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A FRAMEWORK TO DEFINE AND QUANTIFY
LEADERSHIP STYLES WITHIN
NAVY ENGINEERING UNITS

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ABSTRACT

This study aimed to develop a framework for the U.S. Navy's leadership styles by assessing self-perceived leadership styles in a sample of reserve Engineering Duty Officers (EDOs) and the Senior Enlisted Leaders (SELs) in these technical units. Transformational and transactional leadership styles were examined using the Multifactor Leadership Questionnaire (MLQ) Form (Avolio & Bass, 2004), while the servant leadership style was analyzed using the Servant Leadership Self-Assessment Questionnaire (SLSQ) (Sandling, 2021). The effect of rank and the triad leadership position on leadership style was explored in this study. The survey was made available to all EDOs and SELs (n = 525). A total of 84 surveys were completed (a 16% return rate). Results showed a statistically significant difference in servant leadership between SELs and junior officers. When broken down into the factors of servant leadership, this difference was seen in the conceptual skills and putting followers first factors. No statistical differences were seen across leadership triad positions or between any other ranks for any other leadership style. The findings are discussed for their implications for leadership development in the U.S. Navy.

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LIST OF ACRONYMS

CO………………………………………………………………....Commanding Officer

DCO……………………………………………………………….. Direct Commission Officer

EDO……………………………………………………………….. Engineering Duty Officer

IRB………………………………………………………………..Institutional Review Board

MLQ……………………………………………………….. Multifactor Leadership Questionnaire

R&D………………………………………………………...…Research and Development

SEL……………………………………………………...…….... Senior Enlisted Officer

SLQ……………………………………………………..Servant Leadership Questionnaire

SLSQ…………………………………………Servant Leadership Self-Assessment Questionnaire

XO…………………………………………………...…………….. Executive Officer

CHAPTER ONE: INTRODUCTION

Study Background

Leadership has existed since intelligent beings were able to gather in groups. Both humans and animals display leadership characteristics. With the abundance of historical leadership examples from B.C. civilizations and onwards, the lack of significant research known to exist before the twentieth century is surprising. The first forty years of known leadership research were devoted to trait theory (Bass, 1990), while prior leadership theories regarded leadership as hereditary. The last 50 years have seen an explosion of leadership theories attempting to fully define what leadership consists of. The most prevalent of these theories today are transactional, transformational, and servant leadership. Unfortunately (perhaps due to societal values or the chosen names), transformational leadership has been touted as good or desirable, while transactional leadership has been denigrated as wrong, basic, or detrimental. This dichotomy does not exist, as there are numerous successful transformational and transactional leaders. Servant leadership exists as a separate theory, first proposed by Greenleaf (1970). Servant leadership has rarely been studied with respect to transactional and transformational leadership.

The leadership of the U.S. Navy has been in the news a lot recently for major mishaps and leadership failings: two separate collision incidents of the USS McCain and the USS Fitzgerald, the capturing of Navy patrol boats by Iranian forces, the fire aboard the USS Bonhomme Richard, and the Glenn Defense Marine Asia (or Fat Leonard) scandal. As a result of the collisions, members of Congress commissioned a report to evaluate the culture of the Navy (Schmidle & Montgomery, 2021). The report concluded that 94% of sailors interviewed attribute the operational failures to issues with Navy culture and leadership. In a centuries-old

organization with an established mission and core values, changing a cultural or leadership failing issue can be as successful as patching the hole in the USS McCain with a box of band-aids.

To better understand the leadership problems the Navy has faced, this study sought to develop a framework of the leadership styles within a successful naval reserve unit by surveying its leaders. This study explored a potential relationship between rank and leadership position within a triad with respect to an individual's perceived transactional, transformational, and servant leadership styles. Few studies have examined this relationship, especially within military organizations or specifically among engineers. There were no specific studies to leverage for this study due to the examination of a previously unstudied population (reserve Engineering Duty Officers (EDOs) and Senior Enlisted Leaders (SELs) in units with EDOs). The concept of a leadership triad (Commanding Officer, Executive Officer, and an SEL) is also relatively unique to the military. It is not duplicated in corporations; as such many existing leadership studies were not relevant to this study. Determining a linkage between the leadership styles, rank, and triad role could position the U.S. Navy with the ability to determine the correct person for an assignment or allow the development of leadership skills prior to an individual being given a specific position.

Problem Statement

Transformational leadership studies that have been completed focus on transformational versus transactional leadership, exclusive of servant leadership. When Burns (1978) introduced the concepts of transactional and transformational leadership, he envisioned a continuum with transactional leadership on one end of the spectrum and transformational leadership on the other. Subsequent studies have included laissez-faire leadership as a third leadership style on this

continuum (Bass, 1985, 1998). Laissez-faire leadership, as defined by Bass (1998), consists of not making necessary decisions and ignoring the responsibilities of leadership. In the military's chain of command structure, laissez-faire leadership is not a valid option that would allow a sailor to retain a billet (Bass et al., 2003). Military leadership composition is arranged as a triad, not a dyad. There is a potential for three different leadership styles as each triad member has a different role and responsibility for the unit. The triad is comprised of the Commanding Officer (CO), Executive Officer (XO), and the SEL. The CO has the responsibility, accountability, and authority for everything in the command and is generally the highest-ranked officer. The XO is a direct representative of the CO, enforcing the CO's directives and ensuring the unit's administrative, training, and effectiveness. The XO may be an officer of any rank within the unit, though the XO is often the second highest-ranked individual (Kacher, 2018). The SEL is in charge of all the enlisted sailors and is responsible for their development. The SEL, who is usually a Chief, though sometimes a Chief Petty Officer if the unit does not have a Chief, also provides guidance to the CO and XO from the perspective of the enlisted sailor as an individual with significant hands-on experience.

The Navy requires all its sailors in leadership positions to attend leadership courses every five years. These leadership courses are differentiated by rank. There are courses for senior officers (O-5 and above), junior officers (O1-O4), and senior enlisted (E-4 and above), as well as leadership courses for specific positions, such as those focused on taking command of a unit instead of a general leadership course. EDOs have a specific EDO Leadership Development Framework (Moore, 2019) that further details expectations based on an EDO's career progression. Suppose correlations were found between rank or leadership position in the triad. In

that case, the Navy could ensure that the instruction in its leadership courses prepares its sailors for the Navy's desired leadership style.

Study Purpose

The purpose of this case study was to develop a framework for the U.S. Navy's leadership styles by determining if there are significantly different leadership styles used at different ranks and triad leadership positions within the U.S. Navy. The EDO reserve community and the SELs from these technical units participated in this study. This study determined what type of leadership styles are being employed in a successful unit of the U.S. Navy (Hanshaw, J., Behn, N., & Montgomery, M., 2020). A valid framework could aid any underperforming units by placing individuals in the correct position with compatible leadership styles identified herein of the successful units surveyed for this study.

A proportional number of participants were surveyed from the groups of senior enlisted, junior officers, and senior officers. Officers were determined by examining the Navy Personnel Registrar to determine who was billeted as a reserve EDO. The SELs were determined by soliciting the EDOs who are commanding officers to pass the survey on to their SELs. An announcement was also made at the EDO TRAINEX with a predominant number of EDOs and SELs in attendance.

Research Question

Leadership is inherent for any officer or chief in the military, but what types of leadership exist within these ranks? It is unknown to what extent, if any, rank affects the leadership style exhibited by an individual. The base research question of this study was whether transactional, transformational, and servant leadership styles are more prevalent at different ranks or the triad leadership position within the U.S. Navy reserve EDO units.

This study attempted to answer the following questions:

Q1.   Is there a relationship between military rank and transactional leadership?

Q2.   Is there a relationship between military rank and transformational leadership?

Q3.   Is there a relationship between military rank and servant leadership?

Q4.   Is there a relationship between a triad leadership position and transactional leadership?

Q5.   Is there a relationship between a triad leadership position and transformational leadership?

Q6.   Is there a relationship between a triad leadership position and servant leadership?

Hypothesis

The results from this study will provide evidence for one of the following hypotheses:

$H1_0$.   There is no significant relationship between military rank and a transactional leadership style within U.S. Navy reserve EDO units.

$H1_A$.   There is a significant relationship between senior officer military rank and a transactional leadership style within U.S. Navy reserve EDO units.

$H1_B$.   There is a significant relationship between junior officer military rank and a transactional leadership style within U.S. Navy reserve EDO units.

$H1_C$.   There is a significant relationship between senior enlisted military rank and a transactional leadership style within U.S. Navy reserve EDO units.

$H2_0$.   There is no significant relationship between military rank and a transformational leadership style within U.S. Navy reserve EDO units.

$H2_A$.   There is a significant relationship between senior officer military rank and a transformational leadership style within U.S. Navy reserve EDO units.

H2$_B$.   There is a significant relationship between junior officer military rank and a

transformational leadership style within U.S. Navy reserve EDO units.

H2$_C$.   There is a significant relationship between senior enlisted military rank and a

transformational leadership style within U.S. Navy reserve EDO units.

H3$_0$.   There is no significant relationship between military rank and a servant leadership

style within U.S. Navy reserve EDO units.

H3$_A$.   There is a significant relationship between senior officer military rank and a

servant leadership style within U.S. Navy reserve EDO units.

H3$_B$.   There is a significant relationship between junior officer military rank and a

servant leadership style within U.S. Navy reserve EDO units.

H3$_C$.   There is a significant relationship between senior enlisted military rank and a

servant leadership style within U.S. Navy reserve EDO units.

H4$_0$.   There is no significant relationship between a triad leadership position and a

transactional leadership style within U.S. Navy reserve EDO units.

H4$_A$.   There is a significant relationship between a triad leadership position and a

transactional leadership style within U.S. Navy reserve EDO units.

H4$_B$.   There is a significant relationship between a triad leadership position and a

transactional leadership style within U.S. Navy reserve EDO units.

H4$_C$.   There is a significant relationship between a triad leadership position and a

transactional leadership style within U.S. Navy reserve EDO units.

H5$_0$.   There is no significant relationship between a triad leadership position and a

transformational leadership style within U.S. Navy reserve EDO units.

H5$_A$.   There is a significant relationship between a triad leadership position and a transformational leadership style within U.S. Navy reserve EDO units.

H5$_B$.   There is a significant relationship between a triad leadership position and a transformational leadership style within U.S. Navy reserve EDO units.

H5$_C$.   There is a significant relationship between a triad leadership position and a transformational leadership style within U.S. Navy reserve EDO units.

H6$_0$.   There is no significant relationship between a triad leadership position and a servant leadership style within U.S. Navy reserve EDO units.

H6$_A$.   There is a significant relationship between a triad leadership position and a servant leadership style within U.S. Navy reserve EDO units.

H6$_B$.   There is a significant relationship between a triad leadership position and a servant leadership style within U.S. Navy reserve EDO units.

H6$_C$.   There is a significant relationship between a triad leadership position and a servant leadership style within U.S. Navy reserve EDO units.

Study Significance

Leadership within the military differs from a typical civilian workforce. Within the military, there are leaders at almost every level, and much responsibility is placed on officers who may be fresh out of college but still regarded as leaders. These leaders may not have formulated their own leadership style yet, but they still have to lead. In contrast, a senior officer or SEL with more experience than the junior officer should already have their own leadership style codified.

This study sought to provide an understanding of how leadership styles are used within the military across the different ranks and positions. Leaders may not be cognizant of their

particular leadership style, just that they have one and believe it works well for them. This study sought to show leaders their leadership styles and help them understand their personal leadership techniques. How leadership potentially changes with rank and increasing experience could have an impact in many fields. Any organization with a tiered management system and a blue-collar workforce could model itself after the military's leadership styles. Findings of a significant number of leaders in a triad leadership position or within one rank having a particular leadership style may be helpful for the Navy to train the sailors in that position or rank with the leadership style they are deficient in.

Since this study surveyed sailors with different ranks, this study showed whether leadership styles change with rank and experience. If senior officers tended to exhibit one leadership style over another, it would serve the Navy to examine that style further. That style may be better than others overall or more beneficial due to a specific leadership position, while another leadership style was better at another leadership position. Suppose no significant difference was found between leadership styles and rank or triad leadership position. In that case, it might indicate that all leadership styles are approximately equally effective and that different leadership situations necessitate different responses. Thus, a successful leader uses a different leadership style for each situation.

<u>Study Nature</u>

This study was a nonexperimental study conducted online amongst reserve EDOs and Chiefs or SELs in units located throughout the United States. The design of this study was to determine a correlation between leadership styles, ranks, and triad leadership positions. There are approximately 448 reserve EDOs and 77 SELs. This population was particularly interesting to study as the dichotomy of the civilian leadership experiences, military experiences, leadership

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training, and ranks brought together within these units continues to exceed in multiple areas for success. Some of these sailors have deployed worldwide, supported joint operations with other military branches and international militaries, and undergone a mass recall during COVID to enable our nation's shipyards to maintain the U.S. Navy's ship availabilities. Using this population of sailors provided an optimal sample regarding the diversity of experiences that may be seen throughout the Navy. Some populations may have been underrepresented within this group from the larger Navy; specifically, minorities and women are likely not found in similar proportions.

The study targeted the entire population, with a minimum goal of 81 participants to obtain a 95% confidence level with a confidence interval of 10 from the projected population of 525 (Creative Research Systems, 2012). Data collection occurred online and at the annual Engineering Duty Officer TRAINEX in 2022. Demographic questions were asked to determine rank, triad leadership position, age (range), civilian career level, and prior enlisted experience. Specifics regarding gender and race were not asked for, as minorities and females were too easily identifiable based on the overall representative number in the population of EDOs and their demographic responses.

All participants took both the MLQ and the SLSQ surveys. The SLSQ has seven concepts correlated to servant leadership: emotional healing, creating value for the community, conceptualizing, empowering, helping followers grow and succeed, putting followers first, and behaving ethically. The SLSQ totals the questions about each category to determine how strongly each servant leadership behavior is displayed. The total value was used to determine the participant's servant leadership level.

The MLQ Self Form developed by Bass and Avolio (2015) is the benchmark tool for measuring transformational leadership. It has been used in numerous studies to provide statistically meaningful results that verify its credibility as an assessment tool. Transactional leadership, transformational leadership, passive leadership, and outcomes of leadership are measured with the MLQ. The MLQ Self Form allows participants to rate themselves in these categories with 45 questions to describe the aforementioned measures. Due to the military hierarchy and to encourage survey participation while reducing the fear of reprisals, subordinates were not asked to rate their superiors. Some superiors may only have one or two subordinates reporting to them, making any responses readily identifiable.

<u>Definition of Key Terms</u>

Command Triad - works to ensure that the unit is prepared to carry out its assigned mission, and that the unit's personnel are trained, motivated, and supported. The command triad is responsible for setting the tone and culture of the unit, and for ensuring that the unit operates in accordance with the Navy's core values of honor, courage, and commitment.

Commanding Officer – is responsible for the overall operation and management of the unit. The CO is responsible for setting the unit's goals, and developing operational plans. A board might have selected them to fill the position, or they might be filling the position as an interim fill if a unit had an immediate need for a CO. The CO is the primary leadership position in the leadership triad.

Engineering Duty Officer – is an officer with the rank of Ensign to Admiral in the U.S. Navy. Officers can be in either 1445 (fully qualified EDO) or 1465 (EDO candidate) designators and serve as restricted line officers (cannot take command of a ship). EDOs serve throughout the U.S. Navy in multiple roles within specialties such as acquisition, program management, heavy

lift, museum ships programs, strategic systems programs, missile defense agency, maintenance, diving and salvage, and onboard weapon systems.

Executive Officer – is the second in command, after the CO, and is responsible for assisting the CO in the management and leadership of the unit. They are generally tasked with ensuring all officers and the SEL understand the CO's intent. The Executive Officer is responsible for coordinating the unit's activities, providing guidance and support to the unit's officers and enlisted personnel, and managing the unit's administrative functions. This position is one of the positions in the leadership triad.

Leadership – is a process whereby an individual influences a group of individuals to achieve a common goal.

Transactional leadership – is a results-driven leadership style where leaders identify the needs of their subordinates and motivate them to accomplish goals with appropriate rewards for their performance. Transactional leaders set clear expectations for performance, and use feedback and monitoring to ensure that standards are being met. This leadership style is often effective in achieving short-term goals and maintaining a structured, hierarchical organization, like that found in the military.

Transformational leadership –is a leadership style where leaders strive to motivate employees to do more than they initially thought they were capable of achieving. A leader will help the subordinate expand their view to see that achieving the goal is more important than their self-interests and encourage innovation and creativity. They work towards creating a sense of shared purpose and excitement.

Senior Enlisted Leader – is the enlisted sailor in charge of a unit's enlisted sailors. This individual may be a Chief, or this role will be transferred to the next senior-ranking enlisted

person if the unit has no Chiefs. The SEL ensures the Commanding Officer's vision is understood by the enlisted sailors in the unit and is responsible for advising the CO and Executive Officer on matters related to the unit's enlisted personnel. The SEL is responsible for maintaining discipline and morale within the unit, and for ensuring that the unit's enlisted personnel are properly trained and prepared to carry out their duties. The SEL is one of the three leadership positions in the leadership triad.

Servant leadership – is a type of leadership that puts the needs of others before the needs of the leader. Servant leaders excel at building community, building up those around themselves, and achieving organizational goals through cooperation and shared team decision-making. They strive to create a supportive and empowering environment where others can thrive and reach their full potential.

Assumptions

Transactional and transformational leadership can be determined with Bass and Avolio's Multifactor Leadership Questionnaire MLQ Self Form (2015).

Servant leadership can be determined with Sandling's Servant Leadership Self-Assessment Questionnaire (SLSQ) (2021).

Leadership exists and can be identified within the military organization.

Leadership within the EDO community can be defined as exemplary and used as a standard of what the Navy should strive to achieve.

Limitations

No surveys exist that compare transactional and transformational leadership with servant leadership. As such, two previously validated surveys were used together to determine

transactional versus transformational leadership styles and whether or not a servant leadership style is present.

Delimitations

The study focused on leaders' self-perceptions of their leadership within the reserve EDO community.

The Multifactor Leadership Questionnaire (MLQ) survey developed by Bass and Avolio was used to define transactional and transformational leadership.

The SLSQ survey developed by Sandling was used to define servant leadership.

This study was designed to explore the relationship between rank and triad leadership positions with leadership styles at a point in time.

EDOs of any rank and the enlisted sailors designated as SEL or Chief in their units were used in this study.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The purpose of this case study focused on analyzing transformational, transactional, and servant leadership within the ranks of Engineering Duty Officers and the Chiefs who serve in these technical units. The literature review gathered papers that dissected the foundations of leadership theories, EDO history, military leadership, and engineering leadership. While all significant historical leadership theories were examined, the most current leadership theories of transformational, transactional, and servant leadership were extensively researched in this dissertation.

Documentation

This literature review used peer-reviewed journal articles and dissertations from scholarly databases, including ProQuest, Sage Journals Online, EBSCO, JSTOR, and Emerald Insight Journals, as well as more contemporary research obtained from Google Scholar. Books where the originators of transformational, transactional, and servant leadership theories first printed their concepts were referenced, as were the originators' subsequent works to follow the development of their theories. Chain searching on relevant articles was performed to trace the progress of these leadership theories, identify pertinent new developments with these leadership theories, and locate potential follow-up studies. Two-thirds of the literature gathered is from 2000 and newer; the remaining third includes historical articles on Engineering Duty Officers from the 19th Century and the early 20th Century, as well as articles published by the theory originators conceptualizing their initial ideas. This literature review represents an unbiased

review of the available literature while discovering and acknowledging the gaps in engineering leadership literature.

The first section of this literature review examines the concept of leadership, leadership theory development, engineering leadership, and the evolution of leadership within the military. Major leadership theories are chronicled from their origin to their downfall through the concepts of transactional, transformational, and servant leadership as they are defined for use in this dissertation. The dearth of research on engineering leadership is also examined. Leadership is then examined across the different military services, as is the literature available to train the military's future leaders. This literature analysis and research gap form the crux of this dissertation.

The second section delves into the theory of transformational leadership. The origination and the evolution of transformational leadership were reviewed to provide a foundational base for this theory. Applicable transformational leadership studies were also examined to provide an understanding of the current state of the transformational leadership theory.

Transactional leadership is explored in detail in the third section. The origin and evolution to the current version of transactional leadership theory are explained from existing literature. Current pertinent transactional leadership studies are also examined in this section to determine the progress contemporary researchers have made with transactional leadership theory.

Servant leadership is detailed in section four, from the foundation of the theory to the present-day understanding of servant leadership. Servant leadership studies investigating leadership within the military are also included to illustrate current servant leadership trends in militaries.

