NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

AN ANALYSIS OF THE ROLE OF SERVICE–SPECIFIC RISK FACTORS IN ACTIVE DUTY NAVY SUICIDES

by

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March 2014

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704–0188
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202–4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704–0188) Washington DC 20503.			
1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** March 2014	**3. REPORT TYPE AND DATES COVERED** Master's Thesis	
4. TITLE AND SUBTITLE AN ANALYSIS OF THE ROLE OF SERVICE–SPECIFIC RISK FACTORS IN ACTIVE DUTY NAVY SUICIDES		**5. FUNDING NUMBERS**	
6. AUTHOR(S) James D. Golliday			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943–5000		**8. PERFORMING ORGANIZATION REPORT NUMBER**	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A		**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number NPS.2013.0088-IR-EP5-A.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited		**12b. DISTRIBUTION CODE**	

13. ABSTRACT (maximum 200 words)

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14. SUBJECT TERMS Suicide, Risk Factor, Characteristic, Demographic, Service-Specific, Resiliency, Readiness			**15. NUMBER OF PAGES** 77
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UU

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

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AN ANALYSIS OF THE ROLE OF SERVICE–SPECIFIC RISK FACTORS IN ACTIVE DUTY NAVY SUICIDES

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
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LIST OF ACRONYMS AND ABBREVIATIONS

AFHSC	Armed Forces Health Surveillance Center
AFMES	Armed Forces Medical Examiner System
AFQT	Armed Forces Qualification Test
CY	calendar year
DEERS	Defense Enrollment Eligibility Reporting System
DMDC	Defense Manpower Data Center
DOD	Department of Defense
DOD TF Suicide	Department of Defense Task Force on the Prevention of Suicide by Members of the Armed Forces
DONSIR	Department of the Navy Suicide Incident Report
EDIPIN	Electronic Data Interchange Personal Identifier Number
FY	fiscal year
GMT	General Military Training
IA	individual augmentee
JAMA	*Journal of the American Medical Association*
LS	Logistics Specialist
NDAA	National Defense Authorization Act
NETC	Naval Education and Training Command
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OND	Operation New Dawn
PC	Postal Clerk
SECDEF	Secretary of Defense
SPC	Suicide Prevention Coordinator
TF	task force
UIC	unit identification code

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ACKNOWLEDGMENTS

I thank Dr. Yu-Chu Shen and Dr. Jesse Cunha for their outstanding support and guidance throughout the completion of this thesis. I also thank Dr. Parrish Balcena for his time, patience, and critical data support that helped make this thesis possible. I extend further thanks to Jennifer Murguia, who consistently ensured I received essential data exactly when I needed it. I send my deepest appreciation to my wonderful wife, Maria Elena, irreplaceable mother-in-law, Tia, my eternally faithful dogs, Jemima, Jasper, and Jewels, and the rest of my family. Without their love, encouragement, patience, and sacrifice, this thesis would not exist.

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I. INTRODUCTION

In 2013, the U.S. Navy employed over 334,000 active duty personnel;[1] among those, 46 Sailors took their own lives (Office of Management and Budget, 2014; Navy Personnel Command, 2014). Although suicide is extremely rare in the Navy, spouses, children, parents, siblings, and many others endure various hardships while trying to accept and recover from the premeditated death of a loved one. Those affected may even become suicide risks themselves. The overall costs of just one suicide are impossible to quantify, but the family and friends of each suicidal Sailor undoubtedly pay an unacceptable price.

The Navy also experiences many professional, economic, and emotional impacts every time a Sailor decides to end his or her life. A completed suicide immediately degrades command readiness and mission effectiveness. Surviving shipmates must absorb the extra workload as they cope with the loss, affecting morale and performance. The Navy must react to fill the capability gap through a combination of recruiting, accession, and training efforts and their associated expenses. Although a replacement may be readily available for a particular command, the resulting personnel shuffle will still create a hole that needs to be filled.

This thesis analyzes the role of service-specific risk factors in active duty Navy suicides from 2002 to 2012. Through logit regression analysis, I address the following questions: What demographic and service-specific factors are associated with the occurrence of active duty suicides in the U.S. Navy?

Identifying service-specific characteristics associated with active duty Navy suicides provides an up-to-date, Navy-centric blueprint of pertinent factors that have contributed to past suicides. This blueprint will provide Navy leadership with a tool to more accurately assess future suicide susceptibility and therefore offer at-risk Sailors the help they need and deserve before it is too late.

[1] This includes reservists on active duty.

A. BACKGROUND

Suicide is one of the most common reasons service members die while on active duty (Armed Forces Health Surveillance Center, May 2012). As of 2011, suicides accounted for almost 20% of total deaths in the military, compared to combat-related deaths of about 26%. Instances of suicide climbed from less than 10% in 2005 to over 20% in 2009 before leveling off. The highest increase occurred in 2008 (11.6% to 18.5%), which may be attributable to the lower overall number of deaths in that year. In 2010, suicide surpassed transportation accidents to become the highest cause of active-duty deaths after combat (Armed Forces Health Surveillance Center, May 2012). Within the Navy, active duty suicides increased from 40 to 61 between 2010 and 2012, dropping back down to 46 in 2013 (Navy Personnel Command, 2014). Despite the considerable decrease in 2013, the 2012 spike may be the first stage of a gradual increase in instances of suicide. Whether or not 2012 is any indication of the future, the recent spike calls into question the effectiveness of suicide prevention efforts.

In response to the growing number of suicides in the U.S. military, Congress required the establishment of the Department of Defense (DOD) Task Force on the Prevention of Suicide by Members of the Armed Forces (DOD TF Suicide) in the fiscal year (FY) 2009 National Defense Authorization Act (NDAA). Congress directed the task force to develop recommendations for the enactment of an all-inclusive suicide prevention policy for the entire U.S. military (110th Congress, 2008). DOD TF Suicide reported its findings and recommendations in August 2010. It concludes, among other things, that suicide can be prevented, a connection exists between deployments and elevated suicide rates, and specific occupational specialities by themselves are not linked to suicide. DOD TF Suicide also recommends extensive observation to identify at-risk service members (Berman et al., 2010).

In this paper, I examine Navy combat zone deployment associations to active duty Navy suicides to determine if any connections exist specifically within the Navy organization (vice the armed forces organization as a whole). Although DOD TF Suicide finds no direct links to suicide via specific occupations, it groups some occupations together while individualizing others, creating an inconsistency in measurement. I

categorize all Navy enlisted ratings and officer designators into general classifications, which may disclose links to suicide among similar job types in the Navy. By answering the primary research question, my results may enhance the Navy's ability to identify at-risk Sailors.

In June 2012, Secretary of Defense (SECDEF) Leon Panetta demonstrated his concern for the general situation when he informed Congress he had tasked each service to identify sources of suicide and prevention plans (Zoroya, 2012). His intent to abolish suicide in the military came almost two years after the congressionally mandated DOD TF Suicide published its own recommendations (Berman et al., 2010). DOD TF Suicide's report calls for immediate follow-on action "implemented with a sense of urgency…to address the worrisome trend of increasing suicide by members of the Armed forces" (Berman et al., 2010, p. ES-1). Congress and SECDEF Panetta's deterrence initiatives indicate the importance that high-level leadership places on eliminating suicide, while the temporal mismatch in execution suggests the inherent challenges in the fight against it.

In addition to top-level organizational challenges within the DOD, the Navy, just as the other military branches, has had difficulty understanding certain factors contributing to suicide. Two categorical elements can influence suicide risk: personal demographic components and service-specific components. The Navy has experienced the most difficulty attempting to understand and analyze service-specific components. Of the thirteen suicide risk factors listed in the Navy's suicide prevention program instruction (OPNAV Instruction 1720.4A), only one is service-specific: occupational problems (Chief of Naval Operations, 2009). Personal demographics such as age, race, and gender are easier to capture and quantify, and extensive research into psychological, mental, and behavioral disorders has shed much light on associations with suicide, but these elements do not fully explain correlations between suicides and associated factors. Service components unique to the Navy— occupational specialties, warfare platforms, and at-sea conditions—help tell a more complete story of these relationships and need to be further investigated.

B. RELATED RESEARCH

Several studies are related to my paper. For example, LeardMann et al. tackle the challenge of service component analysis by examining some demographic, service-specific, and psychological factors for any connections to completed suicides among current and prior military members. Using Cox models for survival analysis, they find the highest suicidal correlations with males, depressives, manic-depressives, and consumers of alcohol. They draw no independent associations between military service characteristics and suicide risk (LeardMann et al., 2013). These results suggest demographic factors such as gender and psychological profile are more relevant in assessing suicide risk than service factors, but the sample does not solely represent active duty Sailors (nor is it intended to). Instead, the study takes a random sample of service members from all U.S. military branches, active and reserve component, and follows them at three-year intervals, even if they leave the military. Consequently, less than 18% of the sample is active duty Navy, and about 28% is civilian (LeardMann et al., 2013). This all-inclusive approach provides an overall glimpse of suicide risk among U.S. military personnel, but the study's outcomes are weighted toward the Army and Air Force (~73% of the sample size). Including former service members in the sample also creates unobservable variables attributed to civilian life which introduce various biases into most—if not all—of the service-specific variables in LeardMann's report. This thesis focuses exclusively on active duty Sailors, producing an analysis of factors associated with suicide that is tailored to the Navy.

Suicide risk factors identified in LeardMann's investigation substantiate Hilton's Department of the Navy Suicide Incident Report (DONSIR) results from 1999 to 2007. Hilton et al. pinpoint five common risk factors for suicide: depression, past psychiatric treatment, anxiety, alcohol abuse, and guilty/shameful disposition. They execute a Poisson model to ascertain demographic and service factors associated with suicide, finding greater suicide rates in men and enlisted personnel, but no noteworthy correlations with respect to age bracket, time in service, or enlisted rank (Hilton et al., 2009). The DONSIR studies mental, psychological, behavioral, demographic, and career characteristics, including generic warfare platforms, but places less analytical focus on

career characteristics. Only mental, psychological, and behavioral elements are officially classified as "suicide risk factors" in the DONSIR. While extensive research into the mental and psychological realms is very important, common research of career risk factors is lagging behind.

Most recently, Schoenbaum et. al. analyze predictive suicide factors in the U.S. Army. They discover higher susceptibility to suicide in males, Caucasians, junior enlisted personnel, demotions, and present or prior deployment. They conclude demographic indicators are similar to demographic trends and combat-induced stressors are not necessarily cause for increased suicide risk in the Army (Schoenbaum et al., 2014). With the exception of demotions, I consider the key indicators from Schoenbaum's report and apply them to the Navy.

I emphasize both demographic and service-specific factors in an attempt to provide a foundational understanding of possible Navy career characteristics that are associated with suicide. By observing Navy warfare platforms more closely than in past investigations, I also aim to determine if certain types of ships are more prone to instances of suicide than others.

In 2011, Ramchand et al. deliver one of the most comprehensive military suicide reports with their *The War Within: Preventing Suicide in the U.S. Military*. *The War Within* explores the epidemiology of military suicides and examines each military branch's suicide prevention programs. After their meticulous review of each military service, Ramchand et al. make several recommendations applicable to all U.S. armed forces. Among other recommendations, they propose that suicide prevention initiatives be centered on "clearly identified risk factors specific to military populations and to each service" (Ramchand et al., 2011, p. 113). I carry out Ramchand's recommendation by studying Navy-centric characteristics to identify suicide risk factors specific to the Navy organization.

Suicide is a nebulous affair. The events, experiences, emotions, and responses leading up to a person's decision to commit suicide constitute a unique progression that can never be reliably replicated. Even if one could somehow revive a victim of suicide

and recreate every situational nuance contributing to the death, the victim's reaction to any specific incident may be different the second time around, potentially putting the person on an entirely separate life path where suicide is never even considered. Despite this, researchers and analysts have identified several observable and measurable aspects that can be attributed to increased suicide risk. These aspects represent tangible characteristics—both individual and service-specific—that shape the unique biological journey a person takes, regardless of whether or not that person dies by his or her own hand. The individual and career traits of those who do end their own lives, however, may reveal trends that can facilitate recognition of at-risk service members and aid in suicide prevention. Limited definitive research on the role service-specific factors play in a Sailor's suicide risk and the dynamic, situation-specific nature of a suicidal event present a complex puzzle the Navy must solve in order to maximize readiness and resiliency. I examine the role service-specific risk factors play in active duty Navy suicides in order to gain a better understanding of these risk factors, thereby enhancing suicide intervention and prevention in the U.S. Navy. My methodologies provide a foundation for service-specific risk factor analysis in the other military branches as well, ultimately helping contribute to a whole-of-DOD approach in suicide intervention and prevention.

