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### **Who Sings the Baby Blues? Changes in Mental Health and Retention Among Parents in the Military**

March 2022

**LT Megan M. Ellington, USN**

Thesis Advisors: Dr. Jennifer A. Heissel, Associate Professor  
Olivia Healy, Cornell University

Department of Defense Management

**Naval Postgraduate School**

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Prepared for the Naval Postgraduate School, Monterey, CA 93943

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## ABSTRACT

The military is facing pressure to ensure policies foster a diverse and inclusive workforce. As of 2020, 35 percent of the military had dependent children, with most children under the age of 12, and postpartum depression statistics in the military are as high as 29 percent. This thesis explores changes in mental health for both first-time parents and seasoned parents and how such changes predict retention. Pre-birth and post-birth mental health trends for parents who had their first child between March 2013 and March 2015 are captured to predict the likelihood of remaining in the military at least 48 months after the birth of the first child. There is also an attempt to uncover how mental health concerns predict retention for all parents who have a child under 18 between March 2013 and March 2019. Research into the mental health of military parents can provide the military insight on where to focus resources and training so that service members and their families are supported to the greatest extent possible. If the military can provide the right resources to families after the birth or adoption of a child, or at critical times in their careers where mental health illnesses are more likely to occur, service members may perform better or remain in service longer.



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My faith in God drives my life, and He gets the glory for being with me throughout this process, as there were some challenging moments as I struggled with my own mental health concerns. Through this thesis, I want to be a light for those who struggle with mental health challenges and serve in our military. I could not have made it through this without God and the support from my strong, dedicated husband. Steven, you challenge me and push me when I need it. You make me want to be a better person in life, and you helped me find my motivation throughout our time at NPS; I love you.

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACS	Army Community Service
AMI	Any mental illness
ACT-FAM	Active-duty Family
ACT-MAST	Active-duty Military Personnel Master
ADE	Navy Authoritative Data Environment
CDC	Center for Disease Control and Prevention
CNIC	Commander, Navy Installations Command
DEERS	Defense Eligibility Enrollment Reporting System
DHA	Defense Health Agency
DOD	Department of Defense
DTMS	Army Digital Training Management System
FFSC	Fleet and Family Support Center
FOCUS	Families OverComing Under Stress
ICD – 9	International Classification of Diseases – 9
ICD – 10	International Classification of Diseases – 10
MODS	Medical Operational Data System
MWR	Morale, Welfare and Recreation
NAMI	National Alliance on Mental Illness
NavyPHA	Navy Periodic Health Assessment
NPSHVP	New Parent Support Home Visitation Program
NTMPS	Navy Training Management and Planning System
PDE	Person-Event Data Environment
PPD	Postpartum Depression
PRAM	Pregnancy Risk Assessment Monitoring System
PRIMS	Navy Physical Readiness Information Management System
USAF	United States Air Force



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# EXECUTIVE SUMMARY

## Background

Imagine being the parent of a new baby or multiple children, then returning to complete your command's mission after only two to twelve weeks of parental leave. Imagine being relocated for a new assignment or training, then helping your teenager mentally process that they will spend their senior year in a new school. Parents must navigate life in a challenging environment for themselves and their families, no matter the child's age. Scenarios such as these are common in the United States military, and the amount of stress these combined factors cause is significant. From single parents to dual-military married parents, all families share common stressors when children are present in the home. As of 2020, 35.9 percent of active-duty members had children (Department of Defense – Office of the Deputy Assistant Secretary Defense for Military Community and Family Policy (DOD – ODASD (MC&FP)), 2020). In each phase of childhood, a parent experiences different stressors that come with being responsible for another human being. In 2020, 73.8 percent of military children were under 12 years old, and 22.2 percent were aged 12 to 18 (DOD – ODASD (MC&FP), 2020).

A 2017 report by the Deployment Health Clinic Center (DHCC) reported that “20.1% of the military population were diagnosed with a mental health disorder” (Deployment Health Clinical Center, 2017). However, the DHCC report does not state how many parents are battling a mental illness. The military is facing pressure to ensure they take steps towards an inclusive and diverse workforce, as evidenced in the Task Force One Final Report (Phillips & Holsey, 2020) and the 2020 Department of Defense Board on Diversity and Inclusion Report (Esper, 2020). The diverse workforce must include service members who are parents and battle with mental illness. Negative stereotypes associated with having a mental illness or having a family may leave servicemembers who are parents feeling excluded from the workforce and could potentially affect their intentions to remain on active-duty (Acosta et al., 2014; Fosher et al., 2018).



## **Area of Research and Purpose**

Within the Department of Defense (DOD), there is a lack of focus on how mental health impacts service members who are parents, especially when it comes to retention. My thesis analyzes the pre-birth and post-birth mental health trends for service members in their first term of parenthood and how this impacts the likelihood of retention. I also attempt to uncover how mental health concerns impact all parents who have a child between zero and 18. Research into parents' mental health can provide the military insight on where to focus resources and training, so service members and their families are supported to the greatest extent possible. Just as parenthood plays a significant role in military performance, so too might parenthood change mental health needs and care use.

Service members may be more likely to stay in the military if they feel comfortable with how leadership handles stressful life events such as pregnancy, having teenagers in the home, or mental illness. Suppose the military can help educate leadership on mental illness to a greater extent. In that case, leaders may be more capable of interacting with subordinates productively, which could also help the military retain its most valuable assets.

## **Scope and Methodology**

I use data that derives from the Army Person-Event Data Environment (PDE) system, which has access to various military databases such as Defense Eligibility Enrollment Reporting System (DEERS), Active-duty Military Personnel Master (ACT-MAST), Active-duty Family (ACT-FAM), Navy Periodic Health Assessment (NavyPHA), Medical Operational Data System (MODS), and Defense Health Agency.

The panel data in this analysis contains monthly observations of active-duty Sailors, Soldiers, and their dependents from 2013 to 2019. PHA data is limited to the years 2013 to 2017, while inpatient and outpatient mental health diagnosis data is limited to the years 2013 to 2019. In addition, I drop individuals that were never parents during the timeframe. In this analysis, I define a parent as someone who is already a parent when the dataset starts (number of children greater than zero), a first-time parent who has an observation the year before the birth of their first child, a first-time parent who has an observation the year after the birth of their first child, or a service member who will have a child in two years. I



collapse the data down to one observation per year by taking the maximum or average of the utilized variables. I use demographic and individual fixed effect controls during analysis on retention to control for variation that might occur within individuals.

My research areas include: (1) analyzing before and after childbirth mental health concerns for first-time parents, (2) analyzing mental health concerns amongst any parent, and (3) analyzing how mental health concerns relate to retention. For the “first-time parent” sample, I create four reporting “groups”: (1) no concern to no concern, (2) no concern to concern, (3) concern to concern, and (4) concern to no concern. I capture the percentage of each group for the “first-time parent” sample and break this down by gender. Then conduct multilinear regression analysis on first-time parents who had a child between 2013 and 2015, so I can predict the likelihood of them retaining for at least 48 months after the birth of their first child.

Next, I focus on the “all parent” sample who, in general, had mental illnesses while serving in the military from 2013 to 2019. First, I analyze how all parents report mental health concerns based on age of oldest child, age of youngest child, and the number of children. Then I conduct multilinear regression analysis to see if parents with mental health reports are more or less likely to remain on active-duty for another year when they had a reported mental health concern in the preceding year.

## **Results and Conclusions**

Most first-time parents report no concern before the birth of the first child and no concern after the first child’s birth (Group 1), while parents who report a mental health concern before birth and a mental health concern after birth (Group 3) have the fewest reports. This is true for both fathers and mothers. Regression analysis indicates coefficients on Group 2 (no concern to concern) are always statistically significant and have the highest likelihood of separating 48 months after the first child’s birth. Other groups are smaller than Group 2, and I lack the statistical power to make firm conclusions. However, the general adverse outcomes for the other groups highlight the need for future research.

For the “all parent” sample, the critical takeaway from analyzing the three outcomes based on various child factors is that more parents experience mental health concerns as children grow older and have more children. This does not mean that parents with younger



children do not experience increased mental health-related challenges. It just suggests that the military should conduct more research into this topic area to better support service members in the different phases of parenthood. There also tends to be a higher percentage of mothers who experience mental health challenges. While I cannot ascertain if this is due to mothers being more likely to seek mental healthcare or due to higher incidences of mental health challenges among mothers, it would behoove the DOD to research parenthood effects on mothers; this could help the DOD better support females who choose to have a family and a career. Finally, regression analysis results for the “all parent” sample show service members are more likely to separate in the next year if they reported mental health concerns in the past year. This is true for regression models with and without controls and models separated by gender and marital status subgroups.

The military succeeds when members are in a healthy, ready-to-fight mindset. Between the two groups I study in this thesis, and when the military starts to focus on funding allotted for family resources, it becomes a balancing act to ensure members have the right resources available at the correct times. The military could examine existing programs such as parental leave policies and find a way to provide the most benefits to members with newborns without negatively impacting readiness or one’s career. Likewise, suppose the military is concerned about a diverse workforce. In that case, it should take the time to evaluate where parents are having difficulties so policies or programs can benefit parents as much as possible, especially if they intend to remain on active-duty. Reviewing literature and conducting more research that focuses on both fathers and mothers allows the military to target resources for parents in different stages of their parenting journey, which can help them be as mentally healthy as possible. This thesis shows that initial assumptions about subpopulations are not always what we think. The military needs to research challenges at different phases of parenthood for those who choose to serve in the military. Hence, it better understands the actual health of the parent population.

When left untreated, mental illnesses and poor mental health can impact service members, which can create a ripple effect that extends to other aspects of one’s life. If service members are parents, more is at stake if the parent is suffering from mental health concerns, and negative consequences such as domestic violence, child abuse, or suicide



could arise. Therefore, leaders need to be involved and recognize when their people are struggling or acting differently. Within the command, it is essential to publish what services are available for service members concerning mental health; ultimately, these services could help save a marriage or a family from falling apart. When the military supports its people, fosters an inclusive workforce, and takes mental health seriously, its reputation can become more positive. These effects can have lasting impacts, especially if it causes more people to take that step to join the service willingly. The military projects its actions worldwide, and it should foster a healthy culture where its people are treated with dignity and respect, even if they are parents who struggle with mental illness. If the military can get this right, it helps us have a better foothold around the world, one where our adversaries cannot use our downfalls to their benefit. This is strategic and a strong reason this research is vital; it could change how we fight down the road!



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## I. INTRODUCTION

Imagine being the parent of a new baby or multiple children, then returning to complete your command's mission after only two to twelve weeks of parental leave. Imagine being relocated for a new assignment or training, then helping your teenager mentally process that they will spend their senior year in a new school. Parents must navigate life in a challenging environment for themselves and their families, no matter the child's. Scenarios such as these are quite common in the United States military, and the amount of stress these combined factors cause is significant.

Separately, a 2017 report by the Deployment Health Clinic Center (DHCC) reported that "20.1% of the military population were diagnosed with a mental health disorder" (Deployment Health Clinical Center, 2017). However, the DHCC report does not state how many parents are battling a mental illness. The military is facing pressure to ensure they take steps towards an inclusive and diverse workforce, as evidenced in the Task Force One Final Report (Phillips & Holsey, 2020) and the 2020 Department of Defense Board on Diversity and Inclusion Report (Esper, 2020). Service members who battle with mental illnesses and are also parents need to include in the diverse workforce. Negative stereotypes associated with having a mental illness or having a family may leave servicemembers who are parents feeling excluded from the workforce and could potentially affect their intentions to remain on active-duty (Acosta et al., 2014; Fosher et al., 2018).

### A. PURPOSE

Within the Department of Defense (DOD), there is a lack of focus on how mental health impacts service members who are parents, especially when it comes to retention. My thesis analyzes the pre-birth and post-birth mental health trends for service members in their first term of parenthood and how this impacts the likelihood of retention. I also attempt to uncover how mental health concerns impact all parents who have a child between zero and 18. Research into parents' mental health can provide the military insight on where to focus resources and training, so service members and their families are



supported to the greatest extent possible. Just as parenthood plays a significant role in military performance, so too might parenthood change mental health needs and care use.

