		-0.0732	0.1424	-0.0227	-0.0050
	(0.1340)		(0.0712)	(0.0900)	(0.0298)	(0.0400)
d05	0.1471	-0.0390	-0.0370	-0.0800	0.0393	0.0223
	(0.0895)	(0.0736)	(0.0575)	(0.0640)	(0.0321)	(0.0340)
d06	0.0217	0.0066	-0.0440	-0.0288	0.0180	0.0064
	(0.1089)	(0.0239)	(0.0570)	(0.0659)	(0.0300)	(0.0329)

	Fall Company Commander		Fall Platoon Commander		Fall Squad Leader	
VARIABLES	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings
d07	0.1116	0.0123	-0.1148**	-0.0573	-0.0050	-0.0082
	(0.0963)	(0.0216)	(0.0521)	(0.0649)	(0.0274)	(0.0315)
d08	0.1039		-0.1066**	-0.1344**	0.0315	0.0074
	(0.0944)		(0.0530)	(0.0612)	(0.0316)	(0.0330)
d09	-0.3274**	-0.0063	-0.2582***	0.0470	-0.0287	-0.0240
	(0.1355)	(0.0391)	(0.0370)	(0.0691)	(0.0327)	(0.0426)
Observations	171	110	674	674	1,582	1,582
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Table 21. Marginal Effects of Leadership Performance, Spring

	Spring Company Commander		Spring Platoon Commander		Spring Squad Leader	
VARIABLES	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings
Extrovert	-0.1380	0.0578	-0.0445	0.0120	-0.0052	0.0072
	(0.0945)	(0.0427)	(0.0313)	(0.0379)	(0.0209)	(0.0197)
Female	-0.4540***	-0.0047	-0.1669***	0.0182	-0.0954***	0.0546
	(0.0958)	(0.0446)	(0.0255)	(0.0510)	(0.0211)	(0.0334)
Black	-0.1789	-0.0107	0.1158	-0.0344	0.0657	0.0598
	(0.2168)	(0.0752)	(0.1058)	(0.1046)	(0.0696)	(0.0659)
Hispanic	0.1146	0.0098	0.1054	0.0109	0.0060	0.0200
	(0.1776)	(0.0601)	(0.0757)	(0.0738)	(0.0393)	(0.0402)
Asian	0.3354***		-0.0555	0.0243	0.0252	0.0459
	(0.1231)		(0.0677)	(0.1031)	(0.0573)	(0.0558)
Other	-0.1493		-0.0361	-0.0417	-0.0232	-0.0149
	(0.2193)		(0.0714)	(0.0904)	(0.0633)	(0.0642)
1/C FALL AQPR	0.0564	0.0388	-0.0124	-0.0103	-0.0289	-0.0158
	(0.0938)	(0.0382)	(0.0324)	(0.0393)	(0.0215)	(0.0203)
1/C FALL MQPR	0.0039	0.0561	-0.0766*	-0.0393	-0.0772***	-0.0195
	(0.1477)	(0.0495)	(0.0441)	(0.0524)	(0.0282)	(0.0267)
STEM	0.0797	0.0248	0.5628***	0.5824***	0.5500***	0.4905***
	(0.2668)	(0.0836)	(0.0727)	(0.0851)	(0.0431)	(0.0412)
Junior Varsity Athlete	0.2024*	-0.0063	-0.0135	-0.0130	-0.0799***	-0.0679***
	(0.1179)	(0.0487)	(0.0368)	(0.0456)	(0.0220)	(0.0209)

	Spring Company Commander		Spring Platoon Commander		Spring Squad Leader	
VARIABLES	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings	Top Quartile Peer rankings	Top Quartile CO rankings
Junior Club Athlete	0.0632	0.0037	-0.0382	0.0119	0.0212	-0.0111
	(0.1454)	(0.0486)	(0.0411)	(0.0560)	(0.0310)	(0.0263)
Prior Enlisted	0.1438	-0.1622	0.0069	-0.0232	0.0161	0.0815*
	(0.1810)	(0.1553)	(0.0600)	(0.0732)	(0.0422)	(0.0473)
d05	0.3801***	0.0448	0.3735***	0.1036	0.0795	0.0738
	(0.0920)	(0.0322)	(0.0829)	(0.0722)	(0.0531)	(0.0508)
d06	0.4974***	-0.0493	0.3143***	0.0136	0.0931*	0.0627
	(0.0692)	(0.0752)	(0.0825)	(0.0675)	(0.0542)	(0.0499)
d07	0.4155***	-0.0111	0.3454***	0.0794	0.0549	0.0380
	(0.0879)	(0.0601)	(0.0817)	(0.0692)	(0.0504)	(0.0469)
d08	0.3377***	0.0284	0.3419***	0.1986***	0.0713	0.0115
	(0.1022)	(0.0400)	(0.0824)	(0.0718)	(0.0653)	(0.0525)
d09	-0.2513	0.0406	-0.0049	0.1730**	-0.0074	-0.0431
	(0.1563)	(0.0321)	(0.0656)	(0.0737)	(0.0612)	(0.0490)
Observations	172	159	651	651	1,233	1,233
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

