EVALUATING ASPECTS OF HEALTHCARE DELIVERY IN THE U.S. MILITARY: MEDICAL SEPARATIONS, MENTAL HEALTH SERVICES UTILIZATION, AND PRIMARY CARE APPOINTMENT AVAILABILITY

A Dissertation

by

TODD CARL LEROUX

Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Chair of Committee,	Murray Côté
Committee Members,	Hye-Chung Kum
	Alan Dabney
	Rebecca Wells
Head of Department,	Michael Morrisey

December 2015

Major Subject: Health Services Research

ABSTRACT

This dissertation examines how access to care is changing in today's military and how these changes impact various populations. Three topics are examined, which cover pre-existing personality disorder discharges, mental health services utilization of military families, and appointment availability within the medical home.

First, U.S. military discharges and pre-existing personality disorders are examined in a health policy analysis. The Department of Defense (DoD) is facing allegations that servicemembers were wrongfully discharged for pre-existing personality disorders. From 2001 to 2007, 26,000 enlisted servicemembers were discharged for a pre-existing personality disorder (2.6% of total discharges). A government review found the DoD did not adhere to discharge protocols. This analysis explores personality disorders discharges in the military, analyzes various costs to stakeholders, and identifies policy alternatives.

Next is an analysis of mental health services utilization among family members of active duty servicemembers. Much attention has focused on the importance of mental health with military servicemembers. A far less studied topic is the mental health of military families. This study analyzed the mental health services utilization of military family members between 2011 and 2014. A negative binomial generalized estimating equation was used to examine the rate of change in mental health services utilization against various deployment phases. Associations emerged between deployment phases (i.e., deployment 1, between deployments, deployment 2) with increases in mental health

services utilization ranging between 12% and 20%. For military children, there was a notable decrease (~ 9%) in mental health services utilization for the pre-deployment phase only.

The final analysis examines the rate of change in appointment availability as U.S. Navy primary care clinics transition to the medical home. Recent implementation of the Patient-Centered Medical Home (PCMH) in U.S. Navy primary care clinics has gained significant traction and attention from leadership and policy makers. The PCMH is a healthcare model encompassing comprehensive care, patient-centeredness, and coordinated care. One area not addressed by prior research is how appointment availability changes over time as clinics certify as medical homes. A retrospective, longitudinal analysis of 21 primary care clinics from 2011 to 2014 was performed to examine changes in appointment availability. Results include pre-certification rates that were statistically different from post-certification rates. Furthermore, the fixed effect rate of time (post-certification) was statistically significant (p-value 0.011). The change in appointment availability is suggestive of increased access for patients, but the practical difference is likely negligible given the small coefficient estimate.

DEDICATION

Candace and Laekyn – thank you for your unwavering support and compassionate understanding of my "mental deployment" while in school. Looking forward to our time together and all that awaits. Love you both.

ACKNOWLEDGEMENTS

Without the assistance, advice, and direction provided by my dissertation committee, this dissertation would not have reached its final state nor finished in such a timely manner. I owe my committee a great deal in gratitude and respect.

Dr. Murray Côté, my committee chair, provided the oversight and assistance in order for me to navigate this PhD program within the tight timelines specified by the U.S. Navy. His recommendations, guidance, and positive attitude were just what I needed. I greatly appreciate his candor and the numerous times he allowed me the ability to drop into his office and address my questions and concerns.

Dr. Hye-Chung Kum moved mountains for getting this dissertation off the ground. With what originally seemed like an insurmountable obstacle, Dr. Kum provided the insight, contacts, and knowhow for receiving government approval to use Department of Defense data on servers outside the military (no small feat). Beyond securing the data, Dr. Kum provided practical advice for the dissertation process and navigating this PhD program – I feel extremely fortunate to have had the opportunity to learn from her. Her continual push for me to perform my best work was invigorating. Dr. Kum is truly a gem in the academic community.

Dr. Alan Dabney provided incredible insight and patience with me throughout this entire process. His dedication to students was apparent from the first day I took his class. His ability to inspire students has ignited a spark in me to learn all I can about statistics. By far, he is one of the best professors I have ever encountered.

Dr. Rebecca Wells provided the practical advice and sound wisdom for completing this program and dissertation. Even in the midst of transitioning to another university and moving her family she agreed to continue serving on this committee. Her actions of putting students first not only serve as an example for others to emulate, but demonstrate her high level of integrity. I am extremely proud to have the opportunity to learn from Dr. Wells and deeply appreciate all that she has bestowed upon me with my education.

I wish to acknowledge and thank the U.S. Navy – this was truly a once in a lifetime opportunity. Also, I am indebted to CAPT Glendon Diehl, MSC, USN as he provided incredible support, advice, and encouragement during my time in this program. Lastly, I wish to thank my parents, Carl and Cindy, for their encouragement and support.

NOMENCLATURE

ASVAB	Armed Services Vocational Aptitude Battery
CI	Confidence Interval
DEERS	Defense Eligibility Enrollment Reporting System
DHA	Defense Health Agency
DoD	Department of Defense
ER	Emergency Room
GWOT	Global War on Terror
ICD-9CM	Ninth Edition of the International Classification of Diseases
IRR	Incident Rate Ratio
M2	Management Analysis and Reporting Tool
MDR	Medical Data Repository
MEPS	Military Entrance Processing Station
MHS	Military Health System
MSC	Medical Service Corps
NCQA	National Committee on Quality Assurance
NDAA	National Defense Authorization Act
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OND	Operation New Dawn
PCMH	Patient-Centered Medical Home

PHI	Protected Health Information
PTSD	Posttraumatic Stress Disorder
SPQ-B	Schizotypal Personality Questionnaire-Brief
SVD	Singular Value Decomposition
TBI	Traumatic Brain Injury
TOC	TRICARE Operations Center
USN	United States Navy
VA	Department of Veterans Affairs
VHA	Veterans Health Administration

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1. INTRODUCTION: CONCEPTUAL FRAMEWORK

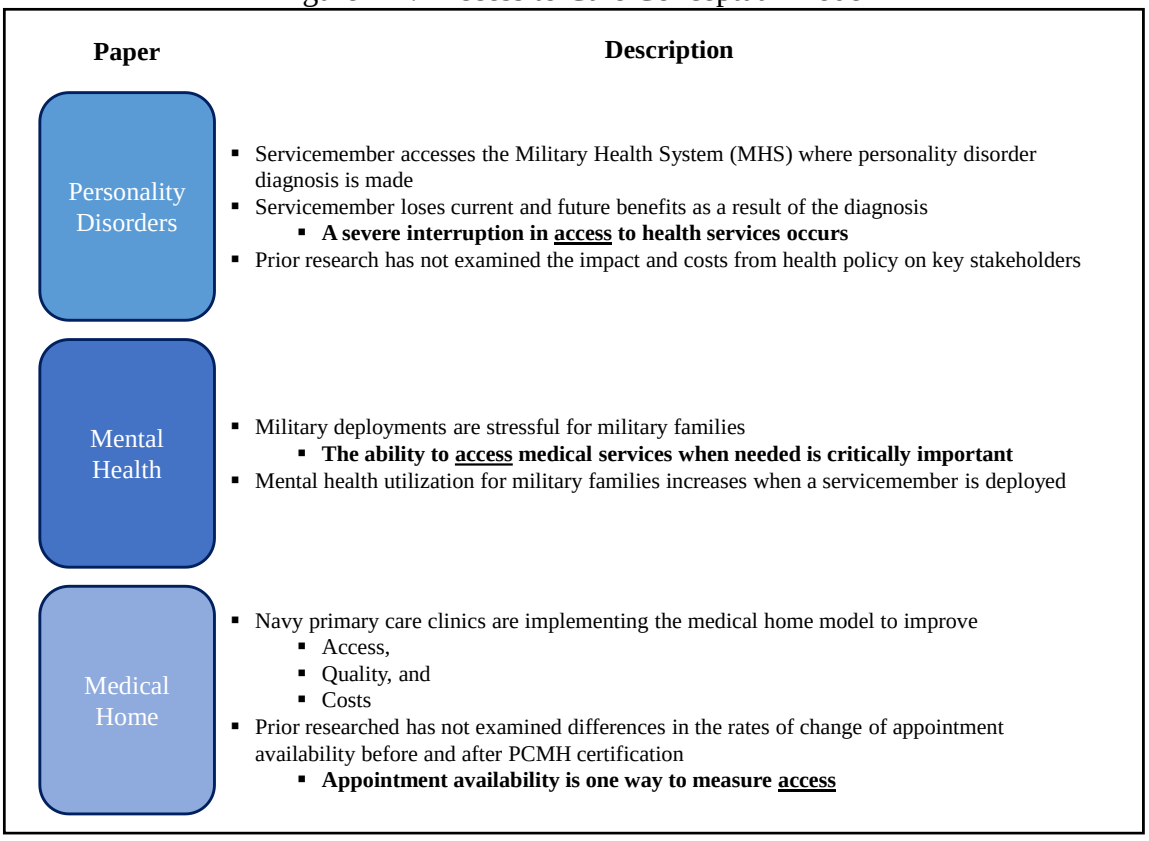
This dissertation examines aspects related to healthcare delivery within the U.S. Military Health System (MHS). The MHS is a federally funded, global healthcare system that provides healthcare for 9.5 million active duty servicemembers, members of the guard and reserves, and their family members.[1] No matter the servicemember's background, military job, or prior health status, the benefits and coverage for a high ranking flag officer and her family are identical to a young, enlisted servicemember fresh out of boot camp. Given this comprehensive coverage, the MHS is well-suited to examine the theme of access to care. In this dissertation, we examine how access to care is changing and how the changes impact various populations in today's military. Since access to care is a broad theme, this dissertation will examine three separate and distinct topics. More specifically, this dissertation will cover pre-existing personality disorder discharges, mental health services utilization of military families, and appointment availability within the medical home.

1.1 OVERVIEW OF THE DISSERTATION

This dissertation comprises three analyses which examine aspects of healthcare delivery within the MHS. Section 2 ("U.S. Military Discharges and Pre-Existing Personality Disorders: A Health Policy Review") is a health policy analysis regarding military discharges and pre-existing personality disorders. Section 3 ("Military Deployments and Mental Health Services Utilization among Family Members of Active Duty Servicemembers") is a retrospective, longitudinal analysis about mental health

services utilization of military family members as they experience phases of military deployments. Section 4 ("Transitioning to Patient-Centered Medical Homes: Associations with Appointment Availability") examines how appointment availability, an indicator of access, changes over time as primary care clinics are certified as a medical home. Figure 1-1 illustrates how each analysis relates to access to care, and the following subsections explore each topic in greater detail.

Figure 1-1: Access to Care Conceptual Model



This conceptual model illustrates access to care and how each section is connected to this theme. The "Medical Home" section is the abbreviated title for "Transitioning to Patient-Centered Medical Homes: Associations with Appointment Availability." The "Mental Health" section is the abbreviated title for "Military Deployments and Mental Health Services Utilization among Family Members of Active Duty Servicemembers." The "Personality Disorders" section is the abbreviated title for "U.S. Military Discharges and Pre-Existing Personality Disorders: A Health Policy Review."

The overarching theme presented in Figure 1-1 is access to care. Each analysis within the dissertation is tied to this theme. Section 2 is "U.S. Military Discharges and Pre-Existing Personality Disorders: A Health Policy Review" (shortened to "Personality Disorders"). This section examines policies around loss of access to care for certain servicemembers diagnosed with a pre-existing personality disorder. As a result of the personality disorder diagnosis, some servicemembers will receive an administrative discharge and will lose current and future healthcare benefits (among other benefits). This loss of benefits is a significant interruption to the servicemember's access to care.

Section 3 is "Military Deployments and Mental Health Services Utilization among Family Members of Active Duty Servicemembers" (shortened to "Mental Health"). In this section, family members experience the stress of military deployments and some family members utilize mental health services during a specified deployment phase. This section demonstrates the need for access to mental health services for military family members during deployment phases.

Section 4 is "Transitioning to Patient-Centered Medical Homes: Associations with Appointment Availability" (shortened to "Medical Home"). In an effort to increase access, increase quality, and reduce healthcare costs, U.S. Navy primary care clinics are implementing the medical home model. This study examines the rate of change in appointment availability (an indicator of access) over time before and after a primary care clinic is certified as a Patient-Centered Medical Home (PCMH) by the National Committee for Quality Assurance (NCQA). Since prior research has not examined the rate of change in access before and after medical home certification, this analysis will

provide evidence as to whether medical home certification is associated with an increase or decrease in access to care for primary care patients.

The following subsections introduce the three topics in greater detail, highlight each study's rationale, and demonstrate how each topic will answer the overarching question as to how access to health services in today's military is changing and how various beneficiary populations are impacted.

1.1.1 U.S. Military Discharges and Pre-Existing Personality Disorders: A Health Policy Review

When a servicemember has a pre-existing personality disorder that interferes with performance of their duties, they may face discharge from the U.S. military. As a result of the discharge they are likely to lose their benefits – these benefits include, but are not limited to, their existing health insurance and future healthcare coverage through the Veterans Health Administration (VHA). This loss in benefits is an interruption to their access to healthcare. Ironically, the same healthcare system where the personality disorder diagnosis was made is also the same system that excludes the servicemember from future care.