Service members may be more likely to stay in the military if they feel comfortable with how leadership handles stressful life events such as pregnancy, having teenagers in the home, or mental illness. Suppose the military can help educate leadership on mental illness to a greater extent. In that case, leaders may be more capable of interacting with subordinates productively, which could also help the military retain its most valuable assets.

## **B. SCOPE AND METHODOLOGY**

To study the patterns of parenthood on mental health encounters and how these situations influence retention, I analyze yearly data on Army and Navy active-duty personnel from 2013 to 2019. I focus part of my thesis on active-duty personnel who had their first child while in the military by analyzing 239,646 observations of first-time parents and how their mental health reporting changes from before to after the first child's birth. Then, I conduct multilinear regression analysis on first-time parents who had a child between 2013 and 2015, so I can predict the likelihood of them retaining for at least 48 months after the birth of a child. Next, I focus on all parents who, in general, have had mental illnesses while serving in the military, with 2,322,715 total observations for all parents from 2013 to 2019. Next, I analyze how all parents report mental health concerns based on age of oldest child, age of youngest child, and the number of children. Then, I conduct multilinear regression analysis to see if parents with mental health reports are more or less likely to remain on active-duty for another year when they reported mental health concerns in the preceding year.

## **C. RESULTS AND FINDINGS**

Most first-time parents report no concern before the birth of the first child and no concern after the first child's birth (Group 1), while parents who report a mental health concern before birth and a mental health concern after birth (Group 3) have the fewest reports. This is true for both fathers and mothers. Regression analysis indicates coefficients



on Group 2 (no concern to concern) are always statistically significant and have the highest likelihood of separating 48 months after the first child's birth. Other groups are smaller than Group 2, and I lack the statistical power to make firm conclusions. However, the general adverse outcomes for the other groups highlight the need for future research.

For the "all parent" sample, the critical takeaway from analyzing the three outcomes based on various child factors is that more parents experience mental health concerns as children grow older and have more children. This does not mean that parents with younger children do not experience increased mental health-related challenges. It just suggests that the military should conduct more research into this topic area to better support service members in the different phases of parenthood. There also tends to be a higher percentage of mothers who experience mental health challenges. While I cannot ascertain if this is due to mothers being more likely to seek mental healthcare or due to higher incidences of mental health challenges among mothers, it would behoove the DOD to research parenthood effects on mothers; this could help the DOD better support females who choose to have a family and a career. Finally, regression analysis results for the "all parent" sample show service members are more likely to separate in the next year if they reported mental health concerns in the past year. This is true for regression models with and without controls and models separated by gender and marital status subgroups.

#### **D. ORGANIZATION AND CHAPTERS**

First, in Chapter II, I introduce a baseline level of knowledge of the current state of parenting and mental health resources for parents in the military. In Chapter III, I discuss parenthood and mental health statistics from past research within the DOD and the civilian sector. In Chapter IV, I describe the data that is used in the analysis and the methodology utilized to analyze the data. Chapter V contains the results of my analysis. Chapter VI contains discussion on my findings and recommendations for future research opportunities. Finally, Chapter VII contains concluding thoughts for my thesis.



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## II. BACKGROUND

In this chapter, I discuss the current state of family support programs and the mental health support services offered in the military. I also give a brief overview of parenthood and mental health stigmas cited in recent history within the military.

From single parents to dual-military married parents, all families share common stressors when children are present in the home. As of 2020, 35.9 percent of active-duty members had children (DOD - Office of the Deputy Assistant Secretary Defense for Military Community and Family Policy (ODASD (MC&FP)), 2020). In each phase of childhood, a parent experiences different stressors that come with being responsible for another human being. In 2020, 73.8 percent of military children were under the age of 12, and 22.2 percent were aged 12 to 18 (DOD – ODASD (MC&FP), 2020). Figure 1 shows the military child trends from 2000 to 2020. (DOD – ODASD (MC&FP), 2020). Since 2010, the 0–5 age group has seen a slightly decreasing population while the 6–11 age group has seen an increase in the military child population.

Age	2000		2005		2010		2015		2020	
	N	%	N	%	N	%	N	%	N	%
0 to 5 Years	478,180	38.9%	469,129	39.8%	527,670	42.3%	452,119	42.0%	399,176	41.4%
6 to 11 Years	414,899	33.8%	375,000	31.9%	382,823	30.7%	340,327	31.6%	312,460	32.4%
12 to 18 Years	291,955	23.8%	286,795	24.4%	284,658	22.8%	236,954	22.0%	214,049	22.2%
19 to 22 Years	44,214	3.6%	46,266	3.9%	52,723	4.2%	47,403	4.4%	38,800	4.0%
<b>Total</b>	<b>1,229,248</b>	<b>100.0%</b>	<b>1,177,190</b>	<b>100.0%</b>	<b>1,247,874</b>	<b>100.0%</b>	<b>1,076,803</b>	<b>100.0%</b>	<b>964,485</b>	<b>100.0%</b>

Note: Children ages 21 to 22 must be enrolled as full-time students in order to qualify as dependents.  
 Note: Displayed percentages may not total 100% due to rounding.  
 Source: DMDC Active Duty Military Family File (September 2000, 2005, 2010, 2015, 2020)

Figure 1. Active-duty Children Child by Child Age Trends 2000–2020.  
 Source: DOD – ODASD (MC&FP) (2020).

Figure 2 shows the family status trends from 2000 to 2020. From this figure, all categories have decreased since 2010 that involve “children.” This suggests a changing dynamic in the number of people choosing to have children while serving in the military. This could be due to the added mental, physical and emotional factors of being a parent.



On top of parenthood stressors, the military family must cope with a dynamic lifestyle that can introduce many stressors to all who live in the household.

Family Status	2000*		2005		2010		2015		2020	
	N	%	N	%	N	%	N	%	N	%
Single, No Children	559,138	40.8%	549,128	40.0%	542,495	38.3%	535,221	41.1%	615,391	46.1%
Single, with Children	85,552	6.2%	74,086	5.4%	75,954	5.4%	58,989	4.5%	52,667	3.9%
Married to Civilian, No Children	145,979	10.7%	176,065	12.8%	196,244	13.8%	182,534	14.0%	181,326	13.6%
Married to Civilian, with Children	500,674	36.5%	479,068	34.9%	508,350	35.9%	441,090	33.9%	393,683	29.5%
Dual-military Marriage, No Children	44,370	3.2%	55,695	4.1%	53,268	3.8%	49,131	3.8%	58,277	4.4%
Dual-military Marriage, with Children	34,941	2.5%	39,492	2.9%	41,059	2.9%	34,478	2.6%	32,478	2.4%
<b>Total</b>	<b>1,370,654</b>	<b>100.00%</b>	<b>1,373,534</b>	<b>100.0%</b>	<b>1,417,370</b>	<b>100.00%</b>	<b>1,301,443</b>	<b>100.00%</b>	<b>1,333,822</b>	<b>100.0%</b>

\* There were 24 cases not reported in 2000.  
 Note: Single includes annulled, divorced, and widowed. Children include minor dependents age 20 or younger and dependents age 22 or younger enrolled as full-time students.  
 Note: Displayed percentages may not total 100% due to rounding.  
 Source: DMDC Active Duty Military Family File (September 2000, 2005, 2010, 2015, 2020); DMDC Active Duty Military Personnel Master File (September 2000, 2005, 2010, 2015, 2020)

Figure 2. Active-duty Members by Family Status Trends: 2000–2020.  
 Source: DOD – ODASD (MC&FP) (2020).

**A. HISTORY OF POLICIES TO SUPPORT MENTAL HEALTH AND COMBAT STIGMAS ABOUT PARENTHOOD AND MENTAL HEALTH IN THE MILITARY**

Being a parent in the military, especially for females, can elicit certain negative perceptions or stereotypes. Until 1975, the military would involuntarily discharge a woman when she became pregnant (*Defense Advisory Committee on Women in the Services (DACOWITS) Public Comment Period, 2020*). Executive Order 13152 prohibits discrimination based on being a parent (U.S. Equal Employment Opportunity Commission, n.d.). Yet, even today, parents, particularly mothers, face workplace discrimination. Articles from recent years highlight issues in the military today for parents. For example, one airman, who had given birth to her second child and was trying to take spaced breaks to pump breastmilk, faced a lack of support and poor treatment from colleagues; they thought she was trying to take advantage of the updated breastfeeding policy (Pawlyk,



2020). In that airman’s case, leadership did nothing to remedy the way others treated her, and she believed women needed more support when returning to work from maternity leave (Pawlyk, 2020). As of 2020, a DOD report highlighted the need to update existing diversity and inclusion policies that prevent pregnancy-based discrimination (Esper, 2020). Postpartum care is currently in the Fiscal Year 2022 National Defense Authorization Act, expanding postpartum resources so childbirth does not undeservedly impact service members (Smith, 2021).

In 2018, the Center for Advanced Operational Culture Learning highlighted the Marine Corps’ struggles with the devaluation of family and creating work environments that encourage Marines to succeed at home (Fosher et al., 2018). This report also shed light on how female Marines feel ostracized for wanting to have a child or becoming pregnant, especially if their command believes they got pregnant to avoid events such as deployment (Fosher et al., 2018). Additionally, the female Marines experienced undue friction created due to a lack of knowledge throughout the command on current policies for women (Fosher et al., 2018). There is a consensus that when a female becomes pregnant or has a child, they must work harder than their male counterparts to prove their worth within their commands. This could impact a female’s decision to remain on active-duty, especially if they feel the military is not supporting their needs or treating them equally.

Just as being a parent in the military has a certain stigma, so does seeking mental healthcare services or having a mental illness. In 2014 the RAND Corporation “defined mental health stigma as a dynamic process by which a service member perceives or internalized this brand or marked identity about himself or herself or a person with a mental health disorder” (Acosta et al., 2014). RAND was charged to evaluate the DOD’s mechanisms to reduce stigma and to see if the policies the DOD had in place were effective (Acosta et al., 2014). In the last decade, the DOD has implemented policies, and Congress introduced multiple pieces of legislation to reduce mental health stigma (Blumenthal & Baldwin, 2020; Department of Defense, 2011; Exec. Order No. 13625, 3 CFR 13625, 2012; Gonzalez-Colon et al., 2021). What is unfortunate is that one of the pieces of legislation died and could have destigmatized mental illness; in a positive light, one of the recent pieces of the legislation is still on the table for discussion. Clearly, this critical topic



continues to get publicity and needs to be taken seriously for those who serve in the military.

## **B. CURRENT FAMILY SUPPORT PROGRAMS AND SERVICES IN THE MILITARY**

One of the most popular and well-known resources for military families is Military One Source (Military One Source, n.d.). This organization is a hub for information on military programs and maintains a database for all that information. Additionally, each military branch has its own unique family support services where service members can receive help for whatever is happening. For example, the Army has Army OneSource and U.S. Army MWR (National Academies of Sciences, Engineering, and Medicine, 2019). The Navy has Navy Fleet and Family Support Program (National Academies of Sciences, Engineering, and Medicine, 2019). The Marine Corps has Marine Corps Community Services and Marine & Family Programs (National Academies of Sciences, Engineering, and Medicine, 2019). Lastly, the Air Force has USAF Services and Airman and Family Readiness (National Academies of Sciences, Engineering, and Medicine, 2019).

Service members are not always aware of the available resources that can help them during life events, such as having a baby or working with their teenager to prepare for an upcoming move (National Academies of Sciences, Engineering, and Medicine, 2019). Mental illnesses, such as postpartum depression, are prevalent throughout the military, with statistics showing an increase in incident rates in the last few decades (Nicholson et al., 2020). Figure 3 is adapted from the “Strengthening the Military Family Readiness System for a Changing American Society” report. It displays the effects of military family stressors at different levels and how military programs can help with intervention and prevention (National Academies of Sciences, Engineering, and Medicine, 2019). Mental illness can impact the family dynamic and add to the stressors within a parent-child relationship, so being aware of the parental psychopathology stressors in Figure 4 is essential to a resilient force. Additionally, parents should be aware of the available resources to help with prevention and intervention when it comes to mental healthcare. When parents have family



support and mental health resources available, they might be better able to cope with mental illnesses and manage stressors associated with parenting while in the military.