II. DATA AND METHODOLOGY

A. DATA DESCRIPTION

I utilize data collected by the Defense Manpower Data Center (DMDC) and the Armed Forces Medical Examiner System (AFMES). Data from DMDC are Navy service member demographics and career-related information. Data from AFMES specifically capture the year of death and suicide outcome of Navy service members who have died while on active duty. DMDC and AFMES data are compiled separately then linked using an Electronic Data Interchange Personal Identifier Number (EDIPIN). The original DMDC dataset comprises quarterly snapshots of all active duty Navy enlistees and officers between the fourth quarter of calendar year (CY) 1997 and the fourth quarter of CY2012.[2] Featuring 21,468,856 total observations, the original DMDC dataset contains 1,010,113 individual records. The original AFMES dataset consists of all active duty Navy deaths between the first quarter of CY2002 and the fourth quarter of CY2012. The original AFMES dataset contains 2,206 total observations, all of them individual records.

AFMES decedent data catalog the month and year of death of every Sailor who has died on active duty from CY2002 to CY2012. Over the course of the AFMES observation period, 2,206 active duty Sailors died and 449 of those fatalities were confirmed suicides (~20%). Tables 1 and 2 provide a more detailed illustration of general suicide statistics derived from the dataset.

For this analysis, I use four analytical files developed from the DMDC-AFMES linked dataset. Two files comprise enlisted personnel only, while the other two files comprise officers only. I separate enlistees and officers because these two groups are very different from each other in terms of size, professional lifestyles, and ability measurements (i.e., Armed Forces Qualification Test (AFQT) score). These files are built upon quarterly DMDC demographic information that has been merged with quarterly DMDC deployment data and quarterly AFMES decedent data. The first file of the

[2] Active duty Sailors include active component and reservists on active duty. The dataset does not differentiate between the two, resulting in possible, unavoidable biases in some variable estimations.

enlisted sample consists of panel data measuring demographic and service factors at a yearly level. The enlisted analytical file of panel data features 3,510,765 total observations representing 703,230 unique Sailors. The second file aggregates the yearly information so that each observation represents a unique Sailor. I create similar analytical samples for the officer analysis. The officer panel data features 618,035 total observations representing 98,594 unique Navy officers. Details about the analytical file construction can be found in Appendix A.

By utilizing a panel data sample and an aggregate sample I can obtain both yearly and overall trends and compare them to each other to achieve a more detailed analysis of suicide risk factors in the samples. The enlisted and officer panel data samples allow me to capture change in suicide susceptibility from year to year, although they may be prone to measurement errors. The enlisted and officer aggregated data samples provide better precision, but I am not able to capture changes in variable values from year to year. The panel and aggregate data help complement each other, yielding results from both a yearly and comprehensive perspective.

B. KEY VARIABLES

I focus on twelve key variables used as regressors in the logit regression models. Some of the categorical variables have been converted into indicators as part of the data aggregation process. Related literature and the characteristics of service members who completed a suicide suggest that several demographic and service-specific factors play varying roles in each instance of suicide. Choosing key variables based solely on existing literature and trends, however, may not adequately answer the primary research question. Limited studies have been conducted that investigate correlations between demographics and suicides. Even fewer studies have examined correlations between service-specific attributes and suicides (OPNAV N14, 2012). The variables selected reflect traits that have been associated with suicides in past research and traits that have received little to no analytical attention. Most of the under-analyzed variables chosen are service-specific in nature and are vital to addressing the primary research question. An explanatory list of key variables in their non-aggregated format (i.e., by CY quarter) is provided below.

1. Outcome Variable

The outcome of all regressions is whether a Sailor completed **suicide**. The **suicide** variable takes on a value of 1 if a Sailor commits suicide that resulted in death at any point during the applicable CY quarter and a value of 0 otherwise. It is important to note that this variable does not capture unconfirmed suicides or suicide attempts due to their questionable validity.

2. Gender

Gender takes on a value 1 if a Sailor is a male and 0 otherwise. Nationally and within the military, more males commit suicide than females (Hourani, Warrack & Coben, 1997). Armed Forces Health Surveillance Center (AFHSC) figures indicate over 95% of military suicides from 1998 to 2011 were completed by men (Armed Forces Health Surveillance Center, June 2012). This is not surprising, since the vast majority of service members are male. I hypothesize my results will reflect similar statistics—the observation periods are almost identical—and positive correlation between males and suicide.

3. Age

The **age** variable denotes how old a Sailor was on the last day of each CY quarter. In the regression, I group enlistees into the following age groups: 17–19, 20–24, 25–29, 30–34, and 35+; I group officers into the following age groups: 20–29, 30–34, 35–39, 40–44, and 45+. Ramchand et al. remark that suicide rates and age are positively correlated on a national scale; however, AFHSC's Medical Surveillance Monthly Report reveals a peak in suicide events among service members in the 20–24 age bracket followed by a sharp-to-gradual decline in each subsequent (older) bracket (Ramchand et al., 2011; Armed Forces Health Surveillance Center, June 2012). Roughly 50% of all active duty military personnel are 25 and younger, so suicidal instances tend to be far more pronounced with younger active duty military members (U.S. Department of Defense, 2010). I hypothesize my results will most likely corroborate previously observed relationships between age and suicide.

4. Race/Ethnicity

Sailors' racial and ethnic backgrounds are signified by **black**, **white**, **other minority**, **Hispanic**, **unknown race**, and **unknown ethnicity** indicator variables. **white** serves as the reference race (i.e., the omitted group). **non-Hispanic** is the baseline ethnicity, so it will not be used in regressions either. Unknown races and ethnicities are grouped in the **unknown race** and **other ethnicity** categories for simplicity purposes. As with males and youth, whites/Caucasians constitute the bulk of active duty U.S. military personnel. Coupled with the greater propensity for non-Hispanic whites to end their own lives than non-Hispanic blacks, suicide occurrences in the armed forces are also more pronounced with white service members (National Center for Injury Prevention and Control, 2010). I expect data analysis to yield comparable results.

5. Marital Status

Marital status is symbolized by **married**, **never married**, and **divorced/separated/widowed** indicator variables. **Divorced/separated/widowed** includes legally separated persons, those who have entered into an interlocutory decree, annulled marriages, and widowed Sailors. Sailors who have never married become the baseline marital classification so **never married** will not be used in regressions. Unknown marital statuses are clustered with the **never married** baseline under the assumption that service members who marry report this information to the Defense Enrollment Eligibility Reporting System (DEERS) as they are required to. Each Sailor's marital snapshot is taken on the last day of the applicable CY quarter, and this status may change from one quarter to the next.

Over half the observed suicides in a study conducted by the *Journal of the American Medical Association (JAMA)* in 2013 were by married personnel (n=83), although this may include suicides completed after separating from the military (LeardMann et al., 2013). From 1998 to 2011, slightly less than half of active component military suicides were completed by married persons (n=2,652), but the suicide count of never-married persons was nearly equal. Suicides by divorced, separated, or widowed service members accounted for only about 5% of all active component suicides,

suggesting marriage introduces extra stressors (Armed Forces Health Surveillance Center, June 2012). I postulate data analysis will back up these figures and may provide further insights when applied to other demographic and Navy-specific characteristics.

6. Number of Dependents

The number of dependents a Sailor had on the last day of each CY quarter is signified by **dependents**. The current literature does not appear to measure any direct effects of dependent count on suicide. By itself, dependent count most likely does not affect suicide very significantly; when included in regressions with other factors, I expect any effects on suicide to be more pronounced. Dependent information enters the regression model as four categorical variables: 0 dependents (reference group), 1, 2, 3, and 4+ dependents.

7. Rate/Rank

Each Navy rate (enlisted) and rank (officer) is designated by an indicator variable, with every rate and rank represented in the master file. The rank/rate variable expresses the paygrade of a Sailor on the last day of each CY quarter. All rates and ranks are grouped into categorical indicators based upon seniority for regressions. Rate/rank categories are: **enlisted apprentice** (E1–E4), **enlisted journeyman** (E5–E6), **enlisted supervisor** (E7–E9), **warrant officer** (WO2–WO5), **junior officer** (O1–O3), **senior officer** (O4–O6), and **flag officer** (O7–O10). **Enlisted apprentice** and **junior officer** become the categorical baselines, so they will be omitted in the regressions. From 1999–2007, the enlisted Sailor suicide rate was higher than the naval officer suicide rate (7.1 officer suicides per year per 100,000 people vs. 11.3 enlisted suicides). DONSIR also finds no significant differences in suicide rates between enlisted paygrades for this time period; however, 66% of all enlisted suicides were completed by E4-E6 personnel. DONSIR provides no officer rank breakdowns (Hilton et al., 2009).

Results may not be consistent with DONSIR's findings because of the large increase in Sailor deployments to combat zones beginning in 2007, which may have introduced extra and unique stressors to Navy service members. Since Navy E3 and below are generally prohibited from combat zone deployments, suicide statistics could be

biased toward senior enlisted personnel, assuming there is a correlation between combat zone deployments and suicide (Chief of Naval Personnel, 2010). Data analysis will include both enlisted and officer paygrade suicide statistics; however, separate regressions will be performed for officer and enlisted personnel due to notable differences between the two groups.

8. Enlisted Rating/Occupational Specialty and Officer Designator

The Navy boasts numerous enlisted ratings and officer designators—too many to apply an indicator variable to each one. Instead, I assign related ratings and designators to more general job categories. Basic enlisted ratings are **air**, **operations**, **construction**, **supply**, **intelligence**, **engineering**, **weapons**, **medical**, **administration**, and **other rate**. **administration** becomes the baseline, and it will not be used in regressions. Basic officer designators are **surface/ship**, **submarine**, **administration**, **engineering**, **aviation**, **intelligence**, **medical**, **supply**, and **other designation**. **administration** becomes the baseline—it will not be used in regressions. Each Sailor's rating or designator is captured on the last day of the applicable CY quarter and may change from one quarter to the next.

Linking individualized occupational specialties to suicide is problematic because of the rarity of incidents within specific ratings/designators and the subjectivity of categorical classifications in any particular study. Still, there are trends. From 2001–2009, nearly all enlisted ratings had three or less yearly suicides. Electronics Technicians (ETs), Storekeepers (including Logistics Specialists (LSs) and Postal Clerks (PCs)), Machinist Mates (MMs), and unrated seamen exhibited consistently higher suicides during this time (Berman et al., 2010). LeardMann's study corroborates this with higher suicides in the mechanical/electrical repair and functional support/service/supply rating groups in 2001, 2004, and 2007 (N=83) (LeardMann et al., 2013). Submarine Warfare Officer Under Instruction was the only officer designator to exhibit more than one yearly suicide over the entire nine-year period, and most designators had no suicides at all (Berman et al., 2010). Since enlisted Sailors outnumber officers 7.1 to 1 in the dataset, crude suicide totals are most likely more prominent with enlisted personnel.

I hypothesize my analysis results will not reflect DOD TF Suicide's findings because enlisted ratings and officer designators will be consistently categorized instead of selectively categorized. Data analysis may only partially support LeardMann's research. LeardMann et al. studies all branches of the military and includes former military service members. Less than 11 of the 83 observed suicides in her report belong to the Navy (this number is shared with the Coast Guard), weighting suicide data toward the much higher suicide instances in the Army and Air Force during the observation period (2001–2009). For prior Sailors, any unobservable factors of civilian life may collude with service-specific factors, biasing service-specific characteristics upward or downward depending on the exact situation. Separate regressions will be performed for officer and enlisted personnel due to notable differences between the two groups. Overall, I do not expect any significant correlation between enlisting ratings, officer designators, and suicide.

9. Primary Warfare Platform

I break down the Navy's warfare platforms into fundamental groupings via indicator variables. These variables describe the type of warfare platform a Sailor was assigned to on the last day of the applicable CY quarter, and platform assignments may change from one quarter to the next. Primary warfare platforms are **shore**, **air**, **amphibious ships**, **destroyers**, **minesweepers**, **submarines**, **aircraft carriers**, **cruisers**, **frigates**, **undefined at-sea platforms**, and **unknown platforms**. "Shore" platforms are duty stations other than aircraft, ships, and submarines; they include overseas locations and shore deployments. Thus, **shore** becomes the baseline, so it will be omitted from the regressions. Platform designators are derived from the Sailor's unit identification code (UIC). UICs of decommissioned units could not be obtained, so these UICs are placed in the **unknown platforms** group. Since **unknown platforms** represent about 33% of all platforms, decommissioned units create some data limitations.

Hilton et al. explore associations between command type and suicides from 1999 to 2007. They determine most suicides occurred in ship commands (27%) and shore commands (33%) (Hilton et al., 2009). Hilton et al. do not, however, examine suicide instances based on specific ship platforms. Analyzing suicides by ship types will offer

more robust results, especially since more suicides occur on ships than on any other operational platform. I expect data analysis to reveal connections between smaller ships (destroyers, cruisers, frigates, and minesweepers) and instances of suicide. Crewmembers on smaller ships tend to experience higher operational tempo because they deploy to sea more often; additionally, the lower crew size results in many Sailors taking on higher numbers of collateral duties on top of their normal job responsibilities. The operational environment onboard smaller ships presents a higher possibility of stressful experiences than being assigned to larger warships.