It is estimated the Department of Defense (DoD) discharged approximately 26,000 servicemembers between 2001 and 2007 for a pre-existing personality disorder.[2] Some of these discharges were performed even though discharge protocol was violated. For example, some servicemembers with Posttraumatic Stress Disorder (PTSD) were discharged although procedural instructions prohibit such instances. The main issue is the impact of wrongful discharges on military servicemembers and how these discharges

affect each stakeholder – the section's three study objectives bring to light this issue in greater detail. The first objective is to identify and explore the stakeholders impacted by pre-existing personality disorder discharges. The second objective is to analyze the costs incurred to each stakeholder. The third objective is to provide feasible policy alternatives for future health policy.

1.1.2 Military Deployments and Mental Health Services Utilization among Military Family Members of Active Duty Servicemembers

Mental healthcare utilization can change over time as a result of life events. Understanding particular times of increased mental health service utilization is important when planning healthfcare services to certain populations in order to ensure adequate access to care. Military deployment marks a difficult time for some military families. There are distinct phases to a military deployment, which include pre-deployment, deployment, and post-deployment. Prior research showed associations with increased mental health services utilization for military family members during deployed periods when compared to non-deployed periods. This study goes one step further by longitudinally analyzing mental health services utilization over select deployment phases (i.e., pre-deployment, deployment 1, between deployments, deployment 2, post-deployment) when compared to a stable baseline phase.

The purpose of this study is to provide military leaders and the general public with a better understanding as to which deployment phases are associated with increased rates of mental health services utilization in order to protect the mental well-being of military families. The mental well-being of military families can impact military

readiness. To achieve military readiness, servicemembers need to remain focused and vigilant while performing military operations. If servicemembers are concerned (and as a result distracted) for their families well-being while deployed, military operations and other servicemembers are placed in harm's way. Since the U.S. military provides national security, the general public needs to have a vested interest in ensuring our military families have appropriate access to care.

1.1.3 Transitioning to Patient-Centered Medical Homes: Associations with Appointment Availability

Beginning in 2009, the U.S. military shifted the delivery of primary care in its clinics by implementing the PCMH. This section examines the longitudinal rate of change in appointment availability, an indicator of access, as primary care clinics are certified as PCMHs by the NCQA. Previous research as to whether the PCMH is associated with increased levels of access is inconclusive. The purpose of this section is to provide further evidence as to whether the PCMH is associated with increased, relatively similar, or decreased levels of access within the MHS.

1.2 CONCLUDING REMARKS

Each section on its own will contribute methodology, findings, and implications not addressed by prior research. Collectively, this dissertation highlights how access to care for today's military is changing. Examining how access to care changes is paramount to help improve the delivery of care within the military. Much attention in the gray literature and peer-reviewed literature focuses on healthcare delivery for Medicare, Medicaid, and the VA. Far less attention is devoted to the MHS, although all

four healthcare delivery systems are funded by taxpayers. While the MHS' population (approximately 9.5 million[1]) is far less than Medicare (approximately 52.3 million[3]), Medicaid (approximately 68.0 million[4]), and VA (approximately 21.8 million[5]) populations, this population consists of an all-volunteer force charged with maintaining the nation's security and global interests. The majority of servicemembers that leave the military will seek care through the VA, so the policies directly tied to the MHS will also have a downstream impact on the VA. As a result, it not only makes financial sense to improve the delivery of care to control public healthcare costs, but it makes intuitive sense to provide the best access to care possible to ensure our warfighters are healthy and can remain focused on their duties and ability to respond in any time of need.

2. U.S. MILITARY DISCHARGES AND PRE-EXISTING PERSONALITY DISORDERS: A HEALTH POLICY REVIEW*

2.1 INTRODUCTION

Since the onset of Operation Iraqi Freedom (OIF) / Operation New Dawn (OND) and Operation Enduring Freedom (OEF), claims have come forward the U.S. military wrongfully discharged enlisted servicemembers for a pre-existing personality disorder by failing to properly adhere to discharge protocol.[6] Some of the discharged servicemembers were even required to repay enlistment bonuses.[6] These assertions caught the attention of media outlets and the United States Senate, which forced a review of the then-current personality disorder discharge procedures.[7]

The core issue is the complexity of disentangling personality disorders to determine if the disorder pre-dates military service. Certain conditions such as traumatic brain injury (TBI) and posttraumatic stress disorder (PTSD) may also exacerbate personality disorder symptoms.[8] While the Department of Defense (DoD) has policies to guard against servicemembers with TBI or PTSD from being discharged due to a pre-existing personality disorder,[9] it has deviated from its guidelines for separating servicemembers.[10] It remains unknown how many servicemembers were discharged when separation protocol was violated and the extent of such impact to their lives. Key stakeholders in this issue include the Department of Veterans Affairs (VA), the DoD,

* This manuscript was previously published in *Administration and Policy in Mental Health* in November 2014 (doi 10.1007/s10488-014-0611-z).

and the discharged servicemembers. The purpose of this section is to explore personality disorders in the U.S. military, analyze inherent costs, and address potential policy alternatives. Information for this section was gathered from relevant peer-reviewed journal articles, government reports, Department of Defense instructions, and data made publicly available by the Department of Defense.

2.2 PERSONALITY DISORDERS IN THE U.S. MILITARY

2.2.1 U.S. Military Demographics

To comprehend the scope of personality disorders it is useful to understand the makeup of the U.S. military. This analysis only consists of the active duty population of the Army, Air Force, Navy, and Marine Corps. It is worth noting, however, Reserve and National Guard servicemembers, in addition to the Coast Guard, also encounter military discharges for pre-existing personality disorders. The total population of the four services in fiscal year 2012 is 1,388,028.[11] The Army is the largest military service comprised of servicemembers, followed by the Air Force, the Navy, and then the Marine Corps. [11] When in aggregate (i.e., officers and enlisted), 42.7% of all servicemembers are 25 years old or younger. [11] The average age of an enlisted servicemember is 27.4 years old.[11] Young, enlisted servicemembers make up the largest category of the military – they are also the group largely associated with discharges for personality disorders. More than 75% of enlisted men and 60% of enlisted women diagnosed with personality disorders are less than 21 years old.[12] Military rank is also a significant predictor for a mental disorder; low ranking enlisted servicemembers are at greater odds for mental disorders as compared to officers.[13]

2.2.2 Understanding Personality Disorders

The American Psychological Association recognizes 10 forms of personality disorders (paranoid, schizoid, schizotypal, antisocial, borderline, histrionic, narcissistic, avoidant, dependent, and obsessive-compulsive).[14] The most common types of personality disorders diagnosed in the military are obsessive-compulsive, paranoid, and schizoid.[15] Personality disorders typically present in adolescence or early adulthood, and can lead to marked difficulty in performing military duties.[16]

The United States has pre-screened military applicants for psychological abnormalities since World War I.[17] Screening efforts were further refined during World War II and this period marked a shift in reliance on intelligence testing in identifying psychological abnormalities.[17] Even during World War II, however, there was a divergent opinion as to whether servicemembers with pre-existing personality abnormalities could adequately serve in a military setting and perform their duties accordingly.[17] Today's military screening utilizes three components to identify psychological abnormalities – the Armed Services Vocational Aptitude Battery (ASVAB) which was introduced in 1968, the attainment of a high school diploma (significant predictor for finishing an enlistment term), and a general psychological evaluation in the Military Entrance Processing Station (MEPS).[17]

2.2.3 Discharge from the U.S. Military

Various classifications of military discharge can impact guaranteed benefits and can also impact future employment opportunities. There are two broad categories of discharges – punitive and administrative.[18] The punitive category contains discharges

related to disciplinary issues where the servicemember receives a *Dishonorable Discharge*.[19] Outcomes for administrative discharges are *Honorable, Under Honorable Conditions* (i.e., General Discharge), and *Under Other Than Honorable Conditions*.[19] Honorable, Under Honorable Conditions, and some forms of Under Other Than Honorable Conditions discharges may still qualify a servicemember to benefits through the VA.[20] Servicemembers discharged with a personality disorder could potentially receive any classification of discharge depending on service-specific guidelines and any pertinent circumstances upon exiting the military (e.g., disciplinary action).

Each military service classifies personality disorder discharges in separate ways. The U.S. General Accounting Office notes under the category of personality disorder, the enlisted servicemember is discharged from the Air Force and the Marine Corps as a fraudulent enlistment.[21] In contrast, the Army's classification falls under a failure to meet medical or physical standards.[21] The Navy, on the other hand, classifies this separation as an erroneous enlistment.[21]

Classifying discharges as fraudulent or erroneous may present contextual issues, because the classification implies the servicemember had implicit knowledge of the disorder prior to enlistment. There are three hypothetical cases of servicemembers that highlight these contextual issues with discharge classifications. The first case involves the servicemember that has a personality disorder, but does not know the disorder exists or believes the undiagnosed symptoms warrant no medical attention (this type of case exists as demonstrated by Mojtabai, Olfson, and Mechanic[22]). With this servicemember a discharge classified as erroneous or fraudulent is inappropriate as there was no implicit

knowledge of the disorder. The second hypothetical cases involves a servicemember that enlists with prior knowledge of the disorder, but withholds this information from officials at the time of enlistment. In this case the fraudulent or erroneous classification seems justified. The third case, possibly the rarest, entails a servicemember that disclosed the personality disorder at the time of enlistment, but was admitted to the military (either due to an approved medical wavier or disclosed information was overlooked). In this case classifying the discharge as erroneous or fraudulent is also unwarranted.

When servicemembers leave the military they can seek care through the VA if they had service in combat after November 1998.[23] The period of eligibility for VA care is five years from the date of military separation.[24] Under the Enhanced Eligibility criteria for Veterans with combat-related medical conditions associated with OIF / OND / OEF, there are no copays for combat-related medical conditions.[24] Veterans receive care based on specific priority ratings – there are a total of eight priority groups (Priority Group 1 has the highest priority, Priority Group 8 has the lowest priority). The existence of a personality disorder prior to enlistment may jeopardize future medical care in the VA. The possibility exists the DoD could pursue a discharge and discharge classification that would bar the servicemember from receiving VA medical care (once the personality disorder is determined it pre-dates military service). Alternatively, if the servicemember is discharged for a pre-existing personality disorder (with a discharge and discharge classification that allows for VA medical care of other service-related conditions), the servicemember may decide not to pursue care as a result of becoming

marginalized by the government. Servicemembers involuntarily separated may also have eligibility up to 180 days of TRICARE coverage through the Transitional Assistance Management Program or 18 months of eligibility through the Continued Health Benefit Program, a premium-based program.[25] Eligibility for the Transitional Assistance Management Program is also dependent upon discharge classifications, which could vary depending on individual circumstances.[25]

2.2.4 Personality Disorder Separations

From 1990 to 1999 there were 13,921 military inpatient hospitalizations and 35,107 military outpatient visits resulting in a diagnosis of a personality disorder across the military services.[26] Almost half (47%) of all servicemembers hospitalized for a mental health disorder were discharged from the military within six months of the hospital discharge date.[26] Personality disorders and other neurotic conditions were the leading medical diagnoses that result in hospitalization for enlisted servicemembers with one to two years of military service from 2007 through 2012.[27] The DoD estimates 26,000 enlisted servicemembers were separated for the diagnosis of a personality disorder between November 2001 and June 2007.[2] This represents 2.6% of total enlisted discharges. Data on the number of inpatient hospitalizations and outpatient visits to coincide with the November 2001 to June 2007 timeline of personality disorder discharges are unavailable.

Involuntary separations associated with mental disorder hospitalizations are tied to misconduct, legal troubles, and alcohol / drug treatment failures.[28] Enlisted Sailors in the U.S. Navy with personality disorders are at greater odds for demotions, unauthorized

absences, and periods of desertion, along with short periods of service.[12] Enlisted servicemembers with personality disorders also have a higher association with suicidal tendencies.[29] It is unlikely a discharge for a pre-existing personality disorder occurred in the absence of disciplinary issues. This raises the question, however, whether the servicemember is discharged for a pre-existing personality disorder or whether the pre-existing personality disorder diagnosis is used as means to separate a servicemember facing disciplinary action.

2.3 THE COSTS OF PRE-EXISTING PERSONALITY DISORDERS

Given that the VA, DOD, and servicemembers (and their families) are all stakeholders impacted by pre-existing personality disorders, this section evaluates each perspective, analyzes the relevant costs, and provides recommendations for areas of future research. Overall, there is an inherent lack of data specifying the extent of mental health conditions that pre-date military service. This lack of information acts as a downward bias in realizing the impact of pre-existing medical conditions in each military service.[27]

2.3.1 U.S. Department of Veterans Affairs

The VA avoids costs in terms of disability payments and costs of medical treatment for pre-existing personality disorders as the condition does not qualify as service-related or service-aggravated. The VA is estimated to save between $3.65M and $1.14B annually by avoiding disability payments for personality disorders.[30] The annual cost estimate of $3.65M was derived from the 2,800 Veterans that served in the Iraq and Afghanistan wars from 2001 through 2007 and were discharged for a pre-existing

personality disorder. The annual cost estimate of $1.144B was if all 26,000 servicemembers that were discharged from the military from 2001 through 2007 received a 100% disability rating. Further research is needed to determine how many servicemembers were discharged for a pre-existing personality disorder when other mental conditions were present (e.g., TBI, PTSD) that would have barred discharge. Additionally, further research is needed to examine the costs of medical care required for someone discharged with a pre-existing personality disorder if the care were to take place in the VA setting.