THIS PAGE INTENTIONALLY LEFT BLANK

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The Navy as an organization aims to produce effective leaders capable of meeting the Navy's future challenges. In determining what makes an effective leader, the topic of personality arises, as many believe personality traits can predict leadership emergence and effectiveness. Many believe that the characteristics of an extroverted leader are more conducive to leadership success. These leaders are described as charismatic personalities with great communication and team-building skills. However, introverted leaders possess skills like thoughtfulness, humility, and slow to rash decisions, which may also be conducive to effective leadership. If leaders of both personality groups possess qualities that are advantageous to leadership, it begs the question: do extroverts make better leaders?

This study sought out to examine if extroversion could predict leadership effectiveness and leadership emergence. The USNA offers a plethora of leadership opportunities for midshipmen during their senior year. In addition, seniors receive peer and company officer evaluations during both semesters. In the years represented in my data set, all midshipmen took the MBTI during freshmen year to gain self-awareness about their personality traits. This allowed me the opportunity to use the data on personality traits to test whether extroverts are more likely to be selected for leadership and whether they are more likely to be ranked in the top quartile of their cohort.

For the first research question, whether extroverts are more likely than introverts to become leaders, I defined several outcome variables for high-level and low-level leadership positions within the Brigade. For the high-level leadership positions, I examine the probability of being selected to Commanders (Company, Battalion, Regimental and Brigade Commander), Triad (Company, Battalion, Regimental, Brigade Commander, Executive and Operations Officer), and LDCR and above (Battalion, Regimental and Brigade Commander) billets. For the low-level leadership positions, I consider the probability of selection into Company Commander, Platoon Commander, and Squad Leader. For each of these outcome variables, I use a baseline and an extended model with

controls to estimate whether extroverts are more likely to be selected into each of these leadership positions in the Fall and Spring semester. Only for three of these models, the estimates show that extroverts have a higher likelihood of selecting into Triad and LCDR and above positions in the Fall semester, and LCDR and above for the Spring semester. The estimates fail to provide evidence that extroverts and introverts have any different probability of being selected into leadership billets for all the other models.

Thus, extroversion was not identified as a significant across the board predictor of leadership selection. Other variables were found to be significant across the board predictors of leadership emergence. For example, a higher MQPR increases the likelihood that midshipmen to be selected for a leadership position. Additionally, a higher AQPR decreases the likelihood that a midshipman is selected for a leadership position. Concerning athletics, varsity athletes do not have as much time to pursue a higher leadership billet. These athletes must balance the demand of practice and games with the normal midshipmen life that revolves around military and academic studies. Varsity athletes are found to be less likely to select for high-level leadership positions across the board. For varsity athletes, additional obligations such as the responsibility of higher leadership billets carry a greater burden than intramural athletes as these midshipmen are not affected by a demanding athletic lifestyle.

The second research question addressed whether extroverts are more likely than introverts to rank in the top quartile (25 percent) of their senior class, as measured by peer ranking and senior officers' rankings. For these leadership effectiveness models, the estimates fail to bring evidence that extroverts are better leaders than introverts, as measured by rankings, in both fall and spring semesters, with one exception. The exception is isolated within the squad leadership group in the fall semester, for which extroverts are less likely to rank in the top quartile of the officers' rankings when compared with introverts. The only consistent finding among squad leaders was that African American squad leaders were less likely to be rated in the top quartile when compared to Caucasian midshipmen in squad leader billets. The similar estimates in both spring and fall semesters further strengthen the finding that race is a predictor of leadership effectiveness in this sample. Additionally, females are found to hold an advantage over males in their likelihood

of being ranked in the top quartile of the company by their peers. This effect was observed for both platoon commanders and squad leader groups.

Despite the emergence of other significant factors, this thesis does not find enough evidence to conclude whether personality type does or does not affect leadership emergence or leadership effectiveness.