Leadership

When did leadership originate? Have there not always been leaders? Do all leaders have leadership? Are leaders made or born? What is leadership? Is it managing, or is it something else? The answers to these questions from the leadership field's subject matter experts prove only that "inconsistency is consistency within this conversation" (Sister Hazel, 1994). Bass (1981) notes that the term "leadership" originated in the early nineteenth century but that the term "leader" had been in use since the 1300s in English. Compounding some of the confusion, the opening sentence of the same book states that "The study of leadership is an ancient art" (Bass, 1981, p. 5). Bennis (1959) argues that "more has been written and less is known about leadership than any other topic in behavioral science" (pp. 259-260). Burns (1978) agrees with this sentiment as he states that "Leadership is one of the most observed and least understood phenomena on earth" (p. 2). With the various approaches to leadership, it is not easy to settle on a consistent definition. What, then, is leadership? Bass (1981) defines leadership as an interaction, while Northouse (1997) defines leadership as a process. This may be hypercritical as an interaction can be a process. Thus, for this dissertation, Northouse's definition will be adopted: "Leadership is a process whereby an individual influences a group of individuals to achieve a common goal" (p. 3). There are countless different definitions of leadership, and this one, in particular, does not capture the breadth of every single leadership definition or argument. However, this definition succinctly captures the overall gist of the preponderance of available definitions discovered during this literature review.

Leadership Theories

Depending on the leadership book or article referenced, leadership theories may begin with the pharaohs, sun-tzu, the kings and queens of England, or even Homer's tale of the

Odyssey. It may be argued that while leadership occurred throughout history, leadership theories are more contemporary than a poem of a protagonist returning from the Trojan War. To avoid falling down a very deep well at the end of a rabbit hole, the major historical theories will be examined in this literature review, and speculation on what is gleanable of leadership from King Arthur's tales will be left for future studies.

One of the earliest relevant leadership theories was the great man theory that stemmed from a work by Galton (1869) where he opined on the eminence of 2,500 men from a list that had been published as "Men of Time." The focus of this theory was that if a leader's personality and behavior were copied, a person could become a successful leader (King, 1990). Unfortunately, this was not a qualitative method to study leadership but more conjecture on the perceived values of each leader as viewed by Galton. This led to trait theory, where researchers attempted to define the traits of a successful leader (after the widely differing personalities of leaders were realized during the great man theory era). One of the trait research studies, performed by Kohs and Irle (1920), into trait theory attempted to correlate an individual's traits with their promotion potential in the Army. The results of this study were inconclusive, and the researchers postulated that the Army's system for promotion might be at fault for the inconclusive results by promoting people with the incorrect traits for leadership. Stogdill performed two surveys, one in 1948 that used 124 existing trait studies and one in 1970 that used an additional 163 studies to find a correlation from any of the traits (Bass, 1981; Northouse, 1997). Stogdill's studies concluded that, at best, a leader's characteristics (traits) are a part of leadership. However, leadership exists in relationship to a situation and does not solely rely on a leader's traits (Greenwood, 1996; Stogdill, 1981). The more significant problem with trait theory studies was that they neither take the leadership situation into account nor do they have a defined

list of traits between the studies. For example, through at least 1986, Lord, DeVader, and Alliger still considered masculinity an important leadership trait. Trait theory research has led to a list of subjective terms that cannot necessarily be ordered into a hierarchy of important traits (Bass, 1990; Northouse, 1997).

Leadership theory moved on from trait theory when the realization occurred that leadership also had something to do with relationships and did not rely solely on a leader's traits. An attempt to codify the relationships in leadership was based on the power the leader wielded (Bass, 1981). The researched relationships were top-down and not concerned with the worker's needs. This theory describes an authoritarian leadership style that is not exemplary of leadership as a whole but a particular type of leadership whose effectiveness is debated by researchers (King, 1990).

Another facet of leadership explored the possibility of the actions of a leader being crucial to leadership, not the particular power the leader yields. Multiple different theories arose around this principle; Theories X and Y and the Managerial Grid Model are the most prevalent. Theory X and Y postulated that there are two kinds of people, ones that are passive and need direction (Theory X) and ones that are motivated and need the right environment to begin (Theory Y) (King, 1990).

The situation where the leadership was occurring was the next component considered in defining leadership theory. According to Bass (1990), the overall situation where leadership was needed would ultimately determine who would become a leader. This meant any person could be a leader if the situation presented itself. The situation could be defined by the type of tasking, social standing, and the relative power the leader already held over the subordinates (Bass, 1981).

The next evolution of leadership theory began to combine the aforementioned individual components of behavior, personality (traits), influence (power), and situation. This was the beginning of acknowledging that leadership is a multidimensional theory that cannot be described by examining only one individual aspect, much like a tree cannot be explained by only describing one leaf. One of the more prominent theories was contingency theory, where a leader's effectiveness was dependent on how well that leader's style fits the overall situation (Northouse, 1997). Fiedler's (1967) version of contingency theory focused on finding the right situation for a leader to succeed by ensuring the group being led viewed the leader highly and that the leader had legitimacy and power (Bass, 1990). Path-Goal theory leaned into the concept that a leader was meant to motivate workers to follow a path that would lead them to the goal (Bass, 1990; Georgopoulos et al., 1957). To increase a worker's performance, a leader could increase satisfaction with the work itself or increase the rewards for reaching the goal (Bass, 1990). This theory relies on workers wanting to and believing they can do the work for the expected reward (Northouse, 1997).

Leadership theory took a turn in the 1970s with anti-leadership theories that suggested leadership only existed to an observer, leadership had outlived its usefulness, and that leadership can be stopped from affecting the worker's performance (Kerr & Jermier, 1978; King, 1990; Miner, 1975; Mitchell, 1979). The idea of giving up further leadership studies was later retracted by its author after pushback from several leadership scholars. Leadership theory continued to evolve after this period of the leadership dark ages (Miner, 1982).

Another attempt at describing leadership came with the supposition that leadership may be inherent to the culture of a workplace (King, 1990). The theories generated under this paradigm concentrated on the quality of work and shifted away from increasing the quantity of

work being done. Then, once leadership was established within an organization, the organization could lead itself (Manz & Sims, 1987). These theories were supplanted by the theories this literature review is focused on, transactional, transformational, and servant leadership theories. These will be discussed in detail in subsequent sections.

Engineering Leadership

Engineering and leadership are paradoxical concepts when grouped together by most researchers. When working outside academia, leadership requirements are thrust upon engineers, but leadership theory is not taught at most universities and has been described as a nascent field as recently as 2016 (Klassen et al., 2018). Hylton's (2011) paper identified academia in engineering fields as not using transformational leadership theories in their own pursuits. Hylton contends this results in a knowledge and experience gap amongst engineers as they are not employing effective leadership. This mindset is being transferred to the next group of engineers, who are left to figure out leadership for themselves if they become employed outside of academia.

Paul et al. (2018) attempted to define engineering leadership by surveying participants at various engineering leadership conferences and perusing literature for existing definitions. The definition they ultimately came up with is:

> Engineering leadership is an approach that influences others to effectively collaborate and solve problems. Engineering leadership requires technical expertise, authenticity, personal effectiveness, and the ability to synthesize diverse expertise and skillsets. Through engineering leadership, individuals and groups implement transformative change and innovation to positively influence technologies, organizations, communities, society, and the world at large.

The first sentence sounds a lot like Northhouse's (1997) definition of leadership, "Leadership is a process whereby an individual influences a group of individuals to achieve a common goal" (p. 3). The remaining two sentences address technical specifics but could easily be adapted for any field. For example, medical leadership requires medical expertise and medical leadership will implement transformative change and innovation to influence medicine positively. This leaves a question as to whether an engineer with a couple of leadership classes can be an effective leader, as companies call for engineers who are proficient leaders with technical and business proficiencies (Farr & Brazil, 2009).

Emison (2011) advocates for engineers to become adaptive and transformational in the current times as demands for multi-faceted engineers increase. An engineer today is under increased pressure with all decisions as stakeholders for any project technical increase, and other factors like cost or schedule may overshadow the deference to an engineer's judgment. The literature reviewed has demonstrated that engineers who are leaders are not prevalent among today's existing engineers. Those who can excel as both engineers and leaders have likely educated themselves through on-the-job training or additional coursework that was not part of their engineering degree.

Military Leadership

Leadership in the military has been speculated on and studied over history. Any military that can gain a tactical advantage over another force by choosing the right leaders will use that knowledge. Jenkins (1945) studied available literature then and found the existing studies lacking in understanding leadership. For example, Navy leaders were to have characteristics of "simplicity, self-control, tact, honor, adherence to duty, and loyalty" (Jenkins, 1945, p. 66).

Jenkins points out that none of these characteristics is based on any empirical value but are typical of the research work or that time.

Since the 1950s, as leadership theories emerged, more concrete theories were extended to military leadership and corporations. Most of Bass's initial work examined leadership in different military units (Bass, 1998, 2003). In his 2003 study, Bass surveyed army platoons to determine that transformational and transactional leadership styles were both predictors of unit performance. The population surveyed was a mix of officers and enlisted in platoons, with no delineation of how many officers or enlisted in the population. Another researcher (Dvir et al., 2002) conducted a field experiment with the Israeli army where leaders attended a transformational leadership training program, resulting in platoons that could perform at higher levels than before.

Servant leadership is also being studied in the military (Earnhardt, 2008), but fewer published papers exist on servant leadership than on transformational and transactional leadership in the military. Current studies seek to determine what type of leadership improves a specific facet of a military operation. However, most studies test only for the type of leadership being studied without regard to other leadership theories. Suppose a leadership theory is taught in detail where no specific theory has been taught. In that case, it may not be a stretch to accept that a leadership theory (like Dvir et al., 2002) would result positively regardless of what leadership theory was taught. By looking at different leadership theories across the military, instead of just one, it could be possible to begin to unravel the paradox of leadership and ascertain which leadership style is dominant or which mix of styles results in the most effective leader.

Engineering Duty Officers

To fully understand the modern-day Engineering Duty Officer, it is crucial to comprehend the history that brought EDOs to their current roles in the Navy; see Figure 1 for a chronological pictorial of the EDO's history. Technically proficient people have always been around in the military, but recognizing their contributions, educating officers in engineering, and forming a permanent engineering corps did not occur with the formation of the Navy. Even obtaining a qualification pin recognizing the EDO contribution only recently occurred in 2017 (Department of the Navy, 2021). The need for engineers in the Navy dates back to the Navy's re-establishment in 1794[1] when six men were appointed by Secretary of War Henry Knox as Navy captains to oversee the construction of six new frigates. While Engineering Duty Officers were not yet in existence, these six men were the first men with technical acumen to become officers in the U.S. Navy.

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[1] After the Revolutionary War, naval assets were sold off and the Continental Navy was disbanded. Threats to merchant mariners propelled Congress to create a permanent U.S. Navy with the Naval Act of 1794 (Toll, 2006).

1794 — U.S. Navy re-established as part of War Department; Six technical officers appointed to oversee building of six frigates

1836 — Civilian appointed as steam engineer to the Fulton II

1842 — Engineer Corp established; Navy reorganized to create Bureau of Construction, Equipment, and Repair; 35 engineers recruited

1853 — Senior constructor appointed to head Bureau of Construction, Equipment, and Repair, per Congress; First time technical person holds senior position

1859 — Engineers given commissioned rank

1862 — Navy bureaus reorganized to create Bureau of Steam Engineering

1864 — Naval Academy authorized to educate officers in engineering

1866 — Constructors given relative commissioned rank

1869 — Attorney General revokes constructor relative rank

1871 — Congress reaffirms engineers should be given rank

1879 — First of two naval cadet engineers attend three-year naval architecture course in England

1881 — Naval Academy offers its first naval architecture class

1888 — Engineers account for approximately 30% of all naval officers

1899 — Roosevelt dissolves Engineering Corps

1916 — LT Robinson (Father of EDOs) proposes reviving Engineering Corps as Engineering Duty Only officers, part of 1916 National Defense Act

1920 — 65 EDOs selected; Bureau of Steam Engineering becomes Bureau of Engineering

1930 — 15 years of experience as a line officer required to be selected as EDO (later reduced to 4)

1940 — Bureau of Engineering and Bureau of Construction combined to Bureau of Ships, headed by an engineer; 212 Construction Corps officers join 82 EDOs as line officers

1947 — Aeronautical Engineering Duty Officer (AEDO) and Ordnance Engineering Duty (OED) Officer specializations created

1966 — Bureau system replaced by system commands; EDOs moved to Naval Ship Systems Command (NAVSHIPS)

1974 — NAVSHIPS merged with NAVORD to bevome NAVSEA; OEDs become EDOs

1977 — ED Officer school created

2017 — EDO qualificaiton pin approved

Legend:
- Creation of EDOs
- Engineering rank and pin
- Navy reorganizations
- Notable engineering events
- Engineering education

Figure 1: A brief timeline of the origin of the Engineering Duty Officer
(Alden, 1995; Designated Engineering Duty Only, 1951; Dinger, 1908; Edwards, 1896; Edwards, 1984; Fee, 2001; and Madden, 1954)

A precursor to the EDOs was established in 1842 as the Engineering Corps (Alden, 1995; Tily, 1960). These engineers were not line officers and were not given officer ranks until 1859, with Congress passed legislation in 1866 and 1871, reaffirming the 1859 law that engineers should have officer rank and promotion potential equivalent to that of line officers (An act making appropriations for the naval service for the year ending June thirty, eighteen hundred and seventy-two, and for other purposes, 1871; An act making appropriations for the naval service for the year ending the thirtieth of June, eighteen hundred and sixty, 1859; An act to define the number and regulate the appointment of officers in the Navy, and for other purposes, 1866; Fee, 2001). With rank came a modicum of recognition from the sea-faring naval officers as the Navy reorganized to develop a Bureau of Steam Engineering, and the Naval Academy in Annapolis received approval to teach engineering courses (An act to reorganize the Navy Department of the United States, 1862; Fee, 2001). Engineers began to take hold in the Navy, comprising 30% of all naval officers in 1888, before Roosevelt decided in 1889 that every naval officer should be "a fighting engineer" (Alden, 1995) and a separate corps of engineers were no longer necessary (An act to reorganize and increase the efficiency of the personnel of the Navy and Marine Corps of the United States, 1899; Fee, 2001).

From 1899 through 1916, the Navy went through a period of attrition where the remaining officers of the Engineering Corps began retiring (Bassler, 1955). While every officer was required to understand engineering, engineering was no longer a specialty for any officer. In 1916, with the threat of World War I looming, Lt Samuel Murray Robinson, from the Bureau of Steam Engineering, realized a group of officers who had technical specialization was needed to once again oversee the impending shipbuilding efforts (An Act Making Appropriations for the Naval Service for the Fiscal Year Ending June Thirtieth, Nineteen Hundred and Seventeen, and

for Other Purposes, 1916; Designated Engineering Duty Only, 1951). He successfully lobbied for the Engineering Duty Officers to be created as a group of line officers so that current line officers interested in engineering could become EDOs without losing promotion possibilities. From 1916-1920, 65 new EDOs were selected to complement the few remaining Engineering Corps officers (Madden, 1954). The hiring of new EDOs slowed drastically when the Navy underwent a personnel survey in 1930. It was determined that one of the qualifications for becoming an EDO was to have 15 years of experience as a line officer (Fee, 2001). By 1940 there were only 82 EDOs, a drastic decline from 1888, when 220 EDOs accounted for 30% of naval officers (Fee, 2001). It took a merger of 212 construction engineers to join the EDOs as line officers in the creation of the Bureau of Ships for EDOs to begin to reach their former numbers (An Act Providing for the Reorganization of the Navy Department, and for Other Purposes, 1940; Bassler, 1955). After undergoing a couple more reorganizations, EDOs today fall within the Naval Sea Systems Command (NAVSEA). An EDO School was formed to develop and train EDOs. This has resulted in over 800 active duty and over 400 reserve EDOs currently serving in the Navy (Department of the Navy, 20221b). This force of numbers and an Admiral championing for EDOs to receive recognition propelled the Navy to approve a qualification pin in 2017 that acknowledges the long-serving under-recognized community of EDOs (Department of the Navy, 2021a).

Active duty EDOs are still culled from existing line officers who express interest in engineering. They are then sent to obtain their master's degrees and subsequently join the EDO community. Reserve EDOs who desire admission to the EDO community must enter the Navy with a technical master's degree and pass a screening board of senior EDOs before being commissioned as an officer. Reserve EDOs are chosen for their technical skillsets and leadership

abilities. They are expected to be able to qualify as an EDO within four years of joining the Navy, less than a third of the time active-duty officers in 1930 were given. They are also expected to do this while maintaining a healthy civilian work-family-reserves balance. The vigorous demands placed upon reservists require a candidate to have a unique character, making this group an optimal target population for a leadership study. The expected progression of an EDO's career is depicted in Figure 2. This is more typical of an active duty EDO since reserve EDOs will start this development path as ensigns, not as lieutenants. The emphasis on leadership throughout the career progression is evident as the technical requirements are balanced with mentoring and leadership training. Appendix D has another version of the officer leadership development career path for the general naval officer (not EDO specific) and one for enlisted leadership development.
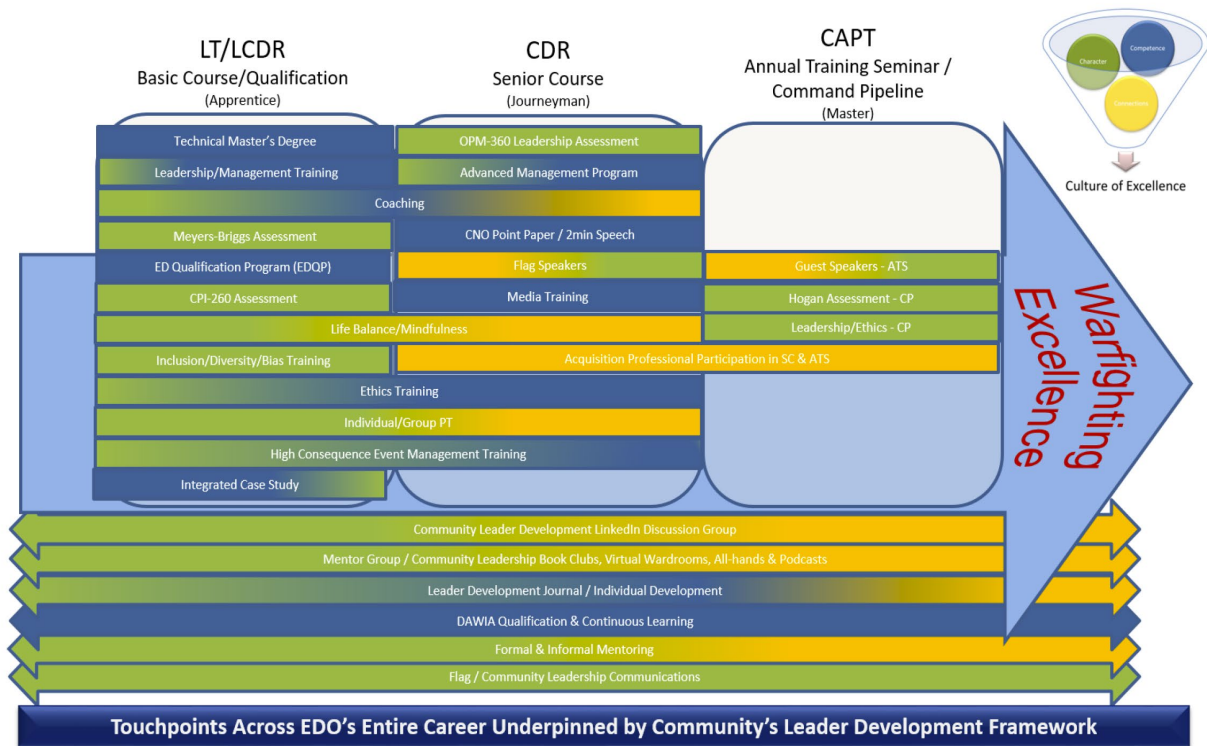
Figure 2: Engineering Duty Officer Leadership Development

Transactional Leadership

Transactional leadership was described by Burns (1978) as a series of exchanges between two people that benefits both parties. This may entail exchanging work for a reward to achieve the desired goal (Singer & Singer, 1990). Bass (1985) expanded this definition to incorporate the leader and subordinate more globally, stating that the transactional leader can identify the desired outcome of a subordinate's work and attempts to give the subordinate that rewards if their work merits recognition. The transactional leader is also responsible for clarifying the requirements to accomplish the task and explaining how a subordinate's needs will be met if the effort expended by the subordinate meets the goal (Bass, 1985).

A study by Singer and Singer (1990) examined whether subordinates preferred a leader's transactional or transformational leadership style or if either style led to an increase in subordinate satisfaction. This study was administered to employees in three Taiwanese companies and a group of New Zealand police officers. Their survey results indicated that while both Taiwanese and New Zealanders overall preferred transformational leadership, the Taiwanese employees preferred transactional leadership more than New Zealanders, suggesting a cultural difference. This is potentially relevant to this study as military service is compulsory in Taiwan and currently not in New Zealand.

Transactional Leadership Factors

Avolio and Yammarino (2002) developed three factors to describe transactional leadership: contingent reward, management-by-exception active, and management-by-exception passive. This comes from their view that transformational leadership is the path forward and transactional leadership is less effective than transformational leadership. Contingent reward

leadership, for example, is described by Avolio and Yammarino as being "reasonably effective in motivating followers, but to a lesser degree than is transformational leadership" (p. 10). The prevalence of this view in existing literature points to a negative bias against transactional leadership, despite it being the leadership style most often found in industry (Yammarino & Bass, 1990b).