2.3.2 Department of Defense

The DoD encounters sunk costs when servicemembers are discharged for pre-existing personality disorders. The Office of the Under Secretary for Personnel and Readiness estimates the combined costs of recruiting, entry screening, and training was approximately $20,000 in 1993.[31] The U.S. General Accounting Office estimates the Department of Defense spent $390M in FY 1996 ($585M in 2013 dollars) on new enlisted accessions that never made it to their first duty stations – they were discharged from training facilities.[21] Instruction in boot camp, for example, costs the U.S. Navy more than $4,700 (1997 dollars) to transport, house, feed, and train a new recruit.[32] In 1998, the U.S. General Accounting Office estimated training and recruitment costs at approximately $35,000.[33] Table 2-1 summarizes the three estimated costs in 2013 dollars and applies these figures to the number of enlisted personality disorder discharges that occurred between November 2001 and June 2007.

Table 2-1: Estimated Sunk Costs of Recruitment & Training for Personality Disorder Discharges

Fiscal Year	Estimated Costs	2013 Dollars	Estimated Discharges	Estimated Total Costs
1993	$20,000	$32,408	26,000	$842,612,420
1997	$4,700	$6,857	26,000	$178,274,200
1998	$35,000	$50,277	26,000	$1,307,212,140

This table combines several reports from the U.S. Government Accountability Office and applies the cost figures in 2013 dollars to the estimated discharges for personality disorder from 2001 – 2007 to arrive at a cost range estimate. The estimated total costs represent the estimated sunk costs (forgone opportunity cost) on the part of the DoD in enlisted servicemembers discharged for a pre-existing personality disorder. Estimated costs in 1997 are considerably lower than 1993 and 1998 as this figure is limited to costs incurred for recruit training only. The other cost figures comprise recruiting, entry, and initial training.

The annual total sunk cost for all enlistees that did not complete their first term of obligation is estimated at $1.3B in 1993.[33] To further clarify, the $1.3B ($2.1B in 2013 dollars) is the cost for all early discharges, not just costs related to personality disorders. If the $2.1B is extrapolated over the 2001 to 2007 time period ($12.6B), the percent of sunk costs attributed to pre-existing personality disorders to total sunk costs is estimated between 7% and 10.8%. Further research is needed to determine the potential costs of retaining a servicemember with a pre-existing personality disorder and treating them within the military setting. The research should also examine the extent to which a servicemember diagnosed with a personality disorder can adequately function in a military setting. This could then provide a basis in determining whether to retain a servicemember with a pre-existing personality disorder, especially if future incurred costs are less than estimated sunk costs (contingent on the servicemember's ability to adequately function).

2.3.3 Servicemember

The least researched area for pre-existing personality disorders in the military encompasses the perspective of costs to the discharged servicemember. Further research is needed to examine if medical treatment for other service-related conditions are impacted due to the exclusion of treatment for a pre-existing personality disorder in the VA. Additionally, further research is needed to study the opportunity costs incurred as a result of receiving an administrative discharge on employment or educational opportunities.

2.4 RECENT EVENTS AND CONSEQUENCES

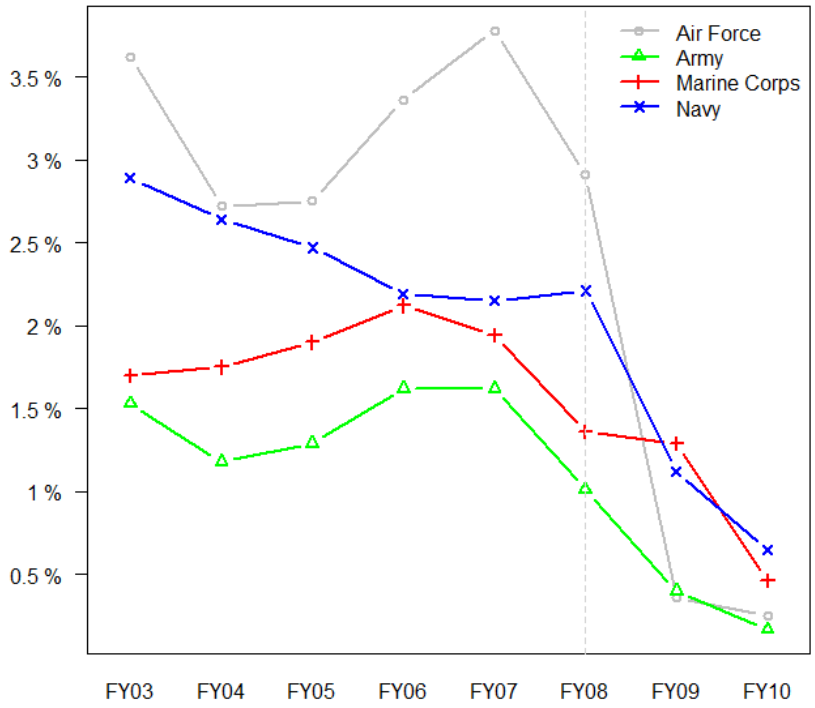
2.4.1 Recent Course of Events

In August 2008 the DoD enforced additional requirements for each military service when separating servicemembers on the basis of a pre-existing personality disorder.[9,10] First, the servicemember must receive notification he or she is undergoing separation for a personality disorder.[10] Second, prior to the notification, the servicemember must receive a diagnosis of a personality disorder by a credentialed psychologist or psychiatrist with the determination the disorder interferes with the servicemember's ability to serve in the armed forces.[10] Third, the servicemember must receive formal counseling about the condition and their ability to adequately function in the armed forces.[10] Lastly, the service must examine the possibility of whether another underlying medical condition is present (e.g., TBI, PTSD) if the servicemember deployed to a combat zone within the past 24 months from the time of diagnosis.[9,10]

2.4.2 Intended Consequences

Discharges for pre-existing personality disorders decreased 31% in 2008 from 2007.[6,9,34] A direct correlation between the new guidelines issued in 2008 and the decrease in personality disorder discharges is unknown. It is possible Commanding Officers are less likely to discharge someone under the basis of a personality disorder given the added scrutiny on the subject. Figure 2-1 trends discharges for pre-existing personality disorders by military service.[6,9,11,34]

Figure 2-1: Enlisted Personality Disorder Discharges to all Enlisted Discharges



This figure combines data from the Department of Defense made publicly available through the Freedom of Information Act and by public data from Military One Source.[6,9,11,34] Percentage of enlisted personality disorder discharges compared to all enlisted discharges from fiscal years 2003 through 2010. The updated personality disorder discharge policy was instituted in August 2008. In fiscal year 2009 there was a sharp decline in the percentage of enlisted personality disorder discharges to all enlisted discharges.

2.4.3 Unintended Consequences

As the number of personality disorders sharply decreased following the updated policy, there is growing concern discharges for adjustment disorders are replacing discharges for personality disorders.[6] An adjustment disorder involves the manifestation of behavioral or developmental symptoms in response to specific stressors of a psychological nature.[35] Discharge for an adjustment disorder falls outside the scope of the updated discharge requirements.[16] Additionally, adjustment disorders did not receive the media attention, inclusion into the U.S. Government Accountability Office's reports, and was not part of U.S. House of Representatives' testimony that shed light on the personality disorder discharges.[7] As a result, servicemembers are still subject to discharge with the same outcome only with a different diagnosis.

2.5 POLICY OPTIONS AND CONCLUSION

As a result of incremental policy over the past several years, further action is recommended. This section provides four potential policy alternatives to address discharges for pre-existing personality disorders. These options include strengthening current screening provisions, applying a sunset provision, maintaining current policy, or providing benefits through the VA.

2.5.1 Strengthen Screening Provisions

From 2007 through 2011 there were 7,037 military discharges for psychiatric conditions that existed prior to service.[27] It is unknown the percentage of these discharges that were administrative or punitive. These discharges represent servicemembers that passed initial screening parameters at Military Entrance Processing

Stations and comprise 22.8% (N=30,842) of all discharges for medical reasons that pre-existed military service. Psychiatric conditions ranked third (12.5%) among disqualification classifications of first-time active duty applicants in 2012.[27] In a study of new Sailors in the U.S. Navy, half of the personality disorder diagnoses were attributed to existing prior to military service.[12] This finding is also consistent with Soldiers in the U.S. Army.[13]

One policy recommendation is to strengthen screening provisions by implementing a personality disorder screening tool in MEPS, such as the two-minute Schizotypal Personality Questionnaire-Brief (SPQ-B) described by Raine and Benishay.[36] A tool such as the SPQ-B may prove beneficial in the applicant screening phase as it is administered quickly and is one additional tool the medical practitioner examining the applicant could use to determine if a personality disorder exists. The positive aspect of this recommendation is the efficiency of a questionnaire's administration at the time of screening. Its drawback may come in the form of its sensitivity for identifying pre-existing personality disorders. Take the case of servicemembers that pass the initial screening (hypothetically assuming the questionnaire is in use at MEPS), but are later identified as having a pre-existing personality disorder once in military service. This then creates a complex scenario for handling a potential discharge and its classification, or deciding to retain the servicemember and classifying the disorder as service-related or service-aggravated.

2.5.2 Sunset Provision

Weiser describes the option of a sunset provision in lieu of abandoning the policy outright.[37] For example, a sunset provision would only allow discharges for pre-existing personality disorders to occur within the first six months of service.[37] After six months the personality disorder is considered service-related or service-aggravated. Approximately half of all personality disorder diagnoses are made before the servicemember has completed one year of service.[12] This policy recommendation's benefit is in the form of leaving Commanding Officers with considerable flexibility for managing their servicemembers accordingly. Its inherent drawback, however, is the provision's applicability if an event manifests after six months into the servicemember's career, but was determined to pre-exist military service.

2.5.3 Maintain Current Policy

In a review of adherence to service protocols when separating for personality disorders, the U.S. Government Accountability Office noted stark discrepancies in each service's ability to follow its own guidelines for discharging servicemembers with a personality disorder.[10] For the three requirements (i.e., proper notification, diagnosis, and formal counseling) no service achieved compliance by the U.S. Government Accountability Office's standards. The only service to achieve compliance in two of the three categories was the Air Force.[10]

The DoD could maintain its current policies with the updated August 2008 provisions. If this option was pursued, the first step is to increase compliance for service-specific discharge procedures. As the U.S. Government Accountability Office

made clear, no service was able to achieve compliance in any three of the discharge requirements.[10] Maintaining the existing policy and increasing compliance would help to reduce claims of alleged negligence on behalf of the military services for erroneous discharges (the benefit to the policy recommendation). This recommendation's negative aspect is its lacking ability to provide medical care and benefits for servicemembers that had no prior knowledge of their personality disorder or did not believe their symptoms warranted medical attention, as they are still subject to discharge.

2.5.4 Provide Care at Department of Veterans Affairs

This policy option provides servicemembers discharged for a pre-existing personality disorder care at the VA regardless of the pre-existing context. If an agreement for providing medical care at the VA is made for servicemembers discharged for a pre-existing personality disorder, the question arises as to which category they fall under. For example, Priority Group 1 includes Veterans with greater than 50% disability and Priority Group 3 includes Medal of Honor recipients, Prisoners of War, and Purple Heart recipients.[23] The benefit of this policy recommendation is servicemembers without prior knowledge of their personality disorder are eligible to receive medical care. The negative aspects for this policy recommendation are twofold. First, if personality disorder Veterans are placed in higher prioritization categories, it may seem incongruent with the Veterans currently in these categories (e.g., Medal of Honor recipients). Second, if the Veterans are placed in lower prioritization categories, it may appear only as if incremental reform occurred. Table 2-2 outlines the various policy options and the impact each option may have on the stakeholders.

Table 2-2: Potential Alternatives and Impact to Each Stakeholder

	Strengthen Screening Provisions	Sunset Provision	Maintain Current Policy	Provide Care at VA
DoD	Could impact end-strength by limiting previously eligible servicemembers from joining; sunk costs are likely to decrease, but costs to screen for pre-existing personality disorders could increase at an unknown amount	Maintains flexibility for discharging servicemembers before sunset period expires; limited ability to remove servicemembers with actual pre-existing personality disorder after sunset period expires	Flexibility for discharging servicemembers with pre-existing personality disorder remains; will need to adhere to proper discharge protocol to demonstrate policy adherence	Servicemembers might enlist only with the intention to attain medical benefits through the VA - additional research is needed to determine what impact this may have upon end strength, morale, and military culture
VA	Likely no additional impact as pre-existing personality disorders are currently excluded from eligibility	More servicemembers could utilize the VA when their military obligation ceases	Likely no additional impact	Additional access to and utilization of services is likely as the number of eligible Veterans could increase
Service Member	Less servicemembers could gain entry into military service; servicemembers with pre-existing personality disorders that do pass screening (i.e., lack of system's sensitivity) will still face the obstacles currently encountered when discharged	Partially ensures servicemember can access some Veterans' benefits; servicemembers may conceal symptoms until sunset period expires before attempting to receive care; military applicants may explicitly deny known personality disorder to gain access to medical benefits	Care at VA is still excluded; future employment and educational opportunities are impacted depending on the type of discharge received	Guaranteed benefits are ensured; unknown how this option may impact military retention or end-strength – additional research is needed

This table examines the various policy alternatives and how each alternative may impact various stakeholders.

2.5.5 Closing Remarks

Discharges for pre-existing personality disorders may remain a contentious topic until further action is taken. The Committees on Armed Services of the Senate and House of Representatives have recently renewed their interest in pre-existing personality disorder separations. Contained within the National Defense Authorization Act for Fiscal Year 2014 is the stipulation the Comptroller General of the United States is to submit a report quantifying the extent of separations for pre-existing personality disorders and adjustment disorders.[37] Also, the report is to analyze the individual military services' ability to follow prescribed guidelines for separating servicemembers for a pre-existing personality disorder, and the impact these separations have on servicemembers attaining Veterans services.[37] The Comptroller General report may amplify whether previous deficits were corrected or if they are still persistent today.