	Family Level	Resilience Processes Targeted for Prevention/Intervention	EBP Intervention Examples
<p><b><u>Military Family Stressors</u></b>  <b>Parental psychopathology: PTSD, depression, substance use</b></p>	<p><i>Individual stress regulation</i></p>	<p>Individual treatment to remit symptoms and prevent deterioration that includes the family</p>	<p>Evidence-based individual treatments            Trauma-focused Cognitive Behavioral Therapy (TF-CBT)</p>
<p><b>Child abuse and neglect (maltreatment)</b></p>	<p><i>Parent-child relational processes</i></p>	<p>Effective parenting practices: attachment, reflective capacity, warmth, structure, encouragement, discipline, problem-solving, communication, monitoring (middle childhood and adolescence)</p>	<p>Family Advocacy Program, New Parents Support Program            Strong Families Strong Forces            Strong Military Families            ADAPT            FOCUS Families – Early Childhood            Parent-Child Interaction Therapy (PCIT)</p>
<p><b>Death of a parent</b></p>	<p><i>Couple relational processes</i></p>	<p>Effective relationships, problem solving, co-parenting</p>	<p>Strong Bonds            Strength at Home            FOCUS – Couples            Cognitive-behavioral couple therapy for PTSD</p>
<p><b>Physical injury</b></p>	<p><i>Overall family processes</i></p>	<p>Family level practices            Individual and interpersonal skill development: communication, emotional regulation, problem-solving, goal setting, management of trauma and loss reminders, narrative reflection/shared meaning</p>	<p>FOCUS – Couples and Families            Family Focused Therapy for TBI            Family Bereavement Program</p>
<p><b>Intimate partner violence</b></p> <p><b>Child mental health problems</b></p>			

Figure 3. Effects of Military Family Stressors, Targets for Prevention/ Intervention and Evidence-Based Military Intervention Programs (EBP). Adapted from Kizer & Le Menestrel (2019).

When Sailors or Soldiers are resilient in their home lives, that resilience translates into being an effective warfighter, which is a priority for today’s top military leaders (Gilday, 2019). The DOD overhauled its Family Readiness Policy in 2012. As recently as 2019, the “John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Public Law 115-232) emphasized the importance of supporting service members and their families” (National Academies of Sciences, Engineering, and Medicine, 2019). When someone enters the military, the family is just another limb of the service member that the DOD must consider. By taking these steps, the DOD shows it is thinking about the personal lives of those that serve to protect our freedoms.



## **C. CURRENT MENTAL HEALTH SUPPORT SERVICES IN THE MILITARY**

Whilst Military One Source provides resources for active-duty military members seeking help for parenting, it also directs service members and their families to available resources able for mental health care (Military One Source, 2020). It provides a list of different support services for varying issues, from mental illnesses to online screening tools to Moving Forward, an online educational program geared towards teaching problem-solving skills to help one handle life stressors more easily (Military One Source, 2020). Other resources such as the National Alliance on Mental Illness (NAMI) are available. NAMI strives to build better lives for those impacted by mental illness; they seek to provide support, resources, and public awareness of mental illness (National Alliance on Mental Illness, 2021b). NAMI has a support network for veterans, active-duty members, and families who need assistance for mental health concerns or mental illnesses. Part of their mission is to break the stigmas associated with disclosing mental healthcare concerns and mental illnesses so that Airmen, Marines, Sailors, and Soldiers practice self-care by encouraging self-reporting (National Alliance on Mental Illness, 2021a).

Many resources exist in the military to address mental health. However, more importantly, leadership that should always be on the lookout for individuals showing signs of poor mental health and demonstrates supporting behavior to encourage treatment-seeking behavior. Military leaders can influence their subordinates, so leadership must encourage and promote a positive perception of mental healthcare (Charrys, 2021). The operational tempo can significantly impact one's mental and physical health, which can create a ripple effect back in the home; leaders need to be cognizant of how the pace of operations might be affecting those service members who are parents.



### **III. LITERATURE REVIEW**

In this chapter, I review literature on parenthood and mental health studies in the military and then shift to reviewing parenthood and mental health in the civilian sector. I also sprinkle information on stigmas associated with mental health and parenthood in the civilian sector. While I focus my thesis on parenthood and mental health in the military, it is advantageous to observe the civilian sector and countries like the United States to see if the issues transcend into different sectors of American society. While the military presents service members with unique challenges, it is beneficial to investigate the effects of parenthood on the civilian population and how mental health plays a role in their journey of having a family. Civilian literature can also provide insight into whether civilians face similar pressures when it comes to their work performance, whether mental illness or mental health concerns are as prevalent and if there are stigmas associated with seeking treatment for mental health concerns or illnesses.

The Navy competes with the civilian sector for its most precious asset – its people. While there has not been in-depth research into how mental health concerns/issues related to parenthood affect retention, other research shows that parenthood impacts performance. Therefore, if a Soldier or Sailor believes they cannot perform their duties at work because they are dealing with mental health challenges and being a parent, they might feel the need to separate from the military.

#### **A. PARENTHOOD CHALLENGES**

Serving in the military is challenging enough when one is single and has no dependents. Having a child can exacerbate any stressors parents may face, including mental health concerns through which they are working.

##### **1. Research on the challenges for parents in the military**

Initially, after the birth of a child, men and women perform worse when it comes to job-related physical performance (Healy & Heissel, 2020). Women, on average, have significant declines that linger even after 24 months postpartum, while men eventually recover to their pre-pregnancy performance (Healy & Heissel, 2020). Pregnancy also



impacts women's career performance. During pregnancy, gaps in advancement arise compared to non-mothers and continue to grow postpartum, with first-time mothers receiving fewer promotions than non-mothers (Healy & Heissel, 2020). Just like men do not suffer as much physically, they also do not see long-term effects when it comes to advancement or promotion (Healy & Heissel, 2020).

One aspect of Healy and Heissel's parenthood study is that they also look at the duration of the maternity leave policies that the Marine Corps was following during the length of the study. When mothers had more maternity leave, they suffered more with respect to advancement and promotion than mothers with shorter maternity leave (Healy & Heissel, 2020). This could impact their intention of staying in the service if they believe they are getting punished career-wise due to having a baby. In addition, studies from several countries, including the United States, Australia, Sweden, and Lebanon find that longer paid parental leave correlates with greater mental and physical well-being, including a reduced risk of depression (Saxbe et al., 2018).

These studies inform my research by giving a baseline starting point of where parents struggle with military performance and provide examples of other countries studying the impacts of parental leave on mental health. This allows me to analyze mental health specifically more in-depth and to make sound recommendations for policies that could improve the quality of life of military members who are parents.

## **2. Research on the challenges for parents in the civilian sector**

Like the military, parents in the civilian workforce appear to have work disadvantages which can create retention or inclusion issues. While military women might not have job security concerns due to contract and service obligations, parents in the civilian sector might be less fortunate. Recent surveys show that women are more likely to say that having a child is an obstacle to job security than men (University of Chicago Harris & Associated Press-National Opinion Research Center (AP-NORC), 2021). In addition, parents feel like having a child is a barrier to promotion, with four out of ten revealing that having a child is an obstacle to a pay raise (University of Chicago Harris & AP-NORC, 2021). Parenthood can impact the time focused on work or potentially lead to taking a job



that might not be beneficial to one’s career. When there are work-family clashes, such as taking work home or working too much in the office, employees might consider leaving that organization (Aslam et al., 2011). Stresses arise when parents navigate obstacles such as parental leave, setting up childcare, after-school programs, or a working spouse. Literature reviewed reveals that “sources of work-family role strain among people with a job and families were working hours per week, the number of children, and child’s age” (Aslam et al., 2011).

## **B. MENTAL HEALTH OF PARENTS**

The transition to parenthood often triggers the first major episode of depression (Saxbe et al., 2018), and this may affect the parent later in life, being more susceptible to depressive episodes (Saxbe et al., 2018). Mental illnesses that new parents encounter can directly affect every facet of life. Likewise, parents who have older children in the home are likely to experience different challenges that may trigger higher stress levels on the parent that could lead to mental health concerns.

### **1. Military research studies**

General military research from studies on mental health in the military reveals that up to 25 percent of members in the sample utilize mental health services, with 8.5 percent utilizing some form of medication for mental health within the last year (Meadows et al., 2021). With fewer studies on mental health reporting patterns within the active-duty parent population, leveraging literature on general mental health in the military provides valuable insights.

Military women are more at risk of getting depression when compared to their civilian counterparts (Garcia et al., 2021). Literature on female active-duty service members reveals that preexisting mental health disorders, prenatal depression, childcare stress, and maternity blues are just a few preexisting risk factors that increase the likelihood of a mother getting PPD (Garcia et al., 2021). Research also reveals diagnosis rates of PPD increased significantly from 2001 to 2018 in the active-duty female population, “with those most often diagnosed with PPD being white, married, enlisted (E1 to E4), in the Army, and



between the ages of 20-to 24 years old” (Nicholson et al., 2020). Postpartum depression in mothers reported in various studies ranges from 15 percent (Nicholson et al., 2020) to 29 percent (Garcia et al., 2021). Other studies publish postpartum mood disorders in military women as high as 85 percent (Willis, 2020).

Authors of one of these studies highlight that there are still gaps in research that focus on “family, community, and system-level factors that affect active-duty servicewomen’s postpartum mental health” (Nicholson et al., 2020).

## **2. Civilian research studies**

Mental illnesses are not uncommon in the American population. Over 20 percent of the American adult population had any mental illness (AMI), with any mental illness defined as “a mental, behavioral, or emotional disorder”(National Institute of Mental Health (NIMH), 2019). Of those with AMI, almost 50 percent received mental health services within the last year (National Institute of Mental Health, 2019).

There have been numerous studies on postpartum depression in women (Kim & Swain, 2007). It is one of the most common conditions for a mother after the birth of a child (Department of Health & Human Services, 2020; Garcia et al., 2021). The Center for Disease Control reported in 2019 that “1 out of 10 women in the United States reported symptoms that suggest they experienced an episode of major depression in the last year,” with PPD rates as high as 1 in 5 depending on the state (Centers for Disease Control and Prevention, 2020). Depending on the study, PPD rates range from seven to 19 percent in the American population (Dunkel Schetter et al., 2016; O’Hara & McCabe, 2013).

There are numerous studies on postpartum depression in mothers, but research shows fathers also experience the condition. Since there is little to no research on paternal postpartum depression in the military, we can gain insight from civilian research to learn about the statistics in the American population. Men with risk factors such as a history of depression, poverty, maternal depression, or an unintended pregnancy face increased risk of PPD (Scarff, 2019). Unlike mothers, fathers tend to have a delayed onset of PPD, with eight to ten percent of fathers experiencing PPD three to six months postpartum (Scarff, 2019). Along with having a history of depression, paternal PPD is correlated with maternal



PPD (Da Costa et al., 2017; Kim & Swain, 2007). Literature reveals paternal postpartum depression rates have a wide range of occurring, from 1.2 to 25.5 percent (Da Costa et al., 2017; Kim & Swain, 2007). Even though the DOD has not studied paternal PPD, understanding and knowing statistics in the civilian population can provide a benchmark that paternal PPD might exist in the military.

Given the prevalence of mental illness in the United States, it is critical to fill in the gaps where parents who struggle with a mental illness or poor mental health might benefit. These studies inform my thesis by revealing the prevalence of PPD in both men and women. I will be able to capture if there are similar instances of mental health encounters in both fathers and mothers.

### **C. CONCLUSION OF LITERATURE REVIEW**

These studies show the prevalence of mental health issues within the military parent population and provide examples from civilian research on parents' challenges when faced with mental health. My thesis seeks to expand existing research by evaluating the trends of mental health reporting before and after the birth of a first child for mothers and fathers. I also seek to understand when parents are more susceptible to mental health concerns regarding their child's age and how many children they have. Finally, I will be able to make recommendations that support effective parenting programs that check-in on parents at the points in time when they may be struggling more with mental health issues.