These results call for further research as it adds doubt to the cultural myth that only extroverts make the best leaders. If this myth were true, evidence would have been observed to support that argument. However, the lack of evidence supports some further research into a very interesting topic.

B. LIMITATIONS

In conducting this study, there were limitations related to the data used to measure the personality traits of extroversion and introversion, and leadership performance. The MBTI many-faceted scores are known for being difficult to use to identify personality traits. The extroversion and introversion traits are assigned for the scores above, and below the cutoff, in a rather crude way, making it difficult to accurately distinguish between extroverts and introverts, especially for those whose scores are close to the mean (Pittenger, 1993). Further, the peer rankings measures may be 'noisy' indicators of true performance. Also, there are a few patterns in the data regarding the rankings that need better understood and accounted for. For example, the average peer rankings for various leadership groups were substantially higher than in the fall than in the spring. Rankings are administered during the spring semester as one of the final requirements before commissioning. These rankings have no impact on any criteria for commissioning at the point of submission, providing little incentive for midshipmen to put in the effort to rank each other according to performance accurately. Lastly, another limitation of the study is that high-level leadership billets do not receive rankings from their peers. It is hard to determine the leadership effectiveness of these midshipmen from the point of view of their subordinates as these midshipmen do not reside in company spaces. The company level was the only sample available for this study to answer research question two regarding leadership effectiveness.

C. RECOMMENDATIONS

Future studies can further explore the relationship between personality traits and leadership using other metrics to determine leadership effectiveness. The Naval Academy has made great strides in standardizing the evaluation process for midshipmen. In their evaluation forms, an area for leadership effectiveness is made available for raters to give midshipmen feedback about their performance. This information is not recorded in the midshipmen database and, therefore, not available for this study. However, if one were to collect this information from midshipmen, a future analysis could shed additional insight into the relationship between leadership effectiveness and personality traits.

Additionally, future studies could use the Five-Factor personality test to determine personality profiles. The MBTI may not be the best personality inventory in all of its shortcomings, but it currently is the only available personality test for USNA midshipmen. Administering and collecting data using the five-factor model may produce more precise measures of personality traits.

The Navy must continue to help leaders gain self-awareness, as this is a key to exposing our inner weak spots. While personality inventories are great tools to help gain awareness, we must understand that personality inventories also can reveal our strengths. Our goal should not be to force our leaders into a single leadership style, but rather to leverage each individual's strengths. Given the right circumstances, individuals identified as introverts can be effective leaders when placed in roles that take advantage of their natural tendencies. The only roadblock to creating more success with introverted leaders is identifying how to leverage their strengths.

LIST OF REFERENCES

Alsina, F. J. (2005). *An analysis of Hispanic midshipmen success at the United States Naval Academy* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/2194

Bono, J. E., & Judge, T. A. (2004). Personality and transformational and transactional leadership: A meta-analysis. *Journal of Applied Psychology*, *89*(5), 901–910. https://doi.org/10.1037/0021-9010.89.5.901

Department of the Army. (2015). *Leader Development* (FM 6-22). https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/fm6_22.pdf

Derue, D. S., Nahrgang, J. D., Wellman, N., & Humphrey, S. E. (2011). Trait and behavioral theories of leadership: an integration and meta-analytic test of their relative validity. *Personnel Psychology*, *64*(1), 7–52. https://doi.org/10.1111/J.1744-6570.2010.01201.X

Fox, J. P. (2003, June). *Selecting the brigade leadership at the United States Naval Academy: who are the stripers?* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. https://calhoun.nps.edu/handle/10945/985

Grant, A. M., Gino, F., & Hofmann, D. A. (2011). Reversing the extroverted leadership advantage: The role of employee proactivity. *Academy of Management Journal*, *54*(3), 528–550. https://doi.org/10.5465/amj.2011.61968043

Hogan, R., Curphy, G. J., & Hogan, J. (1994). What we know about leadership: Effectiveness and personality. *American Psychologist*, *49*(6), 493–504. https://doi.org/10.1037/0003-066x.49.6.493

Judge, T. A., Bono, J. E., Ilies, R., & Gerhardt, M. W. (2002). Personality and leadership: A qualitative and quantitative review. *Journal of Applied Psychology*, *87*(4), 765–780. https://doi.org/10.1037/0021-9010.87.4.765

Jung, C. G., Hull, R. F. C., & Baynes, H. G. (1976). *Psychological Types (The Collected Works of C. G. Jung, Vol. 6) (Bollingen Series XX)*. Princeton University Press.