3. MILITARY DEPLOYMENTS AND MENTAL HEALTH SERVICES UTILIZATION AMONG FAMILY MEMBERS OF ACTIVE DUTY SERVICEMEMBERS

3.1 INTRODUCTION

Since the onset of the wars in Iraq and Afghanistan (Operation Iraqi Freedom/Operation New Dawn and Operation Enduring Freedom) attention has increased on the importance of mental health among military servicemembers. An integral component, although far less studied, are the ties between mental health and military family members.[38] While military family members are not deployed to combat zones, their situation is no less challenging to that of their servicemember. In ways, the situation is unique – some military families have to shoulder the burdens of civilian life while managing the family with only one parent (while acknowledging not all military families consist of two married adults).[39] Deployments can create "deployment stress" in military spouses and can lead to depression and anxiety.[40] The military spouse is the linchpin to family health.[41] The majority (86%) of military spouses are women and previous research has found maternal mental health has spillover effects with the mental health of children.[42] Additionally, military families face uncertainty and experience anxiety about the safety of their deployed servicemember.[40] Military families must adapt to the dynamics of their situation, and readjust when their servicemember returns home. One important aspect is evaluating how mental health services utilization changes for military family members throughout a deployment. Prior studies have

shown that increased mental health services utilization is associated with deployments for both military spouses and military children. It remains unknown, however, if mental health services utilization changes over time when evaluated through the lens of deployment phases. The purpose of this study is to address this research gap with hopes of providing additional insight for military leaders when accounting for the health and well-being of military families when planning, preparing, and managing military deployments.

3.2 BACKGROUND

3.2.1 The At-Home Military Spouse

Military deployment marks a time when a military family, sometimes consisting of two married adults and children, now functions with one less adult – all the family responsibilities and duties normally carried out in tandem now fall to one.[40] Deployments associated with the Global War on Terror (GWOT) are typically longer than previous wars and 48% of servicemembers have deployed more than once.[43,44] Increased lengths of absence from a family and repetitive absences can increase the likelihood of stressful family events. In general, military spouses tend to exhibit greater levels of stress as compared to civilian norms,[45] and utilize mental health services at an increased rate when their servicemember is deployed.[46] Military spouses can experience increases in depressive, sleep, and adjustment disorders during periods of deployment.[46] Divorce in the military is nothing new – for years the rate of divorce in the military has greatly exceeded the rate of divorce in the civilian population.[11,47] The high rate of divorce may also point to the taxing and stressful lifestyle the military has on family

members. Also, the cumulative length of deployment seems to have a strong effect on the rate of divorce for both enlisted servicemembers and officers.[48]

There are distinct phases to a military deployment (i.e., pre-deployment, deployment, and post-deployment) and military family members may react differently to each phase.[40,49,50] Military spouses can better cope for an upcoming deployment with the knowledge of the deployment well in advance of the departure date.[39] In a prior attempt to assess reported stressors for Sailors attached to an aircraft carrier, 1.8% of the family members exhibited suicidal-related behavior during the pre-deployment phase (methodological limitations prevented assessment in the remaining deployment phases).[51] While 1.8% may appear trivial, one aircraft carrier can employ as many as 3,000 Sailors (referred to as ship's company). In this case, suicidal-related behavior could affect more than 50 individual families on one ship (this estimate does not include aircraft squadrons – another 2,000 Sailors).

3.2.2 The Military Child

Deployment is known to impact military children in profound ways. From increasing tendencies of internalizing and externalizing behaviors,[52,53] to altering physiological responses such as an elevated heart rate,[54] to even drastically increasing the odds of child maltreatment,[55] deployment has associative effects that can impact military children in a variety of scenarios. One out of three military children with a deployed parent is potentially at-risk for some sort of psychosocial morbidity.[41] When comparing military teenagers with and without a deployed parent, military teenagers with a deployed parent exhibit increased signs of behavioral health symptomatology.[56]

Prior research found military children with deployed mothers can exhibit increases in internalizing behavior.[53] The difficulties military children face with a parental deployment are noticed well beyond the constraints of the families themselves – teachers and school counselors often realize the impact a deployment has on a military child's behavior, social interactions, and emotions.[57]

Overall medical utilization for military children increases dramatically when their parent is deployed.[58] In the case of mental health diagnoses, there are significant increases for military children with a deployed parent when compared against other military children without a deployed parent.[59,60] Prior studies showed that certain factors such as age, gender, and marital status of the parents also play an important role when examining mental health services utilization in military children. The amount of mental health diagnoses for a child is higher when the military parent is male and the military spouse is female.[59] Well-child visit rates are increased while mental health diagnoses are decreased for married military parents during a deployment (as opposed to single parents).[59] The length of deployment may also impact the military child's ability to deal with life events when their parent is deployed.[57] Some of these observed differences in mental health services utilization of military children between married and single military parents, however, may correspond to extraneous factors such as the ability to navigate the military health system during a deployment (e.g., extended family caring for a military child during a single parent's deployment may have difficulty seeking care).

The research objective assesses the extent of change in the rate of mental health services utilization for military spouses and military children during various phases of a

military deployment. While military spouses and military children are closely related, two separate models are employed to analyze the utilization as there are hypothesized differences in utilization for each sample group. It is suspected military spouses experience significant changes in mental health services utilization during the pre-deployment and between deployment phases. Specifically, it is theorized military spouses experience a perceived crisis with the pending first deployment (utilization observed in the pre-deployment phase) and also with news of a second, unexpected deployment (utilization observed in the between deployment phase). Regarding military children, it is suspected mental health services utilization increases during the first deployment due to family separation and then also during the post-deployment phases (representing difficulties with family reunification).

3.3 DATA AND METHODS

3.3.1 Data Acquisition

Military medicine provides two sources of care to beneficiaries: direct care and purchased care. Direct care is provided in military hospitals and clinics. Purchased care is rendered by civilian providers in non-military hospitals and clinics. Data were collected from the Defense Health Agency's (DHA) Military Health System Data Repository (MDR) via an interactive interface, the Management Analysis and Reporting Tool (M2). All direct care mental health visits were extracted utilizing the Diagnosis-Related Group "mental health." Following methods previously utilized by Hoge et al, mental health visits from the purchased care setting were extracted from claims data by using mental health diagnoses classified by the ninth edition of the International

Classification of Diseases (ICD-9CM).[26] The settings of care where diagnoses were identified include family medicine, pediatric medicine, internal medicine, emergency medicine, and mental health practices. All data were collected with the unit of analysis at the person-month level. Institution Review Board approval was obtained from Texas A&M University (2014-0826M) and DHA (CDO-15-2008). Permission to use the data were obtained from DHA (data sharing agreement # 15-1276). Data management was completed using R software and statistical analysis was performed using SAS software.

3.3.2 Study Sample

This study utilizes a retrospective, longitudinal approach evaluating outpatient mental health services utilization from military health insurance claims of family members whose servicemember is assigned to an aircraft carrier. While there are currently 10 active aircraft carriers with the U.S. Navy's fleet, this study only analyzed one aircraft carrier. The time period includes 36 months of data from 2011 through 2014. To avoid censoring (i.e., only evaluating mental health services users) with family members associated with the aircraft carrier, data from health insurance claims were combined with data showing which family members were associated with the aircraft carrier.

Table 3-1 outlines the 36-month time period of study with corresponding deployment phases. A pre-deployment phase is the time period before the ship deploys. Deployment marks the time when the ship is underway and post-deployment encompasses the time when the ship has returned from deployment. A yard period represents an overhaul period where the ship undergoes extensive upgrades and

maintenance. While the yard period extended well beyond five months, the beginning five month period was used to capture this phase as a baseline period.

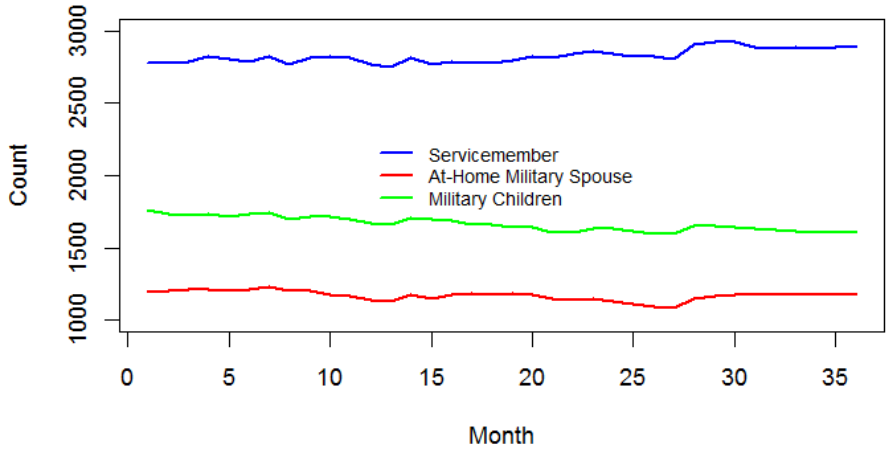
Table 3-1: Time Period of Study

Phase	# Months	Corresponding Time
Pre-Deployment	5	March 2011 – July 2011
Deployment 1	7	August 2011 – February 2012
Between	6	March 2012 – August 2012
Deployment 2	8	September 2012 – April 2013
Post-Deployment	5	May 2013 – September 2013
Yard Period	5	October 2013 – February 2014

The table above outlines the deployment phases and the corresponding time period for each phase. As a Yard Period lasts longer than five months, only the beginning of the period was used in the study as a baseline category.

During the study timeframe, family member enrollment to the aircraft carrier was relatively stable. By nature of military assignments, it is typical for military families to move to a new duty station, on average, every two to three years.[61] As such, not all military families were observed during the entire study period. Figure 3-1 provides a graphical representation of enrollment by beneficiary category throughout the course of the study period.

Figure 3-1: Enrollment by Beneficiary Category



The above figure outlines three beneficiary categories of enrollment to the aircraft carrier during the study period. Enrollment for all three beneficiary categories remained relatively stable.

For purposes of this analysis, a military spouse is married to an active duty servicemember, as identified through the Defense Eligibility Enrollment Reporting System (DEERS) as having dependent benefits of the servicemember. There is no assumption made as to the employment or military status of the military spouse, as this level of detail is not available. With respect to this analysis, military children are defined as children of military servicemembers less than 18 years of age and also classified as a dependent of the servicemember via the Defense Enrollment Eligibility Reporting System (DEERS).

3.3.3 Analysis

Both models were analyzed through a generalized estimating equation (GEE) with a negative binomial distribution, due to over dispersion concerning mental health visits (i.e., the variance exceeds the mean). When dealing with correlated observations,

GEE is able to model the average response of individuals within a population while a working correlation matrix is estimated.[62] The equation fit for each model is as follows,

$$E(Y|B) = \beta_0 + \beta_1 P_1 + \cdots + \beta_5 P_5 + \beta_6 t + \beta_7 (P_1 \times t) + \cdots + \beta_{11} (P_5 \times t) + \sum_{i=12}^{16} \beta_i Z_{(i-11)},$$

where Y is the average number of outpatient mental health visits, P_1through P_5 correspond to the deployment phases (pre-deployment, deployment 1, between deployments, deployment 2, post-deployment), t corresponds to time (month), and Z corresponds to time-invariant and time-varying covariates. These previously mentioned covariates include gender, mean-centered age (to provide more intuition focusing on average age), the number of months attached to the ship, corresponding number of children in the family, and sponsor rank category. When evaluating whether mental health services utilization changes over time of deployment phases, H_0 assumes $\beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = 0$ ($\alpha = 0.05$). The working correlation matrix was specified as exchangeable, but was also tested utilizing autoregressive and independent to ensure the empirical standard errors did not fluctuate (to evaluate model stability).

3.4 RESULTS

3.4.1 At-Home Military Spouses

Twenty percent of military spouses had at least one mental health visit during the study timeframe. Table 3-2 provides demographic and summary information for military spouses with regard to their mental health services utilization status. There are differences between military spouses that utilized mental health services and those spouses that did not utilize services during the study period. Specifically, more women

tend to utilize mental health services, the associated ethnicity of the sponsor is white for users, users are associated with the aircraft carrier for longer periods of time, users have more children, and a greater proportion of users are associated with the sponsor rank category of senior enlisted.

Table 3-2: Key Summary Statistics of Military Spouses

Characteristic	**≥1 M.H. Visit(s) (N = 512)**	**No M.H. Visits (N = 2,018)**	**P-value**
Military Spouses			
Age (years), Mean (S.D.)	30.7 (7.5)	30.1 (8.0)	0.12
Female, No. (%)	485 (94.7%)	1,817 (90.0%)	< 0.01
Sponsor ethnicity, No. (%)			
American Indian	20 (3.9%)	101 (5.0%)	
Asian	19 (3.7%)	160 (7.9%)	
Black	36 (7.0%)	248 (12.3%)	< 0.01
Hispanic	84 (16.4%)	361 (17.9%)	
White	328 (64.0%)	1,059 (52.5%)	
Other	25 (4.8%)	86 (4.2%)	
Months attached to carrier, No. (%)	26.5 (11.2)	20.5 (11.1)	< 0.01
Children in family, Mean (S.D.)	1.5 (1.3)	1.2 (1.2)	< 0.01
Sponsor rank category, No. (%)			
Junior enlisted	141 (27.5%)	721 (36.9%)	
Senior enlisted	313 (61.1%)	1,029 (50.9%)	
Warrant officer	10 (1.9%)	20 (0.9%)	< 0.01
Junior officer	21 (4.1%)	128 (6.3%)	
Senior officer	27 (5.2%)	112 (5.5%)	

M.H. = mental health, SD = standard deviation, No. = number. The above table presents summary statistics pertaining to military spouses. In instances where mean and standard deviations are presented, t-tests for analyzing differences were performed ($\alpha = 0.05$). In instances where frequencies and percentages are presented, chi-square tests were performed ($\alpha = 0.05$).