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## IV. DATA AND METHODOLOGY

In this chapter, I first describe the data I use to study active-duty Army and Navy personnel who are either parents when entering active-duty or become parents while on active-duty (by birth or adoption). This includes summary statistics tables for the “first-time” parent and “all parent” samples. I then discuss and define the outcomes I intend to research. Next, I discuss empirical methodology used to conduct my analysis. Lastly, I discuss the limitations of the data that were discovered during the quantitative process of coding.

### A. DATA DESCRIPTION

This thesis includes data from the Army Person-Event Data Environment (PDE) system, which has access to various military databases. I look at before and after childbirth mental health concerns, mental health concerns amongst any parent, and how mental health concerns relate to retention. The databases utilized include Defense Eligibility Enrollment Reporting System (DEERS), Navy Training Management and Planning System (NTMPS), Total Army Personnel Database-Enlisted (TAPDB), Army Digital Training Management System (DTMS), Navy Authoritative Data Environment (ADE), Active-duty Military Personnel Master (ACT-MAST), Active-duty Family (ACT-FAM), Navy Periodic Health Assessment (NavyPHA), Medical Operational Data System (MODS), and the Navy Physical Readiness Information Management System (PRIMS).

The panel data used in this analysis contains monthly observations of active-duty Sailors, Soldiers, and their dependents from 2013 to 2019. PHA data is limited to the years of 2013 to 2017, while inpatient and outpatient mental health diagnosis data is limited to the years of 2013 to 2019. In addition, I drop individuals that were never parents during the timeframe. In this analysis, I define a parent as someone who is already a parent when the dataset starts (number of children greater than zero), a first-time parent who has an observation the year before the birth of their first child, a first-time parent who has an observation the year after the birth of their first child, or a service member who will have a child in two years.



There are 2,322,715 observations coded as parents, consisting of 1,461,792 Army and 860,923 Navy observations. There are 2,037,276 male observations and 285,439 female observations who are or become parents. There are 239,290 parent observations coded as first-time parents. Among first-time parents, 82.47 percent are male observations, and 17.53 percent are female observations. I collapse the data down to one observation per year by taking the maximum or average of the utilized variables.

The data includes demographics such as gender, race, age, marital status, number of dependents, time in service, and education. I utilize reported PHA depression medication usage and reported PHA mental health concerns data from the PHA data source. I also utilize mental health diagnoses identified within the Defense Health Agency (DHA) data source by identifying health care encounters with ICD-9 codes of 290–319 before October 2015 and ICD-10 codes of F01-F99 on and after October 2015. I create variables for mental health outcomes and if a service member had their first child (or adopted) while serving on active-duty.

The PHA and health data allowed me to analyze the retention of different mental health reporting groups (i.e., no mental health concern before pregnancy to mental health concern after pregnancy and mental health before pregnancy to mental health concern after pregnancy). I will then see the difference in reporting groups compared to the baseline group (i.e., no mental health concern before pregnancy to no mental health concern after pregnancy). I modify the model to further compare different groups (i.e., active-duty fathers versus mothers, divorced, race, Navy versus Army). More importantly, I can also identify “gaps” for individuals who report mental health concerns on the PHA but do not receive mental health services because DHA and PHA data are linked in the PDE.

## **1. Summary statistics**

The following subsections will identify summary statistics for two groups: (1) first-time parents and (2) all-parents.



*a. First-time parents in the Army and Navy*

Table 1 reports summary statistics for Army and Navy personnel that are first-time parents. This table compares first-time parents a year before they have a child to a year after they have a child. I include the same individuals in the before and after columns. The data is contained to births in the years March 2013 to March 2015 to ensure I can observe first-time parents for at least four years when I analyze retention outcomes. I represent all values as sample averages.

Table 1. Summary Statistics for Army and Navy First-Time Parents March 2013–March 2019

	Fathers		Mothers	
	Pre	Post	Pre	Post
Age	27.11	28.15	26.62	27.64
Married (0/1)	0.71	0.87	0.62	0.74
Mil Spouse (0/1)	0.08	0.07	0.32	0.36
Relationship Impacting Event (0/1)	0.01	0.02	0.02	0.06
Widowed (0/1)	0.00	0.00	0.00	0.00
Black (0/1)	0.19	0.19	0.34	0.34
Hispanic (0/1)	0.47	0.47	0.52	0.52
Officer (0/1)	0.16	0.16	0.17	0.17
Navy (0/1)	0.41	0.41	0.47	0.47
Time in Service (Months)	70.88	82.84	65.50	77.40
Some College (0/1)	0.10	0.11	0.12	0.14
College Graduate (0/1)	0.05	0.06	0.08	0.09
Observations	98669	98669	20975	20975

Summary statistics for first-time parents that are coded in the analysis covering March 2013-March 2015. First and second columns show summary statistics pre and post pregnancy for fathers. Third and fourth columns show pre and post pregnancy summary statistics for mothers.

First-time fathers and mothers are on average 27.11 and 26.62 years old, respectively, 12 months before the birth of a child. Both male and female marriage rates go up after having a first child, with marriage rates going from 71 percent to 87 percent among men and 62 percent to 74 percent among women. Dual military males make up eight percent of the sample before and nine percent of the sample after the birth of a first



child. Dual military females make up 32 percent before and 36 percent of the sample after the birth of a first child, reflecting the more general pattern females are more likely than men to have marriages with other service members. I group events such as divorce, legal separation, or annulment into a category called relationship-impacting events; both men and women see fractions of the sample size grow after the birth of a first child. This could suggest that the addition of a child into the relationship impacts the status of the relationship. Several variables do not change from pre to post-birth. About 15 percent of the male sample and 17 percent of the female sample are officers. 41 percent of males and 47 percent of females are in the Navy; the remainder are in the Army. The average before birth time in service for males is 70.88 months and 65.50 months for females; this goes up by 12 months in the post sample. In the sample, education levels grow slightly from before to after the birth for both new fathers and new mothers.

***b. All parents in the Army and Navy***

Table 2 reports summary statistics for all Army and Navy personnel that are parents. Here, I have an observation for every year we observe the person as a parent. This table describes what the typical parent “looks” like in the dataset for March 2013 to March 2019. I represent all values as sample averages.



Table 2. Summary Statistics for All for Army and Navy Parents March 2013–March 2019

	Fathers	Mothers
Age	34.19	32.55
Married (0/1)	0.92	0.69
Military Spouse (0/1)	0.04	0.25
Relationship Impacting Event (0/1)	0.04	0.15
Widowed (0/1)	0.00	0.00
Black (0/1)	0.19	0.40
Hispanic (0/1)	0.47	0.48
Officer (0/1)	0.20	0.20
Navy (0/1)	0.37	0.40
Time in Service (months)	147.62	126.68
Some College (0/1)	0.19	0.23
College Graduate (0/1)	0.13	0.14
Age of Oldest Child	9.17	8.19
Age of Youngest Child	5.69	5.90
Number of Children	2.02	1.60
Observations	2,037,276	285,439

Summary statistics for all parents that are coded in the analysis covering March 2013–March 2019. All statistics are represented as averages. The first column shows summary statistics males who are or will become parents in the next 2 years. The second column shows summary statistics for females who are or will become parents in the next 2 years.

For all parents in the “all parent” sample, fathers and mothers are 34.19 and 32.55 years old, respectively. Parents are more likely to be married than not married, with 92 percent of males and 69 percent of females married in the sample. Women are more likely to be married to a spouse in the military, with 25 percent of the “all parent” sample of mothers being dual-military versus approximately four percent of fathers. Regarding a relationship impacting events such as divorce, legal separation, or annulment, four percent of males and 15 percent of females in the sample have had such an event occur. Officers, both male and female, make up approximately 19 percent and 40 percent of all parents. The average time in service for males and females respectively is 147.62 and 126.68 months (12.30 and 10.56 years, respectively). Among the “all parent” sample, females are more likely to be educated with some college or college than men. The average number of children for males and females is 2.02 and 1.60, respectively. The youngest child’s age is



5.69 and 5.90 for males and females, respectively. The oldest child's age is 9.17 and 8.196 for males and females, respectively.

## **B. DATA OUTCOMES**

I analyze the following data outcomes in this thesis. First, I divide them into the “first-time parent” and the “all parent” sample.

### **1. Mental health encounters and retention for “first-time parent” sample**

My first outcome involves mental health encounters before and after the birth of a first child. My second outcome captures the likelihood of retention 48 months after having a first child.

I create four mental health reporting groups by using a categorical variable. The “group” variable will serve as an independent and dependent variable for first-time parents. I define pre-pregnancy mental health encounters as at least one encounter 12 months before pregnancy. An encounter could have been a mental illness diagnosis or medication utilization to treat a mental illness. Then I define any post-pregnancy mental health encounters based on the same encounters as the pre-pregnancy data but measured 12 months after birth. If there is a reported mental health encounter for both before and after, it will be reported as a “1” and if not, it will be reported as a “0.” Then, I construct four groups of parents as follows:

1. No concern before birth and no concern after birth
2. No concern before birth and concern after birth
3. At least one concern before birth and at least one concern after birth
4. At least one concern before birth and no concern after birth

For the second outcome, retention over 48 months of service, I define the variable equal to “1” if the member stays in the service at least 48 months after the birth of the first child in the data and “0” if they separate before 48 months after the birth of the first child.



## 2. Mental health encounters and retention for “all parent” sample

I define additional outcomes for the “all parent” sample. I analyze these outcomes individually to capture how reporting might change for each of them based on age of oldest child, age of youngest child, and the number of children. I conduct analysis on the “all parent” sample using this method vice creating mental health reporting pattern groups like I did with the “first-time parent” sample because I am not trying to capture a pre and post-birth reporting patterns. These include:

- Any mental health encounter from PHA data (=1 if yes, else 0)
- Any depression medication usage from PHA data (=1 if yes, else 0)
- Mental health diagnosis (=1 if yes, else 0)

I create another dependent variable for retention, with the variable equal to “1” if the member stays in the service another year after reporting a mental health concern in the data in the preceding year and “0” if they separate within a year after reporting a mental health concern.

## C. METHODOLOGY

I conduct my analysis in the statistical program Stata Corps 15.1 within the CITRIX domain of PDE. I use data from multiple databases, and I cleaned for unwanted information. I drop duplicates for each snapshot. I merge the data to create one mass file for both males and females based on the unique person identifier listed in the datasets.

For this analysis, I create and analyze two different populations. The first set of data focuses on first-time parents who have a child between March 2013 and March 2015 for Army and Navy service members. Next, I look at changes in reported mental health for the same individuals over time, before and after the first birth, comparing four different mental health reporting groups: Group 1 (no concern to no concern), Group 2 (no concern to concern), Group 3 (concern to concern), and Group 4 (concern to no concern). I then run multiple linear regression with the regression equation as follows:



$$\text{Retained48}_i = \beta_0 + \beta_1 \cdot \text{Group2} + \beta_2 \cdot \text{Group3}_i + \beta_3 \cdot \text{Group4}_i + X_{it}\theta + \varepsilon_i$$

Where Retained48 is retained at least 48 months after the birth of the first child for parents  $i$ . My preferred model controls  $X_{it}$ , which designates age, marital status (coded as married, military spouse, relationship impacting event ever [divorce, annulled, legally separated relative to single or married], ever widowed, divorced/annulled/legally separated in the last period, widowed in the last period, education (coded as some college and college), race/ethnicity (coded as Black or Hispanic relative to white), service branch (coded as Navy equal to one), and rank (coded as officer equal to one).  $\varepsilon_i$  represents the error term. In this regression, the coefficients of interest are  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$ , which represent how much a given group (Group 1, Group 2, and Group 3 respectively) differs from the baseline (Group 1)

The second set of data focuses on all parents from March 2013 to March 2019. Here, I conduct a longitudinal analysis over six years of data with yearly snapshots to capture when parents are more susceptible to mental health reports based on age of oldest child, age of youngest child, and the number of children. I limit the number of children to seven or fewer to ensure the data remains de-identifiable. I capture this data for males and females separately but display them on the same graph to visualize the difference. The data points are captured based on age of oldest child age, age of youngest child, and number of children data reported in the PDE for the analysis timeframe. I graph the dependent variables (any reported mental health encounter from PHA data, any reported depression medication usage from PHA data, or any mental health diagnosis) separately against the age of oldest child, age of youngest child, and number of children. I then run multiple linear regression with, the equation is as follows:

$$\text{Retained1yr}_i = \beta_0 + \beta_1 \cdot \text{Parentmentalhealthconcern} + X_{it}\theta + \alpha_i + \varepsilon_{it}$$

Where Retained1yr <sub>$i$</sub>  is retained another year given that the parent  $i$  had a mental health encounter the prior year and who had their child in year  $t$ . My preferred model controls  $X_{it}$ , which designates age, marital status (coded as married, military spouse, relationship



impacting event ever [divorce, annulled, legally separated relative to single or married], ever widowed, divorced/annulled/legally separated in the last period, and widowed in the last period), education (coded as some college and college), race/ethnicity (coded as Black or Hispanic relative to white), service branch (coded as Navy equal to one), rank (coded as officer equal to one), age of oldest child, age of youngest child, and number of children.  $\alpha_i$  designates the individual fixed effects to capture individual differences that remain constant.  $\varepsilon_{it}$  is the error term. In this regression, the coefficient of interest is  $\beta_1$ , which represents if the parent had a mental health counter (mental health diagnosis, PHA reported mental health concern, or PHA depression medication usage reported) in the preceding year.