Kello, J. (2012). Can introverts take the lead? Yes—They can shift from homework to handshakes. *Chilton's Industrial Safety & Hygiene News*, *46*(10), 28–.

McCormack, L., & Mellor, D. (2002). The role of personality in leadership: An application of the five-factor model in the Australian military. *Military Psychology*, *14*(3), 179–197. https://doi.org/10.1207/s15327876mp1403_1

Mitchell, M. E. (1999, June). *Study of voluntary resignation by female midshipmen from the Naval Academy* (Thesis). Naval Postgraduate school. http://hdl.handle.net/10945/13537

Montor, K., Ciotti, A., & Wolfe, M. (1984). *Fundamentals of Naval Leadership*. Naval Institute Press.

Murray, K. M., & Johnson, W. B. (2001). Personality type and success among female Naval Academy midshipmen. *Military Medicine, 166*(10), 889–893. https://doi.org/10.1093/milmed/166.10.889

Myers, I. B., McCaulley, M. H., Quenk, N. L., & Hammer, A. L. (1998). *MBTI Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator, 3rd Edition* (3rd ed.). Consulting Psychologists Press. https://archive.org/details/mbtimanualguidet00myer/page/358/mode/2up?q=leadership

Pashneh, K., & Foster, T. F. (2002, June). *The utility of personality measures in the admissions process at the United States Naval Academy* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/5927

Percy, S. (2019, June 19). *Do Extroverts Make Better Leaders?* Forbes. https://www.forbes.com/sites/sallypercy/2019/06/10/do-extroverts-make-better-leaders/?sh=5477eaad56fe

Pittenger, D. J. (1993). The Utility of the Myers-Briggs Type Indicator. *Review of Educational Research, 63*(4), 467–488. https://doi.org/10.3102/00346543063004467

Roush, P. E. (1989). MBTI Type and Voluntary Attrition at the United States Naval Academy. *Journal of Psychological Type, 18*, 72–79. https://www.capt.org/jpt/pdfFiles/Roush_P_Vol_18_72_79.pdf

Stephens-Craig, D. Kuofie, M. & Dool, R. (2015). Perception of Introverted Leaders by Mid to High -Level Leaders. *Journal of Marketing and Management, 6(1)*, 62 http://search.ebscohost.com.libproxy.nps.edu/login.aspx?direct=true&db=bth&AN=102670455&site=ehost-live&scope=site

Stonaker, K. W. (2005, June). *An analysis of leadership opportunities, experiences and influence at the United States Naval Academy from the perspective of midshipmen.* (Thesis). Naval Postgraduate School. https://calhoun.nps.edu/handle/10945/1917

University of Leicester. (2010) *Trait Theories*. https://www.le.ac.uk/oerresources/psychology/organising/page_06.htm#:%7E:text=Trait%20theories%20of%20leadership%20identify,than%20being%20developed%20through%20learning).

U.S. Naval Academy. (n.d.-a). *Apply to USNA.* Admissions. Retrieved March 8, 2021, from https://www.usna.edu/Admissions/Student-Life/Life-in-the-Brigade.php

U.S. Naval Academy. (n.d.-b). *Life in the brigade.* Admissions. Retrieved March 8, 2021, from https://www.usna.edu/Admissions/Student-Life/Life-in-the-Brigade.php

U.S. Naval Academy. (n.d.-c). *Majors and courses.* Academics. Retrieved March 12, 2021, from https://www.usna.edu/Academics/Majors-and-Courses/index.php

U.S. Naval Academy. (2013, Aug 22). *Brigade striper organization and selection procedures.* (COMDTMIDNINST1601.12D). Department of the Navy. https://www.usna.edu/Commandant/Directives/Instructions/1000-1999/comdtmidninst-1601.12d_brigade_striper_organization_and_selection_procedures.pdf

U.S. Naval Academy. (2018, Aug 3). *Midshipmen aptitude for commissioning system* (COMDTMIDINST 1600.2J). Department of the Navy. https://www.usna.edu/Commandant/Directives/Instructions/1000-1999/Comdtmidninst-1600.2j_Midshipmen-Aptitude-For-Commissioning-System.pdf

U.S. Naval Academy. (2017, Aug 8). *Class Standings* (USNAINST 1531.51B). Department of the Navy. https://www.usna.edu/AdminSupport/Inst/1000-1999/USNAINST%201531.51B%20Class%20Standings.pdf

THIS PAGE INTENTIONALLY LEFT BLANK

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
   Ft. Belvoir, Virginia

2. Dudley Knox Library
   Naval Postgraduate School
   Monterey, California