10. Combat Zone Deployment

The **combat zone** indicator variable identifies any Sailor who has deployed to a combat zone at any point during the applicable CY quarter. Combat zones captured in the dataset are the Persian Gulf, Red Sea, Gulf of Oman, Arabian Sea, Gulf of Aden, Iraq, Kuwait, Saudi Arabia, Oman, Bahrain, Qatar, the United Arab Emirates, Kosovo, and Afghanistan (Executive Order No. 12,744, 1991; Executive Order No. 13,119, 1999; Executive Order No. 13,239, 2001). About half of active duty Sailors have not had a combat zone deployment, and nearly every Sailor who deploys to a combat zone does so as an individual augmentee (IA). Navy IA deployments are considered non-traditional deployments. They can introduce unique stressors that are not normally experienced during afloat deployments such as imminent danger, combat exposure, inter-service conflicts, demanding training and unit certification cycles, and skillset mismatches.

Task Force (TF) Resilient's Final Report on suicides in the Navy concludes that IA assignments "do not appear to increase the risk of suicide…" (Task Force Resilient, 2013, p. 35). TF Resilient's conclusion is partially based on a CNA[3] report that finds a lower likelihood of self-inflicted death in Sailors who were shore-deployed during Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and Operation New Dawn (OND) versus Sailors who were not shore-deployed during these operations (Task Force Resilient, 2013; Lien, 2010). There are no indications that these OIF/OEF/OND

[3] Per CNA's website: "CNA is not an acronym and should not carry a parenthetical descriptor" (CNA, 2014).

shore deployments were divided into combat zone and non-combat zone locations, which may dilute any distinct associations between combat zone deployments and suicide. LeardMann et al. distinguish between combat and non-combat deployments, and crude suicide deaths are higher for those who were in combat zones (19 deaths against 13), although combat experience is not connected to greater suicide risk. Despite this, the report is naturally weighted toward the Army and Air Force due to a much higher number of personnel in those branches within the sample size (LeardMann et al., 2013). I predict a stronger relationship between Navy combat zone deployments and instances of suicide for the above operations—relationships that would not be apparent by grouping all shore deployments and all military services together.

11. AFQT Score

AFQT score is a proxy for an enlisted Sailor's ability and remains constant throughout an enlistee's career. I categorize AFQT scores into the following groups: category IV/V (score 1–30), category IIIB (score 31–49), category IIIA (score 50–64), category II (score 65–92), and category I (score 93–99). Since officers have no AFQT scores, this variable will not be used in regressions using the officer analytical files. The current literature does not appear to measure any direct effects of ability on suicide. I hypothesize AFQT score will have little effect on suicide susceptibility, but it may reveal unexpected associations with suicide so will be included in regressions using the enlisted analytical files.

12. Accession Waivers

Accession waiver indicator variables denote any waivers a Sailor needed in order to be eligible to join the Navy. I categorize waiver variables as **minor offense**, **serious offense**, **felony**, **drug**, **other**, and **none**. People without waivers serve as the reference group in the regression. **Minor offense**, **major offense**, **felony**, and **drug** accession waivers will be collectively termed "moral waivers." Other waivers mostly include age waivers, education waivers, and administrative waivers. Minor and serious offenses include traffic infractions. Accession waiver data remain constant throughout a Sailor's career. The maximum number of waivers in the dataset for any one Sailor is three. Since

the only officers with waivers who committed suicide were those with other waivers (only 4 suicides), I will only include waiver variables in enlisted regressions. TF Resilient finds no links between moral waivers and suicide in the Navy, but several studies find psychological, mental, and behavioral disorders are connected to suicide (Task Force Resilient, 2013; LeardMann et al., 2013; Ramchand et al., 2011; Hilton et al., 2009). I expect a relationship exists to some extent between moral waivers and psychological, mental, and behavioral disorders. If there are strong connections, I predict Sailors with moral waivers will be more likley to commit suicide than Sailors with no moral waivers.

13. Year Cohorts

Each calendar year observed in the sample is represented by its own indicator variable. Including year indicator variables in the logit model regressions will account for unobservable incidental factors that occur in any particular calendar year such as national and international events (natural disasters, rising unemployment rates, governmental stressors, etc.) and unobservable life events (buying/selling a house, death/illness of a loved one, marital/family problems, etc.). Year cohorts will only be used for the officer and enlisted analytical files with yearly observations, as the other analytical files are aggregates of all yearly observations. CY02 becomes the baseline year so it will be omitted in regressions.

I aggregate the variables described above from a quarterly basis to the yearly level. Values for **age** and **dependents** change over time, so the last non-missing datum becomes the aggregate value because it is the most recent. **suicide**, **male**, race/ethnicity, marital status, rank, rate, enlisted rating, officer designator, primary warfare platform, and **combat zone** are also time-specific, but I use the maximum value of these variables in order to capture whether or not a Sailor was ever in any particular category over the applicable observation period. Appendix B summarizes and describes key regression variables in their non-aggregated format.

14. Additional Regressors to Capture Change in Status

In addition to the key variables described above, I add a few more indicator variables to capture nuances related to marital status and deployments that may affect a

Sailor's susceptibility to suicide. These variables denote whether a Sailor got married, divorced, separated, widowed, or combat-zone deployed in a particular calendar year. They are not the same as the general marital status or deployment categories. Instead, these variables describe the *change* in a Sailor's marital and/or combat deployment status in a calendar year. Lastly, I generate two variables that track a Sailor at the one-year and two-year mark following a deployment. These extra marital status and deployment variables will only be included in analytical files of yearly observations because they become irrelevant when all data have been aggregated into one observation per Sailor. The additional indicator variables are described in Appendix B.

C. DESCRIPTIVE STATISTICS

1. Summary Statistics of Suicide

I first discuss general suicide statistics in Table 1 and Table 2.

Table 1. Yearly Suicide Statistics of the Dataset, CY2002–CY2012

Year	Number of Active Duty Suicides in the Sample	Number of Active Duty Suicides Reported by the U.S. Navy*	Percentage of Total Suicides in the Sample	Sample Size**	Crude Suicide Rate (per 100,000 persons)***
CY2002	38	45	8%	411,127	9.2
CY2003	42	46	9%	411,595	10.2
CY2004	37	42	8%	406,355	9.1
CY2005	37	40	8%	392,380	9.4
CY2006	33	45	7%	381,183	8.7
CY2007	39	43	9%	366,548	10.6
CY2008	36	40	8%	359,438	10.0
CY2009	44	48	10%	356,280	12.3
CY2010	33	40	7%	350,559	9.4
CY2011	50	52	11%	349,819	14.3
CY2012	60	61	13%	347,546	17.3
Total	449	502	~100%	791,021****	56.8

*Includes all active duty personnel (active component and reservists on active duty). Retrieved from Navy Personnel Command Statistics: http://www.public.navy.mil/BUPERS-NPC/SUPPORT/21ST_CENTURY_SAILOR/SUICIDE_PREVENTION/Pages/Statistics.aspx
**Includes all active duty personnel in the sample (active component and reservists on active duty)
***Computed based on total personnel in the sample for applicable year
****Number of unique Sailors in the entire sample (individual records)

Until 2011, active duty suicides reported by the U.S. Navy averaged around 45 per year. Official totals rose above 50 in 2011—rising even above 60 in 2012—before returning to pre-2011 averages in 2013 (46 suicides). From 2002 to 2012, there were 502 officially reported and confirmed active duty Navy suicides, including activated reservists. The dataset does not capture all of these suicides, presenting an unavoidable data limitation. Dataset totals, however, never exceed official totals, and the 2011–2012 spike is reflected in the data. Overall, sample statistics resemble Navy population statistics. The sample suicide rate escalates from 9.4 per 100,000 in 2010 to 17.3 in 2012, nearing the average comparable rate of about 19 per 100,000 in the U.S. population (the Navy population suicide rate moved from 12.2 to 19.2 in the same timeframe) (Navy Personnel Command, 2014). Table 2 illustrates the distribution of demographic and service-specific characteristics among the suicide sample.

Table 2. Suicide Statistics by Demographic and Service-Specific Characteristics

Characteristic	Number of Suicides (n=440)*	Percentage of Total Suicides
Male	421	96%
Female	19	4%
Age 17-19	24	5%
Age 20-24	145	33%
Age 25-29	111	25%
Age 30-34	68	15%
Age 35-39	56	13%
Age 40-44	23	5%
Age 45-49	7	2%
Age 50-54	3	1%
Age 55-59	1	0%
White	323	73%
Black	56	13%
Other Minority	52	12%
Other Race	16	4%

*9 suicides had missing demographic and/or service-specific information

Table 2 (cont'd.). Suicide Statistics by Demographic and Service-Specific Characteristics

Characteristic	Number of Suicides (n=440)*	Percentage of Total Suicides
Hispanic	48	11%
non-Hispanic	357	81%
Married	212	48%
Never Married	205	47%
Divorced/Separated/Widowed	22	5%
No Dependents	225	51%
1 Dependent	69	16%
2 Dependents	62	14%
3 Dependents	44	10%
4 Dependents	29	7%
5+ Dependents	11	3%
Enlisted Apprentice (E1-E4)	184	42%
Enlisted Journeyman (E5-E6)	182	41%
Enlisted Supervisor (E7-E9)	33	8%
Junior Officer (O1-O3)	23	5%
Senior Officer (O4-O6)	15	3%
Flag Officer (O7-O10)	0	0%
Warrant Officer	3	1%
Shore Facilities	93	21%
Air Platforms	54	12%
Amphibious Platforms	28	6%
Other Sea Platforms	7	2%
Destroyer Platforms	21	5%
Submarine Platforms	11	3%
Aircraft Carrier Platforms	36	8%
Cruiser Platforms	10	2%
Frigate Platforms	5	1%
Minesweeper Platforms	0	0%
Surface/Ship Designators	5	1%
Submarine Designators	5	1%
Special Warfare Designators	1	0%
Administrative Designators	2	0%
Engineering Designators	1	0%
Aviation Designators	10	2%
Intelligence Designators	3	1%
Medical Designators	7	2%
Supply Designators	1	0%

*9 suicides had missing demographic and/or service-specific information

Table 2 (cont'd.). Suicide Statistics by Demographic and Service-Specific Characteristics

Characteristic	Number of Suicides (n=440)*	Percentage of Total Suicides
Air Ratings	98	22%
Operations Ratings	34	8%
Construction Ratings	7	2%
Supply Ratings	29	7%
Intelligence Ratings	47	11%
Engineering Ratings	79	18%
Weapons Ratings	35	8%
Medical Ratings	35	8%
Administrative Ratings	12	3%
Undesignated Ratings	23	5%
Combat Zone	58	13%

*9 suicides had missing demographic and/or service-specific information

Crude suicide percentages imitate demographic trends and are largely consistent with existing literature. In the sample, most suicides are completed by males, younger service members, enlisted service members, and Caucasians. Married and never married persons represent nearly equal halves of all completed suicides. More suicides occur in shore facilities and air platforms, also in line with current research. Consistent with recent research, Sailors deployed to a combat zone constitute only 13% of all suicides. Regression analysis, however, may still reveal a high association. Supply rating percentages are contradictory to the literature, which finds high suicide rates with Storekeepers and functional support/service/supply rating groups (Department of Defense Task Force on the Prevention of Suicide by Members of the Armed Forces, 2010; LeardMann et al., 2013). Part of the mismatch may be a result of the subjectivity and inconsistency inherent in categorical groupings, but regression analysis may reveal a high association with suicide nonetheless. As expected, most of the officer designators exhibited very few suicides; some designators have no suicides at all. Finally, minesweepers and flag officers boast 0% suicides in the dataset. The flag officer percentages support common findings. The warfare platform percentages mark new ground in existing research because prior studies have not separated platforms into major ship types. Warfare platform percentages also appear to disprove my hypothesis that

smaller ships will display higher instances of suicide. Regression analysis may provide results that are different from crude percentages, as percentages alone do not necessarily signify substantial associative relationships.

2. Summary Statistics of the Dataset

I use four analytical files for regressions, so I have four separate sets of descriptive statistics. The analytical files of yearly observations will capture year-to-year associations to suicide in the sample. The analytical files of one observation per Sailor will capture associations to suicide in the sample throughout the entire observation period (CY2002-CY2012). In this way, I obtain both yearly and overall trends and can compare them to each other to achieve a fuller-bodied analysis of suicide risk factors in the samples. The descriptive statistics tables show the total number of observations, the mean value and one standard deviation from that value. Table 3 and Table 4 contain descriptive statistics for all four analytical files. Table 3 lists variable statistics for the enlisted yearly dataset and enlisted aggregated dataset.