The majority of diagnoses for military spouses encompassed depressive, anxiety, and adjustment disorders. One-third of all military spouses with mental health services utilization had more than one type of primary mental health diagnosis. Table 3-3 presents the top 10 mental health diagnoses for military spouses.

Table 3-3: Top 10 Mental Health Diagnoses for Military Spouses (Total Visits = 2,737)

#	%	Description
1	17%	Depressive disorder, not elsewhere classified
2	16%	Anxiety state, unspecified
3	11%	Adjustment disorder with mixed anxiety and depressed mood
4	11%	Attention deficit disorder without mention of hyperactivity
5	10%	Generalized anxiety disorder
6	9%	Major depressive affective disorder, recurrent episode, moderate
7	8%	Posttraumatic stress disorder
8	7%	Dysthymic disorder
9	6%	Adjustment disorder with anxiety
10	4%	Unspecified episodic mood disorder

The table above presents the top 10 mental health diagnoses for military spouses during the entire study period. The percentage column lists the proportion of diagnoses of interest to total diagnoses. During the entire study period, 512 spouses out of 2,018 total spouses utilized mental health services.

Deployment phases are compared against the baseline period (yard period) through incident rate ratios (IRRs). An incident rate ratio is the exponentiated model coefficient (each model coefficient represents the difference in the log expected count for mental health visits given a one-unit increase in the covariate of interest). Deployment 1, between deployment stage, and deployment 2 phases have significantly higher mental health services utilization for military spouses as compared to the yard period (baseline). From the model, the first deployment had expected mental health services utilization rates upwards of 20% as compared to the yard period (holding all

other variables constant). In the same vein, between and deployment 2 phases have expected mental health services utilization rates of 15.4% and 12.6% as compared to the yard period, respectively (holding all other variables constant). The pre-deployment and post-deployment phases did not reveal any statistical differences from the yard period. Table 3-4 presents the adjusted incident rate ratios for the GEE model results regarding mental health services utilization for military spouses. A Wald chi-square test with contrasts for interactions with time and deployment phases demonstrated statistically significant differences in rates of change between all phases ($\chi^2 = 12.83$, df = 5, p-value = 0.02).

Table 3-4: Adjusted Incident Rate Ratios GEE Model Results –Military Spouses

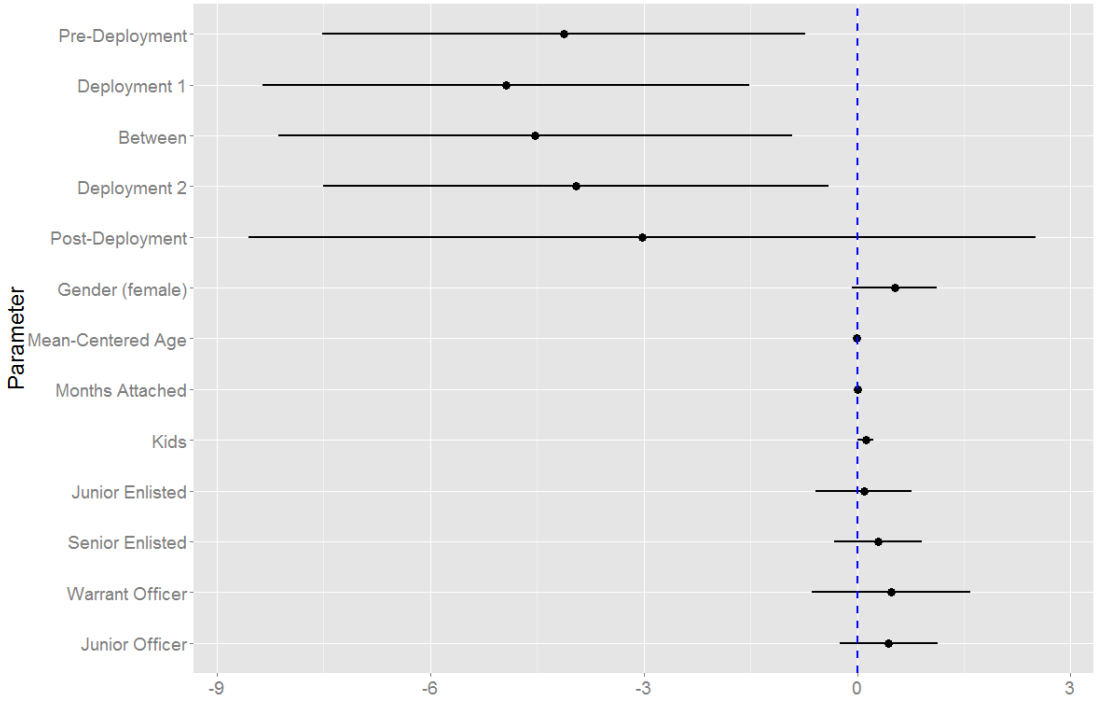
Covariate	IRR	95% IRR CI
Time	0.892 *	[0.808 – 0.985]
Deployment Phase with Time Interaction		
Pre-Deployment	1.069	[0.936 – 1.220]
Deployment 1	1.201 **	[1.072 – 1.345]
Between	1.154 *	[1.019 – 1.308]
Deployment 2	1.126 *	[1.008 – 1.257]
Post-Deployment	1.090	[0.913 – 1.301]
Yard Period	1.000	-

*IRR = Incident Rate Ratio, 95% IRR CI = 95% Incident Rate Ratio Confidence Interval. The table above displays adjusted incident rate ratios for the covariates of main interest in the model (i.e., time and time with deployment phase interactions) ($\alpha = 0.05$). The model was adjusted for mean-centered age, gender, the number of months attached to the aircraft carrier, the number of children in the family, and the associated rank of the servicemember. The IRRS were calculated by exponentiating model estimates. * = p-value < 0.05, ** = p-value < 0.01.*

Model adequacy was evaluated with transformed residuals utilizing Cholesky decomposition and lowess curves for fitted values and the covariates of main interest.

The lowess curve did not depart from zero, which provided indication of a model with adequate fit. For additional insight into the remaining model parameters, Figure 3-2 displays the remaining coefficient estimates and respective 95% confidence intervals. All values with confidence intervals encompassing 0 are not statistically significant (all values without intervals including 0 are statistically significant, as these estimates and intervals are presented in log-scale).

Figure 3-2: Coefficient Estimates and 95% Confidence Intervals –Military Spouses



The above forest plot presents coefficient estimates and 95% CIs from the military spouses GEE model. This plot is presented in the log-scale, so all intervals that include 0 are not statistically significant ($\alpha = 0.05$).

3.4.2 Military Children

Eleven percent of military children experienced at least one mental health visit during the study timeframe. Table 3-5 provides demographic and summary information for military children with regard to their mental health services utilization status. There are observed differences between military children that utilized mental health services and those children that did not utilize mental health services during the study period. Specifically, there are differences between the ages of mental health services users, as mental health services users are typically older. The mental health services users are more likely to be male (as opposed to findings with military spouses). The mental health services users among military children are associated with the aircraft carrier for a longer period of time (a similar finding as with military spouses). Military children that utilize mental health services tend to have more siblings in the family (a similar finding as with military spouses). Lastly, the associated rank category of the sponsor is typically senior enlisted (a similar finding as with military spouses).

Table 3-5: Key Summary Statistics of Military Children

Characteristic	≥1 M.H. Visit(s) (N = 405)	No M.H. Visits (N = 3,046)	P-value
Military Children			
Age (years), Mean (S.D.)	10.4 (4.6)	7.4 (5.7)	< 0.01
Female, No. (%)	153 (37.3)	1,521 (49.9%)	< 0.01
Sponsor ethnicity, No. (%)			
American Indian	17 (4.2%)	153 (5.0%)	0.09
Asian	27 (6.7%)	255 (8.3%)	
Black	45 (11.1%)	393 (12.9%)	
Hispanic	51 (12.6%)	490 (16.1%)	
White	254 (62.8%)	1,671 (54.9%)	
Other	10 (2.4%)	81 (2.6%)	
Months attached to carrier, No. (%)	28.0 (10.7)	21.8 (11.7)	< 0.01
Siblings in family, Mean (S.D.)	1.5 (1.0)	0.8 (0.9)	< 0.01
Sponsor rank category, No. (%)			
Junior enlisted	30 (7.4%)	559 (18.3%)	< 0.01
Senior enlisted	324 (80.0%)	1,962 (64.4%)	
Warrant officer	6 (1.4%)	61 (2.0%)	
Junior officer	28 (6.9%)	243 (7.9%)	
Senior officer	17 (4.1%)	221 (7.2%)	

M.H. = mental health, SD = standard deviation, No. = number. The above table presents summary statistics pertaining to military children. In instances where mean and standard deviations are presented, t-tests for analyzing differences were performed ($\alpha = 0.05$). In instances where frequencies and percentages are presented, chi-square tests were performed ($\alpha = 0.05$).

As opposed to military spouses, the top diagnoses for military children revolved around attention deficit and autistic disorders. While the diagnoses for these two categories may not have a clear connection between the reason for the diagnosis and a deployment phase, removing visits related to attention deficit disorder and autism could result in potential biases (if not impacted by deployment phases, the percentage of visits

for these categories should remain consistent). As such, the visits related to these diagnoses were left in place in order to capture the true utilization throughout the study period. Sixteen percent of military children with mental health services utilization had more than one type of primary mental health diagnosis. Table 3-6 outlines the top 10 mental health diagnoses for military children during the study period.

Table 3-6: Top 10 Mental Health Diagnoses for Military Children (Total Visits = 3,133)

#	%	Description
1	42%	Attention deficit disorder with hyperactivity
2	30%	Autistic disorder, current or active state
3	5%	Unspecified adjustment reaction
4	5%	Childhood disintegrative disorder, current or active state
5	4%	Adjustment disorder with depressed mood
6	4%	Adjustment disorder with mixed disturbance of emotions and conduct
7	3%	Major depressive affective disorder, single episode, severe
8	3%	Other specified pervasive developmental disorders, current or active state
9	3%	Unspecified disturbance of conduct
10	2%	Oppositional defiant disorder

The table above presents the top 10 mental health diagnoses for military children during the entire study period. The percentage column lists the proportion of diagnoses of interest to total diagnoses. During the entire study period, 405 children out of 3,451 total children utilized mental health services.

The only phase that differed from the yard period (baseline) was the pre-deployment phase, where expected mental health services utilization for military children was 9.4% less than the baseline yard period (holding all other variables constant). There were no other statistically significant differences in deployment phases when compared to the baseline yard period. Table 3-7 presents the adjusted incident rate ratios for the GEE model results regarding mental health services utilization for military children. A Wald chi-square test with contrasts for deployment phases demonstrated

statistically significant differences in rates of change between all phases with time interaction ($\chi^2 = 12.80$, df = 5, p-value = 0.02).

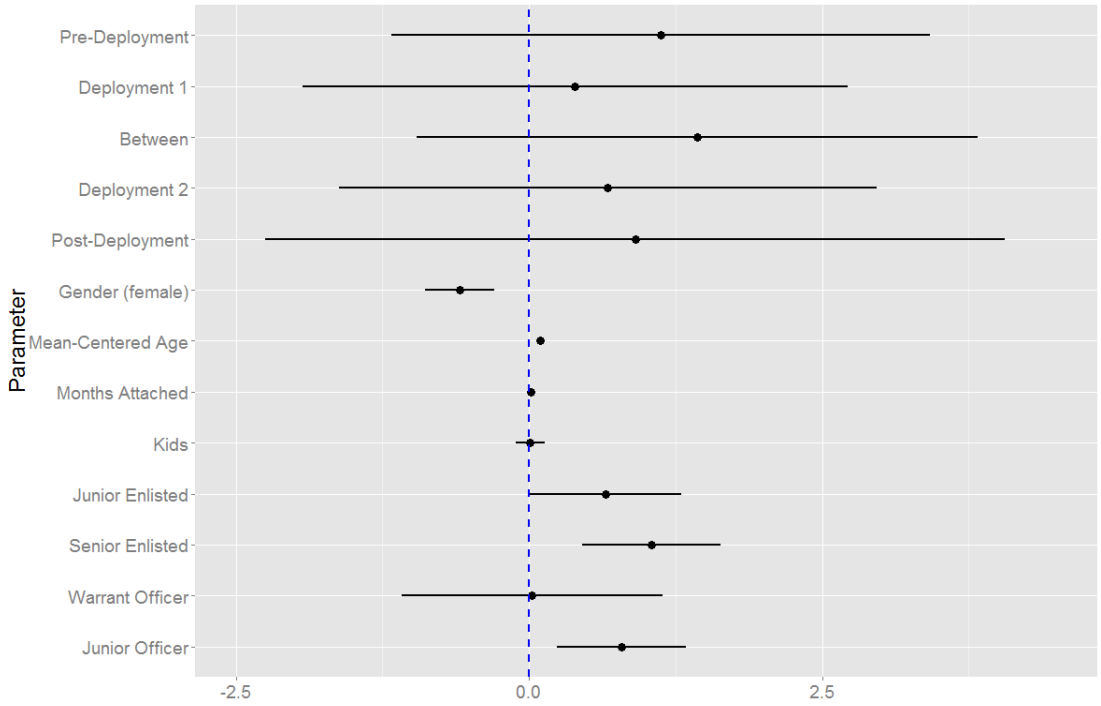
Table 3-7: Adjusted Incident Rate Ratios GEE Model Results – Military Children

Covariate	IRR	95% IRR CI
Time	1.026	[0.959 – 1.097]
Deployment Phase with Time Interaction		
Pre-Deployment	0.906 *	[0.826 – 0.992]
Deployment 1	1.028	[0.949 – 1.114]
Between	0.942	[0.868 – 1.022]
Deployment 2	0.986	[0.919 – 1.058]
Post-Deployment	0.971	[0.879 – 1.074]
Yard Period	1.000	-

*IRR = Incident Rate Ratio, 95% IRR CI = 95% Incident Rate Ratio Confidence Interval. The table above displays adjusted IRRs for the covariates of main interest in the model (i.e., time and time with deployment phase interactions) ($\alpha = 0.05$). The model was adjusted for mean-centered age, gender, the number of months attached to the aircraft carrier, the number of children in the family, and the associated rank of the servicemember. The IRRS were calculated by exponentiating model estimates. * = p-value < 0.05, ** = p-value < 0.01.*

Examining adequacy of the model fit with transformed residuals and lowess curves (methods are the same as to the military spouses model) did not reveal any meaningful departures from zero, which is suggestive of a model with adequate fit. Figure 3-3 displays coefficient estimates and 95% confidence intervals (presented in the log-scale) for military children.