Transactional leadership is based on the concept of contingent reward. However, its leaders have characteristics that are more typical of those traditionally found in a military setting than management-by-exception. Transactional leaders work well within an established system and accept the structure and culture of an organization. They are also good at maintaining the status quo, which is not necessarily a negative within a military organization. While visionary leaders are needed to see the breadth of strategies, leaders who will ensure that everyday tasks are accomplished are crucial to the military strategy as well.

Applicability of Transactional Leadership in the Navy

Although the negative reputation transactional leadership has garnered in some research circles, it can still prove to be a good leadership style in certain situations. Geier's (2016) study examined leadership amongst 20 fire departments in extreme conditions. His study found that leaders exhibited a transactional leadership style in extreme events, much like those situations faced by military personnel. This eight-item survey correlated the leaders' transactional and transformational leadership to followers' performance. These same leaders were found to lead with a transformational leadership style in everyday events. This switching of leadership styles as a reaction to the type of event has direct implications for this study. How a military leader leads a team could possibly not be dependent on rank or position. The desired leadership style for a deployed military leader may not be transformational leadership. Geier's study provides an

area for future study. If EDOs' military leadership styles are identified in normal, non-combat conditions, EDOs could be followed upon deployment to determine their leadership styles while deployed. A longitudinal study of this nature could provide amplifying data on how leadership styles evolve with individuals. Examining the situational leadership styles of the same leaders in both extreme and normal conditions could bring additional context to the field of leadership studies.

<div align="center">Transformational Leadership</div>

Transformational leadership was described by Burns (1978) as contrasting transactional leadership. Where transactional leadership focuses on exchanges, transformational leadership focuses on engaging subordinates while raising the motivation and morality of both the leader and the subordinate. It ultimately "raises the level of human conduct and ethical aspiration of both leader and led" (p. 20) and thus is transformational for both parties.

Bass (1985) expanded the definition of transformational leadership to state that a transformational leader motivates subordinates to do more than a subordinate initially expected to do. A transformational leader can accomplish this by increasing a subordinate's understanding of the goal's importance and how to reach the goal, helping a subordinate exceed self-interest for the team, and either altering a subordinate's level on Maslow's hierarchy or expanding what subordinates need and want. Bass perceived four behaviors that were connected with motivating followers in transformational leadership: charisma, inspiration, intellectual simulation, and individual consideration. Charisma is associated with conveying the overall vision to followers to instill pride in the group to achieve this idea. Inspiration focuses on inspiring workers in terms they relate to. Intellectual inspiration promotes problem-solving with rational solutions.

Individual consideration ensures time is invested in the follower by mentoring and coaching them.

From Burn's (1978) book, transactional leadership is almost purveyed as wrong, while transformational leadership is good. The names even connote a preference for good versus bad, with transformational sounding like the next greatest concept and transactional sounding like a menial tit-for-tat exchange where the leader profits. Bass (1985) contended that transformational leadership was not always a good or beneficial type of leadership. For example, Bass presented Hitler as a leader who transformed Germany, but for the worse, not for the better. This leadership example, however, does not fit Burn's concept of a leader who raises the morality of subordinates.

Bass shared his views on learning to be a transformational leader in his 1990 article, from transactional to transformational leadership: learning to share the vision. Bass contends that leaders can learn transformational leadership at all levels of an organization. He cites an unreferenced study where MLQ scores were obtained on inmates in industrial shops. The inmates were then separated into groups and taught transformational or transactional leadership, while two of the groups remained untrained. Of all the groups, those that trained with transformational leadership experienced improved productivity and reduced absenteeism. Bass acknowledged that training is not likely to turn a transactional leader into a transformational leader. This view may imply that a leader cannot significantly alter an initial learned form of leadership. If this were true, leadership styles across all levels of leaders should not vary. Senior officers, junior officers, and SELs should have a remarkably similar distribution of transactional, transformational, and servant leadership styles, as all leaders come from similar backgrounds with similar military training.

Transformational Leadership Factors

Perceptions of a leader's transformational or transactional leadership style from both the subordinate's and the leader's point of view were examined in Hater and Bass' (1988) article. A total of 54 managers participated who represented the top performers in the company. The managers rated their leadership styles, and their subordinates rated their perceptions of their leaders. Through analysis, Hater and Bass concluded that the data corroborated previous studies in that a subordinate's view of their leader's effectiveness and satisfaction increased with transformational leadership. Transformational leadership was also more applicable to a better-educated workforce, as they would be more likely to apply themselves and develop their abilities under a transformational leader. Transactional leaders were deemed less likely to energize their workforce to excel. This study applies to this dissertation as the EDO community comprises an exceptionally highly educated group of individuals. Transformational leadership may still be more prevalent at senior ranks, where people are more likely to be further in their studies and have a higher level of continuing education. By obtaining a Master's degree as an Ensign entering the Navy, there may already be sufficient education at the lower ranks to not see a difference in transformational leadership between junior and senior officers if education is a sufficient contributing factor. Also, since SELs are senior to other enlisted, they may possess transformational leadership by being developed leaders regardless of having higher education but by being technical SMEs.

Gray and Brymer's (2006) article reviewed the transformational and transactional leadership model to determine the appropriateness and applicability of effective outdoor leadership. A parallel exists between the disparate duties required of outdoor leaders and military leaders. While this paper did not perform a study, the subject matter expert experiences with

outdoor leadership concluded that the transformational and transactional model was applicable. Key traits in transformational leadership, such as a leader being genuine with their motivation, could serve a leader well in both outdoor leadership and military leadership. The authors acknowledged that transactional leadership might be required to provide recognition to subordinates. As senior leaders in the military generally provide recognition, this postulate could impact the hypothesis of this study with senior officers displaying more transactional than transformational qualities.

<div align="center">Criticism of Transformational Leadership</div>

While transformational leadership has been heralded as the optimal leadership style, studies still indicate it may not be optimal in every situation. Research and Development (R&D) employees were used in Keller's (1992) study on leadership and performance to determine that project leaders who inspired research employees to have a sense of purpose for their work were viewed as more effective leaders. The R&D community is a niche community of technical and creative thinkers, much like the EDO community, despite it being outside the structure of the military. The study found that groups that concentrated on developmental projects found transformational leadership was less important than a leader who could effectively initiate structure within the project team. This type of behavior was not seen as falling within the transformational leadership style.

Transformational leadership is somewhat ambiguous when delving down into what makes it work. How to achieve a positive outcome with a specific leadership behavior is not identified within transformational leadership (Odumeru & Ifeanyi, 2013; Yukl, 1999). Transformational leadership also does not address the group dynamic in leadership. Instead, it is assumed that leadership flows from the leader to the subordinates. If leadership results in a

successful outcome, the leader is credited with successfully influencing subordinates (Odumeru & Ifeanyi, 2013; Yukl, 1999).

Applicability of Transformational Leadership in the Navy

Kayaalp's (2018) article examined creativity as it pertains to transformational leadership. Transactional leadership was not included in this study. A total of 195 students were studied in Turkey who had a two-year education at a higher-level military institution to determine the creativity within the organization and leadership's transformational leadership behaviors. Results from the study indicated that transformational leadership correlates positively with creativity and is contingent on the strength of the innovative climate. Few studies regarding creativity within the military, and fewer consider creativity within the organizational climate exist. While creativity is not being examined in this study, Kayaalp established a positive existence of transformational leadership in a military setting.

Servant Leadership

Servant leadership is credited to originating with Greenleaf (1970). Greenleaf coined the phrase in his book, The Servant as Leader, and introduced several of its key concepts. Some argue that servant leadership is timeless, but that would not give the appropriate credit to the person who began to codify it for others to learn from. Servant leadership is where others are put first. Service to others becomes a priority, whether within the community, an organization, or wherever leadership occurs. In putting others first, the power of decision-making is also shared amongst those involved in leadership (van Dierendonck, D., & Patterson, K., 2010). Like Bass (1990), Greenleaf believed that servant leadership could be learned, though some leaders would have a natural predisposition for servant leadership.

Servant Leadership Factors

In van Dierendonck and Patterson's (2010) book on servant leadership, ten characteristics of a servant leader are identified. These are listening, empathy, healing, awareness, persuasion, conceptualization, foresight, stewardship, commitment to the growth of people, and building community. All of these serve to make the leader second to the idea of serving the subordinates. A servant leader can better understand subordinates' needs by listening instead of talking. By being able to empathize, there is more of an acceptance of subordinates. Healing allows leaders to recognize people as people, not just subordinates, with needs akin to their own. By being adept at awareness, a servant leader can see others' points of view. Persuasion skills enable a servant leader to convince subordinates of a task instead of forcing their compliance on the issue. Conceptualization allows the long-term view to be seen instead of focusing only on the short-term gains within the organization. Foresight is seeing the likely outcome and choosing the correct path based on these foreseen outcomes.

Most successful companies practice the last three of Greenleaf's leadership factors. Stewardship is practiced when the community is put first. An organizational-level example of this is when sustainability is practiced. Commitment to the growth of people ensures that every subordinate has the opportunity to excel to their potential. Several organizations enable this through leadership programs, scholarships, or tuition assistance programs. Building community as a servant leader fosters a workplace that employees look forward to working in. An organization can easily extend this to the community by fostering community-improvement projects.

Servant leadership aims to build up everyone on the team, not just have the leader look good. Foster a community that is welcoming so that employees will want to succeed. When the

organization succeeds, the employees will also reap the benefits as their community improves. Servant leaders ultimately have the motivation to serve. This aligns with the military's commitment to service and the SEL's desire to re-enlist every four years to continue to build their community.

Comparison of Theories

A review of transformational and servant leadership theories was conducted by Anderson (2018), where he concluded that both theories have so many disparate definitions that they can no longer be defined as single theories. He posits that both theories will soon collapse as they fail to succinctly define leadership. Stone et al. (2003) took a different approach through an empirical investigation to conclude that both transformational and servant leadership are different and offer conceptual frameworks for leadership through their separate approaches. Smith et al. (2004) also saw transformational and servant leadership as separate theories but saw servant leadership as more useful in static environments. The research by Smith et al. (2004) is limited, however, as there is no quantitative data backing up the assertions made by the authors, just an opinion that a static environment is more useful than a dynamic environment.

Gaps in the Research

The correct definition and the optimal mix of leadership styles have yet to be determined. It could vary by situation, position, personality types involved, or other factors a study cannot control. Every research study done within the realm of leadership gets the field closer to discovering the truth behind leadership. Gaps continue to exist in the leadership field as the definition of leadership continues to evolve. Is there an optimal mix of leadership that can be universally applied?

One study attempted to determine whether effective leaders are both transformational and transactional through a pattern-oriented analysis (O'Shea, Foti, Hauenslein, & Bycio, 2009). Of the 726 participants in this study, all were nurses and predominantly female (97%), drastically different from the EDO community's composition. Subordinates and leaders were surveyed for this study to determine leadership style and subordinate satisfaction. Leaders were then divided into groups based on whether they had high or low-degree leadership styles in transformational, contingent rewards, or passive management-by-exception styles. Overall, the authors of this study concluded that a mix of transformational and contingent reward leadership with low management-by-exception behavior was the most effective at producing high subordinate satisfaction. The result of a mix of transformational and transactional leadership as optimal applies to this study as a mix may also prove optimal within the EDO community. The strong female gender bias may not be an important factor in yielding an optimal transformational and transactional style mix.

Based on the literature gathered, the job descriptions, and the responsibilities of the different triad positions, an initial framework was developed, Figure 3. The commanding officer is thought to have a transformational leadership style as they look outward and see the big-picture strategy for the entire command (Kane & Tremble, 2000). The executive officer would predominantly use the transactional leadership style as they work to implement decisions made by the commanding officer. The SEL would lead with the servant leadership style, focusing on

bringing the sailors below them up to their ranks and retaining them in the U.S. Navy.
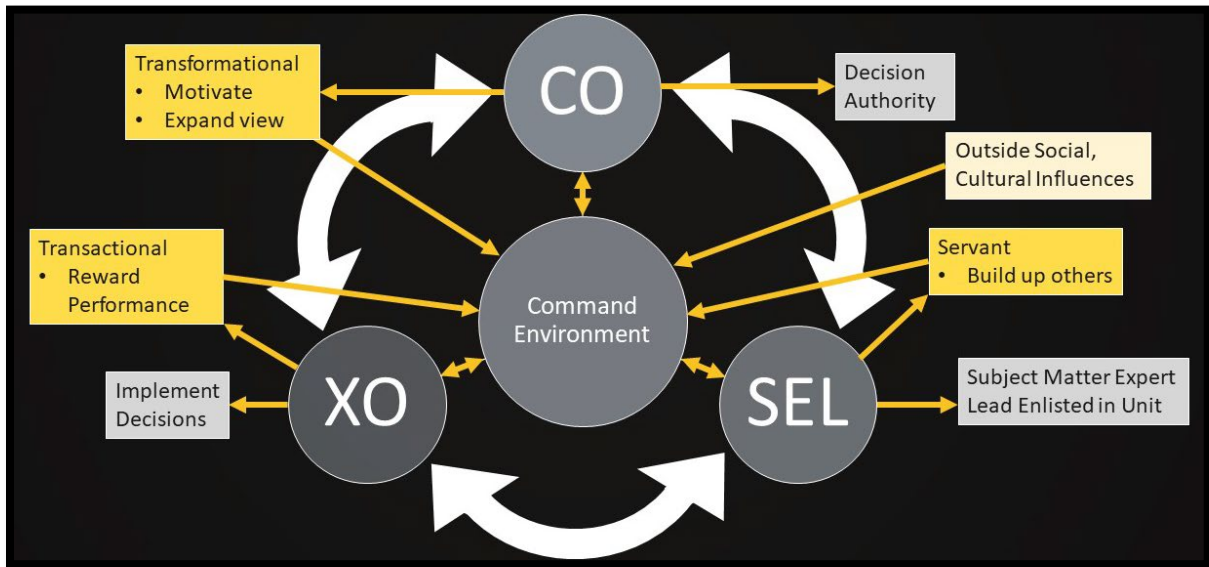
Figure 3: Initial framework

CHAPTER THREE: METHODOLOGY

Research Method and Design

This non-experimental correlational study was designed as a quantitative research study employing a survey to collect data to determine to what extent transformational, transactional, and servant leadership styles exist at the various ranks within the EDO community and the units they lead. Two separate survey instruments were used to gather data, the MLQ Leader Self Form (Bass & Avolio, 2015), SLSQ (Sandling, 2021), and a descriptive demographic questionnaire were used to collect data from all participants. The MLQ was selected as a research instrument as it is regarded as the standard in the field of transformational and transactional leadership. The 2008 SLQ survey the SLSQ is based upon has been extensively validated (Liden et al., 2008). The SLSQ was selected due to its ability to self-assess servant leadership traits. The self-assessment version of this survey was not widely proven, but there is no other survey for self-assessing servant leadership traits that has been proven. Self-assessment is traditionally accomplished through a survey of subordinates. However, due to the nature of the varied positions held by reserve EDOs, each leader's subordinates were unavailable for surveying. Questionnaires were available online via Qualtrics for the participants, who were given a password to access the survey. This study was publicized at the 2022 EDO TRAINEX to elicit maximum participation. Follow-on e-mail announcements were sent to the reserve EDO community during the survey window.

Quantitative analysis was conducted on the participant's responses to determine the population's self-assessed transformational, transactional, and servant leadership levels. Analysis of the participant's perceptions of their leadership styles included a factor analysis, a further

analysis to examine the relationships between the various demographic variables, and a post hoc analysis.

Population

The research population for this study consisted of all US Navy reserve EDOs and the SELs from these technical units. This community is highly educated, with a minimum of a technical master's degree required to become a member. EDOs are trained in various fields: acquisition, ship repair and overhaul, research and design, strategic systems, weapons systems, diving, heavy lift, and cybersecurity. EDOs are generally a couple of years older than Officers in other communities due to the master's degree requirement. Reserve EDOs can be officers transferred from active duty or Direct Commission Officers (DCOs). Some have prior enlisted experience from active duty and then earned a commission. DCOs generally have no previous experience and were recruited based on an in-demand field, like engineering. The typical reserve EDO also holds a civilian job in a technical engineering field. EDOs consist of approximately 448 members, but there are only around 77 SELs.

SELs are generally Chiefs and are generally the most experienced of their enlisted counterparts. If a unit does not have a Chief assigned to it, the SEL will be the most senior ranking enlisted sailor, generally a Petty Officer First Class (E-6). No degree requirement currently exists to be enlisted in the Navy or to be an SEL. An SEL may or may not have a technical civilian job as their rate in the U.S. Navy does not always reflect their work in their civilian jobs.

Sample

The target population sample includes approximately 525 participants, with 448 EDOs and 77 SEL service members. The sample size was calculated using equation 1 (Creative Research Systems, 2012).

$$ss = \frac{Z^2 \times p \times (1-p)}{c^2} \tag{1}$$

Here the sample size is a function of the Z value (Z), the percentage of the population selecting responses (p), and the confidence interval (c). The sample size was calculated with a confidence level of 95%, a confidence interval of 10, and a sample size of 525. These equations determined that 81 participants are necessary to participate and reflect the target population. Since 84 responses were received, the confidence interval was decreased to 9.8. If more responses had been received, the confidence interval could have been decreased even further, which would have been more ideal.

Survey Instruments

This study used three data collection instruments, the MLQ Self Form, the SLSQ, and a demographic survey. The MLQ Self Form is an approved adaptation of Bass and Avolio's MLQ survey, and this survey was combined with the SLSQ. The SLSQ is a version of the 2008 SLQ survey developed by Liden, Wayne, Zhao, and Henderson that was adapted for an individual leader by Sandling (2021). The demographic survey asked for basic information grouped into categories to make respondents less readily identifiable.

Leadership style perception was examined in Jung's (2001) article. In his article, he looked at the effect of transformational and transactional leadership on creativity in groups. In the study, moderators portrayed different leadership styles to participants of randomly selected

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groups. These participants were then asked to take the MLQ to rate the leaders' leadership styles, and they successfully determined the correct leadership style from the script the moderators were reading. Jung's study has implications for this study as it indicates that if participants could identify leadership behaviors in others after a short 1.5-hour session, they would be able to identify their personal leadership styles with similar accuracy.

The MLQ has been used extensively in organizations and for leadership research across multiple disciplines. This survey instrument is internationally recognized. Numerous studies were identified in the literature review of this study that used the MLQ surveys to obtain statistically significant results that were both valid and reliable. The self-form has 45 questions and measures a leader's perceptions of their personal leadership style. The MLQ is rated on a 5-point Likert Scale and asks a participant to rate various statements as they apply to them in varying degrees from not at all, once in a while, sometimes, fairly often, and frequently. The MLQ examines the prevalence of transformational, transactional, and laissez-faire leadership across six factors. These factors are the following:

- Charisma/Inspirational - Provides followers with a clear sense of purpose that is energizing; a role model for ethical conduct, which builds identification with the leader and his/her articulated vision.

- Intellectual Stimulation - Gets followers to question the tried-and-true ways of solving problems; encourages them to question the methods they use to improve upon them.

- Individualized Consideration - Focuses on understanding the needs of each follower and works continuously to get them to develop to their full potential.

- Contingent Reward - Clarifies what is expected from followers and what they will receive if they meet expected levels of performance.
- Active Management-by-Exception - Focuses on monitoring task execution for any problems that might arise and correcting those problems to maintain current performance levels.
- Passive Avoidant - Tends to react only after problems have become serious to take corrective action and may avoid making any decisions at all (Avolio & Bass, 2004, p.53).

The following scale reliabilities were reported across these six factors: charisma/inspirational (α=.92); intellectual stimulation (α=.83); individualized consideration (α=.79); contingent reward (α=.80); active management-by-exception (α=.63); passive avoidant (α=.84) (Avolio & Bass, 2004, p.64). Three sample items from the MLQ survey and the permission to re-publish the MLQ survey online are included in Appendix A. Sufficient licenses to cover the responses received were purchased from MindGarden.

The SLSQ was developed in 2021 by Jonathan Sandling and is beginning to be used in published research (Souffrant, 2022). The survey it is based on, the SLQ, has provided valid and reliable statistically significant results. Liden et al. (2008) performed an exploratory factor analysis on the SLQ that showed seven distinguishable servant leadership factors. These leadership factors are:

- Emotional healing—the act of showing sensitivity to others' personal concerns
- Creating value for the community—a conscious, genuine concern for helping the community

- Conceptual skills—possessing the knowledge of the organization and tasks at hand so as to be in a position to effectively support and assist others, especially immediate followers

- Empowering—encouraging and facilitating others, especially immediate followers, in identifying and solving problems, as well as determining when and how to complete work tasks

- Helping subordinates grow and succeed—demonstrating genuine concern for others' career growth and development by providing support and mentoring

- Putting subordinates first—using actions and words to make it clear to others (especially immediate followers) that satisfying their work needs is a priority (Supervisors who practice this principle will often break from their own work to assist subordinates with problems they are facing with their assigned duties.)

- Behaving ethically—interacting openly, fairly, and honestly with others (Liden et al., 2008, p. 162).