Table 3. Descriptive Statistics: Enlisted Analytical Files

	Yearly Dataset		Aggregated Dataset	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
suicide (in 100,000)	11	(1066)	57	(2381)
male	84.73%	(35.97%)	83.10%	(37.47%)
female	15.25%	(35.95%)	16.84%	(37.43%)
17-19 years old	9.16%	(28.85%)	7.24%	(25.91%)
20-24 years old	36.99%	(48.28%)	38.18%	(48.58%)
25-29 years old	22.10%	(41.49%)	23.53%	(42.42%)
30-34 years old	13.30%	(33.95%)	10.56%	(30.73%)
35-39 years old	11.12%	(31.44%)	10.00%	(30.00%)
40+ years old	7.33%	(26.06%)	10.50%	(30.66%)
white	62.11%	(48.51%)	62.71%	(48.36%)
black	20.68%	(40.50%)	20.07%	(40.05%)
other minority	13.71%	(34.39%)	15.92%	(36.59%)
unknown race	4.11%	(19.85%)	7.71%	(26.67%)
Hispanic	13.61%	(34.29%)	14.97%	(35.68%)
non-Hispanic	75.69%	(42.90%)	77.97%	(41.45%)
unknown ethnicity	16.67%	(37.27%)	38.46%	(48.65%)

Table 3 (cont'd). Descriptive Statistics: Enlisted Analytical Files

	Yearly Dataset		Aggregated Dataset	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
never married	38.44%	(48.64%)	59.75%	(49.04%)
married	51.33%	(49.98%)	53.21%	(49.90%)
divorced/separated/ widowed	20.99%	(40.72%)	33.31%	(47.13%)
got married	5.22%	(22.24%)		
got divorced/ separated/widowed	1.58%	(12.48%)		
0 dependents	48.81%	(49.99%)	47.13%	(49.92%)
1 dependent	18.47%	(38.80%)	19.49%	(39.62%)
2 dependents	12.88%	(33.50%)	12.49%	(33.06%)
3 dependents	11.68%	(32.12%)	11.59%	(32.01%)
4+ dependents	8.16%	(27.38%)	9.29%	(29.04%)
CY2002	10.05%	(30.07%)		
CY2003	10.06%	(30.07%)		
CY2004	9.91%	(29.88%)		
CY2005	9.56%	(29.40%)		
CY2006	9.26%	(28.99%)		
CY2007	8.86%	(28.42%)		
CY2008	8.67%	(28.14%)		
CY2009	8.58%	(28.00%)		
CY2010	8.40%	(27.74%)		
CY2011	8.36%	(27.69%)		
CY2012	8.28%	(27.56%)		
AFQT CAT IV/V (1-30)	1.36%	(11.58%)	1.28%	(11.24%)
AFQT CAT IIIB (31-49)	27.81%	(44.81%)	26.19%	(43.97%)
AFQT CAT IIIA (50-64)	24.08%	(42.76%)	25.13%	(43.38%)
AFQT CAT II (65-92)	36.27%	(48.08%)	37.13%	(48.31%)
AFQT CAT I (93-99)	5.80%	(23.37%)	6.20%	(24.11%)
E1-E4	53.01%	(49.91%)	77.38%	(41.84%)
E5-E6	42.28%	(49.40%)	45.21%	(49.77%)
E7-E9	11.06%	(31.36%)	11.04%	(31.34%)
shore facility	26.08%	(43.91%)	38.24%	(48.60%)
air platform	10.80%	(31.04%)	14.55%	(35.26%)
amphibious ship	6.45%	(24.56%)	10.91%	(31.17%)
other sea platform	2.12%	(14.41%)	3.88%	(19.31%)
destroyer	5.44%	(22.69%)	8.84%	(28.39%)
submarine	2.72%	(16.25%)	3.79%	(19.10%)
aircraft carrier	11.57%	(31.98%)	18.18%	(38.57%)
cruiser	2.75%	(16.35%)	4.59%	(20.92%)
frigate	1.69%	(12.90%)	2.89%	(16.74%)

Table 3 (cont'd). Descriptive Statistics: Enlisted Analytical Files

	Yearly Dataset		Aggregated Dataset	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
minesweeper	0.19%	(4.36%)	0.41%	(6.38%)
unknown platform	50.18%	(50.00%)	88.20%	(32.26%)
air rating	24.12%	(42.78%)	25.95%	(43.83%)
operations rating	8.70%	(28.19%)	9.39%	(29.17%)
construction rating	2.14%	(14.47%)	2.17%	(14.56%)
other rating	2.46%	(15.49%)	2.53%	(15.71%)
supply rating	6.83%	(25.22%)	7.30%	(26.01%)
intelligence rating	13.52%	(34.19%)	13.77%	(34.45%)
engineering rating	16.11%	(36.77%)	18.22%	(38.60%)
weapons rating	7.97%	(27.09%)	8.08%	(27.25%)
medical rating	8.74%	(28.24%)	9.00%	(28.62%)
administrative rating	4.59%	(20.93%)	4.57%	(20.87%)
undesignated rating	9.50%	(29.32%)	33.19%	(47.09%)
unknown rating	0.98%	(9.85%)	2.89%	(16.75%)
combat-zone deployed	19.74%	(39.81%)	48.01%	(49.96%)
one year post-deployed	10.28%	(30.37%)		
two years post-deployed	10.00%	(30.00%)		
got combat-zone deployed	12.46%	(33.03%)		
no accession waiver	82.23%	(38.22%)	83.36%	(37.24%)
other accession waiver	12.14%	(32.66%)	11.50%	(31.91%)
minor offense waiver	0.57%	(7.55%)	0.61%	(7.76%)
major offense waiver	4.46%	(20.64%)	3.87%	(19.29%)
drug waiver	0.53%	(7.28%)	0.58%	(7.58%)
felony waiver	0.14%	(3.79%)	0.14%	(3.68%)
Total Observations	3510765		703230	

Suicide in the enlisted analytical file of yearly observations reflects the rarity of suicide in the Navy active duty population. On average, about 11 out of every 100,000 sailors (about 1/100th of a percent of the sample) committed suicide annually. Since the enlisted analytical file of yearly observations includes up to eleven observations per Sailor, the average number of suicides in column 2 is smaller than the average number of suicides in column 4. The sample is representative of the Navy overall: 83% males, most personnel in their early twenties, 62% white, and about 50% ever married. Over half of the sample is ever E6 and below. Shore facilities and aircraft carriers represent the largest conglomeration of platforms enlisted personnel are ever assigned to in the sample, while aviation and engineering ratings are the most common

ratings enlistees ever worked under in the sample.[4] About half of the sample is ever combat deployed. About 6% percent of the sample joined the Navy with an identifiable moral waiver (minor offense/major offense/drug/felony).

Table 4 lists variable statistics for the officer yearly dataset and officer aggregated dataset.

Table 4. Descriptive Statistics: Officer Analytical Files

	Yearly Dataset		Aggregated Dataset	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
suicide (in 100,000)	7	(814)	42	(2039)
male	84.62%	(36.07%)	82.78%	(37.76%)
female	15.39%	(36.08%)	17.30%	(37.82%)
20-29 years old	30.38%	(45.99%)	27.45%	(44.63%)
30-34 years old	19.84%	(39.88%)	19.36%	(39.51%)
35-39 years old	18.83%	(39.10%)	13.89%	(34.58%)
40-44 years old	16.42%	(37.04%)	17.69%	(38.16%)
45+ years old	14.53%	(35.24%)	21.61%	(41.16%)
white	82.60%	(37.92%)	83.25%	(37.34%)
black	8.01%	(27.14%)	8.13%	(27.33%)
other minority	5.45%	(22.69%)	6.70%	(25.00%)
unknown race	4.50%	(20.74%)	7.78%	(26.78%)
Hispanic	5.70%	(23.18%)	6.18%	(24.08%)
non-Hispanic	90.89%	(28.78%)	90.16%	(29.78%)
unknown ethnicity	4.15%	(19.94%)	8.54%	(27.95%)
married	69.33%	(46.11%)	73.27%	(44.25%)
never married	22.16%	(41.53%)	37.30%	(48.36%)
divorced/separated/ widowed	16.90%	(37.48%)	33.20%	(47.10%)
got married	3.79%	(19.10%)		
got divorced/separated/ widowed	1.28%	(11.23%)		

[4] When referring to any time-variant variable in the four collapsed analytical files, the correct interpretation is ***a Sailor ever is or never is*** in a particular category throughout the observation period, rather than a Sailor is currently in one specific category.

Table 4 (cont'd.). Descriptive Statistics: Officer Analytical Files

	Yearly Dataset		Aggregated Dataset	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
0 dependents	28.95%	(45.35%)	24.28%	(42.87%)
1 dependent	20.15%	(40.11%)	18.34%	(38.70%)
2 dependents	14.94%	(35.65%)	14.16%	(34.87%)
3 dependents	21.06%	(40.77%)	23.29%	(42.27%)
4+ dependents	14.91%	(35.62%)	19.93%	(39.95%)
CY2002	9.36%	(29.13%)		
CY2003	9.42%	(29.21%)		
CY2004	9.42%	(29.21%)		
CY2005	9.16%	(28.85%)		
CY2006	8.97%	(28.58%)		
CY2007	8.86%	(28.42%)		
CY2008	8.83%	(28.38%)		
CY2009	8.88%	(28.45%)		
CY2010	8.94%	(28.53%)		
CY2011	9.05%	(28.69%)		
CY2012	9.10%	(28.76%)		
O1-O3	59.81%	(49.03%)	74.51%	(43.58%)
O4-O6	39.63%	(48.91%)	43.55%	(49.58%)
O7-O10	0.46%	(6.74%)	0.61%	(7.81%)
warrant officer	3.19%	(17.57%)	3.76%	(19.02%)
prior enlisted	8.91%	(28.50%)	11.28%	(31.64%)
shore facility	39.00%	(48.77%)	67.41%	(46.87%)
air platform	11.96%	(32.45%)	18.43%	(38.77%)
amphibious ship	3.53%	(18.45%)	8.46%	(27.83%)
other sea platform	2.78%	(16.45%)	6.97%	(25.46%)
destroyer	4.31%	(20.31%)	9.82%	(29.76%)
submarine	2.19%	(14.65%)	4.26%	(20.19%)
aircraft carrier	4.35%	(20.41%)	10.14%	(30.19%)
cruiser	1.88%	(13.57%)	4.64%	(21.03%)
frigate	1.42%	(11.84%)	3.61%	(18.66%)
minesweeper	0.27%	(5.17%)	0.82%	(9.00%)
unknown platform	52.18%	(49.95%)	84.32%	(36.36%)
other designator	7.07%	(25.63%)	8.36%	(27.68%)
surface/ship designator	18.86%	(39.12%)	21.70%	(41.22%)
submarine designator	8.73%	(28.23%)	9.54%	(29.38%)
special warfare designator	2.11%	(14.38%)	2.26%	(14.86%)
administrative designator	6.83%	(25.23%)	7.64%	(26.56%)
engineering designator	2.95%	(16.91%)	2.99%	(17.04%)

Table 4 (cont'd.). Descriptive Statistics: Officer Analytical Files

	Yearly Dataset		Aggregated Dataset	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
aviation designator	25.60%	(43.64%)	25.57%	(43.63%)
intelligence designator	3.27%	(17.78%)	5.46%	(22.71%)
medical designator	20.11%	(40.08%)	21.05%	(40.77%)
supply designator	4.99%	(21.78%)	4.92%	(21.63%)
unknown designator	0.06%	(2.37%)	0.35%	(5.89%)
combat-zone deployed	15.78%	(36.45%)	46.75%	(49.89%)
one year post-deployed	9.12%	(28.78%)		
two years post-deployed	10.13%	(30.17%)		
got combat-zone deployed	9.99%	(29.98%)		
no accession waiver	95.87%	(19.89%)	96.08%	(19.41%)
other accession waiver	2.88%	(16.72%)	2.74%	(16.32%)
minor offense waiver	0.07%	(2.65%)	0.07%	(2.61%)
major offense waiver	1.14%	(10.60%)	1.05%	(10.21%)
drug waiver	0.02%	(1.46%)	0.03%	(1.86%)
felony waiver	0.03%	(1.58%)	0.03%	(1.77%)
Total Observations	618035		98594	

Suicide in the officer analytical file of yearly observations also indicates the rarity of suicide in the Navy active duty population. Approximately 7 out of every 100,000 Navy officers in the sample committed suicide on yearly basis. Similar to the enlisted file, the suicide rate in column 2 represents the yearly rate while the suicide rate in column 4 represents the overall rate. Officer gender statistics are nearly identical to enlistees at 83% males. Most officers are in their twenties, 83% is white, and about 73% is ever married. About 11% of the officer sample is prior-enlisted. Shore facilities and aviation platforms represent the most common platforms officers are ever assigned to in the sample, and the majority of officers are ever under a surface, aviation, or medical designator. Like the enlisted sample of yearly observations, about 85% of the officer sample is ever assigned to an unknown warfare platform. Unknown platforms represent decommissioned units that are no longer included in the Standard Naval Distribution List (SNDL). This creates some data limitations as discussed in the primary warfare platform variable description. At 47% of the sample, more officers are ever combat deployed than enlisted. Fewer officers enter the naval service with moral waivers than enlisted: less than 2% officers versus 5% enlisted.

D. APPROACH

Since the outcome of interest is a binary indicator, I use non-linear models. Because suicide is a rare event, it is easier to interpret the results in terms of odds ratios; hence I chose logit regressions for the analysis. Using logit regression models, I estimate the odds ratios of a Navy active duty service member committing suicide given certain demographic and service-specific characteristics. The results of the logit regressions will provide clues as to what service-specific factors are associated with the occurrence of active duty Navy suicides.