Figure 3-3: Coefficient Estimates and 95% Confidence Intervals – Military Children



The above forest plot presents coefficient estimates and 95% CIs from the military children GEE model. This plot is presented in the log-scale, so all intervals that include 0 are not statistically significant ($\alpha = 0.05$).

3.5 DISCUSSION

This analysis demonstrated associations with changes in rates of mental health services utilization for military spouses and military children when compared with corresponding deployment phases. For military spouses, there are observed differences (increases ranging between 12% and 20%) in mental health services utilization for the first deployment, between deployment, and second deployment phases when compared to the baseline yard period. The original study hypotheses theorized mental health services utilization would increase for periods of pre-deployment and between deployment phases for military spouses. Study findings only partially support this

hypothesis, pointing to the association between increased mental health services utilization in the between deployment phase. The increase in mental health services utilization for the first deployment, in between phase, and second deployment could have association with the situation the military spouse is shouldering additional responsibilities and experiencing mental stressors due to the absence of the servicemember. Given that the pre-deployment phase is a busy time for military families, it is plausible that seeking mental health services for stressors associated with this deployment phases were put on hold until the deployment occurred.

With regard to military children, observed differences in mental health services utilization were only found with the pre-deployment phase (a decrease of approximately 9%) as compared to the baseline yard period. Military children were suspected to have increased mental health services utilization during the first deployment and post-deployment phases. Study findings do not support this hypothesis as there were only observed differences for the pre-deployment phase. One plausible explanation of the decrease in mental health services utilization for the pre-deployment phase is also due to the busy time period before deployment. Much like the busy time the pre-deployment phase encompasses for military spouses, it is entirely plausible that the child's parents held off on mental health services for their children until the deployment actually took place.

In the case of this study, the aircraft carrier experienced a second deployment that was largely unexpected, but rumors circulated among the crew for a number of months. Anecdotally, the unconfirmed rumors created a considerable amount of stress

with families as there was little time to make preparations common with deployment (e.g., family relocates closer to extended family for support, putting belongings in storage, selling vehicles). As global security and crises emerging throughout the world may limit the amount of advanced notice of a deployment, military leaders should continue to keep their servicemembers well informed of a potential deployment. A prior study found military spouses' abilities to cope with a deployment was positively associated with advanced notice of the deployment.[39] This study supports this finding, as increased rates in mental health services utilization were associated with the between deployment phase for military spouses. The between deployment phase represented a time of uncertainty and reports of a second deployment were not readily confirmed until late in this phase, so it is highly probable military families were experiencing stressful times.

This study is not without its limitations. As this study is observational in nature and utilizes secondary administrative data, definitively tying mental health visits to a corresponding deployment phase will never occur. Certain delays, such as appointment wait time, may confound whether the appointment need corresponds to a specific deployment phase or the deployment itself. It is highly probable that military family members receiving treatment for mental health have no issues when dealing with the stresses of a military deployment. Furthermore, it is unknown whether one visit is associated with a prior visit (e.g., follow-up care) or if the visit is separate in clinical nature. Study findings for military children could potentially be confounded by factors

to include the mental well-being of parents caring for the children (e.g., parents act as gatekeepers to their children receiving medical care).

Future studies could look to incorporate "episodes of care" when evaluating mental health services utilization utilizing insurance claims or other administrative data.[63] Collapsing visits into episodes of care could potentially mitigate the confounder of follow-up versus new / single-episode points of care. Future studies should evaluate the association between overall medical utilization for military children with military spouses receiving mental health services against those not receiving mental health services during a deployment period. Additionally, future studies should also evaluate the mental health services utilization of military families by military service and job classification of the deployed servicemember.

Overall, this study highlights the important mental health needs of military servicemembers and their families. Military family members have a unique burden placed upon them throughout their servicemember's military career. When a servicemember knows his or her family is mentally prepared to cope with separation through a military deployment, the servicemember can continue to focus on the mission at-hand and look forward to returning home safely.

4. TRANSITIONING TO PATIENT-CENTERED MEDICAL HOMES: ASSOCIATIONS WITH APPOINTMENT AVAILABILITY

4.1 INTRODUCTION

Recent implementation of the Patient-Centered Medical Home (PCMH) in U.S. Navy primary care clinics has gained significant traction and attention from leadership and policy makers. The PCMH is a healthcare delivery model encompassing distinguishable components and attributes – comprehensive care, patient-centeredness, coordinated care, accessible services, quality, and safety.[64] Also, in May 2014, the former Secretary of Defense, Mr. Chuck Hagel, ordered a full review of all military primary care clinics in an effort to assess access, patient safety, and quality.[65] This order came shortly after the revelation of secret waitlists for patients awaiting appointments at select Veterans Health Administration (VHA) facilities surfaced. While the review revealed no marked deficiencies in safety, quality, and access, the report acknowledged wide variability in facilities' performance.[66] In light of the momentum of clinics transitioning to a PCMH and Military Health System (MHS) review performed in 2014, one area not addressed by prior research is how appointment availability changes over time as U.S. Navy primary care clinics transition to PCMHs. Appointment availability is an important indicator of access, and access is also a central topic concerning PCMHs.

4.2 BACKGROUND

4.2.1 History of the Medical Home

Within the U.S. Navy, the PCMH is known as the Medical Home Port.[67] The Medical Home Port was implemented as part of system redesign to strengthen the delivery of primary care and properly manage patients with chronic conditions while reducing healthcare costs.[67] The PCMH is one area of redesign within primary care that has recently gained considerable traction in its philosophical beliefs of improving the way in which medical care is delivered in the primary care settings.[68] With its original roots in managing chronic conditions in pediatric primary care from the 1960s, a number of insurers, payors, and medical institutions have piloted the PCMH to improve the effects of the triple aim in primary care: reducing costs, increasing access, and improving quality.[69] The Under Secretary of Defense (Health Affairs) announced, in 2009, all three military services would formally adopt the PCMH as the means of delivering primary care within the MHS.[68,70] The first to venture with PCMH adoption in the Navy was Walter Reed National Military Medical Center's internal medicine clinic in 2008 (before the facility merged as a joint service medical facility).[67] Early evaluations found an increase in access, a reduction in emergency department utilization, and an increase in Healthcare Effectiveness Data and Information Set (HEDIS) measures.[71]

4.2.2 Jury Deliberations Continue

In a rebuttal commentary to an evaluation of the medical home in the *Journal of the American Medical Association*, the author commented "The patient-centered medical

home (PCMH) is not a pill. It would be much easier to evaluate this primary care reform if it were."[72] Within the past decade, a number of studies evaluating the effectiveness of the PCMH in civilian settings have left mixed reviews. Some studies note decreases in costs,[73] while others note no change.[74] On the topic of utilization, findings are also mixed. Evidence does suggest, however, the PCMH is associated with decreases in emergency room utilization for patients with chronic conditions.[75-78] Findings in the civilian setting mirror those within the U.S. Navy. In a recent review, naval military treatment facilities also had a wide variation in results when comparing PCMH patients with non-PCMH patients regarding inpatient admissions, pharmacy costs, total medical costs, ER utilization, and primary care utilization.[79,80]

4.2.3 The Wide Spectrum of Implementation

Primary care clinics may "plant" the medical home flag, but the spectrum of adoption and implementation of a PCMH can vary from selective implementation to full-fledged investment. One of the difficulties in evaluating the PCMH is the wide variation in the adopted principles, how they are interpreted, and determining how to best measure them.[81] In an effort to standardize the PCMH, the NCQA has set forth a certification process for medical homes, ranging from levels one to three – level three certification represents the highest degree of medical home implementation.[82] In May 2010, the U.S. Navy Surgeon General announced all primary care military treatment facilities (MTFs) would transition to the PCMH for delivering primary care and gain certification by the NCQA.[83] The NCQA is a non-governmental organization that provides certification for medical homes. The PCMH certification is not without its

critics; opponents contend the certification is process-based and focuses on clinics rather than patient outcomes.[81,84] As of February 2015, 104 of the Navy's 125 primary care clinics have received PCMH certification by the NCQA (96 of the certified clinics received level three recognition).

4.2.4 Access to Care

One principle of the PCMH is to provide increased access.[85] Access is a construct – it can hold numerous definitions and can be measured in many ways. This presents a challenge when attempting to evaluate access within PCMHs. In the most basic interpretation, access can be measured through in-person visits between patients and providers. As witnessed in early implementation of the PCMH within the MHS, tensions often arise between continuity of care between a patient and provider and the desire to offer same-day appointments, as the next available appointment may not always be with the patient's usual provider.[86] Same-day appointments are almost synonymous with open access scheduling.[87,88] As the PCMH principles foster increased access and continuity, there is a fine balance to strike between continuity and appointment availability. Continuity and appointment availability, however, are not two mutually exclusive events – there are ways to manage outpatient appointing so continuity and appointment availability both increase.[87]

4.2.5 Prior MHS PCMH Research

Formal criticism of the use of appointment availability in assessing access in PCMHs within the MHS has surfaced.[89] The claim contends appointment availability is not patient-centered and can be manipulated to distort the perception of access within a

clinic. As an alternative to measuring available appointments, the use of patient questionnaires to assess access has been recommended. Key predictors of patient satisfaction include perceived access to care and perceived continuity of care.[90] Patient questionnaires, however, are subject to selection bias and response bias.[91,92] At various military treatment facilities, patients have the ability to change primary care providers and whether they would like to be enrolled in the purchased care setting. If patients with negative experiences regarding access left the clinic, then bias is introduced in the current findings if recently transitioned enrollees are not questioned. In addition, patients may only respond to a questionnaire if they are extremely dissatisfied or extremely satisfied with their perceived access to care – a number of other confounders may exist that would limit or impact who responds to these questionnaires.[92] While all statistical measures can be negatively influenced or distorted,[93] including appointment availability metrics along with other measures of access (e.g., radiology practices employ the outpatient availability score) would help provide a more complete picture of the access construct.[94]

4.2.6 Face-to-Face Visits are the Core of Healthcare Delivery

Appointment availability for in-person office visits does not solely explain demand for medical care. Primary care in the MHS is meeting demand through delivery methods such as secure messaging, nurse-run clinics (e.g., Coumadin clinics, lipids clinics), and telephone consults. The use of electronic visits (e.g., messaging, telephone consults), however, does not decrease the demand for in-person medical encounters.[73,95] The face-to-face medical encounter remains the core of healthcare delivery. One

drawback of devoting additional time to the use of electronic visits is that it takes time away from providers that could be treating a patient in-person.

4.2.7 Study Intent

The intent of the analysis is to examine how appointment availability changes over time, from time of PCMH certification (level three) by the NCQA. It is theorized U.S. Navy primary care clinics improve appointment availability prior to certification, but then decrease appointment availability following certification. The reason for the hypothesized changed in appointment availability centers on the "what gets measured gets done" philosophy. As clinic managers and other leaders are preparing for certification they are perhaps *more* focused on improving appointment availability within the clinic. Once the clinic is certified as a medical home, attention may turn away from appointment availability and towards other projects or matters requiring attention.

4.3 METHODS

4.3.1 Study Design

This study utilizes a retrospective, longitudinal approach evaluating appointment availability at monthly intervals at the primary care practice-level (unit of analysis was clinic-month). The data are compiled by collapsing utilization from military health insurance claims of TRICARE beneficiaries enrolled to primary care clinics. The study examines the extent to which available appointments (for acute appointments) change over time as Navy primary care clinics certify as a PCMH by NCQA.