The following scale reliabilities were reported by Liden et al. (2008) for the SLQ version of the survey: conceptual skills (α=.86); empowerment (α=.90); helping subordinates grow and succeed (α=.90); putting subordinates first (α=.91); behaving ethically (α=.90); emotional healing (α=.89); and creating value for the community (α=.89). The SLQ was also validated with confirmatory factor analysis and validated against two other servant leadership scales in this article and was determined to produce near-identical results. The SLSQ is based on the SLQ, but the questions are re-worded for each participant's self-assessment. It has a total of 28 questions that are rated on a 7-point Likert Scale. The ratings range from strongly disagree, disagree, disagree somewhat, undecided, agree somewhat, agree, and strongly agree. The SLSQ solely

examines the degree of the different servant leadership traits. The SLSQ survey is included in Appendix B.

The demographic survey collected pertinent data on each participant without the participant being identifiable. The survey asked for the participant's rank, age (from a range), and civilian career level. The survey also asked if the participant had held a leadership position within the leadership triad, CO, XO, or SEL. The demographic survey also included the participant's prior enlisted experience and highest degree level. The survey did not ask for gender or ethnicity as these distinguishers could make some participants identifiable when combined with other demographic data. The participant demographic survey is included in Appendix C. Results from the demographic portion of the survey are included in Chapter 4 in Table 1.

Ethical Assurances

Ethical guidelines established by UCF's Institutional Review Board (IRB) were followed in this study. Multiple guidelines and regulations were considered; 45 CFR 46, DoDI 1100.13, DoDI 3216.02, and DoDI 8910.01. All participants' privacy was maintained per the directives of the IRB. Participants were provided with a QR code for the survey at the 2022 EDO TRAINEX, and a follow-up hyperlink to the survey was sent via e-mail. Informed consent was obtained from every participant before the survey was displayed via Qualtrics. The informed consent form detailed the purpose of the study, benefits, risks, and their rights as a participant. No identifying participant information was collected that would allow any participant to be directly identifiable. Qualtrics did not record even the IP addresses of the participants, though the date and the time each participant took to complete the survey response were automatically recorded. Data will be

kept confidential and maintained for three years. All data will subsequently be permanently destroyed.

Data Collection, Processing, and Analysis

Rate of Return

The announcement for this study was publicized at the mandatory 2022 EDO TRAINEX and distributed to all reserve EDO's navy e-mails. This allowed all 525 participants to be informed of the survey. All survey portions had to be completed to be considered useful for the study. Qualtrics' statistics indicated the survey was accessed 114 times, but there were only 84 usable survey responses. Of the 30 surveys that were not usable, only 3 were partially filled-out surveys. The remaining surveys that were not usable were either people who did not agree to become participants or people who had accessed the survey homepage but did not enter the password to access the survey. An overall effective rate of return was obtained at 16%. This broke down to 10% of the SELs and 16.9% of officers (14.6% of junior officers and 25.5% of senior officers).

The higher rate of return from senior officers is likely due to the large number of reserve EDOs who have obtained their PhDs and have already gone through the data collection process for their studies. Junior officers may not view themselves as leaders, despite the U.S. Navy viewing them as leaders, and they may have considered themselves not ideal subjects for the survey. SELs were harder to disseminate the survey to since there is no global e-mail list to reach them with. Some SELs attended the 2022 EDO TRAINEX, and others were forwarded the survey information by their COs. Their lower response rate may be attributed to the difficulty with the survey distribution, though the survey was disseminated to significantly more than 8 SELs.

Missing Values

In the 84 useable responses, a total of two values were missing in all of the responses. The missing values had to be accounted for to allow these two responses to be used in the survey. This was accomplished by taking an average of the values for that factor and using it as the response for the missing value. This prevented the missing value from changing the participant's response to that factor. The two missing values were not from the same participant or the same question.

Eight surveys were received that were incomplete and unable to be included, and one additional incomplete survey was received after the deadline had passed. These surveys were missing either the servant leadership survey responses or only had a handful of responses for the MLQ survey. Some participants reported technical problems with the connection resetting or accidentally closing out of the window when taking the survey at the EDO TRAINEX on their smartphones. These individuals indicated they would try again from their computer or had already redone the survey. Sixteen participants had only completed all or portions of the demographic survey (some answering they did not agree to participate), not making it to the actual MLQ or SLSQ surveys. These 24 surveys were completely discarded from inclusion in the results, with no valid data for analysis.

Data Analysis

The MLQ scored leadership with nine factors; five for transformational leadership, two for transactional leadership, two for passive avoidant, and three for additional characteristics. A participant's score was determined by averaging the factors that pertain to each leadership style. The results for passive avoidant and the characteristics were not used in the data analysis of this study.

The SLSQ scores were determined over seven factors. These factors were averaged and subsequently converted to a five-point scale result so they could be compared with the results of the MLQ.

An ANOVA was performed with Tukey post hoc analysis and Welch's ANOVA with Games-Howell post hoc analysis when homogeneity was violated to examine the significant differences in leadership style by rank and leadership triad position. When a statistical significance was discovered, the leadership style was broken back into its factors to determine which factor played into the statistically significant result.

CHAPTER FOUR: RESULTS

Overview

The objective of this research was to answer the six research questions that addressed the possible link between a leadership style (transformational, transactional, and servant leadership) and rank or a triad leadership position. Additional demographic data were also collected to determine if any other factors statistically significantly affect a participant's perceived leadership style. Table 1 shows the results of the demographic survey for all factors that were considered as possible contributing discriminators. The quantitative study of this data involved performing ANOVA tests to determine any significant interactions between groups based on rank and triad leadership position. Previous studies (Earnhardt, 2008) indicated that some aspects of servant leadership were found to have a significant difference when rank was the variable. Ivey and Kline (2010) examined the interaction of transformational and transactional leadership in the Canadian Forces. Though the preponderance of the respondents in both of these studies were junior enlisted members, they determined some significant interactions of transformational leadership between higher-ranking and lower-ranking military members. Despite the populations of these studies differing from this study, these existing studies suggested that a similar result may be duplicated in this survey.

Table 1

Survey Demographics Results

	Frequency	Percent (%)
Rank		
SEL	8	9.5
Junior Officer	51	60.7
Senior Officer	25	29.7

	Frequency	Percent (%)
Triad Leadership Position		
None	17	20.2
SEL	10	11.9
XO	14	16.7
CO	43	51.2
Age		
20-29	1	1.2
30-39	27	32.1
40-49	31	36.9
50-59	25	29.8
60+	0	0
Career Level		
Entry	0	0
Intermediate	19	22.6
Advanced	28	33.3
Senior	37	44.0
Highest Degree		
None	2	2.4
Bachelors	5	6.0
Masters	61	72.6
PhD	16	19.0
Prior Enlisted		
Yes	32	47.1
No	44	64.7

Leadership Styles by Rank

Transactional Leadership

Descriptives

The mean scores for senior officers and SELs were higher than those of the junior

officers (see Table 2). The standard deviation for the senior and junior officers was comparable,

while the SELs' standard deviation was larger. Transactional leadership is the only leadership

style where SELs had a much higher standard deviation than any of the other groups.

Table 2

Descriptives for Transactional Leadership by Rank

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
SEL	8	3.51563	.501949	.177466	3.09598	3.93527	2.875	4.375
JO	51	3.29902	.448664	.062825	3.17283	3.42521	2.250	4.250
SO	25	3.35000	.444878	.088976	3.16636	3.53364	2.375	4.250
Total	84	3.33482	.451387	.049250	3.23686	3.43278	2.250	4.375

Outliers

There were no outliers for the data of transactional leadership when grouped by rank, as depicted in Figure 4.

Figure 4: Boxplot of the outliers for transactional leadership sorted by rank

Normality

When grouped by rank, the means for transactional leadership were normally distributed, as assessed by Shapiro-Wilk's test ($p \geq .05$). The supporting data for Shapiro-Wilk's test are listed in Table 3. The normality plots for the transactional leadership means by each rank are shown in Figure 5, Figure 6, and Figure 7.

Table 3

Shapiro-Wilk for Transactional Leadership by Rank

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Rank	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.157	8	.200*	.959	8	.805
JO	.104	51	.200*	.974	51	.320
SO	.118	25	.200*	.984	25	.947

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction
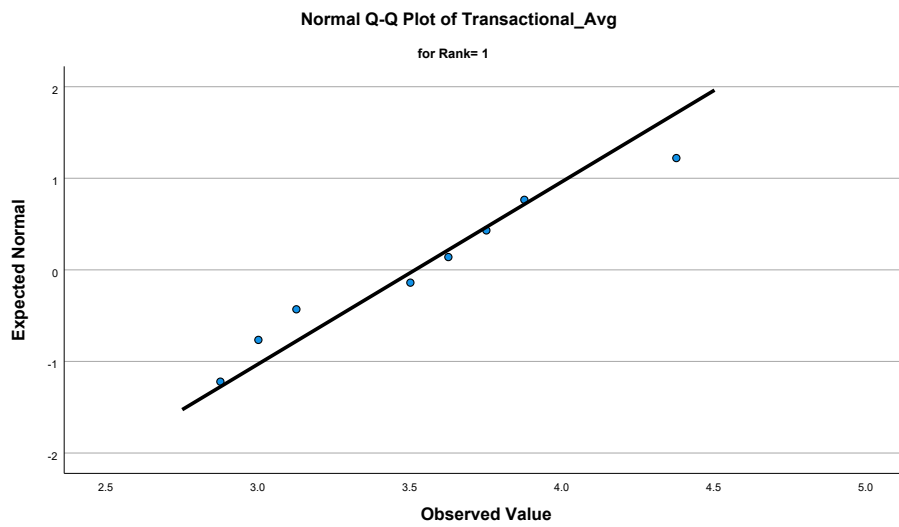
Figure 5: Normality plot for SEL transactional leadership

Normal Q-Q Plot of Transactional_Avg

for Rank= 2
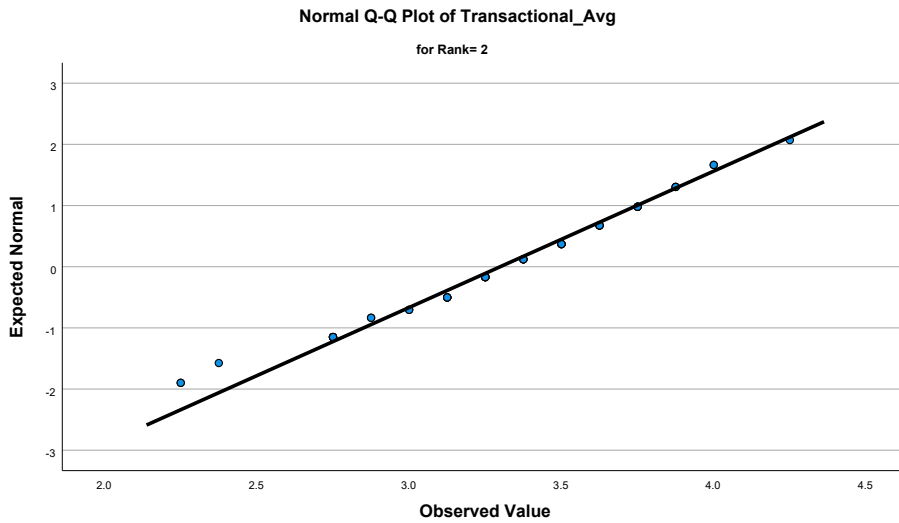
Figure 6: Normality plot for junior officer transactional leadership

Normal Q-Q Plot of Transactional_Avg

for Rank= 3
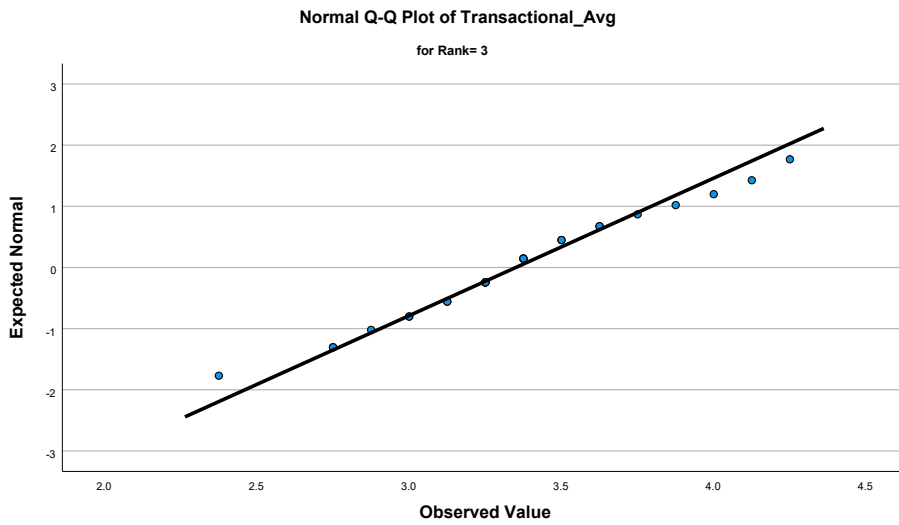
Figure 7: Normality plot for senior officer transactional leadership

<u>Homogeneity</u>

Levene's test for homogeneity of variances was used to confirm this ANOVA requirement. The assumption of homogeneity of variances was met, and the null hypothesis was maintained ($p = 0.885$).

ANOVA Results

        A one-way ANOVA and Tukey HSD were conducted to determine if there were

differences between the self-rated transactional leadership score for groups of sailors with

different ranks. Despite the observed differences in the means between the groups, the group

means were not statistically different ($p > .05$) (Table 4), $F(2, 81) = .813$, $p = .447$. When the

outliers were removed, the ANOVA results, as recorded in Table 5, show the p-value diverging

from statistical significance, $F(2, 81) = .683$, $p = .508$. The outliers did not materially affect the

outcome of the ANOVA. The Tukey HSD results were not relevant since no statistical

significance was discovered. The null hypothesis ($H1_0.$) cannot be rejected, and the alternative

hypotheses cannot be accepted. There is no significant relationship between military rank and a

transactional leadership style within U.S. Navy reserve EDO units.

Table 4

One-Way ANOVA: Rank and Transactional Leadership Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.333	2	.166	.813	.447
Within Groups	16.579	81	.205		
Total	16.911	83			

Table 5

One-Way ANOVA: Rank and Transactional Leadership Results Without Outliers

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.264	2	.132	.683	.508
Within Groups	15.456	80	.193		
Total	15.720	82			

Transformational Leadership

<u>Descriptives</u>

The mean scores for senior officers and SELs were higher than those of the junior

officers (see Table 6). Despite the smaller participant size, the standard deviation for the SELs

was lower than that of the senior and junior officers.

Table 6

Descriptives for Transformational Leadership by Rank

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
SEL	8	4.12500	.259119	.091613	3.90837	4.34163	3.700	4.500
JO	51	3.92549	.461234	.064586	3.79577	4.05521	2.650	4.900
SO	25	4.03800	.354812	.070962	3.89154	4.18446	3.050	4.650
Total	84	3.97798	.418427	.045654	3.88717	4.06878	2.650	4.900

<u>Outliers</u>

There were two outliers in this data, a value of 3.050 for senior officers and 2.650 for

junior officers, as depicted in Figure 8. Since these outliers are genuine results and not from a

data entry or measurement error, the decision was made to leave them in the dataset. To account

for this data, the ANOVA was run with and without these outliers to determine any effect on the
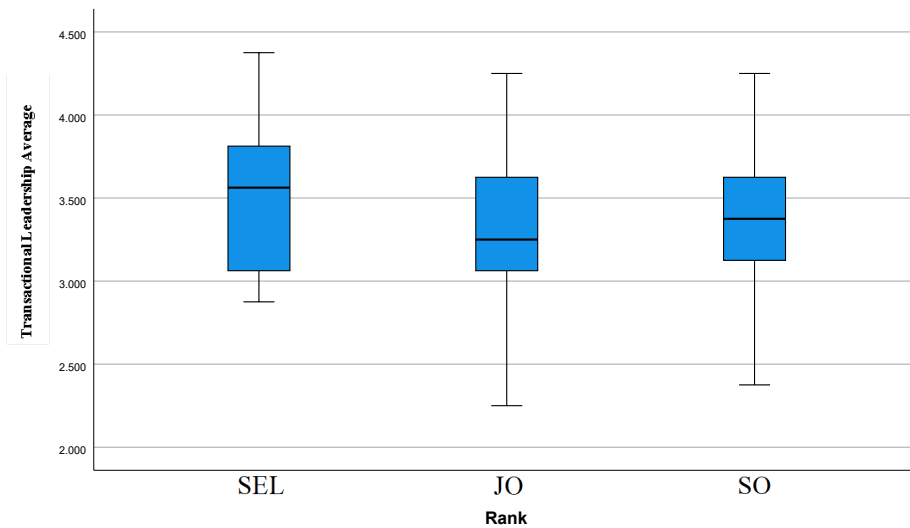
result.
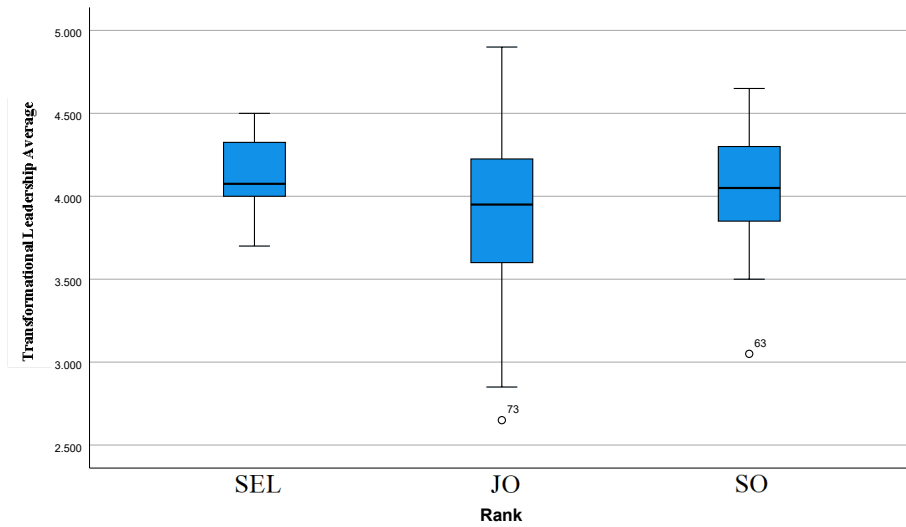
Figure 8: Boxplot of the outliers for transformational leadership sorted by rank

Normality

When grouped by rank, the means for transformational leadership were normally distributed, as assessed by Shapiro-Wilk's test ($p \geq .05$). The supporting data for Shapiro-Wilk's test are listed in Table 7. The normality plots for the transformational leadership means by each rank are shown in Figure 9, Figure 10, and Figure 11.

An ANOVA was also run with the two-outlier data excluded. The data was assessed again by Shapiro-Wilk's test and found to be normally distributed, as recorded in Table 8. The normality plots for this test do not differ significantly from the case with all the data included, so they are not included in this dissertation.