I estimate several logit models for each of the four analytical samples. All models adhere to the following general specifications:

$$Prob(y_i = 1 | x_{ik}) = F(\beta_0 + \beta_k x_{ik} + \varepsilon_i)$$

where the probability that the dependent variable y (suicide) for Sailor i is 1 given all independent x variables is equal to the log function of a linear regression model. β_0 is the intercept parameter, β_k represents the log of odds for each corresponding independent x variable at variable number k, x_{ik} represents each demographic, service-specific, and time independent variable for Sailor i at variable number k, and ε_i is the error term for Sailor i. The odds ratio for each independent x variable is equal to the exponential function of each β_k $(e^{\beta k})$. The error term includes unmeasurable aspects from the dataset that can affect one's odds for committing suicide such as ability (particularly officer ability), qualities that make reservists on active duty different than active component service members (civilian employment, transition between military and civilian life, etc.), family history/background, other life events, and international events (natural disasters, rising unemployment rates, governmental stressors, etc.). Some international events are captured in the year indicator variables, but error will always be present because the dependent variable (**suicide**) can never be completely predicted or explained.

For the enlisted analysis, I estimate five models for both the yearly and the aggregated samples. Model 1 includes demographic characteristics only. In models 2–4, I gradually add service-specific variables to each subsequent model to observe how the odds ratios behave when additional sets of service-specific variables are controlled for in

the models. Lastly, I add moral waiver information to model 5. For the officer analysis, I estimate models 1–4 for each sample. As explained earlier, Model 5 is not estimated on the officer samples due to extremely small cell size.

The analysis using yearly observations will produce yearly trends for both enlistees and officers from CY2002 to CY2012. The analysis using aggregated information will yield overall trends for both enlistees and officers over the entire observation period. I expect odds ratios to exhibit greater magnitudes for the fully aggregated samples because the number of total suicides remains the same while the sample size decreases. For this same reason, some variables that were statistically insignificant in the yearly observation samples may become significant in the fully aggregated samples.

The four analytical files have data limitations that may introduce some bias into the estimation results. The dataset only captures 449 of the 502 officially reported active duty Navy suicides from CY2002-CY2012[5]; the dataset does not delineate between active component and reservists on active duty; 33% of primary warfare platforms are unknown due to unit decommissionings; and the dataset does not include an officer ability proxy (for enlisted it is AFQT score).

Lastly, I consider causation versus correlation (association). More specifically, do any particular independent variables cause active duty Navy suicides or are they merely correlated with suicide? Whether or not an independent variable is causing suicide or is correlated with suicide is mostly contingent upon how much omitted variables bias exists. Numerous factors—both observable and unobservable—contribute to a suicidal outcome (Berman et al., 2010). Observable and unobservable contributing factors to suicide are naturally and highly interdependent, making omitted variables bias an inherent part of any regression model measuring suicide. There are so many elements that influence each instance of suicide that including all (or even most) of them in a regression model is impossible. As a result, some variables that affect suicide and are correlated with dependent variables already in the model are deferred to the error term. Ultimately, I

[5] All individuals in the sample who committed suicide between CY2002 and CY2012, however, are captured.

cannot know if the logit models (or any models) I run show causation; therefore, only correlative relationships can be determined within the dataset samples.

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III. RESULTS

I report all logit regression outputs using odds ratios. An independent variable with an odds ratio less than 1 equates to a lower odds of committing suicide with respect to the baseline reference group for that given variable (for example, comparing male's odds of committing suicide to female's odds), holding all else constant. An odds ratio greater than 1 equates to a higher odds of committing suicide with respect to the baseline reference group, holding all else constant.

1. Enlisted Analysis

Table 5 presents the logit regression results for the enlisted analytical file of yearly observations.

Table 5. Logit Regression Results: Enlisted Analytical File, Yearly Observations

Variable	Demographics	Demographics, Service Factors (Ratings Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors	Demographics, All Service Factors, Accession Waivers
	suicide	suicide	suicide	suicide	suicide
female (ref group)	1	1	1	1	1
male	4.245***	4.303***	4.202***	4.276***	4.259***
	(1.089)	(1.106)	(1.082)	(1.102)	(1.098)
17-19 years old (ref group)	1	1	1	1	1
20-24 years old	1.446	1.588**	1.394	1.451	1.430
	(0.327)	(0.363)	(0.322)	(0.337)	(0.333)
25-29 years old	1.908***	2.004***	1.781**	1.814**	1.755**
	(0.466)	(0.510)	(0.458)	(0.469)	(0.455)
30-34 years old	2.040***	2.237***	1.997**	2.031**	1.933**
	(0.547)	(0.636)	(0.574)	(0.586)	(0.560)
35-39 years old	1.955**	2.243***	1.994**	2.012**	1.938**
	(0.556)	(0.692)	(0.622)	(0.630)	(0.608)
40+ years old	1.467	1.931*	1.704	1.708	1.665
	(0.469)	(0.680)	(0.606)	(0.609)	(0.594)
white (ref group)	1	1	1	1	1
black	0.613***	0.668**	0.663***	0.663***	0.669**
	(0.0923)	(0.105)	(0.105)	(0.105)	(0.106)
other minority	0.792	0.806	0.797	0.793	0.795
	(0.122)	(0.125)	(0.124)	(0.124)	(0.124)
unknown race	1.333	1.524*	1.494*	1.481	1.494*
	(0.321)	(0.369)	(0.362)	(0.359)	(0.362)
non-Hispanic (ref group)	1	1	1	1	1
Hispanic	0.721**	0.711**	0.712**	0.712**	0.712**
	(0.120)	(0.120)	(0.120)	(0.120)	(0.120)
unknown ethnicity	0.852	0.772	0.835	0.821	0.818
	(0.139)	(0.131)	(0.142)	(0.141)	(0.140)
never married (ref group)	1	1	1	1	1
married	0.676*	0.682*	0.680*	0.676*	0.676*
	(0.151)	(0.154)	(0.154)	(0.152)	(0.152)
divorced/separated/widowed	0.219***	0.226***	0.227***	0.226***	0.224***
	(0.0510)	(0.0525)	(0.0529)	(0.0526)	(0.0523)
got married	0.728	0.738	0.727	0.733	0.735
	(0.292)	(0.296)	(0.292)	(0.294)	(0.295)
got divorced/separated/ widowed	3.069**	3.100**	3.082**	3.071**	3.068**
	(1.544)	(1.560)	(1.551)	(1.546)	(1.544)

Table 5 (cont'd.). Logit Regression Results: Enlisted Analytical File, Yearly Observations

Variable	Demographics	Demographics, Service Factors (Ratings Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors	Demographics, All Service Factors, Accession Waivers
no dependents (ref group)	1	1	1	1	1
1 dependent	0.834	0.849	0.841	0.840	0.833
	(0.190)	(0.196)	(0.194)	(0.194)	(0.191)
2 dependents	0.862	0.928	0.922	0.918	0.898
	(0.220)	(0.239)	(0.238)	(0.236)	(0.231)
3 dependents	0.607*	0.656	0.652	0.649	0.631
	(0.172)	(0.188)	(0.187)	(0.186)	(0.180)
4+ dependents	0.768	0.867	0.860	0.856	0.831
	(0.225)	(0.257)	(0.256)	(0.254)	(0.246)
AFQT CAT IV/V (ref group)		1	1	1	1
AFQT CAT IIIB		0.951	0.952	0.963	0.934
		(0.496)	(0.497)	(0.503)	(0.488)
AFQT CAT IIIA		1.199	1.237	1.237	1.180
		(0.626)	(0.647)	(0.647)	(0.618)
AFQT CAT II		1.227	1.310	1.314	1.252
		(0.637)	(0.681)	(0.684)	(0.652)
AFQT CAT I		1.649	1.756	1.772	1.678
		(0.889)	(0.950)	(0.959)	(0.909)
E1-E4 (ref group)		1	1	1	1
E5-E6		0.934	0.902	0.912	0.915
		(0.130)	(0.127)	(0.129)	(0.130)
E7-E9		0.608**	0.592**	0.605**	0.625*
		(0.152)	(0.149)	(0.153)	(0.158)
administrative rating (ref group)			1	1	1
air rating			1.084	1.008	1.004
			(0.256)	(0.247)	(0.246)
operations rating			0.994	1.031	1.025
			(0.269)	(0.280)	(0.279)
construction rating			0.774	0.746	0.746
			(0.354)	(0.342)	(0.342)
other rating			1.074	1.071	1.065
			(0.389)	(0.389)	(0.387)
supply rating			1.367	1.397	1.393
			(0.382)	(0.390)	(0.389)
intelligence rating			0.791	0.803	0.798
			(0.202)	(0.205)	(0.204)
engineering rating			1.117	1.165	1.157
			(0.271)	(0.284)	(0.283)
weapons rating			1.070	1.072	1.064
			(0.285)	(0.288)	(0.286)
medical rating			1.132	1.098	1.091
			(0.304)	(0.297)	(0.296)
undesignated rating			0.610*	0.588**	0.586**
			(0.159)	(0.154)	(0.154)

Table 5 (cont'd.). Logit Regression Results: Enlisted Analytical File, Yearly Observations

Variable	Demographics	Demographics, Service Factors (Ratings Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors	Demographics, All Service Factors, Accession Waivers
unknown rating			1.020	1.037	1.045
			(0.615)	(0.626)	(0.630)
not combat-zone deployed (ref group)		1	1	1	1
combat-zone deployed		1.016	1.016	1.016	1.016
		(0.0212)	(0.0170)	(0.0195)	(0.0195)
got combat-zone deployed		0.363***	0.348***	0.359***	0.359***
		(0.0851)	(0.0807)	(0.0842)	(0.0841)
one year post-deployed		0.830	0.805	0.823	0.823
		(0.151)	(0.145)	(0.149)	(0.149)
two years post-deployed		0.890	0.880	0.880	0.881
		(0.161)	(0.159)	(0.159)	(0.159)
shore facility (ref group)		1		1	1
air platform		1.194		1.169	1.170
		(0.198)		(0.224)	(0.224)
amphibious ship		1.074		1.050	1.052
		(0.238)		(0.236)	(0.236)
other sea platforms		0.601		0.585	0.585
		(0.273)		(0.266)	(0.266)
destroyer		0.903		0.876	0.876
		(0.220)		(0.218)	(0.218)
submarine		0.665		0.624	0.622
		(0.219)		(0.209)	(0.208)
aircraft carrier		0.823		0.784	0.783
		(0.160)		(0.156)	(0.155)
cruiser		0.931		0.910	0.908
		(0.305)		(0.302)	(0.301)
frigate		0.678		0.676	0.675
		(0.309)		(0.310)	(0.309)
unknown platform		1.067		1.084	1.082
		(0.126)		(0.129)	(0.129)
no accession waiver (ref group)					1
other accession waiver					1.400**
					(0.192)
minor offense waiver					1.223
					(0.711)
major offense waiver					1.038
					(0.248)
drug waiver					0.438
					(0.439)
felony waiver					3.302*
					(2.346)

Table 5 (cont'd.). Logit Regression Results: Enlisted Analytical File, Yearly Observations

Variable	Demographics	Demographics, Service Factors (Ratings Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors	Demographics, All Service Factors, Accession Waivers
CY2002 (ref group)	1	1	1	1	1
CY2003	1.387	1.375	1.357	1.366	1.368
	(0.347)	(0.345)	(0.340)	(0.342)	(0.343)
CY2004	1.371	1.372	1.334	1.350	1.358
	(0.346)	(0.350)	(0.341)	(0.345)	(0.347)
CY2005	1.268	1.241	1.201	1.217	1.226
	(0.331)	(0.329)	(0.319)	(0.324)	(0.326)
CY2006	1.202	1.230	1.186	1.204	1.213
	(0.323)	(0.333)	(0.321)	(0.326)	(0.329)
CY2007	1.330	1.354	1.329	1.346	1.356
	(0.344)	(0.353)	(0.347)	(0.351)	(0.354)
CY2008	1.351	1.354	1.334	1.353	1.364
	(0.349)	(0.354)	(0.349)	(0.354)	(0.357)
CY2009	1.780**	1.757**	1.718**	1.748**	1.760**
	(0.438)	(0.441)	(0.431)	(0.440)	(0.443)
CY2010	1.241	1.201	1.172	1.196	1.202
	(0.331)	(0.326)	(0.319)	(0.326)	(0.328)
CY2011	1.783**	1.779**	1.766**	1.790**	1.800**
	(0.435)	(0.439)	(0.437)	(0.444)	(0.446)
CY2012	1.862***	1.683**	1.668**	1.699**	1.713**
	(0.447)	(0.413)	(0.410)	(0.418)	(0.422)
Observations	3,510,765	3,510,765	3,510,765	3,510,765	3,510,765

Variable coefficients are odds ratios. Standard errors in parentheses.
*** Significant at the 99% level; ** Significant at the 95% level; * Significant at the 90% level

The statistically significant logit results from the enlisted analytical file of yearly observations reveal several demographic trends reflected in past research. On average, controlling for demographics and service-specific characteristics, enlisted males are 4.3 times more likely to commit suicide than enlisted females; enlisted African-Americans are 33% less likely than enlisted Caucasians; enlisted Hispanics are 29% less likely than enlisted non-Hispanics; enlistees ever married are 32% less likely than enlistees never married; and enlistees ever divorced, separated, or widowed are 78% less likely to commit suicide than enlistees never married. The odds ratios for these variables change little across all models, and their statistical significance remains the same.