4.3.2 Data Acquisition

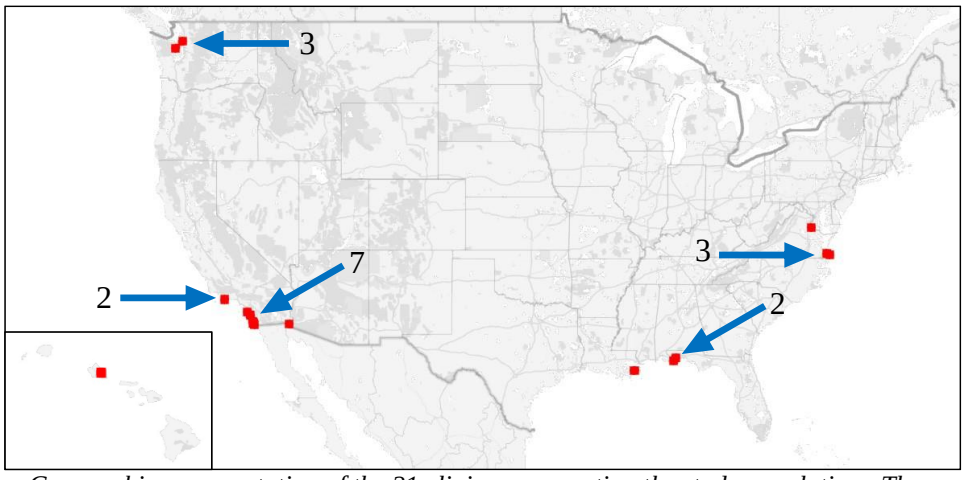
Data were collected from the Defense Health Agency's (DHA) Military Health System Data Repository (MDR) via an interactive interface, the Management Analysis and Reporting Tool (M2). Data for available appointments were collected from the Defense Health Agency's TRICARE Operations Center (TOC). Data on certification dates for Navy primary care clinics were provided by the Navy Bureau of Medicine and Surgery. Institution Review Board approval was obtained from Texas A&M University (2014-0826M) and DHA (CDO-15-2008). Permission to use the data were obtained from DHA (data sharing agreement # 15-1276).

4.3.3 Study Sample

The primary care clinics included in the study sample are distinct brick and mortar facilities located throughout the United States (including Hawaii) referred to as branch clinics. Military medical centers, such as Naval Medical Center San Diego or Walter Reed National Military Medical Center, contain several primary care practices within its walls. With the availability of the data systems, parsing out enrollment, utilization, and ancillary services within and between primary care clinics was not feasible for medical centers and standalone, large clinics (e.g., New England Health Clinic). Medical centers and large standalone clinics often have branch clinics located, for the most part, in the same geographic region. These branch clinics have their own enrollment and provide distinct medical and ancillary services (all of which are visible with the available data).

As of February 2015, there were 125 U.S. Navy primary care medical treatment facilities where TRICARE beneficiaries could be enrolled. For purposes of this analysis, primary care includes family medicine, pediatric medicine, and internal medicine (flight medicine and undersea medicine were excluded).[96] Due to perceived differences in obtaining medical services in civilian healthcare facilities for TRICARE beneficiaries overseas, study inclusion was limited to facilities in the United States. Data on PCMH certification were available for 54 clinics in the United States. Data on clinic characteristics, ancillary services, and ER visits were only available from 2011 – 2014. Working within the timeframe of an adequate pre- and post-certification period (14-pre months and 14-post months),[97] only 27 clinics met the necessary timeframe with available data. Data on available appointments were not available for the entire 2011 period. As such, 21 primary care clinics are included in the study. Figure 4-1 shows the geographic location of the U.S. Navy primary care clinics included in this study.

Figure 4-1: Geographic Representation of Study Clinics



Geographic representation of the 21 clinics representing the study population. The Arabic numerals identify the number of clinics within the specific region.

There were no significant differences between clinic characteristics, ancillary services, or ambulatory care sensitive ER visits between included and excluded clinics. Table 4-1 compares findings of the descriptive statistics for included and excluded clinics.

Table 4-1: Descriptive Statistics Comparison of Included and Excluded Clinics

	Included Clinics n = 21	Excluded Clinics n = 31	P-Value
Clinic Characteristics			
Patients Enrolled, mean (SD)	6,916.7 (4,944.0)	6,770.8 (5,206.3)	0.91
Practicing Providers, mean (SD)	17.3 (12.2)	18.6 (11.1)	0.68
Primary Care Visits, mean (SD)	791.0 (452.0)	1,164.3 (962.1)	0.07
Enhanced Charlson Index, mean (SD)	0.030 (0.016)	0.024 (0.013)	0.17
Ancillary Services			
Laboratory Procedures, mean (SD)	3,537.4 (5,818.5)	3,952.0 (6,143.3)	0.80
Radiology Procedures, mean (SD)	471.1 (447.4)	593.7 (719.2)	0.46
Pharmaceuticals Dispensed, mean (SD)	7,386.8 (7,099.8)	7,690.9 (6,141.1)	0.87
Ambulatory Care Sensitive ER Visits			
Direct Care, mean (SD)	80.0 (91.3)	51.1 (67.1)	0.20
Purchased Care, mean (SD)	159.2 (178.8)	206.6 (208.2)	0.39

SD = standard deviation. The above table examines included and excluded clinics in the analysis for clinic characteristics, ancillary services, and ambulatory care sensitive ER visits. Tests for differences were performed using a t-test ($\alpha = 0.05$).

4.3.4 Analysis

A linear mixed-effects regression model with linear splines and a natural log transformed dependent variable was used to evaluate changed in appointment availability over time. Within the model, each clinic has its own piecewise linear spline growth curve with a knot at the time of certification (time at centered at the month of certification). The growth is represented through an intercept and two slopes – one slope for the time prior to certification and one slope for the time after certification. Time before and after the knot (the knot represents certification) is the main element of interest. The dependent variable, appointment availability, is measured in terms of the "third next available appointment" for an acute appointments. Acute appointments are appointments that are supposed to be delivered within 24 hours from the time of the appointment request. The third next available appointment is measured as the "the

shortest time between 0830 and the first appointment slot for the third available appointment for all providers at a given clinic…"[98] Metrics on third next available appointments in the MHS are calculated daily for each direct care clinic. Third next available appointments were chosen over the use of next available appointments (or second next available appointments) to reduce the sensitivity of appointment availability when it comes to scheduling practices. The linear mixed effects model is as follows,

$$E(\log(Y_{ij})|b_i) = \beta_0 + \beta_1(t_{ij})_- + \beta_2(t_{ij})_+ + \beta_3 C_j + b_{0i} + b_{1i}(t_{ij})_- + b_{2i}(t_{ij})_+ + b_{3i}C_j + \sum_{k=4}^{13}\beta_k Z_{ij(k-3)},$$

let t_{ij} denote the time of the j^{th} measurement on the i^{th} clinic before or after medical home certification. β represents the population-averaged clinic effects and b represents the clinic-specific effects (when combined with β). Additionally, $(t_{ij})_- = (t_{ij})$ if $(t_{ij}) < 0$, and 0 otherwise; $(t_{ij})_+ = t_{ij}$ if $(t_{ij}) \geq 0$, and 0 otherwise. C_j is an indicator variable that represents certification (the month of certification also takes on the value 1). Z_k represent time-varying covariates. The time-varying covariates include (1) clinic characteristics (number of patients enrolled, the number of practicing providers, an interaction effect between enrollment and providers, the number of primary care visits, and the square root of the Enhanced Charlson index [to control for severity of illness]), (2) ancillary services (number of laboratory procedures, number of radiology procedures, number of pharmaceuticals dispensed), and (3) ambulatory care sensitive emergency room encounters (number of direct care and purchased care emergency room visits categorized as potentially avoidable [categorization based upon the New York University Emergency Department algorithm[99]]). Clinic characteristics were included to account for clinic size (e.g., enrollment) and potential confounders that could impact

third next available appointment (e.g., the number of providers in the clinic, severity of illness among patients). Ancillary services were included in the model to help account for clinic size, the amount of work performed within the clinic, and also to account for any changes in ancillary services associated with the PCMH (i.e., as care is now coordinated it is probable the number of ancillary services performed changed). The dependent variable, third next available appointment, was log transformed to maintain mixed effects model assumptions (i.e., normality). Polynomial splines were evaluated in the model against linear splines using fit statistics. Model fit was improved using linear splines. Additionally, providing inference on the rate of change pre- and post-certification is more intuitive with a linear rate of change as opposed to a polynomial rate of change. The null hypothesis assumes $\beta_1 = \beta_2$ (α = 0.05). Data management and statistical analysis were performed using R software.

4.4 RESULTS

Clinic characteristics, ancillary services, and ambulatory care sensitive ER visits did not change before or after certification (Table 4-2 presents these results).

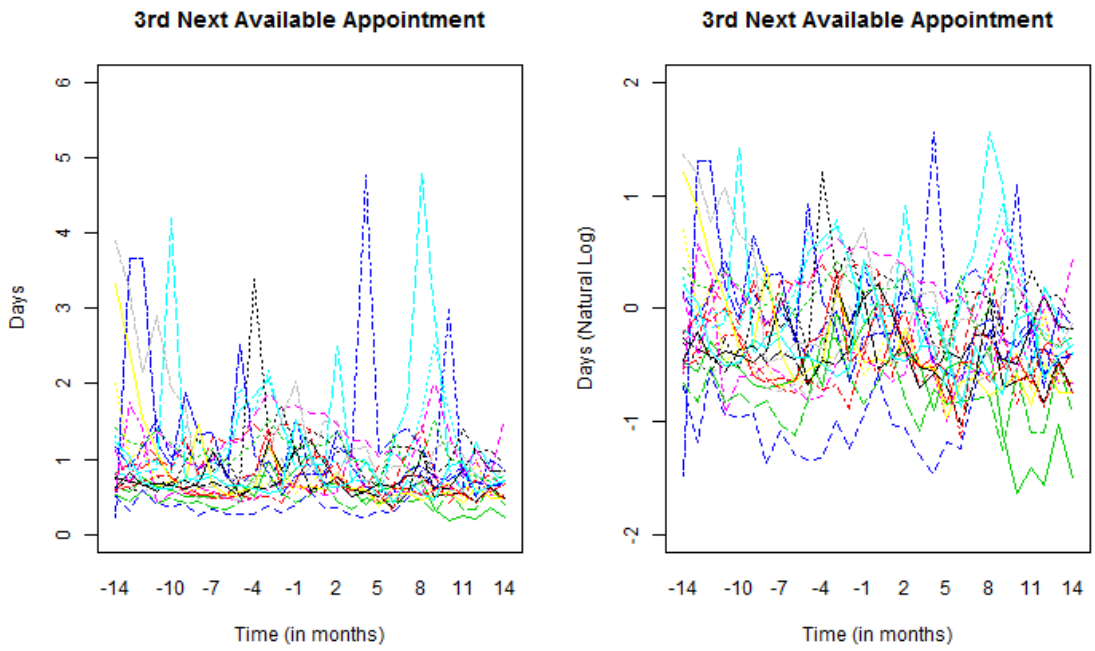
Table 4-2: Summary Information of Study Clinics

n = 21	Before Certification	After Certification	P-Value
Clinic Characteristics			
Patients Enrolled, mean (SD)	6,935.8 (5,322.9)	7,405.9 (5,407.2)	0.78
Practicing Providers, mean (SD)	17.6 (12.7)	18.3 (11.7)	0.86
Primary Care Visits, mean (SD)	793.3 (512.9)	788.9 (463.1)	0.98
Enhanced Charlson Index, mean (SD)	0.026 (0.022)	0.025 (0.017)	0.94
Ancillary Services			
Laboratory Procedures, mean (SD)	6,643.8 (9,656.0)	3,028.8 (4,975.2)	0.17
Radiology Procedures, mean (SD)	420.2 (432.9)	391.0 (427.3)	0.84
Pharmaceuticals Dispensed, mean (SD)	7,260.5 (7,297.4)	6,884.6 (7,099.7)	0.88
Ambulatory Care Sensitive ER Visits			
Direct Care, mean (SD)	79.6 (94.9)	73.6 (82.6)	0.82
Purchased Care, mean (SD)	164.0 (173.3)	160.8 (134.8)	0.96

The table above examines clinic characteristics, ancillary services, and ambulatory care sensitive ER visits from the clinics before and after certification. The "before" certification is month -7 and the "after" certification month is +7. Tests for differences were performed using a paired t-test ($\alpha = 0.05$).

Figure 4-2 presents two "spaghetti" plots of each clinic's third measure of third next available appointments over time (centered at the time of certification, month zero). One plot (left) displays the third next available appointment. The second plot (right) presents the third next available appointment in the natural logarithmic form. In the plot with untransformed third next available appointments, trends involving seasonality were apparent and were confirmed by performing Singular Value Decomposition (SVD). When the third next available appointments were log transformed, the trends in seasonality were no longer evident with follow-up analysis of SVD.

Figure 4-2: Spaghetti Plots of Third Next Available Appointment by Clinic



This figure presents plots of each of the clinics (21 total) across the 29 time points (in months). The plot on the left represents third next available appointment and the plot on the right represents the natural log of third next available appointment. Time zero represents the month of PCMH certification by NCQA. All 21 clinics received level three certification.