Table 7

Shapiro-Wilk for Transformational Leadership by Rank

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Rank	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.190	8	.200[*]	.939	8	.599
JO	.086	51	.200[*]	.973	51	.285
SO	.097	25	.200[*]	.960	25	.409

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Table 8

Shapiro-Wilk for Transformational Leadership by Rank Without Outliers

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Rank	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.190	8	.200[*]	.939	8	.599
JO	.080	50	.200*	.983	50	.686
SO	.11	24	.200*	.978	24	.860

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction
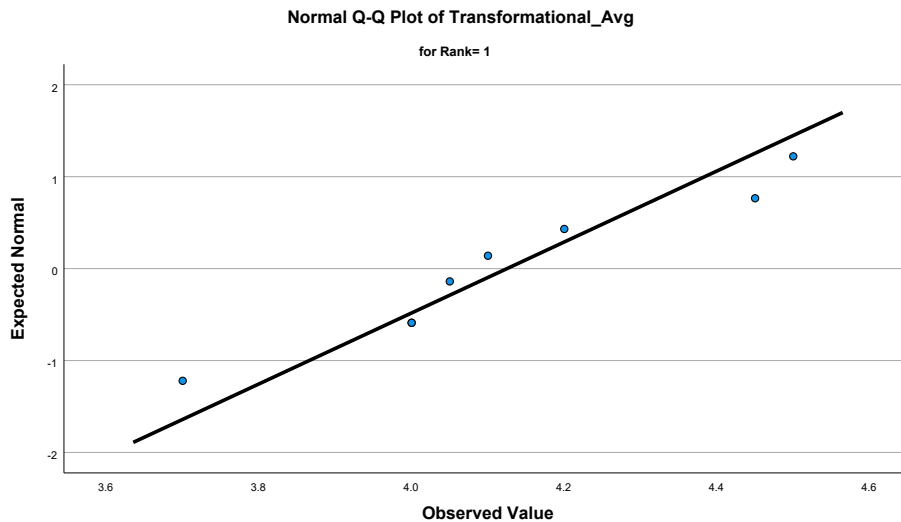
Figure 9: Normality plot for SEL transformational leadership
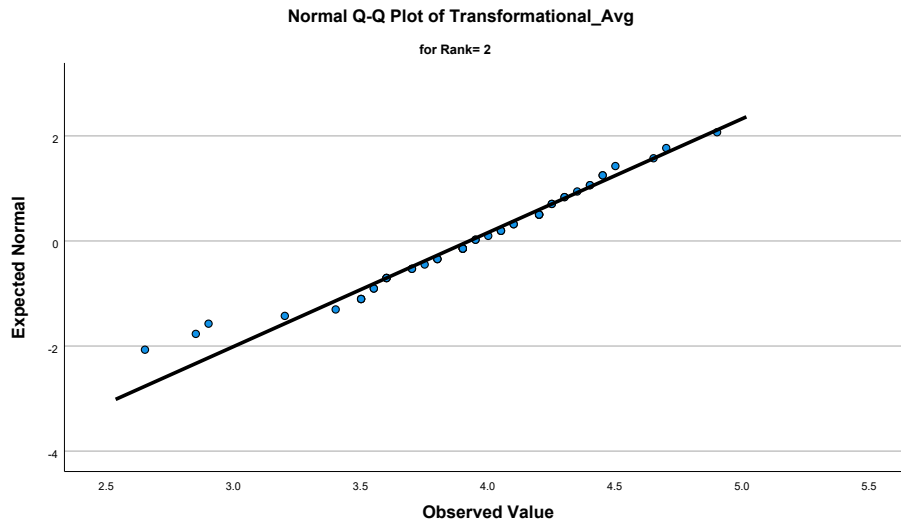
Figure 10: Normality plot for junior officer transformational leadership
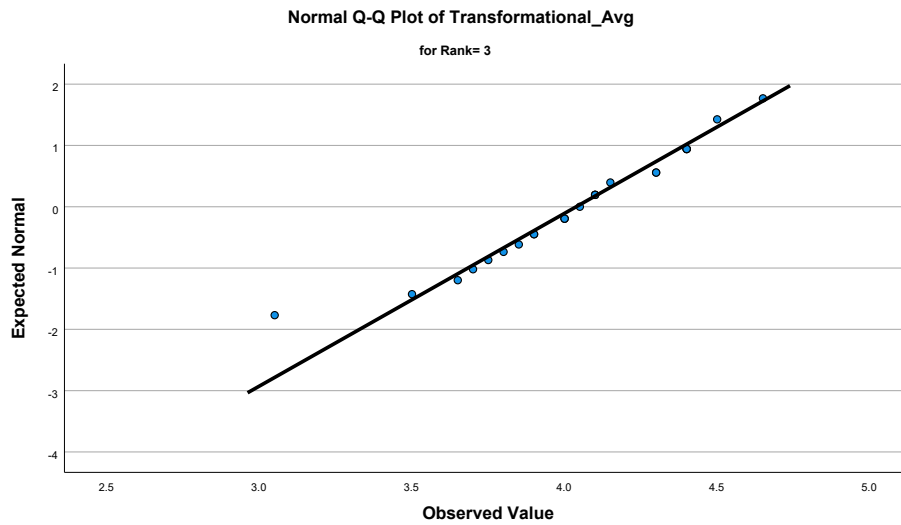
Figure 11: Normality plot for senior officer transformational leadership

Homogeneity

Levene's test for homogeneity of variances was used to confirm this ANOVA requirement. The assumption of homogeneity of variances was met, and the null hypothesis was maintained (p = 0.158).

When the ANOVA was run with the outliers removed, there was still a homogeneity of variances (p = .070).

ANOVA Results

A one-way ANOVA and Tukey HSD were conducted to determine if there were differences between the self-rated transformational leadership scores for groups of sailors with different ranks. Participants were classified into three rank groups: SELs (n = 8), junior officers (n = 51), and senior officers (n = 25). Despite the observed differences in the means between the groups, the group means were not statistically different (p > .05) (Table 9), $F(2, 81) = 1.157$, p = .320. When the outliers were removed, the ANOVA results, as recorded in Table 10, showed the p-value approaching significance but still not statistically significant, $F(2, 81) = 1.674$, p = .194. The outliers did not materially affect the outcome of the ANOVA. The Tukey HSD results were not relevant since no statistical significance was discovered. The null hypothesis ($H2_0$.) cannot be rejected, and the alternative hypotheses cannot be accepted. There is no significant relationship between military rank and a transformational leadership style within U.S. Navy reserve EDO units.

Table 9

One-Way ANOVA: Rank and Transformational Leadership Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.403	2	.202	1.157	.320
Within Groups	14.128	81	.174		
Total	14.532	83			

Table 10

One-Way ANOVA: Rank and Transformational Leadership Results Without Outliers

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.549	2	.274	1.674	.194
Within Groups	13.111	80	.164		
Total	13.660	82			

<p style="text-align:center">Servant Leadership</p>

Descriptives

The standard deviation for senior officers and SELs was also lower than junior officers for servant leadership when grouped by rank (see Table 11). The standard deviation for the SELs and the senior officers was lower than for the junior officers.

Table 11

Descriptives for Servant Leadership by Rank

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
SEL	8	4.21131	.259400	.091712	3.99445	4.42817	3.762	4.524
JO	51	3.92904	.343072	.048040	3.83255	4.02553	3.024	4.500
SO	25	4.02571	.236095	.047219	3.92826	4.12317	3.429	4.429
Total	84	3.98469	.316315	.034513	3.91605	4.05334	3.024	4.524

Outliers

There were two outliers in this data, values of 3.429 and 3.571 for senior officers (Figure 12). Since these outliers are genuine results and not from a data entry or measurement error, the decision was made to leave them in the dataset. To account for this data, the ANOVA was run with and without these outliers to determine any effect on the result.
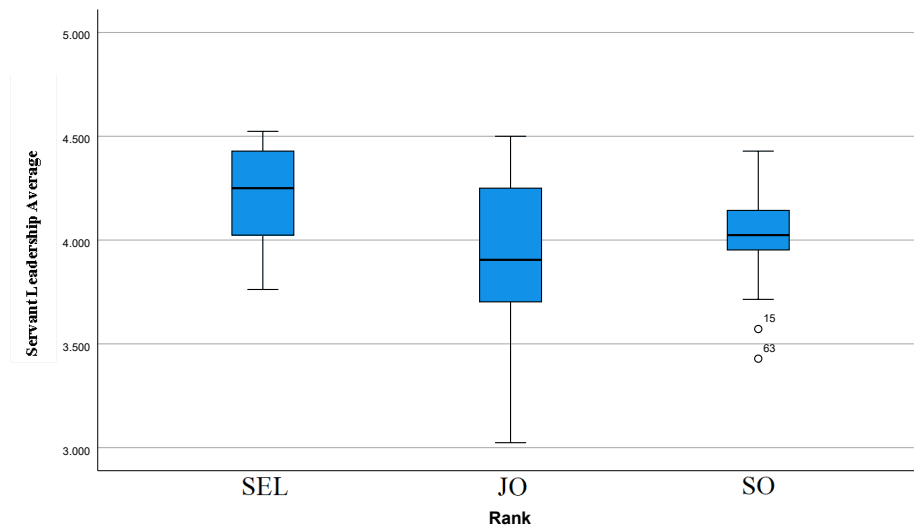
Figure 12: Boxplot of the outliers for servant leadership sorted by rank

Normality

When grouped by rank, the means for servant leadership were normally distributed, as assessed by Shapiro-Wilk's test ($p \geq .05$). The supporting data for Shapiro-Wilk's test are listed in Table 12. The normality plots for the servant leadership means by each rank are shown in Figure 13, Figure 14, and Figure 15.

An ANOVA was also run with the two-outlier data excluded. The data was assessed again by Shapiro-Wilk's test and found to be normally distributed, as recorded in Table 13. The normality plots for this test do not differ significantly from the case with all the data included, so they are not included in this dissertation.

Table 12

Shapiro-Wilk for Servant Leadership by Rank

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Rank	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.147	8	.200*	.945	8	.665
JO	.130	51	.030	.960	51	.080
SO	.140	25	.200*	.958	25	.372

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Table 13

Shapiro-Wilk for Servant Leadership by Rank Without Outliers

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Rank	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.147	8	.200*	.945	8	.665
JO	.130	51	.030	.960	51	.080
SO	.125	23	.200*	.971	23	.722

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction
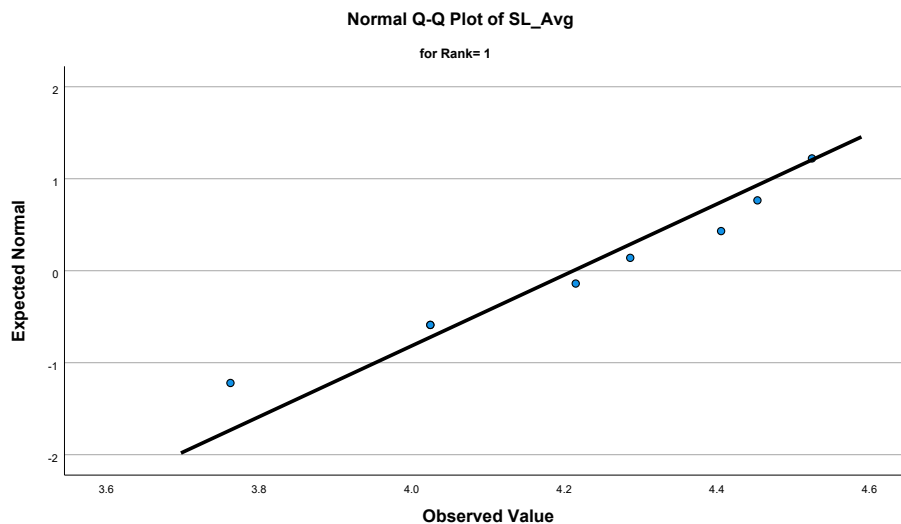
Figure 13: Normality plot for SEL servant leadership

Normal Q-Q Plot of SL_Avg

for Rank= 2
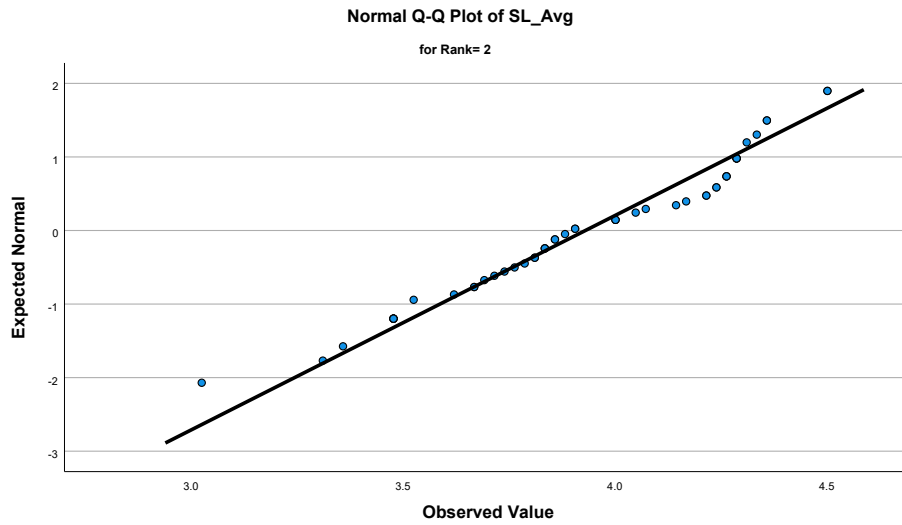
Figure 14: Normality plot for junior officer servant leadership

Normal Q-Q Plot of SL_Avg

for Rank= 3
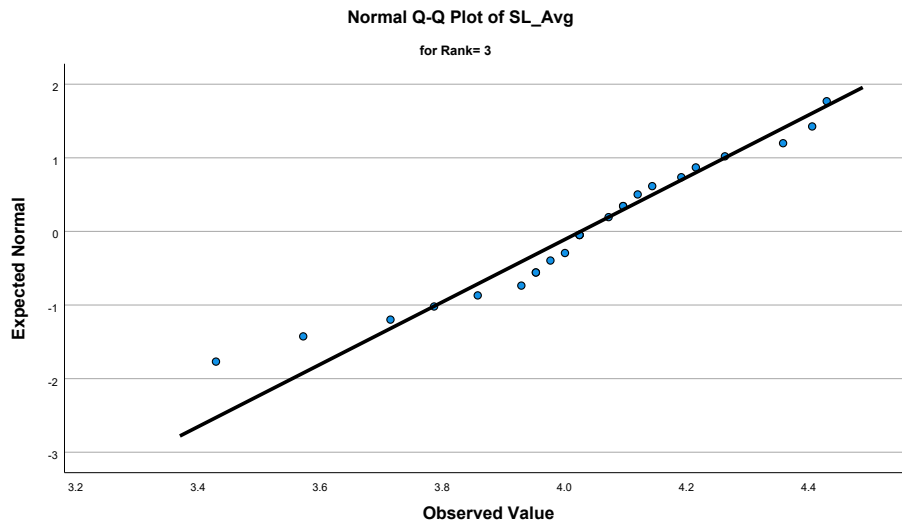
Figure 15: Normality plot for senior officer servant leadership

Homogeneity

Levene's test for homogeneity of variances was used to confirm this ANOVA requirement. The assumption of homogeneity of variances was not met, and the null hypothesis was rejected (p = .019).

When the ANOVA was run with the outliers removed, the homogeneity of variances was still not met (p = .002).

ANOVA Results

Analysis was conducted to determine if there were differences between the self-rated servant leadership score for groups of sailors with different ranks. Due to the homogeneity of variances assumption being violated, the F-test could not be interpreted, and further analysis with the Games-Howell and Welch tests was performed. The Welch test rejected the null hypothesis of equal population means. The mean score for servant leadership differs significantly across ranks, Welch's $F(2, 20.506) = 3.754$, $p = .041$. The Games-Howell post hoc analysis revealed that the mean differences between SELs and junior officers (.282271, 95% CI [.00356, .56098]) were statistically significant (p=.047), as recorded in Table 14. When the outliers in the data were removed, the p-value decreased, Welch's $F(2, 19.847) = 4.588$, $p = .023$. The Games-Howell post hoc analysis yielded the same interaction between SELs and junior officers since the outliers were within the senior officer group. However, the mean difference between senior and junior officers began to approach a statistically significant result, as recorded in Table 15. The null hypothesis (H3$_0$.) was rejected, and the alternative hypothesis (H3$_C$) was accepted. There is a significant relationship between senior enlisted military rank and a servant leadership style within U.S. Navy reserve EDO units.

Table 14

Games-Howell: Rank and Servant Leadership Results

(I) Rank	(J) Rank	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
SEL	JO	.282271*	.103532	.047	.00356	.56098
	CO	.185595	.103154	.215	-.09309	.46428
JO	SEL	-.282271*	.103532	.047	-.56098	-.00356
	CO	-.096676	.067361	.329	-.25821	.06485
CO	SEL	-.185595	.103154	.215	-.46428	.09309
	JO	.096676	.067361	.329	-.06485	.25821

*. The mean difference is significant at the 0.05 level.

Table 15

Games-Howell: Rank and Servant Leadership Results Without Outliers

(I) Rank	(J) Rank	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
SEL	JO	.282271*	.103532	.047	.00356	.56098
	CO	.139881	.099234	.374	-.13448	.41424
JO	SEL	-.282271*	.103532	.047	-.56098	-.00356
	CO	-.142390	.061189	.059	-.28891	.00413
CO	SEL	-.139881	.099234	.374	-.41424	.13448
	JO	.142390	.061189	.059	-.00413	.28891

*. The mean difference is significant at the 0.05 level.

Factor Analysis

The servant leadership survey consisted of seven component factors, emotional healing, creating value for the community, conceptual skills, empowering, helping followers grow & succeed, putting followers first, and behaving ethically. These factors were averaged together to yield the servant leadership mean. To determine where the difference of means was significant, the servant leadership mean was expanded back into its original factors, where a one-way ANOVA could be performed.

The ANOVA resulted in the servant leadership means of conceptual skills and putting followers first factors as statistically significantly different between the different groups of rank. For the conceptual skills mean, all assumptions for ANOVA were met. The ANOVA results for the conceptual skills mean were, $F(2, 81) = 3.408$, $p = .038$. The means increased from junior officers ($M = 3.9837$, $SD = .28172$) to senior officers ($M = 4.0267$, $SD = .41298$) and SELs ($M = 4.3333$, $SD = .28172$), in that order. Tukey post hoc analysis revealed that the mean difference between SELs and junior officers (.34967, 95% CI [.0298, .6695]) was statistically significant ($p = .029$).

The putting followers first mean had a heterogeneity of differences, as assessed by Levene's test of homogeneity of variances ($p = .009$). A one-way Welch was used to assess the statistical significance in the factor of putting followers first, Welch's $F(2, 4.154) = 21.544$, $p = .030$. The means increased from junior officers ($M = 3.9067$, $SD = .33012$) to senior officers ($M = 3.8627$, $SD = .55147$) and SELs ($M = 4.3542$, $SD = .32657$), in that order. Games-Howell post hoc analysis revealed that the mean difference between SELs and junior officers (.49142, 95% CI [.1630, .8198]) was statistically significant ($p = .004$), as well as the difference between SELs and senior officers (.44750, 95% CI [.1285, .7665], $p = .007$).

Leadership Styles by Triad Leadership Position

Transactional Leadership

Descriptives

The mean scores for commanding officers and SELs were comparable and higher than those of the junior officers for transactional leadership (see Table 16). The standard deviation for SELs was larger than for both commanding and executive officers. Transactional leadership is

the only leadership style where SELs had a much higher standard deviation than any of the other

groups.

Table 16

Descriptives for Transactional Leadership by Triad Leadership Position

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
SEL	10	3.40000	.513025	.162233	3.03300	3.76700	2.750	4.375
XO	14	3.31250	.369348	.098713	3.09924	3.52576	2.750	3.875
CO	43	3.42733	.397380	.060600	3.30503	3.54962	2.375	4.250
Total	67	3.39925	.406644	.049679	3.30007	3.49844	2.375	4.375

Outliers

This data had three outliers; two values at 4.250 were too high, and one at 2.375 was too

low for commanding officers (Figure 16). Since these outliers are genuine results and not from a

data entry or measurement error, the decision was made to leave them in the dataset. To account

for this data, the ANOVA was run with and without these outliers to determine any effect on the

result.
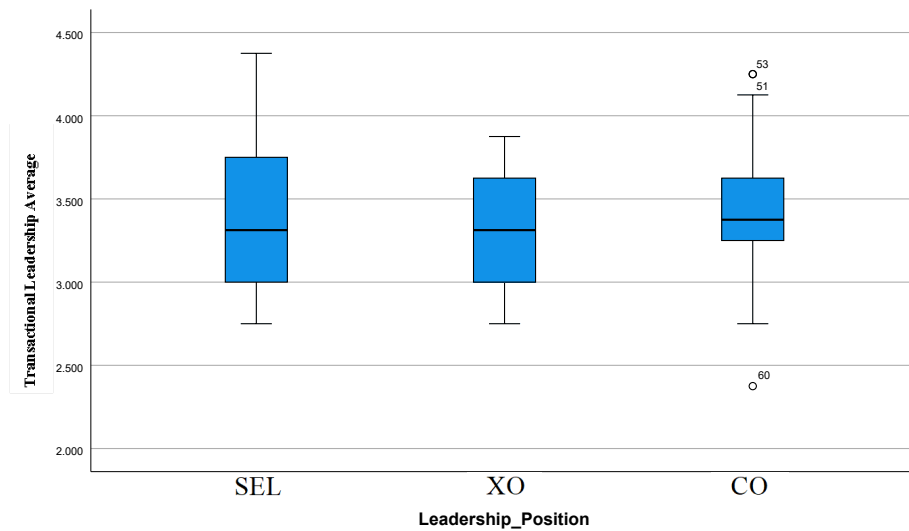
Figure 16: Boxplot of the outliers for transactional leadership sorted by triad leadership position

Normality

When grouped by triad leadership position, the means for transactional leadership were normally distributed, as assessed by Shapiro-Wilk's test ($p \geq .05$). The supporting data for Shapiro-Wilk's test are listed in Table 17. The normality plots for the transactional leadership means by triad leadership position are shown in Figure 17, Figure 18, and Figure 19.

An ANOVA was also run with the two-outlier data excluded. The data was assessed again by Shapiro-Wilk's test and found to be normally distributed, as recorded in Table 18. The normality plots for this test do not differ significantly from the case with all the data included, so they are not included in this dissertation.