#### **D. SCOPE AND LIMITATIONS**

The scope of this thesis focuses on only Army and Navy personnel due to the nature of the data available in the PDE. I do not analyze Air Force or Marine Corps personnel, which, if studied, could provide more insight into parenthood and its relationship to mental health. In addition, I do not analyze all mental health illnesses reported by ICD-9 and ICD-10 codes, but rather focus on general mental health reports from PHA data, anxiety, and depression medication usage reported from PHA data and mental health diagnoses (inpatient and outpatient). One limitation of this thesis is that I do not look at the specific data on service members who utilize programs such as Fleet and Family Support Services, Military One Source, or the Army Community Service Family Program. It would be beneficial to know how often resources are utilized and further research should investigate the data for these programs for that reason.

Another limitation is that some of the outcome data is dependent on service members being honest with their actual health. In the PHA, the Sailor or Soldier discloses information at their own will, so there might be a tendency to underreport actual medication usage, mental health concerns, or any other information that the service member might be worried about disclosing. If under-reporting occurs, it will look like there are fewer problems within the military regarding mental health concerns related to parenthood.



Another limitation is the limited years of data for mental health reports. I only can observe four years (2013–2017) for mental health concerns. This only allows me to generalize data reported in that period, limiting the statistical power to detect patterns in the data. With larger samples, the researcher can more effectively detect smaller differences.

Lastly, for part of my analysis, I restrict the data to only three years of births early in the study window (2013–2015) to observe at least five years of post-birth data for first-time parents and study retention. Again, this only allows me to generalize patterns in 2013–2015. The number of observations decreases, limiting the statistical power to detect patterns in the data. As with the limited mental health data, the researcher can more effectively detect smaller differences.



## V. RESULTS

The following subsections highlight the results of the quantitative analysis that is conducted for first-time parents and all parents in the samples from the datasets.

### A. WITHIN PERSON CHANGES FOR FIRST-TIME PARENTS

The following tables and graphs highlight the results of the within-person changes for first-time parents. Table 3 shows the numerical values of first-time parent mental health reports from before to after the birth of a first child. A mental health report before birth is any mental health concern 12 months prior to the birth of the first child (no=0; yes=1), while a mental health report after birth is any mental health concern 12 months after the birth of the first child (no=0; yes=1). Table 3 is representative of both male and female active-duty service members.

Most service members fall into the Group 1 mental health reporting group, with 98.58 percent of first-time parents reporting no concern before and no concern after the birth of their first child. Group 2 presents the next highest reporting category, with 0.78 percent of first-time parents reporting no mental health concern before and a mental health concern after the first child's birth. Group 4 has the following highest percentage of the sample, with 0.59 percent of parents reporting a mental health concern before the birth of the first child and no concern after the first child's birth. Finally, Group 3 has the lowest percent of reporting, with 0.05 percent of parents having a concern before and after the first child's birth.



Table 3. First-time Parent Mental Health Reporting Patterns Pre/Post Birth

First-time Parent Mental Health Concern Before Birth	First-time Parent Mental Health Concern After Birth		
	No (0)	Yes (1)	Total
No (0)	Group 1: 235,894 (98.58%)	Group 2: 1,864 (0.78%)	237,758
Yes (1)	Group 4: 1,404 (0.59%)	Group 3: 126 (0.05%)	1,530
Observations	237,298	1,990	239,288

Mental health reports include any report on annual PHA (to include mental health concern or reported depression medication usage), mental health diagnosis (inpatient or outpatient). Data is captured 12 months before the birth of a first child and 12 months after the birth of a first child while on active-duty.

Table 4 captures mental health reporting patterns based on gender. This provides the opportunity to see the difference between fathers and mothers in the samples. Again, both fathers and mothers have the same reporting patterns overall, with the majority falling into Group 1 and the least falling into Group 3.

Females report higher percentages than males for Groups 2, 3, and 4. This means that they are more likely than males to have a concern only before, a concern only after, or concern in both time points. For example, mothers are eight times more likely to develop mental health concerns post-birth than fathers (Group 2 represents 2.81 percent of mothers but only 0.35 percent of fathers).



Table 4. First-time Parent Mental Health Reporting Pattern Groups by Gender

Mental Health Reporting Pattern Group	Fathers	Mothers
Group 1 (no concern to no concern)	99.1%	96.1%
Group 2 (no concern to concern)	0.348%	2.81%
Group 3 (concern to concern)	0.0172%	0.219%
Group 4 (concern to no concern)	0.522%	0.892%
Observations	197,338	41,950

The sample data covers all first-time parents from March 2013 to March 2015. “Group” is a categorical variable defined based on a mental health concern captured 12 months before the birth of the first child and a mental health concern capture 12 months after the birth of the first child. Groups are defined as follows: (1) no concern to no concern, (2) no concern to concern, (3) concern to concern, and (4) concern to no concern. Source of data is the PDE.

Table 5 reveals multilinear regression analysis results for first-time parents when analyzing the likelihood of remaining on active-duty service at least 48 months after the first child’s birth for Groups 2–4 compared to group one (no concern to no concern). Each column is a separate regression. There are no control variables included in the first two regressions, while Models 2–8 add the controls and fixed effects. Models 5–8 divide the analysis into subgroups for unmarried (Models 5 and 7) and married (Models 6 and 8).

In Model (1), fathers in Group 2 are 33.7 percentage points less likely to remain in the service at least 48 months after the first child’s birth compared to fathers in Group 1. When controls are added in Model (3), fathers in Group 2 are 29.2 percentage points less likely to remain in the service at least 48 months after the first child’s birth compared to fathers in Group 1. This is equivalent to a 34.9 percent drop relative to the Group 1 mean. Models (5) and (6) break out fathers into a subgroup based on marital status (unmarried and married). In Model (5), unmarried fathers in Group 2 are 4.2 percentage points more likely to remain in the service at least 48 months after the first child’s birth compared to fathers in Group 1. This is equivalent to a 5.1 percent increase relative to the Group 1 mean. In Model (6), married fathers in Group 2 are 40.1 per percentage points less likely to remain in the service at least 48 months after the first child’s birth compared to fathers in Group 1. This is equivalent to a 47.9 percent decrease relative to the Group 1 mean.



The coefficients for Group 2 in all models for fathers are statistically significant except for unmarried fathers in Group 2 (Model 5). On the other hand, coefficients for Group 4 for fathers are insignificant except for unmarried fathers (Model 5). One interesting reflection is that the number of observations for fathers who report a concern before birth to concern after the first child's birth in Group 3 are so small that there are no coefficients reported in any of the models.

In Model (2), mothers in Group 2 are 14.9 percentage points less likely to remain in the service at least 48 months after the first child's birth compared to mothers in Group 1. When controls are added in Model (4), mothers in Group 2 are 12.0 percentage points less likely to remain in the service at least 48 months after the first child's birth compared to mothers in Group 1. This is equivalent to a 15.1 percent drop relative to the Group 1 mean. Models (7) and 8) break out mothers into a subgroup based on marital status (unmarried and married). In Model (7), unmarried mothers in Group 2 are 20.2 percentage points more likely to remain in the service at least 48 months after the first child's birth compared to mothers in Group 1. This is equivalent to a 25.4 percent drop relative to the Group 1 mean. In Model (8), married mothers in Group 2 are 24.7 per percentage points less likely to remain in the service at least 48 months after the first child's birth compared to mothers in Group 1. This is equivalent to a 19.7 percent drop relative to the Group 1 mean.

The coefficients for Group 2 in all models for mothers are statistically significant. The coefficients for Groups 3 are all insignificant except for married mothers (Model 8). The coefficient for Group 3 of married mothers shows that compared to Group 1, Group 3 married mothers are 70.1 percentage points less likely to remain in the service at least 48 months after the first child's birth. This group has the highest likelihood to separate as compared to other groups. However, because the sample size in Group 3 is so small, there is a lot of statistical noise in this estimate.



Table 5. Retention After Having a First Child Based on Mental Health Reporting Group Model (2013–2019) Results

	(1) Father	(2) Mother	(3) Father	(4) Mother	(5) Unmarried Father	(6) Married Father	(7) Unmarried Mother	(8) Married Mother
Group 2	-0.337**	-0.149**	-0.292**	-0.120*	0.041	-0.401**	-0.202 <sup>+</sup>	-0.247**
	(-4.67)	(-2.80)	(-4.14)	(-2.29)	(0.19)	(-4.05)	(-1.82)	(-2.79)
Group 3		-0.296		-0.241				-0.701**
		(-1.18)		(-1.00)				(-20.45)
Group 4	0.060	0.023	0.010	0.021	-0.365**	0.014	-0.023	-0.010
	(1.23)	(0.27)	(0.25)	(0.29)	(-11.75)	(0.26)	(-0.13)	(-0.08)
Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.837**	0.796**	0.126**	0.175**	-0.387**	0.443**	-0.076	0.322**
	(268.76)	(115.01)	(4.89)	(2.98)	(-3.11)	(13.89)	(-0.43)	(3.57)
Observations	14112	3509	14033	3486	886	7460	646	1382
R <sup>2</sup>	0.003	0.004	0.111	0.064	0.101	0.046	0.066	0.052

Source of data is from the PDE. Table 4 shows how mental health reporting groups and control variables influence retention at least 48 months after the birth of a first child. Robust standard errors in parentheses. Data is capture from 2013–2019 for the “first-time parent” sample.

<sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

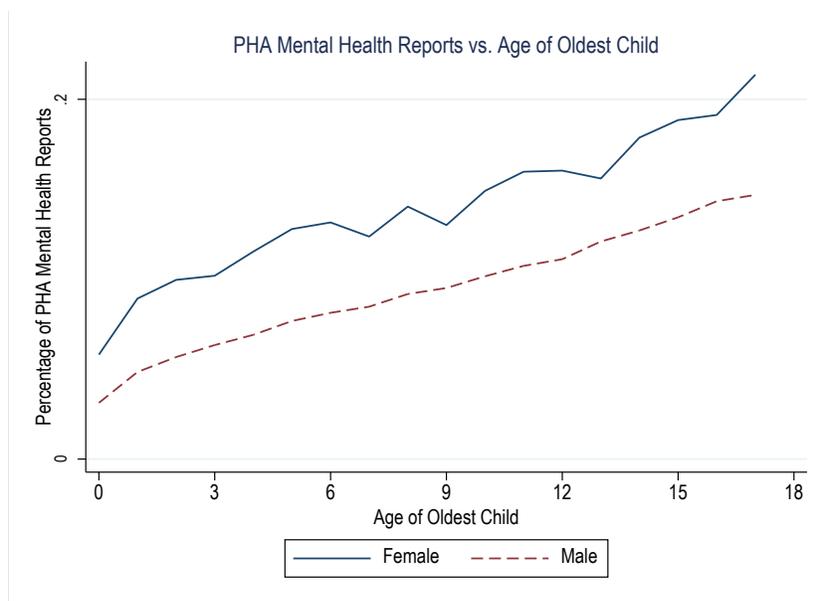


## B. LONGITUDINAL ANALYSIS OF ALL PARENTS

This data allows for analyzing reported PHA depression medication usage, reported PHA mental health concerns, and mental health diagnoses for both inpatient and outpatient locations. I can then look for trends based on age of youngest child, oldest child, and the number of children and how that correlates with retention and separation.