Results on age categories did not follow some of the previous research studying the overall military quite as closely. On average, controlling for demographics and

service-specific characteristics, those aged 25–29 are 1.76 times more likely to commit suicide than those aged 17–19, and those aged 30–34 and 35–39 are 1.93 times more likely to commit suicide than those aged 17–19. Past research shows the highest odds of suicide in the 20–24 age bracket followed by a gradual decline in susceptibility to suicide as age increases; however, the results here are specific to the Navy, and indicate the 20–24 age bracket odds ratios are statistically insignificant while showing an increased suicide susceptibility until the service member exits the 35–39 age bracket (Ramchand et al., 2011; Armed Forces Health Surveillance Center, June 2012). These results are actually not that different from the traditional age distribution of suicide (lower risk among teenagers and older adults); furthermore, the age bracket results coincide with the crude suicide numbers in the dataset (the 17–19 age group had the lowest number of suicides).

Despite the lower odds of committing suicide among enlistees ever divorced, separated, or widowed, enlistees who recently became divorced, separated, or widowed are about 3.1 times more likely to commit suicide than those never married. These results suggest negative stressors are more prevalent in Sailors just after a divorce, separation, or loss of a spouse, and that the stressors tend to dissipate over time.

Very few service-specific variables in the enlisted analytical file of yearly observations are statistically significant. On average, controlling for demographic and service-specific factors, enlisted supervisor ranks (E7-E9) are 38% less likely to commit suicide than enlisted apprentice ranks (E1-E4). These results differ from the 1999–2007 DONSIR report, which finds no significant differences in suicide risk between enlisted ranks (Hilton et al., 2009). Conditions and events that occurred between 2007 and 2012 may explain the differences in results, especially considering that CY2009, CY2011, and CY2012 exhibited higher statistically significant odds ratios for suicide than CY2002. Undesignated enlisted ratings are the only statistically significant rating variables. On average, controlling for demographics and service characteristics, enlistees ever in an undesignated rating are 41% less likely to commit suicide than enlistees ever in an administrative rating. This contrasts TF Suicide's findings of greater instances of suicide in undesignated ratings partly because the data in the enlisted analytical file of yearly

observations measure whether or not a Sailor was ever in a specific rating over a certain time (one year) rather than being in a specific rating at a specific point in time (Berman et al., 2010). Also, making connections between occupational specialties and suicide risk can yield differing results in different research endeavors because of the subjectivity of categorical rating classifications in any particular study.

On average, combat zone deployment is not a significant risk factor of suicide. After controlling for whether a Sailor is ever deployed to combat zone, results show that enlistees who *recently* deployed to a combat zone are 64% less likely to commit suicide than enlistees that never deployed to a combat zone. This corroborates past research, which finds combat experience and OIF/OEF/OND deployments are not connected to greater suicide risk (LeardMann et al., 2013; Task Force Resilient, 2013; Lien, 2010). Accession waiver results substantiate the LeardMann, Ramchand, and Hilton reports linking suicide to psychological, mental, and behavioral disorders. On average, controlling for demographics and service-specific characteristics, enlistees with felony waivers are 3.3 times more likely to commit suicide than enlistees with no accession waivers, while enlistees with other waivers are 1.4 times more likely than enlistees with no accession waivers. No warfare platforms in the enlisted analytical file of yearly observations are statistically significant. Minesweeper platforms do not appear in any enlisted regressions because there are no suicides in these categories.

Table 6 describes the logit regression results for the enlisted analytical file of one observation per Sailor.

Table 6. Logit Regression Results: Enlisted Analytical File, One Observation Per Sailor

Variable	Demographics	Demographics, Service Factors (Ratings Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors	Demographics, All Service Factors, Accession Waivers
	suicide	suicide	suicide	suicide	suicide
female (ref group)	1	1	1	1	1
male	4.721***	4.740***	4.771***	4.748***	4.717***
	(1.211)	(1.219)	(1.228)	(1.224)	(1.217)
17-19 years old (ref group)	1	1	1	1	1
20-24 years old	1.174	1.231	1.117	1.154	1.138
	(0.267)	(0.285)	(0.259)	(0.269)	(0.265)
25-29 years old	1.432	1.393	1.250	1.282	1.248
	(0.343)	(0.353)	(0.318)	(0.328)	(0.319)
30-34 years old	1.964**	1.925**	1.673*	1.724*	1.656*
	(0.515)	(0.543)	(0.477)	(0.494)	(0.475)
35-39 years old	1.462	1.499	1.270	1.285	1.272
	(0.417)	(0.466)	(0.400)	(0.406)	(0.402)
40+ years old	0.670	0.737	0.621	0.621	0.626
	(0.218)	(0.261)	(0.222)	(0.223)	(0.224)
white (ref group)	1	1	1	1	1
black	0.619***	0.684**	0.675**	0.684**	0.689**
	(0.0930)	(0.106)	(0.105)	(0.107)	(0.108)
other minority	0.784	0.795	0.803	0.804	0.805
	(0.117)	(0.119)	(0.120)	(0.121)	(0.121)
unknown race	0.809	0.861	0.818	0.815	0.818
	(0.172)	(0.185)	(0.177)	(0.176)	(0.177)
non-Hispanic (ref group)	1	1	1	1	1
Hispanic	0.790	0.821	0.841	0.848	0.848
	(0.123)	(0.129)	(0.132)	(0.133)	(0.133)
unknown ethnicity	0.955	0.985	1.088	1.118	1.123
	(0.109)	(0.117)	(0.132)	(0.139)	(0.140)
never married (ref group)	1	1	1	1	1
married	1.305	1.260	1.274	1.251	1.240
	(0.315)	(0.302)	(0.305)	(0.298)	(0.294)
divorced/separated/widowed	0.754*	0.804	0.798	0.822	0.833
	(0.115)	(0.124)	(0.122)	(0.126)	(0.128)
no dependents (ref group)	1	1	1	1	1
1 dependent	0.831	0.842	0.826	0.824	0.821
	(0.187)	(0.188)	(0.185)	(0.184)	(0.183)
2 dependents	0.776	0.800	0.778	0.778	0.763
	(0.198)	(0.203)	(0.198)	(0.197)	(0.193)
3 dependents	0.616*	0.647	0.625*	0.628*	0.613*
	(0.172)	(0.180)	(0.174)	(0.174)	(0.170)
4+ dependents	0.771	0.820	0.783	0.791	0.772
	(0.221)	(0.235)	(0.224)	(0.226)	(0.220)

Table 6 (cont'd.). Logit Regression Results: Enlisted Analytical File, One Observation Per Sailor

Variable	Demographics	Demographics, Service Factors (Ratings Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors	Demographics, All Service Factors, Accession Waivers
AFQT CAT IV/V (ref group)		1	1	1	1
AFQT CAT IIIB		0.992	0.972	1.011	0.980
		(0.519)	(0.509)	(0.530)	(0.514)
AFQT CAT IIIA		1.121	1.136	1.164	1.109
		(0.587)	(0.596)	(0.611)	(0.583)
AFQT CAT II		1.191	1.248	1.283	1.221
		(0.620)	(0.651)	(0.670)	(0.638)
AFQT CAT I		1.617	1.682	1.756	1.658
		(0.874)	(0.912)	(0.953)	(0.901)
E1-E4 (ref group)		1	1	1	1
E5-E6		1.197	1.121	1.148	1.153
		(0.154)	(0.147)	(0.151)	(0.152)
E7-E9		0.800	0.747	0.777	0.792
		(0.178)	(0.166)	(0.173)	(0.176)
administrative rating (ref group)			1	1	1
air rating			0.911	0.886	0.891
			(0.110)	(0.128)	(0.128)
operations rating			1.039	1.062	1.058
			(0.180)	(0.187)	(0.186)
construction rating			0.939	0.857	0.856
			(0.314)	(0.289)	(0.289)
other rating			1.180	1.125	1.117
			(0.325)	(0.313)	(0.311)
supply rating			1.420*	1.502**	1.497**
			(0.278)	(0.297)	(0.296)
intelligence rating			0.892	0.924	0.919
			(0.133)	(0.139)	(0.138)
engineering rating			0.936	1.028	1.033
			(0.119)	(0.134)	(0.135)
weapons rating			1.173	1.178	1.169
			(0.199)	(0.202)	(0.201)
medical rating			1.173	1.120	1.111
			(0.202)	(0.196)	(0.195)
undesignated rating			0.580***	0.580***	0.591***
			(0.0861)	(0.0867)	(0.0885)
unknown rating			1.008	1.008	1.016
			(0.303)	(0.302)	(0.305)
not combat-zone deployed (ref group)		1	1	1	1
combat-zone deployed		0.865	0.810*	0.864	0.863
		(0.101)	(0.0889)	(0.101)	(0.101)

Table 6 (cont'd.). Logit Regression Results: Enlisted Analytical File, One Observation Per Sailor

Variable	Demographics	Demographics, Service Factors (Ratings Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors	Demographics, All Service Factors, Accession Waivers
shore facility (ref group)		1		1	1
air platform		1.063		1.045	1.046
		(0.156)		(0.185)	(0.185)
amphibious ship		0.919		0.898	0.896
		(0.165)		(0.164)	(0.164)
other sea platforms		0.833		0.827	0.827
		(0.238)		(0.238)	(0.238)
destroyer		0.830		0.815	0.814
		(0.163)		(0.164)	(0.164)
submarine		0.594*		0.561**	0.557**
		(0.167)		(0.160)	(0.159)
aircraft carrier		0.709**		0.666**	0.664**
		(0.114)		(0.111)	(0.111)
cruiser		1.005		0.985	0.979
		(0.236)		(0.236)	(0.234)
frigate		0.967		0.966	0.961
		(0.275)		(0.278)	(0.277)
unknown platform		0.896		0.950	0.952
		(0.142)		(0.151)	(0.152)
no accession waiver (ref group)					1
other accession waiver					1.405**
					(0.192)
minor offense waiver					1.157
					(0.673)
major offense waiver					1.126
					(0.262)
drug waiver					0.393
					(0.394)
felony waiver					3.095
					(2.201)
Observations	703,230	703,230	703,230	703,230	703,230

Variable coefficients are odds ratios. Standard errors in parentheses.
*** Significant at the 99% level; ** Significant at the 95% level; * Significant at the 90% level

Table 6 shows the logit regression results using the aggregated sample where one observation represents one Sailor. In general, the statistically significant demographic risk factors remain similar, although the magnitudes differ a little when aggregating to the per Sailor level. Some service-specific variables in Table 6 have different results compared to the results from the panel data sample. The E7-E9 rank category becomes insignificant. This could be due to the fact that the data now only capture the highest rank

the Sailor achieved during the study period, but it is consistent with the 1999–2007 DONSIR report finding no significant differences in suicide risk between enlisted ranks (Hilton et al., 2009). Supply ratings become significant, with enlistees ever in a supply rating 1.5 times more likely to commit suicide than enlistees ever in an administrative rating, controlling for demographics and service traits. Supply rating outcomes uphold the DOD TF Suicide and LeardMann studies showing higher suicide risk among supply ratings (Berman et al., 2010; LeardMann et al., 2013). Undesignated ratings stay significant with a slight increase in magnitude.

The odds ratio for submarine and aircraft carrier platforms are similar between Tables 5 and 6, but they become statistically significant in the aggregated sample. This is likely due to more measurement errors in the yearly sample. On average, controlling for demographics and service-specific traits, enlistees ever serving in a submarine and aircraft carrier are 44% and 34% less likely, respectively, to commit suicide than enlistees ever serving at a shore facility.

Accession waiver variables change a little from the enlisted yearly observations. The felony waiver variable loses significance although the magnitudes of the odds ratios are similar between the two samples (3.3 in yearly sample vs. 3.1 in aggregated sample). The other accession waiver variable remains almost exactly the same (1.4 odds ratio maintained). Most of the other accession waivers are non-criminal in nature, so moral waivers have no significant effect on suicide in the fully aggregated enlisted analytical file. Waiver results sustain TF Resilient's findings of no links between moral waivers and suicide (Task Force Resilient, 2013).

2. Officer Analysis

Table 7 lists the logit regression results for the officer analytical file of yearly observations.