Table 17

Shapiro-Wilk for Transactional Leadership by Triad Leadership Position

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Rank	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.204	10	.200*	.948	10	.204
XO	.123	14	.200*	.948	14	.123
CO	.118	43	.145	.976	43	.118

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Table 18

Shapiro-Wilk for Transactional Leadership by Triad Leadership Position Without Outliers

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Rank	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.204	10	.200*	.948	10	.204
XO	.123	14	.200*	.948	14	.123
CO	.116	40	.195	.975	40	.517

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction
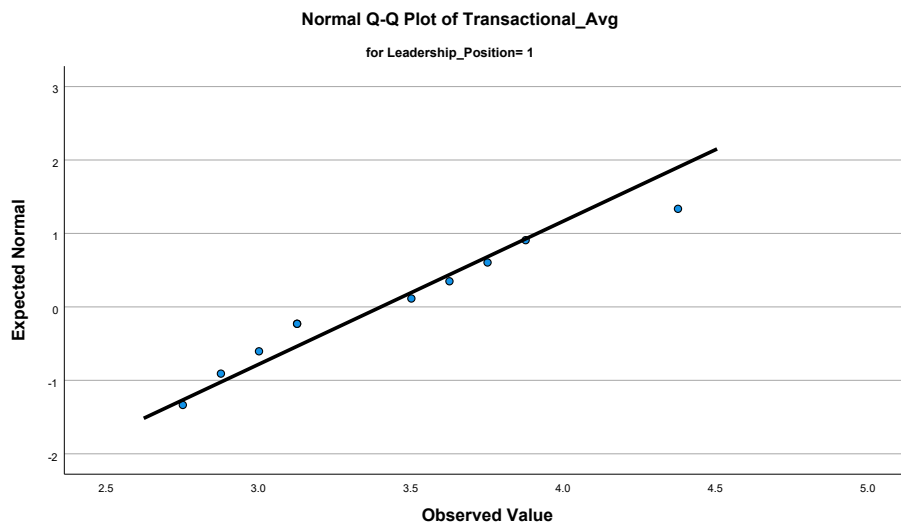
Figure 17: Normality plot for SEL transactional leadership

Normal Q-Q Plot of Transactional_Avg

for Leadership_Position= 2
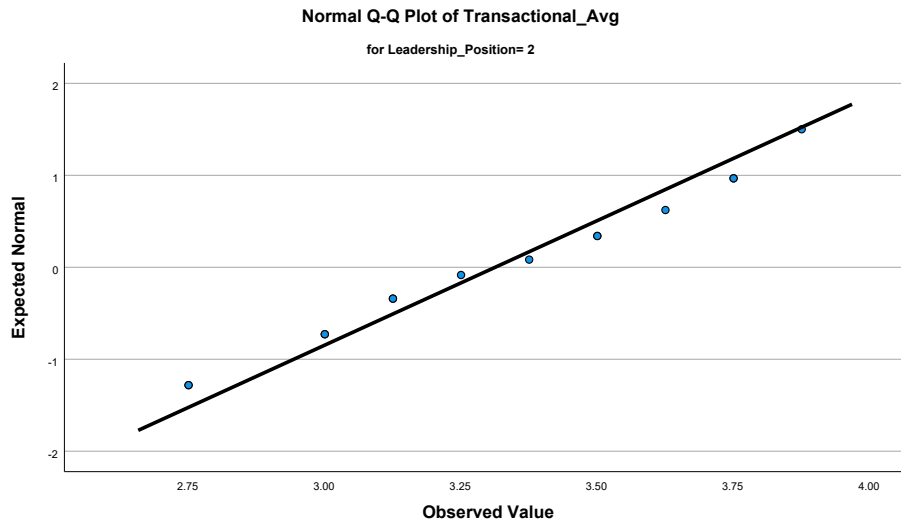
Figure 18: Normality plot for executive officer transactional leadership

Normal Q-Q Plot of Transactional_Avg

for Leadership_Position= 3
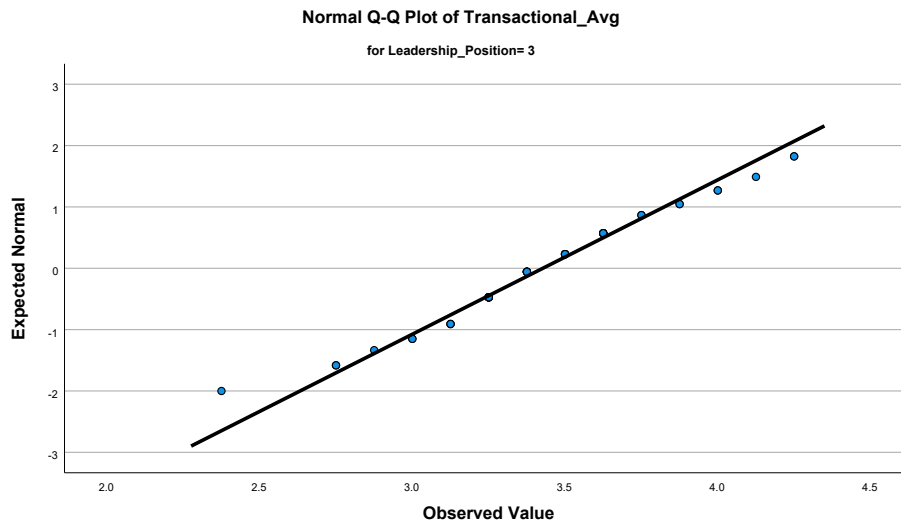
Figure 19: Normality plot for commanding officer transactional leadership

Homogeneity

Levene's test for homogeneity of variances was used to confirm this ANOVA requirement. The assumption of homogeneity of variances was met, and the null hypothesis was maintained ($p = 0.355$).

When the ANOVA was run with the outliers removed, there was still a homogeneity of variances (p = .069).

ANOVA Results

A one-way ANOVA and Tukey HSD were conducted to determine if there were differences between the self-rated transactional leadership score for groups of sailors with different triad leadership positions. Participants were classified into three triad leadership position groups: SELs (n = 10), executive officers (n = 14), and commanding officers (n = 43). Despite the observed differences in the means between the groups, the group means were not statistically different (p > .05) (Table 19), $F(2, 64) = .414$, p = .663. When the outliers were removed, the ANOVA results, as recorded in Table 20, showed the p-value diverging from statistical significance, $F(2, 63) = .386$, p = .681. The outliers did not materially affect the outcome of the ANOVA. The Tukey HSD results were not relevant since no statistical significance was discovered. The null hypothesis (H4$_0$.) cannot be rejected, and the alternative hypotheses cannot be accepted. There is no significant relationship between a triad leadership position and a transactional leadership style within U.S. Navy reserve EDO units.

Table 19

One-Way ANOVA: Triad Leadership Position and Transactional Leadership Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.139	2	.070	.414	.663
Within Groups	10.774	64	.168		
Total	10.914	66			

Table 20

One-Way ANOVA: Triad Leadership Position and Transactional Leadership Results Without

Outliers

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.105	2	.053	.386	.681
Within Groups	8.305	61	.136		
Total	8.410	63			

Transformational Leadership

Descriptives

The mean scores for commanding officers and SELs were higher than those of the junior

officers for transformational leadership (see Table 21). The standard deviation for commanding

officers and SELs was also lower than executive officers when grouped by triad leadership

position.

When sorted by rank and leadership position, the difference in the number of SELs is

attributed to two junior officers who were both previously enlisted. These two officers have not

held a new leadership position since becoming officers, so their most recent leadership position

is an SEL.

Table 21

Descriptives for Transformational Leadership by Triad Leadership Position

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
SEL	10	4.03000	.311983	.098658	3.80682	4.25318	3.500	4.500
XO	14	3.87500	.549038	.146736	3.55800	4.19200	2.650	4.900
CO	43	4.05000	.337886	.051527	3.94601	4.15399	3.050	4.650
Total	67	4.01045	.387644	.047358	3.91589	4.10500	2.650	4.900

Outliers

There was one outlier in this data, a value of 3.050 for commanding officers, as depicted in Figure 20. Since this outlier is a genuine result and not from a data entry or measurement error, the decision was made to leave it in the dataset. To account for this datum, the ANOVA was run with and without this outlier to determine any effect on the result.
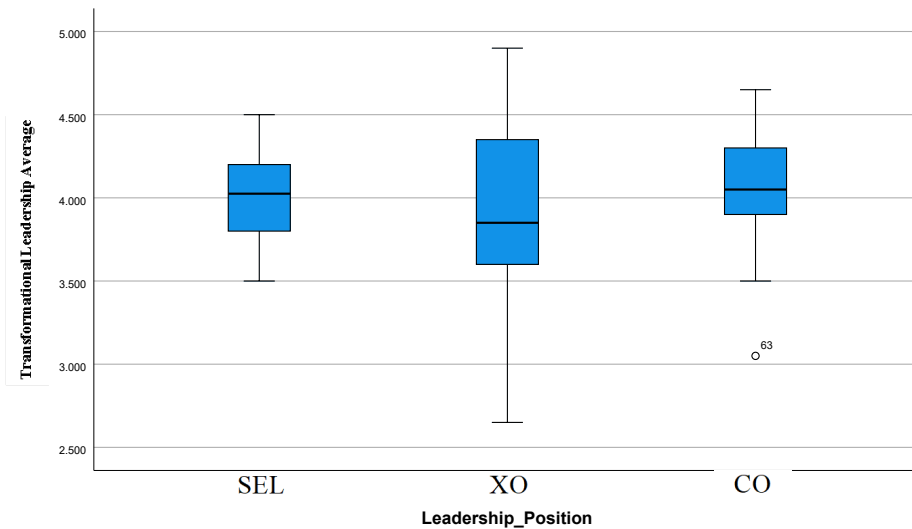
Figure 20: Boxplot of the outliers for transformational leadership sorted by triad leadership position

Normality

When grouped by triad leadership position, the means for transformational leadership were normally distributed, as assessed by Shapiro-Wilk's test ($p \geq .05$). The supporting data for Shapiro-Wilk's test are listed in Table 22. The normality plots for the transformational leadership means by triad leadership position are shown in Figure 21, Figure 22, and Figure 23.

An ANOVA was also run with the two-outlier data excluded. The data was assessed again by Shapiro-Wilk's test and found to be normally distributed, as recorded in Table 23. The

normality plots for this test do not differ significantly from the case with all the data included, so they are not included in this dissertation.

Table 22

Shapiro-Wilk for Transformational Leadership by Triad Leadership Position

Rank	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.162	10	.200*	.967	10	.162
XO	.125	14	.200*	.965	14	.125
CO	.096	43	.200*	.972	43	.096

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Table 23

Shapiro-Wilk for Transformational Leadership by Triad Leadership Position Without Outliers

Rank	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.162	10	.200*	.967	10	.162
XO	.125	14	.200*	.965	14	.125
CO	.082	42	.200*	.975	42	.481

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction
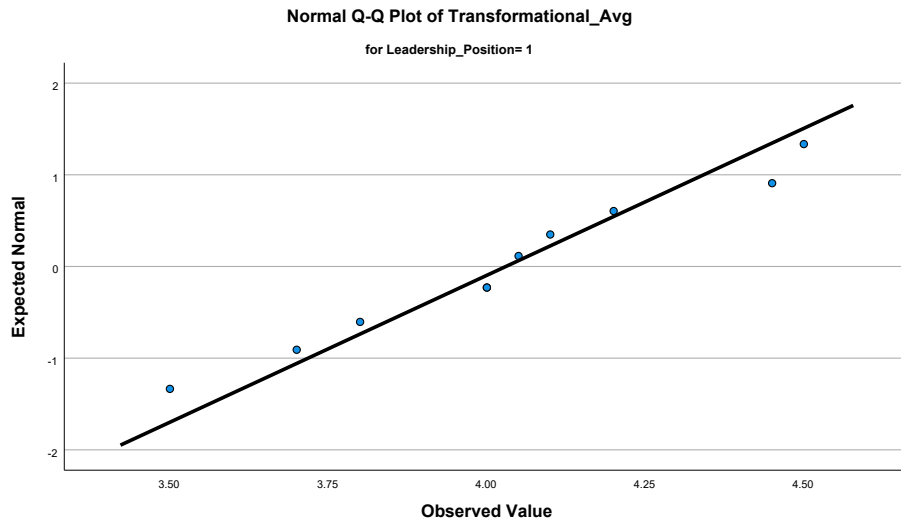
Figure 21: Normality plot for SEL transformational leadership
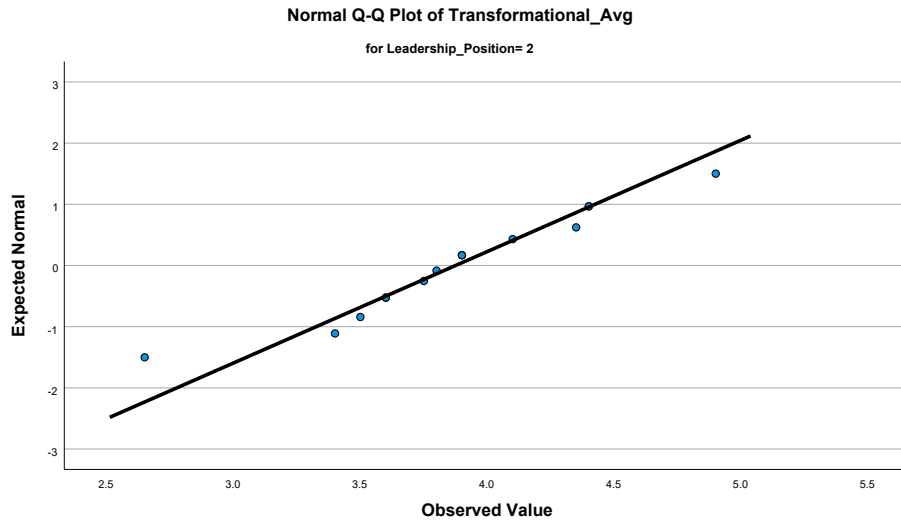
Figure 22: Normality plot for executive officer transformational leadership

Normal Q-Q Plot of Transformational_Avg

for Leadership_Position= 3
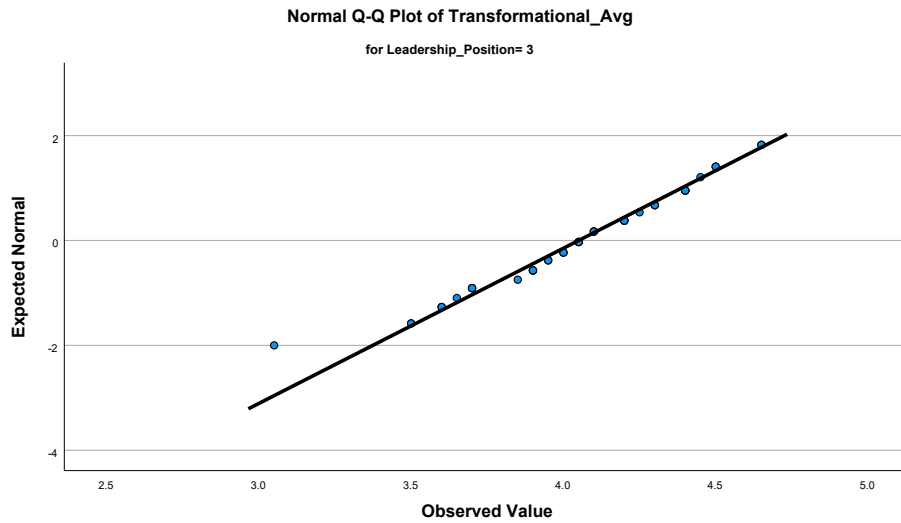
Figure 23: Normality plot for commanding officer transformational leadership

Homogeneity

Levene's test for homogeneity of variances was used to confirm this ANOVA requirement. The assumption of homogeneity of variances was met, and the null hypothesis was maintained (p = 0.131).

When the ANOVA was run with the outliers removed, there was still a homogeneity of variances (p = .067).

ANOVA Results

A one-way ANOVA and Tukey HSD were conducted to determine if there were differences between the self-rated transformational leadership score for groups of sailors with different triad leadership positions. Despite the observed differences in the means between the groups, the group means were not statistically different (p > .05) (Table 24), $F(2, 64) = 1.094$, p = .341. When the outlier was removed, as recorded in Table 25, the ANOVA results showed the p-value approaching significance but still not statistically significant, $F(2, 63) = 1.527$, p = .225. The outlier did not materially affect the outcome of the ANOVA. The Tukey HSD results were

not relevant since no statistical significance was discovered. The null hypothesis ($H5_0$.) cannot be rejected, and the alternative hypotheses cannot be accepted. There is no significant relationship between a triad leadership position and a transformational leadership style within U.S. Navy reserve EDO units.

Table 24

One-Way ANOVA: Triad Leadership Position and Transformational Leadership Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.328	2	.164	1.094	.341
Within Groups	9.590	64	.150		
Total	9.918	66			

Table 25

One-Way ANOVA: Triad Leadership Position and Transformational Leadership Results Without Outliers

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.415	2	.208	1.527	.225
Within Groups	8.566	63	.136		
Total	8.981	65			

Servant Leadership

Descriptives

The mean scores for SELs were higher than those of the commanding and executive officers for servant leadership (see Table 26). The standard deviation for SELs was lower than both commanding and executive officers despite the smaller number of participants, and the executive officer group had the highest standard deviation.

Table 26

Descriptives for Servant Leadership by Triad Leadership Position

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
SEL	10	4.18333	.256939	.081251	3.99953	4.36714	3.762	4.524
XO	14	3.91837	.333949	.089252	3.72555	4.11118	3.310	4.500
CO	43	3.97121	.276425	.042154	3.88614	4.05628	3.429	4.429
Total	67	3.99183	.294232	.035946	3.92006	4.06360	3.310	4.524

Outliers

There were no outliers for the data of servant leadership when grouped by triad

leadership position, as depicted in Figure 24.
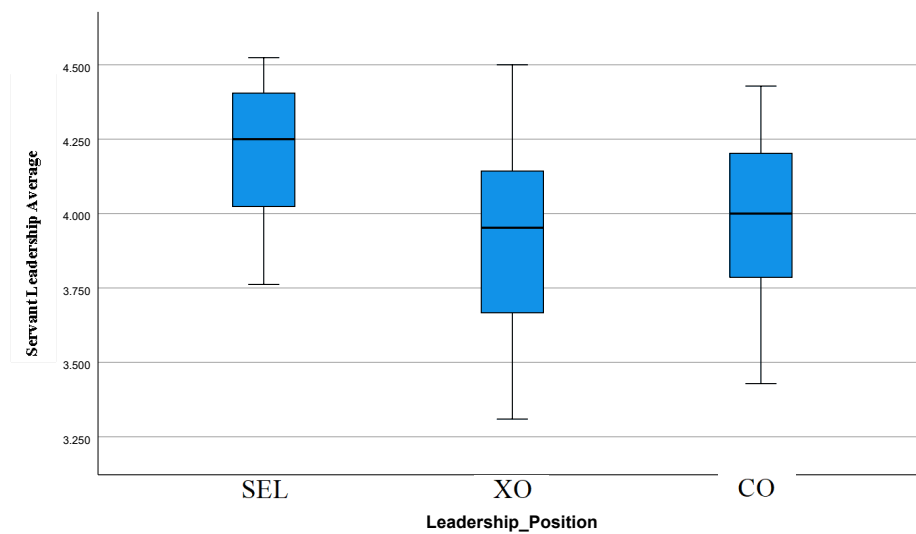
Figure 24: Boxplot of the outliers for servant leadership sorted by triad leadership position

The means for transactional leadership, when grouped by triad leadership position, were

normally distributed, as assessed by Shapiro-Wilk's test ($p \geq .05$). The supporting data for

Shapiro-Wilk's test are listed in

Table 27. The normality plots for the servant leadership means by triad leadership

position are shown in Figure 25, Figure 26, and Figure 27.