Figure 4 illustrates how the percentage of mental health reports identified on the annual PHA changes with respect to age of oldest child. This analysis is limited to those children 18 years old or younger. As the age of the oldest child increases, the percentage of PHA mental health reports also increases.

When the child is age zero and seventeen, approximately three percent and 14 percent of fathers in the sample report a PHA mental health concern, respectively. Likewise, when the child is age zero and seventeen, approximately six percent and 22 percent of mothers in the sample report a PHA mental health concern, respectively.



Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group. The outcome percentage of PHA mental health report conveys the share of parents with any PHA mental health report at each discrete age of oldest child.

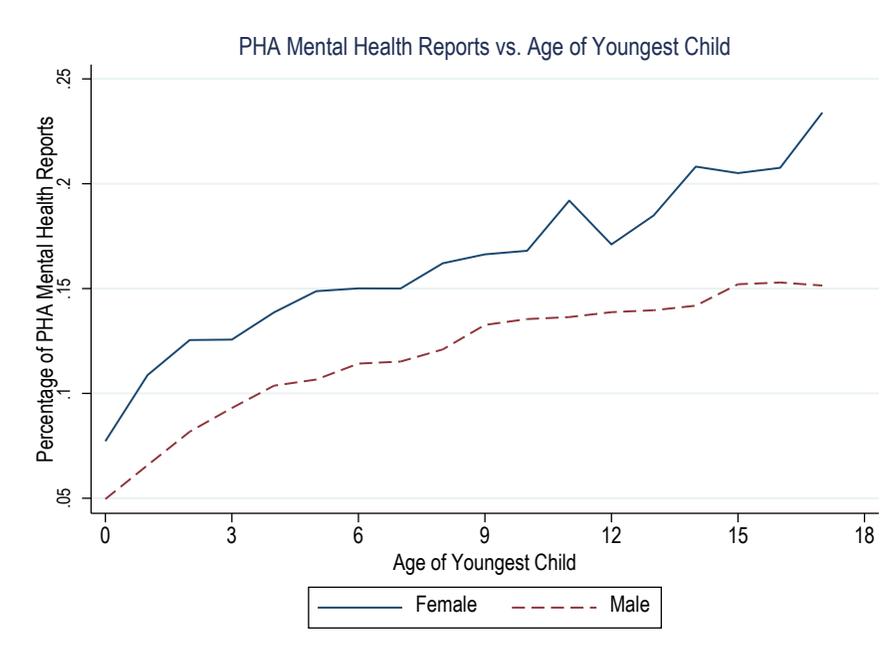
Figure 4. PHA Mental Health Reports versus Age of Oldest Child



The appendix contains additional graphs for mental health diagnoses, and PHA reported depression medication usage based age of oldest child.

Figure 5 illustrates how the percentage of mental health reports identified on the annual PHA changes with respect to age of youngest child. This analysis is limited to those children younger than 18 years old. As the age of the youngest child increases, the percentage of PHA mental health reports also increases.

When the child is age zero and seventeen, approximately five percent and 15 percent of fathers in the sample report a PHA mental health concern, respectively. Likewise, when the child is age zero and seventeen, approximately eight percent and 23 percent of mothers in the sample report a PHA mental health concern, respectively.



Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group. The outcome percentage of PHA mental health report conveys the share of parents with any PHA mental health report at each discrete age of youngest child.

Figure 5. PHA Mental Health Reports versus Age of Youngest Child



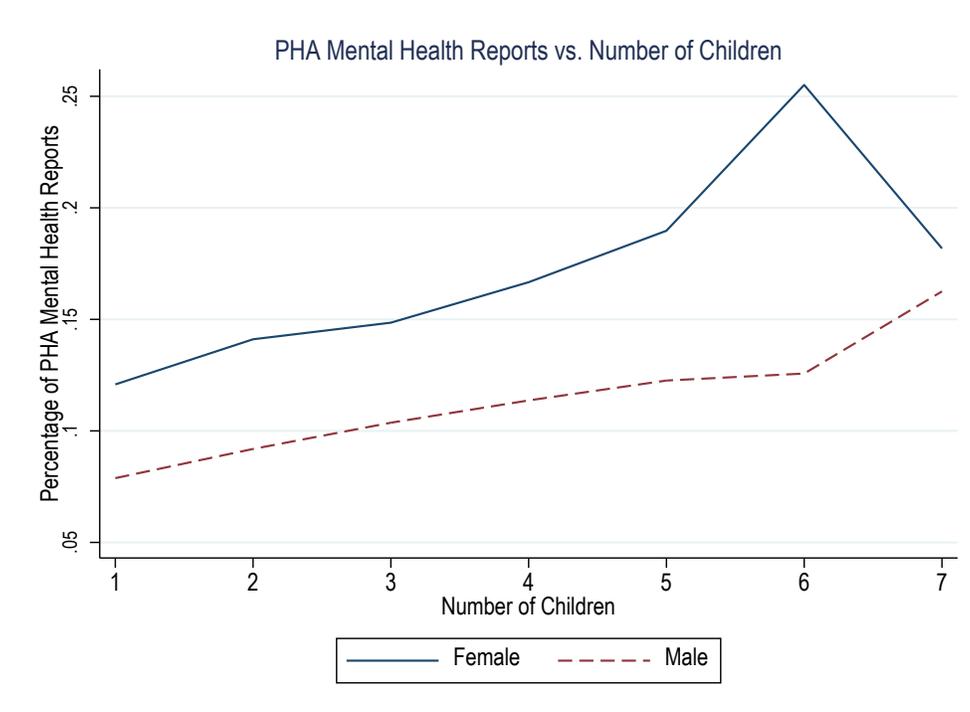
The appendix contains additional graphs for mental health diagnoses, and PHA reported depression medication usage based on age of youngest child.

Figure 6 illustrates how the percentage of mental health reports identified on the annual PHA changes with respect to the number of children a parent has. This analysis is limited to those children younger than 18 years old. In addition, due to the small sample size of fathers and mothers who have eight or more children, the analysis is limited to parents who have seven or fewer children.

Fathers experience a positive correlation between the number of children and PHA mental health reports from zero to seven children. From one child to six children, one can see that the percentage of PHA mental health reports starts to level off at 12.5 percent. For example, approximately eight percent of fathers in the sample have a PHA mental health report when they have one child, whereas 12 percent of fathers have a PHA mental health report when they have six children. There is a sharp increase in the number of PHA mental health reports from six to seven children, increasing from 12 percent to 16 percent of the sample.

Mothers experience a positive correlation between the number of children and PHA mental health reports from zero to six children. From one child to five children, the slope of the line changes slightly but is always positive. For example, at one child, approximately 12 percent of mothers in the sample have a PHA mental health report, whereas 18 percent of mothers have a PHA mental health report at five children. There is a sharp increase in the number of PHA mental health reports from five to six children, increasing from 18 percent to 26 percent of the sample. From six to seven children, there is a decrease in the percent of mothers who have indicated a mental health report on their PHA, dropping from 26 to 17 percent of the sample.





Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group with seven or fewer children. The outcome percentage of PHA mental health report conveys the share of parents with any PHA mental health report with respect to the number of children the parent has.

Figure 6. PHA Mental Health Reports versus Number of Children

The appendix contains additional graphs for mental health diagnoses, and PHA reported depression medication usage based on number of children.

### C. REGRESSION ANALYSIS OF ALL PARENTS

Table 6 shows the regression analysis results for the “all parent” group on the likelihood of retaining another year in service if the parent had a mental health encounter the preceding year. Each column is a separate regression. There are no control variables included in the first two regressions, while Models 2–8 add controls. Models 5–8 divide the analysis into subgroups for unmarried (Models 5 and 7) and married (Models 6 and 8).

In Model (1), fathers are 19.6 percentage points less likely to retain another year when they report a mental health concern the year prior. When controls are added in Model (3), fathers are 13.9 percentage points less likely to retain another year when reporting a



mental health concern in the last year. Models (5) and (6) divide fathers into subgroup based on marital status (unmarried or married). In Model (5), unmarried fathers are 13.7 percentage points less likely to retain another year when reporting a mental health concern in the last year while in Model (6), married fathers are 13.8 per percentage points less likely to retain another year when reporting a mental health concern in the last year.

In Model (2), mothers are 16.3 percentages points less likely to retain another year when they report a mental health concern the year prior. When controls are added in Model (4), mothers are 10.5 percentage points less likely to retain another year when reporting a mental health concern the year prior. Model (7) and (8) divide mothers into subgroups based on marital status (unmarried or married). In Model (7), unmarried mothers are 10.4 percentage points less likely to retain another year when reporting a mental health concern in the last year while in Model (8), married mothers are 10.0 per percentage points less likely to retain another year when reporting a mental health concern in the last year.

Across the subgroups for fathers and mothers, the general patterns from the primary analysis in Models (1) and (2) hold. Having a mental health concern is consistently statistically significant and negative. This means that no matter if males and females are married or unmarried, they are both more likely to separate in the next year if they had a mental health report the year prior.



Table 6. Retention After Reporting a Mental Health Concern in the Prior Year Model (2013–2019) Results

	(1) Father	(2) Mother	(3) Father	(4) Mother	(5) Unmarried Father	(6) Married Father	(7) Unmarried Mother	(8) Married Mother
Parent Mental Health Concern/Encounter	-0.196**	-0.163**	-0.139**	-0.105**	-0.137**	-0.138**	-0.104**	-0.100**
	(-218.42)	(-81.93)	(-161.50)	(-52.65)	(-33.52)	(-152.45)	(-26.49)	(-40.44)
Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.928**	0.929**	2.612**	2.766**	3.391**	2.592**	2.988**	2.730**
	(4063.72)	(1323.42)	(291.69)	(120.22)	(59.36)	(280.87)	(87.79)	(97.50)
Observations	1806743	251674	1720685	231535	129480	1591205	70380	161155
$R^2$	0.413	0.398	0.473	0.481	0.631	0.479	0.554	0.511

Source of data is the PDE. Table 5 shows how mental health reporting concerns and other variables influence retention after 1 year when there was a mental health report in the year prior. Robust standard errors in parentheses. Data is captured from 2013 to 2019 for the “all-parent” sample.

+  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$



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## VI. DISCUSSION AND RECOMMENDATIONS

### A. DISCUSSION

In this thesis, I wanted to uncover mental health reporting patterns for first-time parents 12 months before and after the first child's birth. I also wanted to see how having a child and mental health concerns impact the likelihood of remaining in the military at least 48 months after the first child's birth. Additionally, I wanted to look at all parents in the data set to capture mental health outcomes based on age of oldest child, age of youngest child, and the number of children. Then I also wanted to analyze the likelihood of remaining in the military for another year if the parent had a mental health encounter the preceding year. I create mental health reporting pattern groups for first-time parents to look at pre and post-birth trends for mental health concerns. Most parents report no concern before the birth of the first child and no concern after the first child's birth, while parents who report a mental health concern before birth and a mental health concern after birth have the fewest reports. I then take these groups and conduct regression analysis to see the likelihood of retaining at least 48 months after the birth of a first child. Based on the analysis, most parents report no concern before and after the first child's birth. Regression analysis indicates coefficients on Group 2 (no concern to concern) are always statistically significant and have the highest likelihood of separating at least 48 months after the birth of a child. Other groups are smaller in size, and I lack the statistical power to make strong conclusions. However, the general adverse outcomes for the other groups highlight the need for future research.

In this analysis, I discovered a few surprising results. With respect to the first-time parent analysis, most first-time parents in this thesis fall into Group 1—a group that reported no mental health concern pre or post-childbirth. Based on research into mental health reporting statistics validated by reports from DHA, most service members do not have a mental health illness or report mental health concerns. However, the percent of Group 1 in the first-time parent analysis could be overinflated. Service members are less likely to report if they truly have a mental health concern on forms such as the annual PHA



for fear of reprisal or lack of acceptance based on research on mental health stigmas and the associated consequences of reporting mental health concerns.