Table 7. Logit Regression Results: Officer Analytical File, Yearly Observations

Variable	Demographics	Demographics, Service Factors (Designators Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors
	suicide	suicide	suicide	suicide
female (ref group)	1	1	1	1
male	2.858*	2.786*	2.806	2.818*
	(1.745)	(1.707)	(1.768)	(1.775)
20-29 years old (ref group)	1	1	1	1
30-34 years old	1.351	1.180	1.084	1.062
	(0.661)	(0.601)	(0.559)	(0.552)
35-39 years old	1.771	1.387	1.264	1.208
	(0.906)	(0.823)	(0.760)	(0.733)
40-45 years old	1.366	1.050	0.966	0.914
	(0.785)	(0.726)	(0.669)	(0.640)
45+ years old	1.453	1.158	1.044	0.984
	(0.819)	(0.822)	(0.745)	(0.711)
white (ref group)	1	1	1	1
black	0.942	0.803	0.865	0.854
	(0.569)	(0.492)	(0.532)	(0.526)
unknown race	0.823	0.853	0.886	0.893
	(0.648)	(0.669)	(0.696)	(0.702)
non-Hispanic (ref group)	1	1	1	1
Hispanic	1.354	1.259	1.276	1.269
	(0.849)	(0.791)	(0.804)	(0.800)
unknown ethnicity	1.743	1.946	1.847	1.851
	(1.110)	(1.239)	(1.181)	(1.183)
never married (ref group)	1	1	1	1
married	0.497	0.478	0.472	0.477
	(0.300)	(0.287)	(0.282)	(0.285)
divorced/separated/widowed	0.310*	0.291*	0.289**	0.291*
	(0.196)	(0.185)	(0.183)	(0.184)
no dependents (ref group)	1	1	1	1
1 dependent	0.590	0.575	0.573	0.575
	(0.410)	(0.397)	(0.395)	(0.396)
2 dependents	1.274	1.193	1.203	1.205
	(0.826)	(0.771)	(0.775)	(0.775)
3 dependents	0.548	0.508	0.512	0.509
	(0.393)	(0.364)	(0.365)	(0.363)
4+ dependents	0.753	0.694	0.694	0.690
	(0.544)	(0.501)	(0.500)	(0.496)

Table 7 (cont'd.). Logit Regression Results: Officer Analytical File, Yearly Observations

Variable	Demographics	Demographics, Service Factors (Designators Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors
not combat-zone deployed (ref group)		1	1	1
combat-zone deployed		1.156	1.263	1.232
		(0.717)	(0.782)	(0.772)
got combat-zone deployed		0.427	0.423	0.421
		(0.391)	(0.387)	(0.385)
one year post-deployed		0.957	1.004	0.991
		(0.494)	(0.522)	(0.517)
two years post-deployed		1.945	2.066	2.082*
		(0.853)	(0.919)	(0.927)
shore facility (ref group)		1		1
air platform		0.778		0.708
		(0.434)		(0.441)
amphibious ship		1.168		1.751
		(0.871)		(1.347)
other sea platforms		1.601		1.720
		(1.182)		(1.277)
destroyer		0.940		1.915
		(0.701)		(1.612)
aircraft carrier		1.023		1.127
		(0.763)		(0.849)
unknown platform		0.897		0.863
		(0.298)		(0.291)
O1-O3 (ref group)		1	1	1
O4-O6		1.198	1.236	1.243
		(0.595)	(0.613)	(0.617)
warrant officer		2.038	2.105	2.176
		(1.482)	(1.577)	(1.629)
not prior enlisted (ref group)		1	1	1
prior enlisted		2.247*	2.338*	2.284*
		(1.098)	(1.146)	(1.128)
administrative designator (ref group)			1	1
other designator			1.588	1.558
			(1.136)	(1.117)
surface/ship designator			0.500	0.377
			(0.356)	(0.288)
submarine designator			1.162	1.159
			(0.850)	(0.850)
special warfare designator			0.834	0.790
			(0.961)	(0.914)
engineering designator			0.838	0.893
			(0.962)	(1.025)
aviation designator			0.855	0.965
			(0.563)	(0.645)

Table 7 (cont'd.). Logit Regression Results: Officer Analytical File, Yearly Observations

Variable	Demographics	Demographics, Service Factors (Designators Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors
intelligence designator			1.400	1.321
			(1.122)	(1.064)
medical designator			0.959	0.984
			(0.666)	(0.686)
supply designator			0.432	0.392
			(0.495)	(0.451)
CY2002 (ref group)	1	1	1	1
CY2003	2.657	2.825	2.830	2.836
	(2.030)	(2.162)	(2.165)	(2.170)
CY2005	2.692	2.376	2.374	2.352
	(2.057)	(1.824)	(1.822)	(1.806)
CY2006	2.040	1.845	1.843	1.822
	(1.666)	(1.511)	(1.510)	(1.493)
CY2007	4.069**	3.596*	3.567*	3.529*
	(2.881)	(2.564)	(2.544)	(2.517)
CY2008	2.001	1.668	1.654	1.633
	(1.636)	(1.375)	(1.363)	(1.347)
CY2009	0.653	0.524	0.519	0.510
	(0.755)	(0.609)	(0.603)	(0.593)
CY2010	1.902	1.501	1.453	1.440
	(1.556)	(1.243)	(1.206)	(1.195)
CY2011	3.035	2.385	2.299	2.277
	(2.226)	(1.778)	(1.718)	(1.702)
CY2012	5.213**	3.895**	3.760*	3.727*
	(3.502)	(2.678)	(2.592)	(2.569)
Observations	618,035	618,035	618,035	618,035

Variable coefficients are odds ratios. Standard errors in parentheses.
*** Significant at the 99% level; ** Significant at the 95% level; * Significant at the 90%

The only statistically significant demographic variables from the officer analytical file of yearly observations are male and marital status. Officer suicides are much rarer than enlisted suicides, so fewer statistically significant logit regression results are not surprising. On average, controlling for demographics and service-specific characteristics, male officers are 2.8 times more likely to commit suicide than female officers; officers ever divorced, separated, or widowed are 71% less likely to commit suicide than officers never married.

Only two service-specific variables are statistically significant in the officer analytical file of yearly observations. On average, controlling for demographics and

service traits, officers at the two-year post-deployment mark are 2.1 times more likely to commit suicide than officers not at this milestone; prior-enlisted officers are 2.3 times more likely to commit suicide than officers who are not prior-enlisted. These results support evidence that most suicides take place approximately one to two years after a deployment (Task Force Resilient, 2013). No officer suicides occurred in submarines, cruisers, frigates, minesweepers, or among flag officers during the observation period, so these variables have been excluded from all officer logit regressions. I omit accession waiver variables from all officer logit regressions because no suicides were completed by officers with moral waivers. No officer designators or warfare platforms returned any statistically significant results for the officer analytical file of yearly observations, reflecting the rarity of officer suicides within the Navy total force.

Table 8 lists the logit regression results for the officer analytical file of one observation per Sailor.

Table 8. Logit Regression Results: Officer Analytical File, One Observation Per Sailor

Variable	Demographics	Demographics, Service Factors (Designators Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors
	suicide	suicide	suicide	suicide
female (ref group)	1	1	1	1
male	3.028*	3.043*	3.083*	3.038*
	(1.837)	(1.854)	(1.928)	(1.900)
20-29 years old (ref group)	1	1	1	1
30-34 years old	1.071	1.122	0.956	1.057
	(0.525)	(0.574)	(0.494)	(0.553)
35-39 years old	1.915	1.696	1.463	1.530
	(0.982)	(1.022)	(0.889)	(0.947)
40-45 years old	0.986	0.849	0.696	0.729
	(0.575)	(0.605)	(0.497)	(0.526)
45+ years old	0.741	0.642	0.506	0.547
	(0.432)	(0.475)	(0.375)	(0.410)
white (ref group)	1	1	1	1
black	0.919	0.801	0.851	0.822
	(0.555)	(0.492)	(0.524)	(0.507)
unknown race	0.522	0.550	0.577	0.569
	(0.425)	(0.447)	(0.469)	(0.463)

Table 8 (cont'd.). Logit Regression Results: Officer Analytical File, One Observation Per Sailor

Variable	Demographics	Demographics, Service Factors (Designators Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors
non-Hispanic (ref group)	1	1	1	1
Hispanic	1.339	1.263	1.277	1.262
	(0.830)	(0.787)	(0.798)	(0.788)
unknown ethnicity	1.056	1.048	1.032	1.031
	(0.699)	(0.691)	(0.681)	(0.682)
never married (ref group)	1	1	1	1
married	0.636	0.599	0.585	0.592
	(0.348)	(0.328)	(0.315)	(0.323)
divorced/separated/widowed	0.577	0.590	0.646	0.606
	(0.241)	(0.249)	(0.271)	(0.256)
no dependents (ref group)	1	1	1	1
1 dependent	0.713	0.730	0.699	0.733
	(0.498)	(0.511)	(0.489)	(0.514)
2 dependents	2.716*	2.670*	2.630*	2.719*
	(1.578)	(1.564)	(1.534)	(1.596)
3 dependents	0.702	0.673	0.678	0.680
	(0.482)	(0.465)	(0.466)	(0.470)
4+ dependents	0.805	0.769	0.776	0.770
	(0.553)	(0.533)	(0.535)	(0.534)
not combat-zone deployed (ref group)		1	1	1
combat-zone deployed		0.698	0.813	0.736
		(0.252)	(0.280)	(0.272)
shore facility (ref group)		1		1
air platform		0.768		0.662
		(0.361)		(0.370)
amphibious ship		1.595		2.140
		(0.792)		(1.134)
other sea platforms		1.158		1.243
		(0.713)		(0.774)
destroyer		0.679		1.119
		(0.419)		(0.802)
aircraft carrier		1.048		1.116
		(0.570)		(0.615)
unknown platform		2.643		2.624
		(1.610)		(1.608)
O1-O3 (ref group)		1	1	1
O4-O6		1.299	1.376	1.354
		(0.679)	(0.713)	(0.705)
warrant officer		2.437	1.962	2.093
		(1.760)	(1.459)	(1.561)
not prior enlisted (ref group)		1	1	1
prior enlisted		1.464	1.607	1.434
		(0.704)	(0.772)	(0.700)

Table 8 (cont'd.). Logit Regression Results: Officer Analytical File, One Observation Per Sailor

Variable	Demographics	Demographics, Service Factors (Designators Excluded)	Demographics, Service Factors (Warfare Platforms Excluded)	Demographics, All Service Factors
administrative designator (ref group)			1	1
other designator			0.985	0.904
			(0.608)	(0.566)
surface/ship designator			0.361*	0.270*
			(0.218)	(0.185)
submarine designator			0.587	0.525
			(0.380)	(0.343)
special warfare designator			0.511	0.466
			(0.565)	(0.520)
engineering designator			0.624	0.621
			(0.672)	(0.671)
aviation designator			0.494	0.542
			(0.283)	(0.322)
intelligence designator			0.807	0.657
			(0.564)	(0.465)
medical designator			0.518	0.457
			(0.325)	(0.291)
supply designator			0.284	0.211
			(0.313)	(0.235)
Observations	98,594	98,594	98,594	98,594

Variable coefficients are odds ratios. Standard errors in parentheses.
*** Significant at the 99% level; ** Significant at the 95% level;

Logit regression results based on the aggregated sample for the officer are somewhat similar to officer yearly observations. The only noticeable differences are in surface/ship designator and prior enlistment. On average, controlling for demographics and service traits, officers ever with a surface/ship designator are 73% less likely to die by suicide than officers ever with an administrative designator. Prior enlisted becomes insignificant, and no warfare platforms are statistically insignificant in the fully aggregated officer analytical file.

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IV. CONCLUSIONS AND RECOMMENDATIONS

This thesis analyzes the role of service-specific risk factors in active duty Navy suicides from 2002 to 2012. Through logit regression analysis, I address the following research questions: What demographic and service-specific factors are associated with the occurrence of active duty suicides in the U.S. Navy?

My results on demographic risk factors are generally consistent with the current literature that looks at the overall military or focuses on the Army. Specifically, I find that male and Caucasians have higher odds of suicide compared to the reference groups in both enlisted and officer samples. In addition, enlistees 30–34 years old, and officers with two dependents have higher odds of suicide compared to the reference groups, whereas enlistees with three dependents have lower odds of suicide. Among service risk factors examined, I find enlisted supply ratings and non-moral accession waivers are associated with higher odds of active duty Navy suicide. Additionally, I find undesignated enlisted ratings, enlisted submarine and aircraft carrier assignments, and officer surface designators are associated with lower odds of active duty Navy suicide. I also find ranks and combat zone deployment status are not statistically significantly associated with active duty Navy suicide.

This study has several important limitations. First, it does not establish causality, only correlative relationships as discussed in Chapter II. Second, suicide is measured with many errors because a suicide event contains various immeasurable aspects, which are also described in Chapter II. The dataset only captures 449 of the 502 officially reported active duty Navy suicides from CY2002-CY2012[6], does not delineate between active component and reservists on active duty, does not classify 33% of primary warfare platforms due to unit decommissionings that make UICs unknown, and does not include an officer ability proxy (for enlisted it is AFQT score). Lastly, since this study is Navy specific, my results are not generalizable across other branches of the military.

[6] All individuals in the sample who committed suicide between CY2002 and CY2012, however, are captured.