To ascertain whether a difference exists between pre- and post-certification time periods, a likelihood ratio test was performed using nested models. The effect of time (comparing pre- and post-certification) is statistically significant (χ^2= 6.23, df = 1, p-value = 0.012), which demonstrates that differences exist between appointment availability before and after PCMH certification. Table 4-3 presents model coefficients, standard errors, 95% confidence intervals and t-values of the linear mixed effects model with the covariates of main interest. The linear mixed effects model demonstrates that time (post-certification) is significantly different from zero, although the estimate is small (-0.017). When inferring on the 95% confidence interval, for each one-unit

increase in time (post-certification), with all other covariates held constant, third next available appointments could decrease by as much as 2.9% or as little as 0.4%.

Table 4-3: Adjusted Linear Mixed Effects Model Output Results of Time

	Estimate	**S.E.**	**95% C.I.**	**t-value**
Time (pre-certification)	0.001	0.007	(-0.013, 0.014)	0.102
Time (post-certification)	-0.017	0.007	(-0.029, -0.004)	-2.529

S.E. = standard error, C.I. = confidence interval. This table presents the results of the linear mixed effects covariates of main interest. Time pre- and post-certification were treated as both fixed and random effects ($\alpha = 0.05$). The natural log of the third next available appointment was adjusted for clinic characteristics, ancillary services, and ambulatory care sensitive ER visits. Time (pre-certification) was not statistically significant (p-value =0.918), while time (post-certification) was statistically significant (p-value = 0.011).

The remaining coefficient estimates and 95% confidence intervals from the linear mixed effects model are presented in Table 4-4. Since the values are contained in the natural logarithmic scale, all values with confidence intervals that include zero are not statistically significant. Model covariates that were statistically significant include the number of patients enrolled, the number of primary care visits, the number of providers practicing in the clinic, the interaction effect between enrollment and the number of providers practicing in the clinic, and the number of ambulatory care sensitive direct care ER visits. A note is warranted regarding the time-varying covariates presented in Table 4-4. There are a number of assumptions that need satisfying before inference on time-varying covariates in longitudinal models can take place. As the remaining covariates in Table 4-4 were not the area of main interest in this study, the assumptions concerning validity of the time-varying covariates were not explored.

Table 4-4: Remaining Fixed Effects Model Estimates and 95% Confidence Intervals

	Estimate	S.E.	95% C.I.	t-value
Clinic Characteristics				
Patients Enrolled	9.84E-05	2.55E-05	(4.84E-05, 1.48E-04)	3.88 ***
Practicing Providers	2.70E-02	8.08E-03	(1.11E-02, 4.28E-02)	3.33 ***
Primary Care Visits	-7.03E-04	1.01E-04	(-9.01E-04, -5.06E-04)	-6.98 ***
Providers * Enrollment	-2.43E-06	7.38E-07	(-3.87E-06, -9.82E-07)	-3.29 **
Charlson Index (sqrt)	3.19E-01	2.64E-01	(-1.99E-01, 8.36E-01)	1.20
PCMH Certification	-7.36E-04	5.44E-02	(-1.07E-01, 1.06E-01)	-0.01
Ancillary Services				
Laboratory Procedures	-8.17E-06	6.45E-06	(-2.08E-05, 4.48E-06)	-1.26
Radiology Procedures	-1.47E-04	1.33E-04	(-4.08E-04, 1.13E-04)	-1.10
Pharmaceuticals Dispensed	1.51E-05	1.53E-05	(-1.49E-05, 4.51E-05)	0.98
Ambulatory Care Sensitive ER Visits				
Direct Care	2.03E-03	8.66E-04	(3.28E-04, 3.72E-03)	2.33 *
Purchased Care	-2.33E-04	3.63E-04	(-9.45E-04, 4.80E-04)	-0.64

*S.E. = standard error, C.I. = confidence interval, PCMH = Patient-Centered Medical Home, sqrt = square root. * = p-value < 0.05, ** = p-value < 0.01, *** = p-value < 0.001. This table presents the remaining coefficient estimates of the fixed effects from the linear mixed effects model ($\alpha = 0.05$). As the dependent variables is in the logarithmic scale, all confidence intervals including zero are not statistically significant.*

4.5 DISCUSSION

This study evaluated the use of third next available appointment as a measure to assess access within primary care clinics certified as a PCMH. The effect of time before and after certification revealed significant differences. Furthermore, the rate of change following PCMH certification is significantly different from zero. While statistically significant results are important, providing inference on practical results are far more meaningful. Following PCMH certification, U.S. Navy primary care clinics improve appointment availability by a small rate over time. At six months post-certification, third next available appointments could reduce by as much as 17.4% or as little as 2.4%. As the median third next available appointment at the time of certification was 0.9324 (mean was 0.9349), a reduction of third next available appointment by 17.4% would

reduce a clinic's third next available appointment to 0.77 days. Is a reduction (at the extreme estimate) of 17.4% meaningful at six months post-implementation when half of all clinics had third next available appointments already less than one day? The answer to this question is perhaps best left to the patients attempting to access services within the clinic, but these study's findings serve as evidence of slight improvement in appointment availability following PCMH certification. Furthermore, it remains unknown whether improvements in access actually provide tangible effects to the patient that need medical services the most.

There are several limitations in this study. First, there are unobserved variables that may confound findings. Such confounders could include the extent of leadership and team communication in each of the clinics.[80] It is not ill-conceived that certain clinics likely operate more efficiently than others due to the employees working within each facility. Second, this study is only examining appointment availability. Additionally, while this study examines just over one year pre- and post-certification times, it is possible clinics began their transition prior to the amount of available data. Lastly, the timeframe of study may not be a long enough period to assess changes in appointment availability.[100]

A large component of the PCMH involves quality (and costs) and the extent to which chronic care patients are managed. This analysis does not address costs or quality and is only one component of a much larger context for the PCMH in the MHS. A common theoretical tool in assessing healthcare delivery is the iron triangle (the relationship between costs, quality, and access). Incorporating measures of cost and

quality while assessing changes in access is a logical next step for future studies. As prior studies have called into question the validity of using third next available appointments when evaluating the PCMH, future studies should incorporate other recommended measures of access (e.g., patient questionnaires) to assess whether the results support or conflict with findings from this analysis. This study demonstrated the use of third next available appointment in the application of assessing changes associated with access surrounding PCMH certification. The PCMH is associated with improvements in access for patients following certification by the NCQA. Overall, these findings provide evidence the PCMH is a component of healthcare redesign associated with small improvements related to increasing patients' access to primary care services.

5. SUMMARY AND CONCLUSIONS

5.1 INTRODUCTION

This dissertation examined three specific facets of how access to care in today's U.S. military is changing and the various populations that are impacted. Three topics were covered, which include pre-existing personality disorder discharges, mental health services utilization of military family members, and appointment availability of primary care clinics as they transition to the medical home. Methodologically, the first section was a health policy analysis of pre-existing personality disorders, while the remaining two sections (i.e., "mental health" and "medical home") performed retrospective, longitudinal data analyses. The following sections summarize the findings from each section, recommend future areas of research, and provide closing remarks for this dissertation.

5.2 U.S. MILITARY DISCHARGES AND PRE-EXISTING PERSONALITY DISORDERS: A HEALTH POLICY REVIEW

5.2.1 Summary

This policy analysis compiled information concerning pre-existing personality disorder discharges in order to analyze the stakeholders impacted, to examine the costs involved, and to provide feasible policy alternatives for the future. Approximately 26,000 enlisted servicemembers were discharged for a pre-existing personality disorder between 2001 and 2007.[2] The main issue examined was the complexity of disentangling personality disorders to determine if the disorder pre-dates military service. The

stakeholders include discharged servicemembers, the Department of Defense (DoD), and the Department of Veterans Affairs (VA). Out of the three stakeholders, the discharged servicemember is perhaps most negatively impacted. As a result of the discharge, the servicemember experiences a severe interruption in access to healthcare. The extent of the impact to the servicemembers due to the discharge remains largely unknown, due to the lack of prior research and inability to obtain reliable data on the issue. To overcome the issue of reliable data, the 2014 National Defense and Authorization Act (NDAA) included a stipulation to re-examine personality disorder discharge violations to review evidence as to whether the military services have corrected deficiencies or if they still persist.

The 2014 NDAA required the Government Accountability Office (GAO) to perform a follow-up review of the Department of Defense (DoD) and the four military services regarding their handling of personality disorder discharges. The scope of the review was to identify the number of discharges and to determine compliance with discharge protocol. Findings from the review, published in February 2015, still demonstrate and incompliance with discharge protocol.[101] When reviewing how access to care for servicemembers discharged with a personality disorder has changed, it is readily apparent servicemembers still experience a significant interruption in access to care (noting almost nothing has changed since this issue surfaced almost one decade ago).

5.2.2 Areas of Future Research

There is an immediate need to identify the number of personality disorder discharges occurring each year in each of the four military services. One reason the data are not available is due to the discharge codes utilized by the military services. Currently, there are six available discharge codes and the majority of military services are using a code for a personality disorder that also include discharges for non-disability physical conditions, such as obesity.[101] The military services need to utilize a proper discharge code for a non-disability mental condition specifying a personality disorder. Once proper coding is utilized, this will perhaps help place the DoD on the path to show the full extent of the personality disorder discharges in today's military.

5.3 MILITARY DEPLOYMENTS AND MENTAL HEALTH SERVICES UTILIZATION AMONG FAMILY MEMBERS OF ACTIVE DUTY SERVICEMEMBERS

5.3.1 Summary

Prior research has evaluated the rate of change in mental health services utilization of military families while the servicemember experiences deployed and non-deployed periods.[46,53,58-60] This analysis went one step further by incorporating deployment phases (i.e., pre-deployment deployment 1, between deployments, deployment 2, post-deployment), not just deployment periods (i.e., deployed, not deployed). By further analyzing deployment phases, the data demonstrated increased rates of mental health services utilization in the between deployment phase, which was

consistent with levels of mental health services utilization during deployment 1 and deployment 2.

What do these study findings have to do with access to care and how are military families impacted? While we do not know if the pace of deployments will change given the uncertainty of peacetime and war in the future, we do know deployments are stressful for military families. This study helps us understand select deployment phases are associated with increased mental health services utilization for military spouses. To ensure military spouses are able to utilize mental health services, they need access to these services. If access to mental health services for military family members is not available, a mental health need can turn into a mental health crisis. If left untreated, this crisis could prompt the return of the servicemember. By removing the servicemember from the deployment, the mission and other servicemembers are disadvantaged since there is one less person to perform the duties at-hand. We now know certain deployment phases are associated with increased mental health services utilization, ensuring high levels of access during these time periods could help maintain the family's mental well-being, which in turn could prevent the servicemember from returning home prematurely.

5.3.2 Areas of Future Research

This analysis showed an association with decreased levels of mental health services utilization for military children in the pre-deployment phase only. There are perhaps other confounding factors that need further study to analyze mental health services utilization of military children and deployment phases. Parents act as the gatekeepers for their children when it comes to medical utilization – this would most

certainly extend to mental health services utilization too. Further studies should evaluate the mental health status of parents (in this case the military spouses) to determine if there are differences in utilization for military children. For instance, indicator variables for current mental health services utilization (or utilization in the previous month by the parent) to examine whether the mental well-being of the parent impacts the mental health services utilization of the child.

5.4 TRANSITIONING TO PATIENT-CENTERED MEDICAL HOMES: ASSOCIATIONS WITH APPOINTMENT AVAILABILITY

5.4.1 Summary

The U.S. Navy is implementing the Patient-Centered Medical Home Model (PCMH) in an attempt to improve access, reduce costs, and increase the quality of care delivered in the primary care setting. This study performed a retrospective, longitudinal analysis of 21 U.S. Navy primary care clinics to examine how appointment availability, an indicator of access, is changing over time as clinics are certified as a PCMH. Appointment availability was measured with the third next available appointment (a common metric of access within the MHS). The third next available appointment is the "average length of time in days between the day a patient makes a request for an appointment with a physician and the third available appointment…"[98] Time before and after certification was the main component of interest in this study; linear splines were used to measure the rate of change before and after certification. Study results indicate appointment availability improves following PCMH certification. The rate of change in appointment availability, however, is small (for every one unit increase time, the rate of

change in third next available appointment is between -2.9% and -0.4%). These findings imply that while the PCMH is associated with improvements in appointment availability, the rate of change is perhaps too small for the primary care patients to realize any practical differences.

5.4.2 Areas of Future Research

The peer-reviewed medical home literature is inconclusive as to whether this method of healthcare delivery actually improves access, reduce costs, and improves quality (with the exception of some chronic-disease populations).[73,74] Future studies are recommended that specifically focus on the MHS to include metrics for components of access, quality, and costs. Since this study only evaluated an indicator of access, we could not determine if costs and quality are impacted by medical home certification. Additionally, the use of third next available appointment as an indicator of access it not without its critics.[89] Future studies are also recommended to compare the use of access metrics (e.g., third next available appointment) against other metrics that were recommended in prior research (i.e., patient satisfaction questionnaires). The findings could then be compared to assess if these different metrics support or conflict with each other.

5.5 CONCLUSIONS

The MHS is a global healthcare delivery system that provides care for our nation's warfighters and their families. This all-volunteer military force maintains our national security and provides crisis and humanitarian response around the world. Prior research on the MHS is limited when compared to the volume of literature dedicated to

Medicare, Medicaid, and the VA. This dissertation helped to fill this void and it also showed how access to care for today's military is changing and the populations that are impacted. Since the U.S. military serves an integral function in our country and the MHS is funded by taxpayers, it is imperative the peer-reviewed literature focus on access to care within the MHS to help ensure the best possible care is provided. When our nation's warfighters and their families receive the best care, our servicemembers can continue to perform the missions and fulfill the duties our country requires.

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