For the “all parent” group, I analyze PHA mental health reports, PHA depression medication usage, and mental health diagnoses based on age of oldest child, age of youngest child, and the number of children. The vital takeaway from analyzing these three outcomes is that more parents experience mental health concerns as their children grow older and when they have more children. This does not mean that parents with newborns or younger children do not experience an increase in mental health-related challenges; it just suggests that the military should conduct more research into this topic area to can better support service members in the different phases of parenthood. There are also higher percentages of mothers who report experiencing mental health challenges. While I cannot ascertain whether this is due to mothers being more likely than fathers to seek mental health help or due to higher incidence of mental health challenges among mothers, it would be important that the military continue researching parenthood effects on mothers so the military can better support the females who choose to have a family and a career. For the “all parent” sample, I perform regression analysis to see the likelihood that parents remain in the service if they had a reported mental health concern the preceding year. Both with and without controls, and separating by gender and marital status subgroups, all regressions show that service members are more likely to separate in the next year if they had a reported mental health concern in the past year.

After analyzing retention of first-time parents 48 months after the birth of the first child (equivalent to one additional tour), it makes sense that parents who developed mental health concerns after the birth of a first child (Group 2) have a negative likelihood of retaining for another tour. The additional stressors that come with having the first child and the fact that postpartum depression is one of the most common symptoms for mothers after the birth of a child (Centers for Disease Control and Prevention, 2020) are possible contributing factors to the separation decision.

After analyzing the outcome PHA mental health reports based on age of oldest and youngest child in the “all parent” sample, I find PHA mental health reports increase over time among parents as their children get older. These patterns do not necessarily mean



older children (as age of oldest and youngest child increases) cause more mental health reporting, but it does highlight those parents tend to struggle more as the child gets older. These results were surprising because I thought that most parents with newborns and younger children would struggle more due to dependency on adults. In the military, more parent support programs focus on the transition to parenthood and the period after the birth of a child (i.e., Baby Boot Camp, New Parent Support Program, Moms in Transition). My findings suggest there could be a benefit of programming that focuses on support services for parents with older children. Research into whether such programs are effective could go alongside their implementation.

When observing the regression analysis results for those parents with a mental health encounter in the preceding year and how likely they are to remain on active-duty for another year, it was surprising to discover negative values. One would think that people with mental health issues would remain on active-duty for the medical benefits in the short term. However, perhaps the DOD does not have vital resources to support service members when they are struggling with mental health. Perhaps the service member already knew they wanted to separate, and they no longer care about stigmas associated with seeking mental health treatment. It is difficult to make a conclusive reason why service members who report a mental concern the prior year have a lower likelihood of remaining in the service another year. This is another reason research in this subject area is necessary and warranted.

## **B. FUTURE RESEARCH AND RECOMMENDATIONS**

This thesis was limited in scope to first-time parents who had their first child between 2013 and 2015. Future research could expand the data set to evaluate a more extended period; then, it could see if more data supports the results from this thesis. This is the same recommendation and suggestion for the “all-parents” group; a larger sample population and a longer timespan could compare the outcomes to this thesis. Another method is to capture pre and post-pregnancy mental health concerns. The analysis could follow a group of parents from when they discover they will be having their first child through a period after the birth of their first child via qualitative surveys. The qualitative



surveys could capture data via Likert scale questions or open-ended response questions. This could help the DOD directly gather feedback on mental health concerns from the source. It could utilize the answers or scores to gauge whether first-time parents positively change their reporting (i.e., actually report if they have an issue instead of hiding it) based on the comments provided in the survey. The DOD could then use this to update leadership training on mental health stigmas to pursue reporting more often. This could then help the well-being of service members who are parents and struggle with mental health concerns.

Mental health data is limited to 2013 through 2017. It would be beneficial for future research to capture a longer timespan with mental health data so the military can start making causal statements about the relationship between mental health in parenthood and retention. With that being said, I also focus on only parents. Future research could analyze both parents and non-parents to capture differences between the quasi-control and quasi-experimental groups. Again, this could help the military make casual statements about the effects of having mental health concerns during parenthood when one looks at retention, especially when including a control group such as non-parents.

One additional area of future research could focus on relationship-impacting events such as divorce, legal separations, and annulments. In this analysis, relationship impacting events show negative impacts on retention in the short term (within a year) but positive impacts on retention after four years. The military could benefit by investigating divorce or legal separation patterns and if these truly change over time (negative impacts on retention in the short term but positive impacts in the long run) and how these types of stressful events impact parental mental health encounters in the DOD.

Currently, I am not recommending any specific policy changes with respect to instructions, training, and education in this thesis. I wanted to show through analysis what the world looks like in this subset of military members so the military can start to focus on those parents who struggle with a mental health concern or illness; this thesis is purely descriptive in that I am not trying to make causal statements. However, more in-depth research might confirm if parenthood really does cause mental illnesses or concerns to increase, leading to service members separating faster than non-parents or parents who do not struggle with mental health issues.



I am recommending that the military conduct more research on this subject. Suppose the DOD conducts more research for this subpopulation of service members. In that case, it could use the results to examine its existing family and mental health resources, captures how those resources are utilized, and allow the military to divert funding from one area to the next if needed. This could be in the form of more resources targeted towards parents of teenagers vice parents of toddlers or elementary-age children. Then, when the military can provide the right set of resources at the right time to parents, parents could potentially be better prepared to handle life and balance that life with work.



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## VII. CONCLUSION

The military succeeds when members are in a healthy, ready-to-fight mindset. Between the two groups I study in this thesis, and when the military starts to focus on funding allotted for family resources, it becomes a balancing act to ensure members have the right resources available at the correct times. The military could examine existing programs such as parental leave policies and find a way to provide the most benefits to members with newborns without negatively impacting readiness or one's career. Likewise, suppose the military is concerned about a diverse workforce. In that case, it should take the time to evaluate where parents are having difficulties so policies or programs can benefit parents as much as possible, especially if they intend to remain on active-duty. Reviewing literature and conducting more research that focuses on both fathers and mothers allows the military to target resources for parents in different stages of their parenting journey, which can help them be as mentally healthy as possible. This thesis shows that initial assumptions about subpopulations are not always what we think. The military needs to research challenges at different phases of parenthood for those who choose to serve in the military. Hence, it better understands the actual health of the parent population.

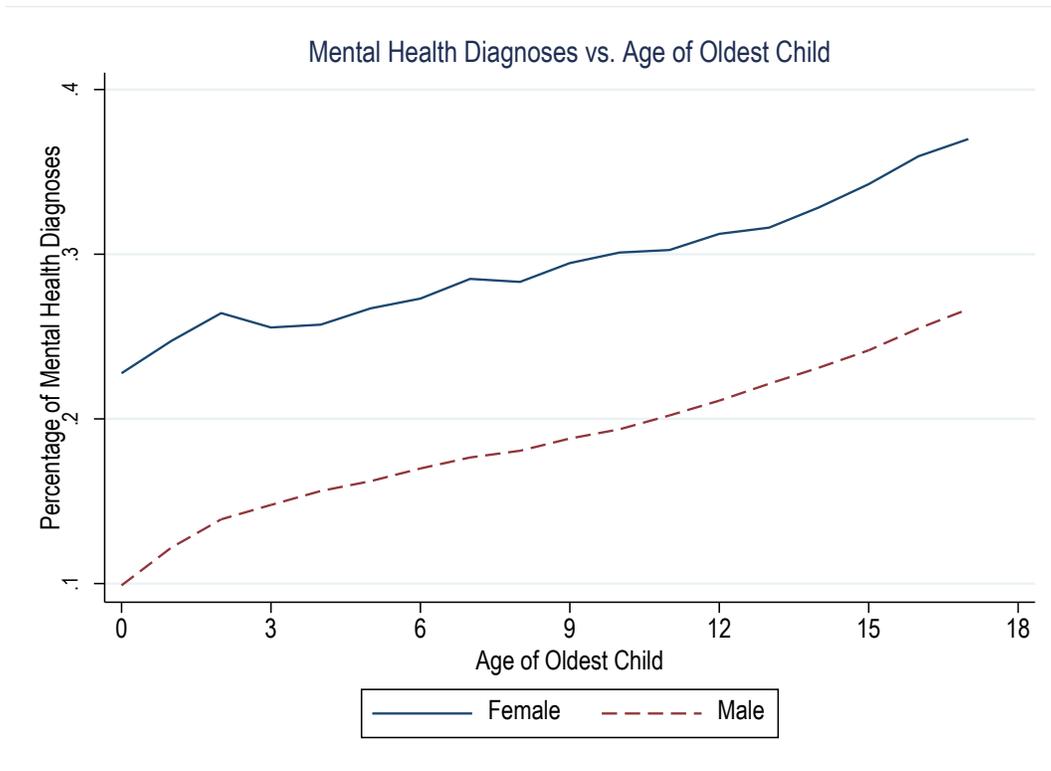
When left untreated, mental illnesses and poor mental health can impact service members, which can create a ripple effect that extends to other aspects of one's life. If service members are parents, more is at stake if the parent is suffering from mental health concerns, and negative consequences such as domestic violence, child abuse, or suicide could arise. Therefore, leaders need to be involved and recognize when their people are struggling or acting differently. Within the command, it is essential to publish what services are available for service members concerning mental health; ultimately, these services could help save a marriage or a family from falling apart. When the military supports its people, fosters an inclusive workforce, and takes mental health seriously, its reputation can become more positive. These effects can have lasting impacts, especially if it causes more people to take that step to join the service willingly. The military projects its actions worldwide, and it should foster a healthy culture where its people are treated with dignity and respect, even if they are parents who struggle with mental illness. If the military can



get this right, it helps us have a better foothold around the world, one where our adversaries cannot use our downfalls to their benefit. This is strategic and a strong reason this research is vital; it could change how we fight down the road!



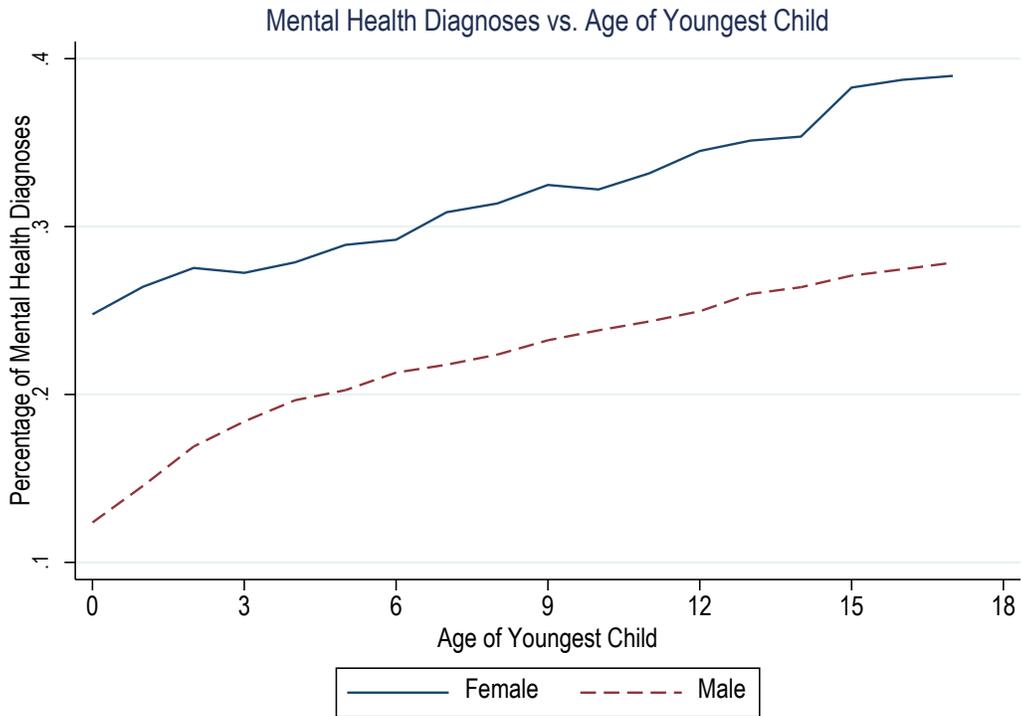
## APPENDIX. ALL PARENT ADDITIONAL ANALYSIS



Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group. The outcome percentage of Mental Health Diagnoses conveys the share of parents with an inpatient or outpatient mental health diagnosis at each discrete age of oldest child.