With these caveats in mind, I make six general recommendations.

(1) Incorporate collective suicide risk factor research findings into Suicide Awareness General Military Training (GMT). Incorporating suicide risk factor findings from professional and academic research into Suicide Awareness GMT will provide the Navy total force with a tool to more accurately assess suicide susceptibility from the unit level up. Educating the total force on current service-specific factors associated with suicide—in concert with demographic and psychological factors—will enhance suicide prevention efforts by providing more robust indicators of when intervention may be necessary. I recommend the Naval Education and Training Command (NETC), as the lead for GMT instruction, work with professional and academic institutions and the Office of the Chief of Naval Operations, Personal Readiness and Community Support Branch (OPNAV N135) to receive the most up-to-date suicide risk factor research for subsequent incorporation into Suicide Awareness GMT.

(2) Tailor command Suicide Prevention Coordinator (SPC) training to include collective suicide risk factor research findings. Tailoring command SPC training to include suicide risk factor findings from professional and academic research achieves the same benefits as incorporating this information into Suicide Awareness GMT. Educating both SPCs and individual Sailors on current service-specific, demographic, and psychological factors associated with suicide enables a stronger defense-in-depth approach to suicide prevention. I recommend OPNAV N135, as executive agent for the Navy suicide prevention program, work with professional and academic institutions and NETC to receive the most up-to-date suicide risk factor research for subsequent inclusion into command SPC training.

(3) Conduct new research on service-specific risk factors every 2–3 years. Update the Navy Suicide Prevention Program instruction (OPNAVINST 1720.4A) to reflect new research findings. The service-specific risk factors of today may not be the service-specific risk factors of tomorrow. Maintaining timely information on suicide risk factors ensures the Navy total force is knowledgeable on the most accurate, up-to-date trends, enhancing suicide prevention and intervention. I recommended, at a minimum, that the Naval Postgraduate School (NPS) or a professional institution with expertise in

suicide studies conduct new research every two to three years. I also recommend OPNAV N135, as executive agent for the Navy suicide prevention program, update the Navy's Suicide Prevention Program instruction (OPNAV Instruction 1720.4A) to include important findings of new research.

(4) Conduct additional research for supply ratings to determine specific risk factors within the ratings. This thesis measures the odds of committing suicide given several demographic and service-specific characteristics. I recommend NPS or a professional institution with expertise in suicide studies initiate a research project specifically focused on the relationships between supply ratings and suicide. A closer examination of suicide risk factors within supply ratings may reveal unique aspects of supply ratings that increase suicide susceptibility (personal backgrounds, work stress, recruiting/accession/training procedures, etc.).

(5) Conduct additional research for warfare platforms to determine specific factors that may make aircraft carriers and submarines less susceptible to suicide. I recommend NPS or a professional institution with expertise in suicide studies initiate a research project specifically focused on the relationships between warfare platforms and suicide. Again, this thesis explores several demographic and service-specific characteristics for their association with active duty Navy suicides. A closer examination of warfare platforms and suicide risk factors may reveal unique aspects about being assigned to a submarine or an aircraft carrier that may reduce a Sailor's susceptibility to suicide.

(6) Apply Navy suicide prevention funding to additional supply rating research and new service-specific risk factor research. Both my research results and past research results have consistently shown enlisted supply ratings are at an increased risk for suicide. I recommend primary fiscal priority be given to additional supply rating research. I recommend secondary fiscal priority be given to new research on service-specific risk factors to maintain modernity and relevance.

Each instance of an active duty Navy suicide is as unique as a fingerprint. A multitude of factors—demographic, service-specific, and personal—contribute to a

Sailor's decision to take his or her own life. A wealth of measurable and immeasurable elements conspire to produce a suicidal outcome, making recognition of suicide risk factors extremely difficult. By examining measurable service-specific factors for their associations to active duty Navy suicides, I aim to provide a foundational understanding of possible Navy career characteristics that may increase a Sailor's suicide risk. My findings represent a starting point for future research on service-specific factors associated with active duty Navy suicides. The more research that is conducted in the largely uncharted territory of service-specific suicide risk factors in the U.S. Navy, the better the odds that the next potential suicide will be prevented.

APPENDIX A. ANALYTICAL FILE CONSTRUCTION

As discussed in Chapter II, I received quarterly data on service members' demographic and service information. In some quarters, individual Sailors may only have deployment and/or death data, while demographic data are missing. This is due to the deployment and/or death taking place a quarter after the last demographic data capture on file for that particular individual. In these instances, a Sailor either performs a deployment and leaves active duty before the next quarterly data are collected, or dies before the next quarterly data are collected. Missing data are accounted for by using indicator variables that capture missing values and by using the last non-missing datum for variables as appropriate. Most Navy deployments last longer than three months and can begin at any point in time, so an individual's deployment information may be spread over more than one quarter. Many service members also travel to multiple locations while deployed; these data are aggregated based on combat zone status.

Before I apply sample restrictions, the DMDC-AFMES linked dataset covers 61 calendar year quarters, so one active duty service member may have up to 61 observations. In order to allow for one observation per service member per year, the linked dataset is aggregated into 16 year cohorts, one for each calendar year observed (1997–2012). After aggregating the dataset into year cohorts, I restrict the sample size. I omit all observations occurring before CY2002. Decedent data are only available from CY2002 to CY2012, so I cannot know if Sailors who exited the sample before CY2002 simply separated from the military or died. I also omit all observations occurring after CY2012 due to the unavailability of decedent data. Next I omit all missing year data, as these represent information that lies outside the CY2002-CY2012 observation period. These data aggregates become the master file. The master file features 4,132,830 total observations and 791,021 individual records. I then separate the master file into an enlisted analytical file and an officer analytical file, dropping another 4,030 observations due to missing paygrade data. The enlisted analytical file features 3,510,765 total observations and 703,230 individual records. The officer analytical file features 618,035 total observations and 98,594 individual records. The individual records in the enlisted

and officer analytical files equal more than the individual records for the master file because some officers are prior enlisted; these officers are represented in both analytical files at some point over the eleven-year observation period (CY2002-CY2012). The enlisted and officer analytical files are further aggregated to produce one observation per Sailor for the entire observation period. The fully aggregated enlisted file contains 703,230 total observations and individual records, and the fully aggregated officer file contains 98,594 total observations and individual records. The original enlisted and officer files and their respective aggregates become the four analytical files used in this thesis.

Aggregation into yearly observations and one observation per Sailor is achieved by collapsing the enlisted and officer datasets. The collapse function combines quarterly data into yearly data into one observation per Sailor, so the collapsed analytical files are essentially a record of whether or not a Sailor is ***ever*** in a specific category during the observation period. Since a Sailor can be in more than one time-variant category over a one-to-eleven year period (rank, warfare platform, marital status, rating/designator, etc.), there will be many instances where an individual falls into two or more categories (e.g., an enlistee is both an E4 and E5 in one year, or an E4, E5, E6, and E7 over the course of several years). As a result, some categorical variables in the collapsed datasets may exceed 100% when summed together. When referring to any time-variant variable in the four collapsed analytical files, the correct interpretation is ***a Sailor ever is or never is*** in a particular category throughout the observation period, rather than a Sailor is currently in one specific category.

APPENDIX B. NON-AGGREGATED VARIABLE NAMES AND DESCRIPTIONS

VARIABLE NAME	VARIABLE DESCRIPTION
suicide	=1 if died by committing suicide; =0 if died by any other means or if still alive
Demographics	
male	=1 if male; =0 if female
age	age in years
black	=1 if black; =0 if non-black
white	=1 if white; =0 if non-white
other minority	=1 if Asian/Pacific Islander, Native American, or other race; =0 if black, white, or unknown race
unknown race	=1 if race is unknown; =0 if black, white, Asian/Pacific Islander, Native American, or other race
Hispanic	=1 if Hispanic; =0 if non-Hispanic
non-Hispanic	=1 if non-Hispanic; =0 if Hispanic
unknown ethnicity	=1 if ethnicity is unknown; =0 if Hispanic or non-Hispanic
married	=1 if married; =0 if never married or divorced, separated, or widowed
never married	=1 if never married; =0 if married, divorced, separated, or widowed
divorced/separated/ widowed	=1 if divorced, separated, or widowed; =0 if married or never married
dependents	total number of dependents
Service-Specific	
AFQT score	Armed Forces Qualification Test score (enlisted only)
enlisted apprentice	=1 if rank E1-E4; =0 if rank E4-O10
enlisted journeyman	=1 if rank E5-E6; =0 if rank E1-E4, E7-O10
enlisted supervisor	=1 if rank E7-E9; =0 if rank E1-E6, WO2-O10
warrant officer	=1 if rank WO2-WO5; =0 if rank E1-E9, O1-O10
junior officer	=1 if rank O1-O3; =0 if rank E1-WO5, O4-O10
senior officer	=1 if rank O4-O6; =0 if rank E1-O3, O7-O10
flag officer	=1 if rank O7-O10; =0 if rank E1-O6
air rating	=1 if enlisted rating is aviation related; =0 otherwise
operations rating	=1 if enlisted rating is operations related; =0 otherwise
construction rating	=1 if enlisted rating is construction related; =0 otherwise
supply rating	=1 if enlisted rating is supply related; =0 otherwise
intelligence rating	=1 if enlisted rating is intelligence related; =0 otherwise
engineering rating	=1 if enlisted rating is engineering related; =0 otherwise
weapons rating	=1 if enlisted rating is weapons related; =0 otherwise
medical rating	=1 if enlisted rating is medical related; =0 otherwise
administrative rating	=1 if enlisted rating is administration related; =0 otherwise
other rating	=1 for other enlisted ratings; =0 otherwise
undesignated rating	=1 if enlisted rating is undesignated; =0 otherwise
unknown rating	=1 if enlisted rating is unknown; =0 otherwise

VARIABLE NAME	VARIABLE DESCRIPTION
Service-Specific	
surface/ship designator	=1 if surface warfare officer; =0 otherwise
submarine designator	=1 if submarine warfare officer; =0 otherwise
special warfare designator	=1 if special warfare officer; =0 otherwise
administrative designator	=1 if administrative/human resources officer; =0 otherwise
engineering designator	=1 if engineering duty officer; =0 otherwise
aviation designator	=1 if air warfare officer; =0 otherwise
intelligence designator	=1 if intelligence officer; =0 otherwise
medical designator	=1 if medical officer; =0 otherwise
supply designator	=1 if supply officer; =0 otherwise
other designator	=1 if other officer designator; =0 otherwise
unknown designator	=1 if officer designator is unknown; =0 if officer is designator known
shore facility	=1 if shore facility; =0 otherwise
air platform	=1 if air warfare platform; =0 otherwise
amphibious ship	=1 if amphibious ship warfare platform; =0 otherwise
destroyer	=1 if destroyer warfare platform; =0 otherwise
minesweeper	=1 if minesweeper warfare platform; =0 otherwise
submarine	=1 if submarine warfare platform; =0 otherwise
aircraft carrier	=1 if aircraft carrier warfare platform; =0 otherwise
cruiser	=1 if cruiser warfare platform; =0 otherwise
frigate	=1 if frigate warfare platform; =0 otherwise
other sea platform	=1 if warfare platform is other sea platform; =0 otherwise
unknown platform	=1 if warfare platform is unknown; =0 if warfare platform is known
combat-zone deployed	=1 if deployed to a combat zone; =0 if not deployed to a combat zone
no accession waiver	=1 if no accession waivers; =0 if any accession waivers
other accession waiver	=1 if other accession waivers; =0 if no other accession waivers
minor offense waiver	=1 if minor offense waivers; =0 if no minor offense waivers
major offense waiver	=1 if major offense waivers; =0 if no major offense waivers
drug waiver	=1 if drug waivers; =0 if no drug waivers
felony waiver	=1 if felony waivers; =0 if no felony waivers
Years	
CY02	=1 if calendar year 2002; =0 otherwise
CY03	=1 if calendar year 2003; =0 otherwise
CY04	=1 if calendar year 2004; =0 otherwise
CY05	=1 if calendar year 2005; =0 otherwise
CY06	=1 if calendar year 2006; =0 otherwise
CY07	=1 if calendar year 2007; =0 otherwise
CY08	=1 if calendar year 2008; =0 otherwise
CY09	=1 if calendar year 2009; =0 otherwise
CY10	=1 if calendar year 2010; =0 otherwise
CY11	=1 if calendar year 2011; =0 otherwise
CY12	=1 if calendar year 2012; =0 otherwise

VARIABLE NAME	VARIABLE DESCRIPTION
Additional Indicators	
got married	=1 if marital status changed from not married to married in applicable CY; =0 if marital status did not change from not married to married in applicable CY
got divorced/separated/ widowed	=1 if marital status changed from married to not married in applicable CY; =0 if marital status did not change from married to not married in applicable CY
got combat-zone deployed	=1 if deployment status changed to combat zone deployed in applicable CY; =0 if deployment status did not change to combat zone deployed in applicable CY
one year post-deployed	=1 if at the one year post deployment mark; =0 otherwise

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