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Table 27

Shapiro-Wilk for Transactional Leadership by Rank

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Rank	Statistic	df	Sig.	Statistic	df	Sig.
SEL	.155	10	.200*	.946	10	.155
JO	.151	14	.200*	.978	14	.151
SO	.078	43	.200*	.958	43	.078

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction
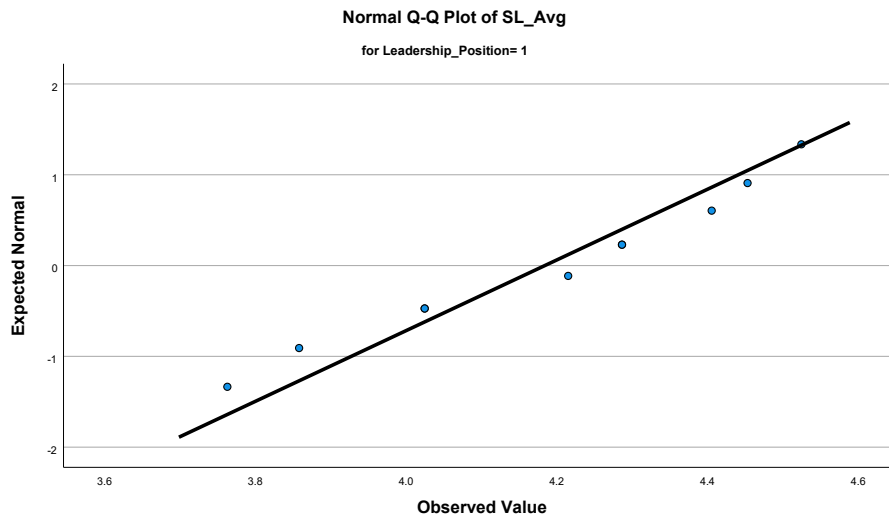
Figure 25: Normality plot for SEL servant leadership
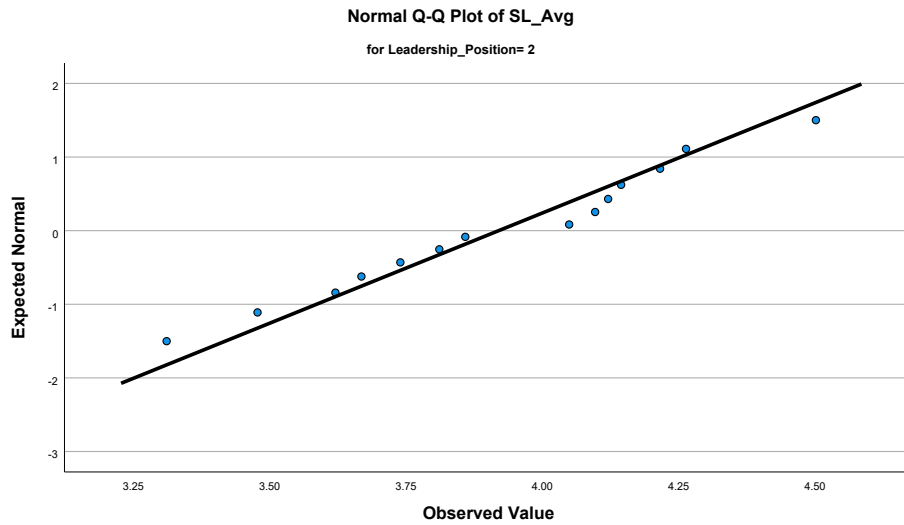
Figure 26: Normality plot for executive officer servant leadership
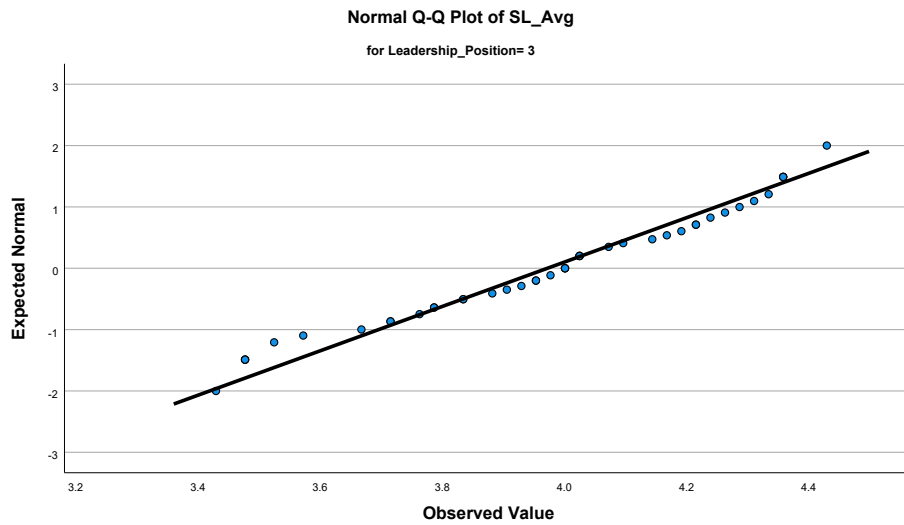
Figure 27: Normality plot for commanding officer servant leadership

Homogeneity

Levene's test for homogeneity of variances was used to confirm this ANOVA requirement. The assumption of homogeneity of variances was met, and the null hypothesis was maintained ($p = 0.467$).

A one-way ANOVA and Tukey HSD were conducted to determine if there were differences between the self-rated transformational leadership score for groups of sailors with different triad leadership positions. Despite the observed differences in the means between the groups, the group means were not statistically different (p > .05) (Table 24), F(2, 64) = 2.806, p = .068. The Tukey HSD results were not relevant since no statistical significance was discovered. The null hypothesis (H6$_0$) cannot be rejected, and the alternative hypotheses cannot be accepted. There is no significant relationship between a triad leadership position and a servant leadership style within U.S. Navy reserve EDO units.

Table 28

One-Way ANOVA: Triad Leadership Position and Servant Leadership Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.461	2	.230	2.806	.068
Within Groups	5.253	64	.082		
Total	5.714	66			

Factor Analysis

The servant leadership survey consisted of seven component factors, emotional healing, creating value for the community, conceptual skills, empowering, helping followers grow & succeed, putting followers first, and behaving ethically. These factors were averaged together to yield the servant leadership mean. Since this result was nearly statistically significant, the servant leadership mean was expanded back into its original factors, where a one-way ANOVA could be performed.

The ANOVA resulted in the servant leadership means of conceptual skills and putting followers first factors as statistically significantly different between the different groups of rank.

All assumptions for ANOVA were met for these factors. The ANOVA results for the conceptual skills mean were, $F(2, 64) = 3.864$, $p = .026$. The means increased from executive officers ($M = 3.8929$, $SD = .27273$) to commanding officers ($M = 4.0000$, $SD = .36004$) and SELs ($M = 4.2833$, $SD = .27273$), in that order. Tukey post hoc analysis revealed that the mean difference between SELs and executive officers (.39048, 95% CI [.0446, .7364]) was statistically significant ($p = .023$).

The ANOVA results for the putting followers first mean were, $F(2, 64) = 3.723$, $p = .030$. The means increased from commanding officers ($M = 3.8527$, $SD = .42757$) to executive officers ($M = 3.9286$, $SD = .50091$) and SELs ($M = 4.2667$, $SD = .33518$), in that order. Tukey post hoc analysis revealed that the mean difference between SELs and commanding officers (.41395, 95% CI [.0499, .7780]) was statistically significant ($p = .022$).

Additional Demographics

When the results of the original hypotheses returned only one statistically significant case, the leadership styles were analyzed with respect to the additional demographics.

When grouped by age, participants were classified into four groups: 20-29 ($n = 1$), 30 – 39 ($n = 27$), 40-49 ($n = 31$), and 50-59 ($n = 25$). When one-way ANOVAs were conducted, the differences between these age groups for leadership were not statistically significant (Table 29 and Table 28).

Table 29

One-Way ANOVA: Age and Transactional, Transformational, and Servant Leadership Results

	Sum of Squares	df	Mean Square	F	Sig.
Transactional					
Between Groups	.332	3	.111	.533	.661
Within Groups	16.580	80	.207		
Total	16.911	83			
Transformational					
Between Groups	.638	3	.213	1.224	.307
Within Groups	13.894	80	.174		
Total	14.532	83			
Servant					
Between Groups	.219	3	.073	.723	.541
Within Groups	8.085	80	.101		
Total	8.305	83			

When grouped by the civilian career level, participants were classified into four groups: entry ($n = 0$), intermediate ($n = 19$), advanced ($n = 28$), and senior ($n = 37$). When one-way ANOVAs were conducted, the differences between the civilian career-level groups for leadership were not statistically significant (Table 30).

Table 30

One-Way ANOVA: Civilian Career Level and Transactional, Transformational, and Servant Leadership Results

	Sum of Squares	df	Mean Square	F	Sig.
Transactional					
Between Groups	.223	2	.111	.630	.535
Within Groups	14.309	81	.177		
Total	14.532	83			
Transformational					
Between Groups	.594	2	.297	1.474	.235
Within Groups	16.317	81	.201		
Total	16.911	83			
Servant					
Between Groups	.197	2	.099	.986	.378
Within Groups	8.107	81	.100		
Total	8.305	83			

When grouped by the highest degree, participants were classified into four groups: none (n = 2), bachelor (n = 5), masters (n = 61), and doctorates (n = 16). The data were not normally distributed for each group, as assessed by the Shapiro-Wilk test, since the first group with no degree has only two participants. When Welch ANOVAs were conducted, the differences between the highest degree groups for transactional and transformational leadership were not statistically significant (Table 31). Servant leadership, however, proved to have statistical significance, $F(3,5.863) = 9.104$, $p = .013$. Upon closer examination of this data, there was one outlier, as assessed by the boxplot, which was incorporated as previous results have determined the outliers not to affect the statistical significance of the ANOVA. There was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p = .271$). Games-Howell post hoc analysis yielded a mean difference between the group with no degree and the group with the doctorates (.502976, 95% CI [.16303, .84292]) that was statistically significant ($p=.007$). This result is likely not relevant due to the unbalanced populations of these two groups. A larger sample size of sailors with no degree would need to be incorporated into this study. Since all EDOs are required to have a minimum of a master's degree, the only possible participants would be SELs. While 79.4% of navy reserve enlisted sailors do not have a degree, or their status is unknown, an SEL is more likely than a junior enlisted sailor to have a degree (Department of Defense, 2021).

Table 31

Welch ANOVA: Highest Degree Obtained and Transactional, Transformational, and Servant

Leadership Results

	Statistic	df1	df1	Sig.
Transactional				
Welch	2.989	3	7.286	.102
Transformational				
Welch	2.704	3	8.239	.114
Servant				
Welch	9.104	3	5.863	.013

When grouped by prior enlisted experience, participants were classified into two groups:

prior enlisted experience (n = 32) and no prior enlisted experience (n = 44). When one-way

ANOVAs were conducted, the differences between the prior enlisted experience groups for

leadership were not statistically significant (Table 32).

Table 32

One-Way ANOVA: Prior Enlisted Experience and Transactional, Transformational, and Servant

Leadership Results

	Sum of Squares	df	Mean Square	F	Sig.
Transactional					
Between Groups	.032	1	.032	.160	.691
Within Groups	14.827	74	.200		
Total	14.859	75			
Transformational					
Between Groups	.454	1	.454	2.504	.118
Within Groups	13.417	74	.181		
Total	13.871	75			
Servant					
Between Groups	.208	1	.208	2.142	.148
Within Groups	7.172	74	.097		
Total	7.379	75			

Summary

The random sample of 84 U.S. Navy reserve engineering duty officers and their SELs came from a total population of 525 sailors. The sample size was smaller than desired but still yielded valuable results. The distribution of the results was normal and allowed parametric statistics to be used. The scores from both the SELs and the senior officers were higher than those of the junior officers for every case analyzed. The SEL and senior officers also generally had lower standard deviations, transactional leadership being the exception, where SELs had the highest standard deviation. The assumptions of ANOVA were violated in the case of servant leadership and rank, where the data was not homogenous. This necessitated the use of Welch's ANOVA in this case and a Games-Howell post hoc test. These yielded a statistically significant result that showed a statistically significant difference between the groups of SELs and junior officers for servant leadership.

The analysis led to the adoption of the following hypotheses:

$H1_0$.   There is no significant relationship between military rank and a transactional leadership style within U.S. Navy reserve EDO units.

$H2_0$.   There is no significant relationship between military rank and a transformational leadership style within U.S. Navy reserve EDO units.

$H3_C$.   There is a significant relationship between senior enlisted military rank and a servant leadership style within U.S. Navy reserve EDO units.

$H4_0$.   There is no significant relationship between a triad leadership position and a transactional leadership style within U.S. Navy reserve EDO units.

$H5_0$.   There is no significant relationship between a triad leadership position and a transformational leadership style within U.S. Navy reserve EDO units.

$H6_0$.   There is no significant relationship between a triad leadership position and a servant leadership style within U.S. Navy reserve EDO units.

This study appears to be the first occurrence of examining transformational, transactional, and servant leadership in unison. The difference in servant leadership was expected, as SELs are known for building up the sailors under their purview. The lack of any other category being statistically significant was unexpected but will be discussed in detail in the next chapter. The results of this study may guide future instruction on leadership by the military to include additional emphasis on servant leadership at lower ranks.

CHAPTER FIVE: DISCUSSION

Leadership has always been an important subject for the military. It will continue to be the subject of many future studies as the military seeks to retain its edge over any threats or potential aggressors. This study aimed to develop a framework for the U.S. Navy's leadership styles by assessing self-perceived leadership styles in reserve EDOs and the SELs in these technical units. A gap in the literature regarding the comparison of transformational, transactional, and servant leadership existed that this study sought to fill by analyzing these leadership styles in technical units. A relationship between the leadership styles was hoped to be found with rank or leadership triad position to determine an optimal leadership style under these circumstances. Only the hypothesis for servant leadership in SELs (H3$_C$) was determined to be supported by the result; in all other cases, the null hypothesis was accepted. Instead of proving an optimal leadership style, this study's findings suggest that leaders use a toolbox containing all the leadership styles.

Framework Discussion Conclusion

This study examined the relationship between transactional, transformational, and servant leadership with respect to rank and triad leadership positions. An initial framework was developed based on the initial hypotheses, see Figure 28. This was based on the enlisted leadership path and the officer leadership path (Appendix D) that guides the development of leaders in the US Navy. The core of the enlisted sailor's development path advances them through on-the-job training and increasing their competence in their work area while developing connections with fellow sailors as mentors, protégés, and peers. The officer's development path concentrates on leadership and command training foremost while developing connections with mentors, protégés, and peers. With these two different paths, SELs focus on bringing up their

fellow sailors, leaning them towards servant leadership. At the same time, executive officers and commanding officers have servant leadership as a lower priority in their training. Commanding officers are directed to have more transformational leadership qualities by seeing the whole picture and motivating subordinates to accomplish goals. Executive officers are focused on implementing the commanding officer's decisions along with the administrative and training tasks for the command. This would lean the executive officer towards a transactional leadership style. This framework ended up being completely wrong.
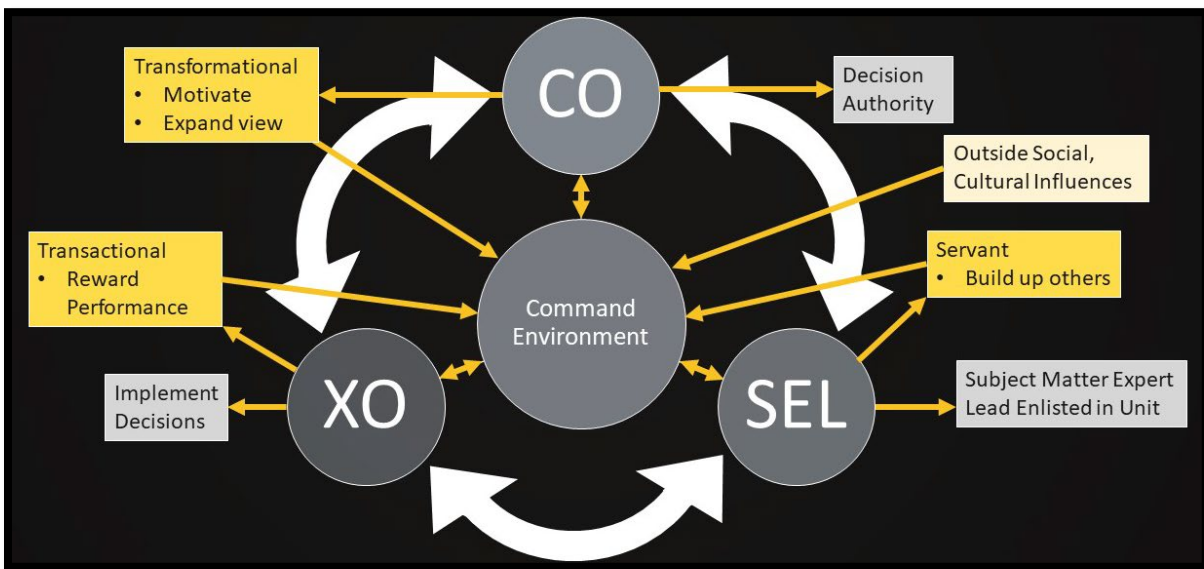
Figure 28: Initial framework

Instead of the intended simple framework with designated leadership styles for every triad leadership position, the only significance found under the initial construct of the study was within the rank groups of SELs and junior officers for servant leadership. Using the initial framework as a guide, the resultant framework (Figure 29) ends up with all ranks doing everything, but the junior officers lean less on the servant leadership style. This does not mean junior officers do not incorporate servant leadership into their leadership style toolbox, but the

SELs are more likely to implement it. This resultant framework more accurately depicts the

chaotic use of the different leadership styles.
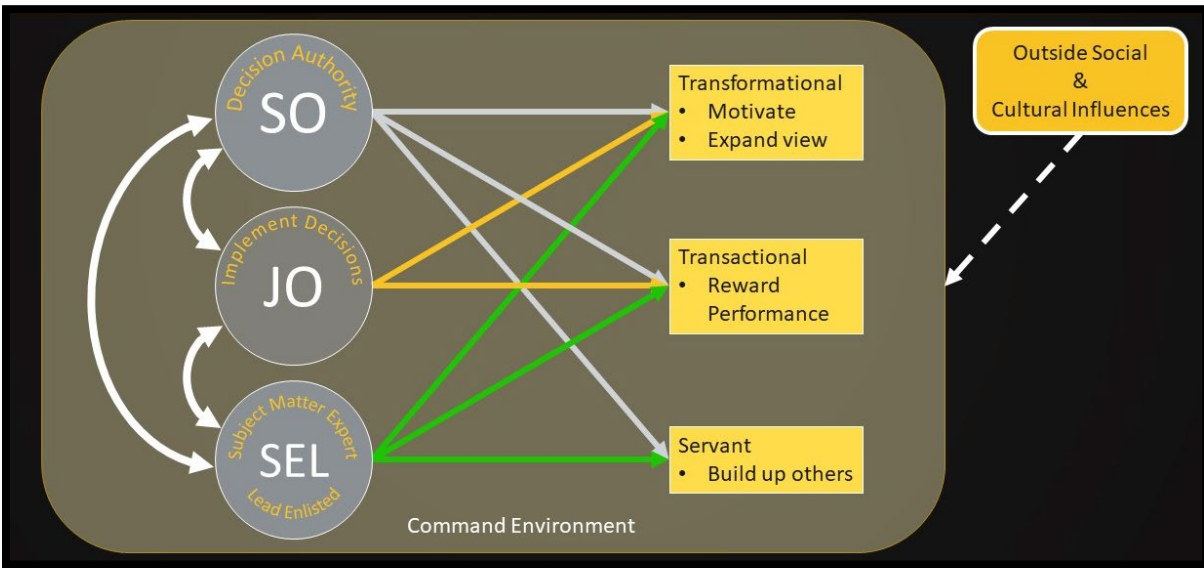
Figure 29: Resultant framework

A Venn diagram (Figure 30 and Figure 31) is an easier way to depict the leadership

styles. Based on the highest means, SELs lean towards servant leadership more, then

transformational, then transactional, in that order. Junior officers use servant leadership and

transformational about the same and transactional the least, but their means are lower than the

SELs and the senior officers for all leadership styles. Senior officers use transformational more,

followed by servant leadership and then transactional. The overlap of the Venn diagram circles

depicts the highest response rate for each of the categories.
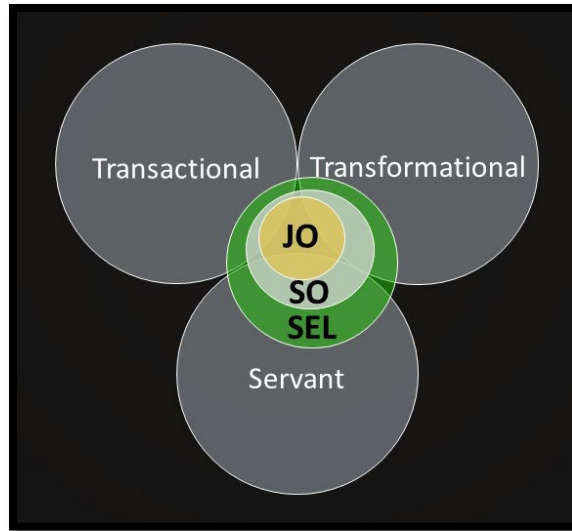
Figure 30: Resultant framework Venn diagram for leadership by rank
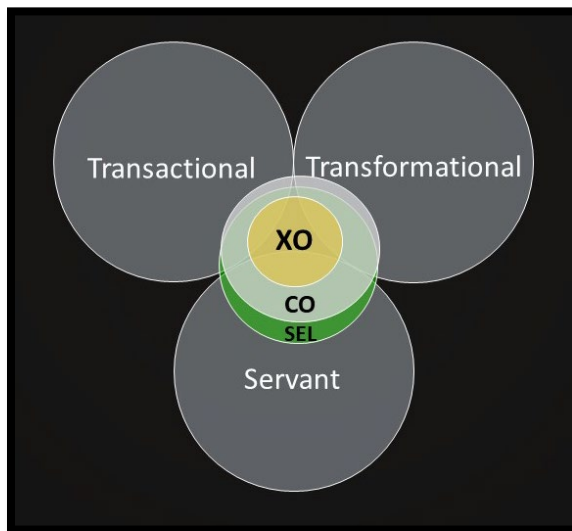
Figure 31: Resultant framework Venn diagram for leadership by triad leadership position

When the groups are divided by leadership triad position, the SELs still dominate with servant leadership followed by transformational and then transactional. Executive officers use servant leadership, then transformational, followed by transactional, but executive officers have a lower mean score on all three leadership styles than SELs. Commanding officers have the

highest mean for transformational leadership, followed by servant leadership and then transactional; however, commanding officers had a higher mean than SELs in transactional leadership.

<u>General Discussion of Findings</u>

Several factors may be contributing factors to the results of this research. One of the primary factors is the homogeneity of the population as a whole. All EDOs and SELs are part of a significantly culled group of sailors. Before joining the EDO community, applicants are required to complete three separate interviews with senior officers in the community. These senior officers act as a gate for all EDO applicants, who must first secure the senior officers' approval before their application can go before the EDO board for consideration. With only 98 senior officers in the community, a core group of officers often perform the interviews. They are looking for traits that they know will make an applicant successful within the EDO community, which results in many like-minded people with similar ambitions.

SELs are predominantly Chiefs chosen from their peers for promotion and have completed initiation into the Chief's mess. No Chief is not proud of being a Chief and making it through the Chief selection process. Like the EDO boards, Chiefs are selective of whom they bring into the Chief's mess. The current Chiefs serve as the gate to ensure their values are upheld and each candidate possesses the traits they seek.