Figure 7. Percentage of Mental Health Diagnoses versus Ages of Oldest Child

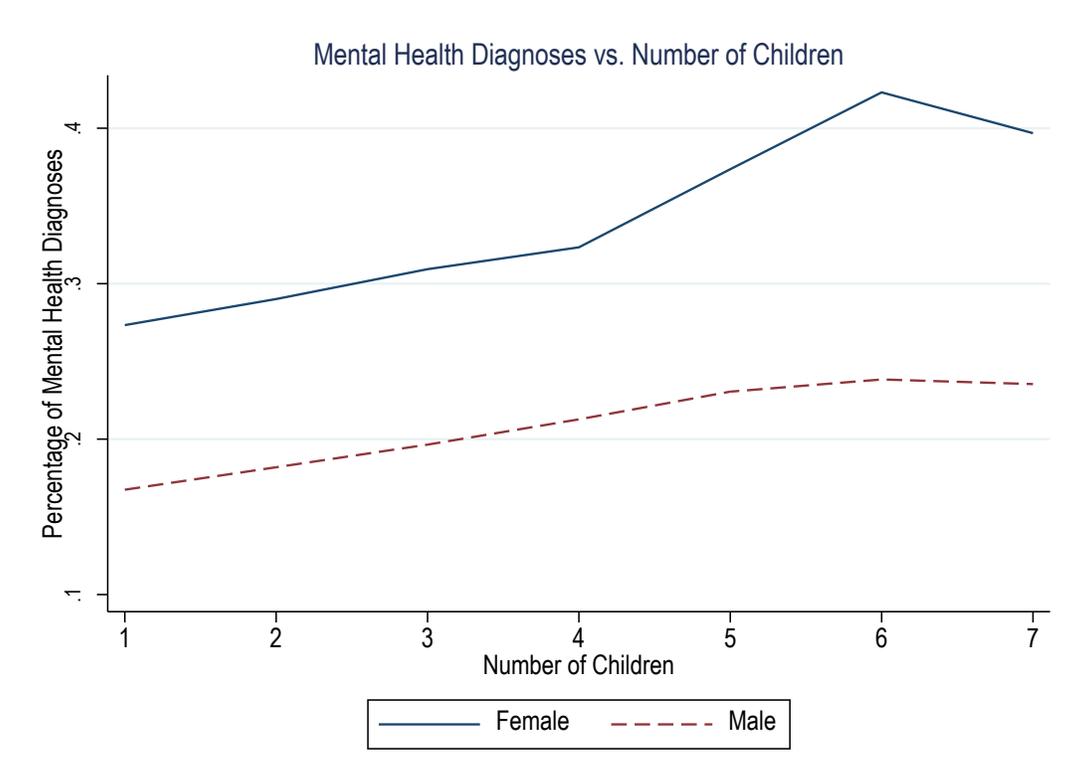




Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group. The outcome percentage of Mental Health Diagnoses conveys the share of parents with an inpatient or outpatient mental health diagnosis at each discrete age of youngest child.

Figure 8. Percentage of Mental Health Diagnosis versus Age of Youngest Child

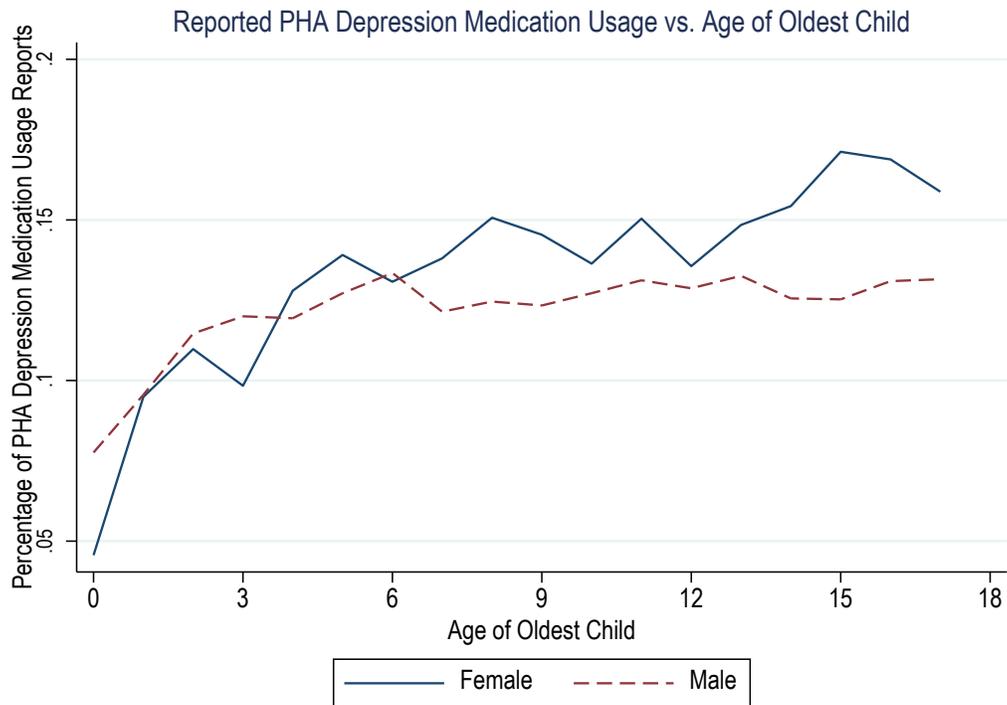




Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group. The outcome percentage of Mental Health Diagnoses conveys the share of parents with an inpatient or outpatient mental health diagnosis with respect to the number of children a parent has.

Figure 9. Percentage of Mental Health Diagnoses versus Number of Children

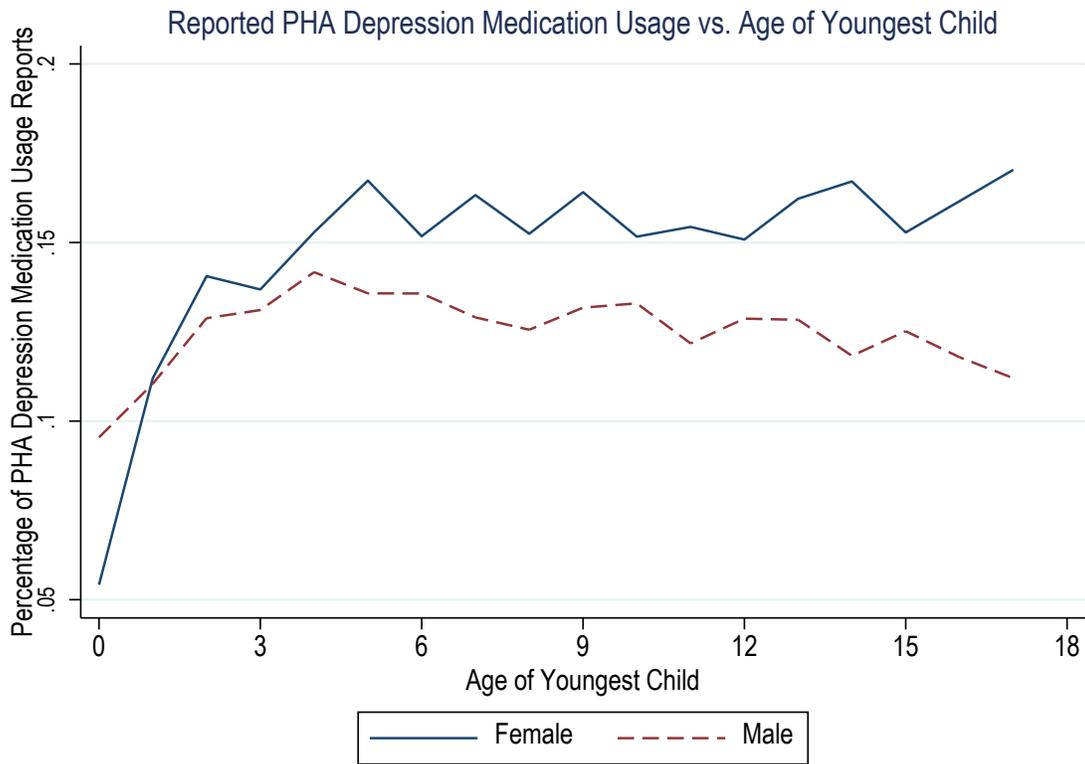




Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group. The outcome percentage of Reported PHA Depression Medication Usage conveys the share of parents with any reported PHA depression medication usage at each discrete age of oldest child.

Figure 10. Reported PHA Depression Medication Usage versus Age of Oldest Child

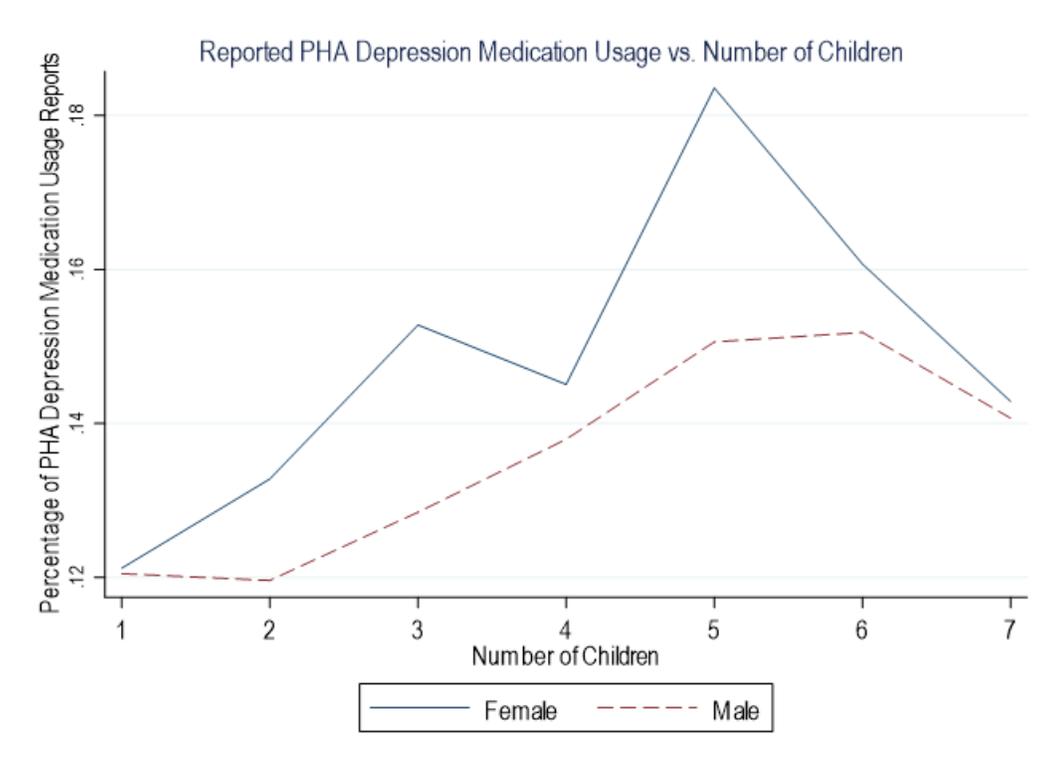




Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group. The outcome percentage of Reported PHA Depression Medication Usage conveys the share of parents with any reported PHA depression medication usage at each discrete age of youngest child.

Figure 11. Reported PHA Depression Medication Usage versus Age of Youngest Child





Source of data is the PDE. Data is captured from 2013 to 2019 for the “all-parent” group with seven or fewer children. The outcome percentage of Reported PHA Depression Medication Usage conveys the share of parents with any reported PHA depression medication usage with respect to the number of children the parent has.

Figure 12. Reported PHA Depression Medication Usage versus Number of Children

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