The EDO community is highly technical, with skilled officers. All EDOs must possess (or complete in short order) a technical master's degree before being considered for the EDO program. This is in high contrast with that of the rest of the navy. Across the active-duty military, 85.7% of officers and 89.8% of reservists have degrees (Table 33). When only looking at the U.S. Navy, 71.2% of all active duty have degrees, while 83.6% of reservists have degrees. For

this survey, 78.9% of EDOs had their Master's degree, and 19% had their Ph.D. Across the entire reserve EDO community, 100% of EDOs hold their Master's degree. Despite attending different universities, this requirement leads to a similarly-disciplined individual with a similar technical education background.

Table 33 Military officers with degrees across the military and the Navy

(Department of Defense, 2021)

Military Officers Active-Duty			Military Officers Reserve		
Degree	Total #	%	Degree	Total #	%
Associates	2874	1.2	Associates	2226	1.6
Bachelors	105944	44.8	Bachelors	66599	48.5
Advanced	93938	39.7	Advanced	54471	39.7
U.S. Navy Officers Active-Duty			U.S. Navy Officers Reserve		
Degree	Total #	%	Degree	Total #	%
Associates	588	1.0	Associates	2	0.01
Bachelors	19732	35.2	Bachelors	6104	43.3
Advanced	19579	34.9	Advanced	5673	40.2

Table 34 Distribution of degrees across EDOs in this study

EDOs in this survey		
Degree	**Total #**	**%**
Advanced	76	100
Masters	60	78.9
PhD	16	19

The SELs in the EDO community also tend to be more educated than their peers. Despite the few responses from the SELs, most (75%) had a degree (Table 36). This is in contrast to the active duty enlisted, where only 9.6% of enlisted sailors possess a Bachelor's or better, or 13.2% of reserve enlisted. These numbers slightly approve when just the U.S. Navy is considered (9.2% of active duty and 14% of reservists), but this fails to meet the numbers in this study (Table 35). A caveat to this analysis is that these numbers consider all enlisted, not only Chiefs or SELs.

Junior enlisted at the beginning of their careers right out of high school are less likely to have obtained a university degree than an SEL, who is later in their career.

Table 35 Military enlisted with degrees across the military and the Navy (Department of Defense, 2021)

Military Enlisted Active-Duty			Military Officers Reserve		
Degree	Total #	%	Degree	Total #	%
Associates	112067	10.2	Associates	57372	8.7
Bachelors	88900	8.1	Bachelors	71589	10.8
Advanced	16187	1.5	Advanced	16076	2.4
U.S. Navy Enlisted Active-Duty			U.S. Navy Officers Reserve		
Degree	Total #	%	Degree	Total #	%
Associates	22663	7.9	Associates	2888	6.6
Bachelors	22877	8.0	Bachelors	5010	11.5
Advanced	3348	1.2	Advanced	1072	2.5

Table 36 Distribution of degrees across SELs in this study

SELs in this survey		
Degree	Total #	%
None	2	25%
Bachelors	5	62.5
Advanced	1	12.5

Appendix D shows that officers follow similar paths as they make their way up the ranks, leading to an even more similar population, especially at higher ranks. This homogeneity can be seen in the senior officers' responses to this survey. The boxplots in Chapter 4 show a more concise spread in the response for senior officers, while junior officers are more dispersed (see Figure 6, Figure 8, and Figure 12).

In retrospect, it should not have come as a surprise that a homogenous group yielded results that were so similar. The purpose of the study, however, was to study a group with proven leadership capabilities. The small number of significant results should not be considered a negative aspect of this study. Instead, it makes the statistically significant aspects very

interesting. First, the high servant leadership in SELs could be attributed to the SELs reaching a point in their career where they are looking for the next sailor to fill their role. SELs may see the importance of mentoring their protégés to help the sailor avoid pitfalls while helping them advance to the next career milestone. Junior officers may not rely as heavily on servant leadership because they feel like they have no one below them to mentor. When soliciting responses for this survey, comments from junior officers indicated they did not view themselves as leaders, did not want to skew the survey with their responses, or did not see their importance as they had not done anything in the military yet, despite some of the participants having held command positions previously.

By breaking the leadership means into their component factors, additional insight into the servant leadership significance was discovered. When grouped by rank, the SELs and junior officers' mean had significant differences over the conceptual skills factor. The conceptual skills factor is defined by Liden et al. (2008) as "possessing the knowledge of the organization and tasks at hand so as to be in a position to effectively support and assist others, especially immediate followers" (p 162). In the Navy, there is a saying, ask the Chief, the saying is not, ask the junior officer. SELs have a reputation for knowing everything, where to get it, or whom to get it from. These points could easily be incorporated into leadership courses targeted at junior officers. There is no way to replace the tribal knowledge of the SELs. However, with recognition of the deficiency and some additional training, junior officers could begin to come up to the level of the SELs.

Putting followers first was the other component factor SELs had statistical significance from both junior and senior officers. This factor is defined by Liden et al. (2008) as "using actions and words to make it clear to others (especially immediate followers) that satisfying their

work needs is a priority" (p 162). This falls in line with the original hypothesis of the study. SELs look to build the community of their fellow sailors. They participate in mentoring, career counseling, and study sessions for their rate exams for promotion.

These two factors also had statistical significance when the triad leadership position servant leadership result was broken back into its factors. The conceptual leadership factor had statistical significance between SELs and executive officers. Executive officers are often more junior in age and experience than the SELs, so it is not surprising that the executive officer may feel like they cannot initially support others effectively. SELs with years of experience would likely have less uncertainty in their organizational knowledge and ability to help their fellow sailors.

<div align="center">Implications of the Study</div>

This study examined a group of successful military leaders to determine their leadership styles. The results indicate that a mix of all leadership styles is used across all ranks and triad leadership positions. Even the one significant result for servant leadership between SELs and junior officers did not negate the use of servant leadership by junior officers. However, junior officers did not identify as using servant leadership as much as the SELs. This study suggests that to be a good leader; a leader must pull from all these leadership styles to lead effectively. Different leadership challenges may be better solved with different approaches rather than applying a particular leadership style to every situation.

Previous studies have analyzed different leadership styles (Earnhardt, 2007), but no study could be found that combined these three styles. The MLQ is generally used by itself to test between transformational, transactional, and laissez-faire; the latter being a lack of leadership. Servant leadership studies mainly study servant leadership against a variable like job satisfaction

without considering another leadership style. This study instead addressed servant leadership at the same level as transformational and transactional leadership.

The lower junior officer mean for servant leadership shows an area with room for improvement. SELs had a significantly larger servant leadership mean, while senior officers also had a larger servant leadership mean than junior officers. SELs and senior officers were selected for promotion from a competitive group of leaders looking to advance. If the boards selecting these senior leaders are selecting sailors with the traits of servant leadership, then it is worth emphasizing the servant leadership style in leadership courses to junior officers to grow an increasingly effective and competitive group of officers. Officers who do not display a well-rounded mix of leadership styles may be less competitive than those who understand all three leadership styles. While not a rule, generally, to obtain a promotion in rank, an officer has to serve as a commanding officer. If commanding officers display higher servant leadership, this may play a part in more senior officers also using servant leadership. Officers who have only served as executive officers may be passed over for promotion by not having previously taken a command position.

This study could be applied to other military communities outside of engineering. It may help determine if one of these dominant leadership styles is missing from the mix of styles that the community employs.

The most notable result of this research is the prevalence of the mix of leadership styles in successful leaders. Some articles hinted at this mix being optimal (Bass et al., 2003; O'Shea et al., 2009). Others concentrated on putting transformational leadership on a pedestal as the superior choice for all leadership (Yammarino & Bass, 1990). The ability to flex between leadership styles and understand the when to use each leadership style ultimately leads to

success. This is done by drawing on the strengths of the different leadership styles, transformational when seeking to inspire masses, servant when building up employees, and a transactional hierarchical approach for some rote objectives. A flex leadership style is ultimately what is recommended as a result of this study. This study adds to the body of works that finds a mixture of leadership styles optimal instead of concentrating on a single leadership style as superior.

Future Research

Future research broadening the scope of this study to other communities within the Navy or other branches of the military could allow the military to structure its leadership class offerings more to yield the leader the military desires through the traits it emphasizes at the promotion boards in successful, highly competitive units. Expanding the population sample to include other successful technical units could help increase the base sample population without diluting the study's intent.

An emphasis on further research to develop a more concise metric to test between these three leadership styles would be helpful to accurately determine the differences between these leadership styles without having a lengthy survey. Additionally, redesigning the demographic questionnaire to delineate the exact ranks instead of grouping the ranks could provide insight into how leadership styles progress as officers achieve seniority. A larger population would be necessary for this to be unable to identify participants with their conglomerated demographic data.

Due to the realized sample size, this study's results can only be used to draw limited conclusions. The survey results were also obtained through self-reported leadership styles since subordinates were not accessible for the survey. This form of surveying may have increased

some bias and self-inflation of the leadership styles. If another corroborating source of a leader's leadership style could be included in the survey, it could provide additional depth for the data analysis.

In conclusion, the framework for this study suggests that military leaders use all forms of leadership surveyed to a varying degree in a flex leadership style approach. Different situations will call for different leadership styles, and by being adept in all of these leadership styles, SELs and officers can provide effective leadership of technical engineering units within the U.S. Navy. This study adds to the body of proof against the existence of a singular superior leadership style in favor of a flex leadership style that empowers leaders to adapt their approaches based on the situation.

APPENDIX A
MLQ QUESTIONNAIRE

mind garden

To Whom It May Concern,

The above-named person has made a license purchase from Mind Garden, Inc. and has permission to administer the following copyrighted instrument up to that quantity purchased:

Multifactor Leadership Questionnaire

The three sample items only from this instrument as specified below may be included in your thesis or dissertation. Any other use must receive prior written permission from Mind Garden. The entire instrument may not be included or reproduced at any time in any other published material. Please understand that disclosing more than we have authorized will compromise the integrity and value of the test.

Citation of the instrument must include the applicable copyright statement listed below. Sample Items:

As a leader ….
> I talk optimistically about the future.
> I spend time teaching and coaching.
> I avoid making decisions.

The person I am rating….
> Talks optimistically about the future.
> Spends time teaching and coaching.
> Avoids making decisions

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Sincerely,

Robert Most
Mind Garden, Inc.
www.mindgarden.com

Remote online use of the Mind Garden instrument stated below is approved for the person on the title page of this document.

Your name:
Megan Praschak

Email address:
m.praschak@gmail.com

Company/institution:
UCF

Mind Garden Sales Order or Invoice number for your license purchase:
ARMNBISSW

The name of the Mind Garden instrument you will be using:
Multifactor Leadership QuestionnaireTM Leader Form (5x-Short)

Please specify the name of and web address for the remote online survey website you will be using and describe how you will be putting this instrument online:
qualtrics https://ucf.qualtrics.com/jfe/form/SV_6tevQVt2oR9H1r0

APPENDIX B
SERVANT LEADERSHIP QUESTIONNAIRE

Servant Leadership Self-Assessment Questionnaire

#	Question	Score (1-7)
1	Others would seek help from you if they had a personal problem.	
2	You emphasize the importance of giving back to the community.	
3	You can tell if something work-related is going wrong.	
4	You give others the responsibility to make important decisions about their own jobs.	
5	You make others' career development a priority.	
6	You care more about others' success than your own.	
7	You hold high ethical standards.	
8	You care about others' personal well-being.	
9	You are always interested in helping people in the community.	
10	You are able to think through complex problems.	
11	You encourage others to handle important work decisions on their own.	
12	You are interested in making sure others reach their career goals.	
13	You put others' best interests above your own.	
14	You are always honest.	
15	You take time to talk to others on a personal level.	
16	You are involved in community activities.	
17	You have a thorough understanding of the organization and its goals.	
18	You give others the freedom to handle difficult situations in the way they feel is best.	
19	You provide others with work experience that enables them to develop new skills.	
20	You sacrifice your own interests to meet others' needs.	
21	You would not compromise ethical principles in order to meet success.	
22	You can recognize when others are feeling down without asking them.	
23	You encourage others to volunteer in the community.	
24	You can solve work problems with new or creative ideas.	
25	If others need to make important decisions at work, they do not need to consult you.	
26	You want to know about others' career goals.	
27	You do what you can to make others' jobs easier.	
28	You value honesty more than profits.	

Key:

1 = Strongly Disagree

2 = Disagree

3 = Disagree Somewhat

4 = Undecided

5 = Agree Somewhat

6 = Agree

7 = Strongly Agree

APPENDIX C
PARTICIPANT DEMOGRAPHIC DATA

Please respond to the following demographics questions.

Rank

Senior Enlisted Leader

Junior Officer (O1-O4)

Senior Officer (O5+)

Age

20-29

30-39

40-49

50-59

60+

Civilian career level

Entry

Intermediate

Advanced

Senior

N/A

Most recent leadership position

SEL

XO

CO

None

Highest degree level

None

Bachelors

Masters

Doctorates

Officer: Prior enlisted experience

Yes

No

APPENDIX D
OFFICER AND ENLISTED LEADER DEVELOPMENT PATHS

Legend:
Schools
On-the-Job Training

Selected Abbreviations:
NP&P: Navy Pride and Professionalism

Years of Service

Character | **Connections** | **Competence**

27-30
5th Shore Tour / Command Training — Leadership Mess — 5th Shore Tour Command Training/OJT
Strategic Thinking Seminar — Executive Leadership Symposium

25-27
5th Operational Sea Tour Command Training — 5th Operational Sea Tour Senior Qual / DLCPO / CMC Command Training/OJT
Navy Senior Leader Symposium

4th Shore Tour / Command Training — 4th Shore Tour OJT

21-25
Sailor 360 Training
Executive Leadership Symposium — NSLS KEYSTONE Executive Leadership Symposium

Professional Networks

19-21
4th Operational Sea Tour / Fleet CPO Training / Command Training — 4th Operational Sea Tour Senior Qual / DLCPO / CMC Command Training
COB/CMC Course — Sailor 360 Training
Senior Enlisted Academy — 3rd Shore Tour OJT

16-19
Sailor 360 Training
3rd Shore Tour Fleet CPO Training Command Training — Senior Enlisted JPME

CPO Mess

14-16
3rd Operational Sea Tour Fleet CPO Training Command Training — 3rd Operational Sea Tour Senior Qual / LPO / LCPO Command Training/OJT
Sailor 360 Training

11-14
2nd Shore Tour Fleet CPO Training Command Training — 2nd Shore Tour OJT
CPO Leader Development Course — First-Class Petty Officer's Association

8-11
2nd Operational Sea Tour Command Training — 2nd Operational Sea Tour Senior Qual / LPO / LCPO Command Training/OJT
Advanced Leadership Dev. Course Sailor 360 Training — C-School / PPME / JPME (DL)

4-8
1st Shore Tour Command Training — 1st Shore Tour OJT
Intermediate Leader Development Course / Sailor 360 Training — Coalition of Sailors Against Destructive Decisions

1-5
1st Operational Sea Tour Command Training Command Indoc/NP&P — 1st Operational Sea Tour Initial and Warfare Qualifications Work Center Supervisor Command Training / OJT

<1-3
Foundational Leader Development Course / Sailor 360 Training — Initial Specialty Training

0
NMT / Life Skills / GMT (Accession Training) — Recruit Indoctrination (Boot Camp)

Family, Friends, Mentors, Protégés, and Peers

Self-Guided Learning: Blogs, Societies, Professional Reading, Local and Online Lectures, College Courses, Local Professional Groups, Qualifications

Enlisted Leader Development Path

Figure 32: Enlisted Leader Development Path (Galinis, 2021)
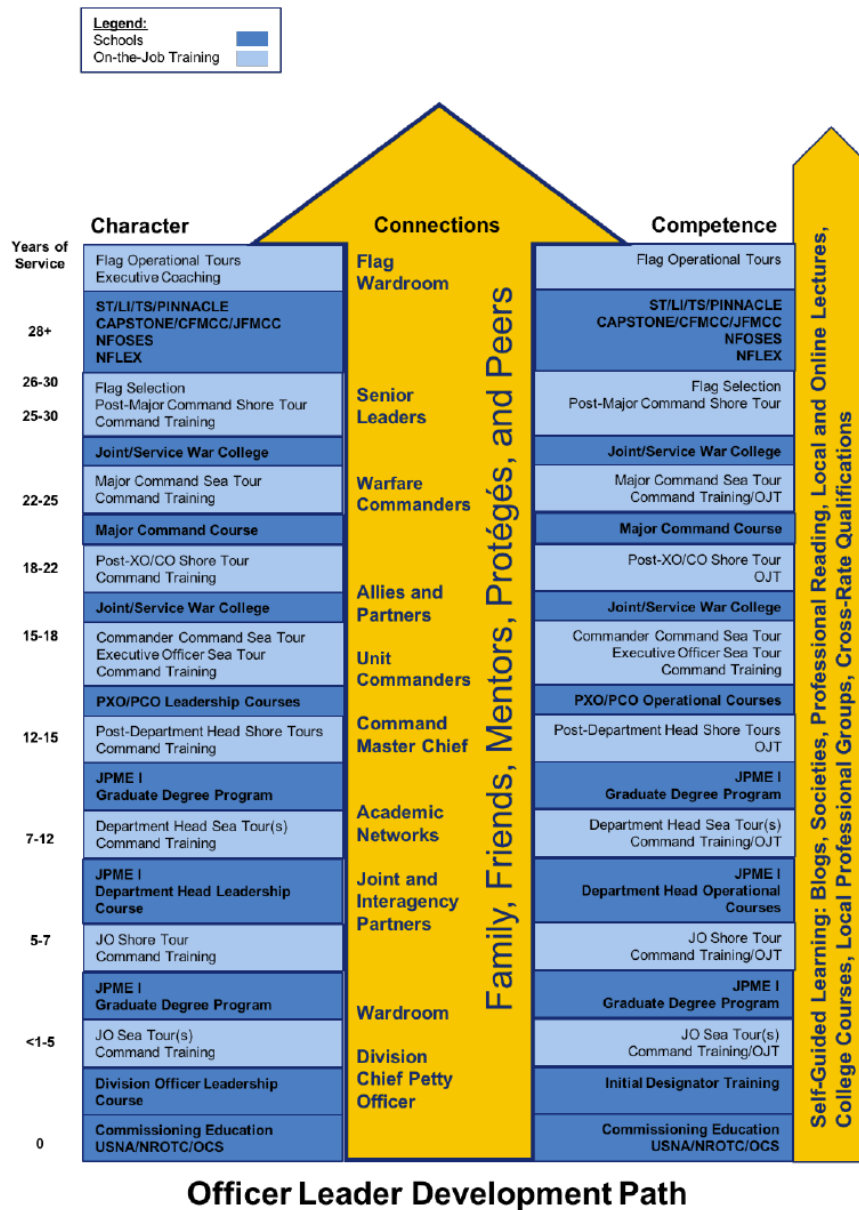
109

Figure 33: Officer Leader Development Path (Galinis, 2021)

APPENDIX E
PARTICIPANT INSTRUCTIONS

Fellow EDOs and SELs,

You are cordially invited to participate in a survey regarding leadership styles in the community. This survey asks you for your opinion on your personal leadership style.

The results from this survey will be used for my Ph.D. dissertation. The survey is anonymous, and no data will be traced back to you. (Ex. Rank is grouped as enlisted, junior officer, or senior officer so as not to be able to single out an individual).

All data will be maintained for five years after the research is completed and will be kept confidential. A link will be provided for you to complete the survey online. This survey is a one-time commitment of approximately 10 minutes.

Thank you so much for your time.

Very Respectfully,

LT Megan Praschak

APPENDIX F
IRB APPROVAL LETTER

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

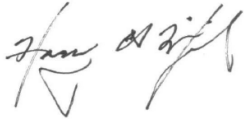EXEMPTION DETERMINATION

May 25, 2022

Dear Megan Praschak:

On 5/25/2022, the IRB determined the following submission to be human
subjects research that is exempt from regulation:

Type of Review:	Initial Study, Exempt Review
Title:	A Framework to Define And Quantify Leadership Styles Within Navy Engineering Units
Investigator:	Megan Praschak
IRB ID:	STUDY00004138
Funding:	None
Grant ID:	None
Documents Reviewed:	• Demographics.docx, Category: Survey / Questionnaire; • HRP-254-FORM Explanation of Research3.pdf, Category: Consent Form; • HRP-255-FORM - Request for Exemption3.docx, Category: IRB Protocol; • MLQ Survey Example2.pdf, Category: Survey / Questionnaire; • Recruitment email2.docx, Category: Recruitment Materials; • Servant Leadership Self Assessment Questionnaire.pdf, Category: Survey / Questionnaire;

This determination applies only to the activities described in the IRB submission
and does not apply should any changes be made. If changes are made, and
there are questions about whether these changes affect the exempt status of the
human research, please submit a modification request to the IRB. Guidance on
submitting Modifications and Administrative Check-in are detailed in the
Investigator Manual (HRP-103), which can be found by navigating to the IRB
Library within the IRB system.   When you have completed your research, please
submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Harry Wingfield
UCF IRB

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