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PARENTHOOD AND ITS EFFECT ON HEALTH AND PERFORMANCE IN THE U.S. MARINE CORPS

by

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As the Marine Corps looks to identify new ways to retain and promote quality talent, it must build a culture of support for its parents. This proposal analyzes the effects of parenthood on health and performance in the Marine Corps. Using personnel data from 2013–2019 on all active-duty Marines, I conduct a time series analysis and establish pre- and post-birth trends to estimate the effects that childbirth has on first-time parents and how patterns differ among subgroup populations. Results show that parenthood significantly impacts the health of first-time Marine parents. The impacts are more significant on new Marine mothers, but both mothers and fathers do eventually recover to near pre-birth levels. Mothers with at least 12 months of post-birth service experience a 0.2–0.4 standard deviation drop from the average mean on fitness tests, compared to their childless counterparts. The job performance of Marine parents is less impacted by parenthood. Further, enlisted Marines and those in the combat arms Military Occupational Specialties are most affected by parenthood relative to other job subgroups. The results of this study can translate to policies in the civilian workplace of similar professions. The U.S. can only build a culture of health around parenthood if we know what programs keep parents healthy. The research should interest the Corps' manpower, physical fitness, and family readiness communities.

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PARENTHOOD AND ITS EFFECT ON HEALTH AND PERFORMANCE IN THE U.S. MARINE CORPS

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LIST OF ACRONYMS AND ABBREVIATIONS

CDC	Child Development Center
CFT	Combat Fitness Test
CITS	Comparative Interrupted Time-Series
CPG	Commandant's Planning Guidance
DOD	Department of Defense
DoN	Department of Navy
DACOWITS	Defense Advisory Committee on Women in the Services
EAS	End of Active Service
FITREP	Fitness Report
FFI	Force Fitness Instructor
FY	Fiscal year
MFLC	Military Family Life Counselor
MOS	Military Occupational Specialty
MTC	Movement to Contact
MUF	Maneuver Under Fire
NDS	National Defense Strategy
PFT	Physical fitness test
PROCON	Proficiency and Conduct Scores
SECDEF	Secretary of Defense
SECNAV	Secretary of the Navy
TFDW	Total Force Data Warehouse
TIS	Time in Service
USMC	United States Marine Corps

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I. INTRODUCTION

> *Recruiting, developing, and retaining a high-quality military and civilian workforce is essential for warfighting success.* Cultivating a lethal, agile force requires more than just new technologies and posture changes; it depends on the ability of our warfighters and the Department workforce to change *business practices to achieve mission success*. The creativity and talent of the American warfighter is our greatest enduring strength, and one we do not take for granted.
>
> — Summary, National Defense Strategy
> (Department of Defense, 2018, p. 7)

To attract, develop, retain, and support the best Marines, the Corps' leadership must evaluate existing programs and policies to ensure they are exploiting all opportunities to keep the very best among their ranks. This includes exploring modern talent management techniques like providing support for the Corps' families. Parenthood is a major life milestone that is common in the U.S. Marine Corps (USMC), with approximately 5,000 babies born to U.S. Marines every year.[1] This makes building a culture of support around parenthood in the Marine Corps key. This study explores the impacts of parenthood and its effect on health and job performance in the USMC. Because beyond the excitement of having a child, the literature suggests that the birth of a child drastically changes parents' daily routines. Changes in sleep patterns, new social responsibilities, and emotional stressors, in addition to mental adjustments, can impact parents' health and well-being (Bellows-Riecken & Rhodes, 2008; Saxbe et al., 2018). The shifts in home life after childbirth can extend beyond the home and impact their performance at work. However, no research exists regarding the potential impacts exclusively within the Marine Corps, which contributes to the motivation for this study. Knowing how new Marine parents react to parenthood can provide useful insights into how the Corps can shape its policies to recruit and retain those seeking to start families while in service.

[1] Based on number of babies added as dependent children to the Defense Manpower Data Center in 2017.

Additionally, in a recent post on Twitter, the Commandant of the Marine Corps, General David Berger posted eight *immediate action* items for his staff to pursue and develop a plan of action (Berger, 2020). Two of the items focused on increasing the number of women in the Corps. One of the action items included growing the active-duty female population through the recruitment of females from the Corps' reserve components (Berger, 2020). General Berger's predecessor, General Robert Neller, directed the Corps to increase its female population to 10%, which the Corps is close to doing at roughly 9% currently (Berger, 2020). The reserve to active-duty strategy would help achieve that 10% goal. Another item focused on expanding the availability of the current parental leave policy to same-sex couples and parents who adopt children (Berger, 2020). The Commandant's focus on these types of goals and policies shows how he is committed to building a more inclusive and diverse Corps. It also shows how there is an appetite to explore more alternative talent management techniques to attract and retain new Marines, especially females. This study aims to contribute to that growing sentiment.

A. PURPOSE

In a high-stress job like that of a Marine, changes associated with parenthood can significantly impact one's performance as well as their decision whether to remain in such a profession. And given that after the birth of a child, most Marines remain working similar jobs, with similar hours, this study can be useful in determining how the Marine Corps can minimize any impacts to keep Marines capable and ready. Therefore, this study compares the health and job performance outcomes between parents and their childless counterparts to see how parenthood affects Marines. Any significant changes in health-related or job performance measures emphasize the importance of making policy supports available for both mothers and fathers in the Marine Corps. In a press briefing on the new parental leave policies, former Secretary of Defense, Ash Carter spoke about how the new policy enables service members to balance their service commitment and their commitment to starting a family (Ferdinando, 2016). As a result, the analysis from this study aims to help identify programs and policies that will reduce the severity of any parenthood impacts, at a minimal cost, and in a realistically achievable manner.

In addition to recent parental leave policy changes, which offers more time at home for military parents, other policies and programs aimed at supporting new parents include additional access to childcare development centers (CDCs), an increase in one's base pay to alleviate potential financial burdens, and health and wellness support. To highlight the type of parent who needs the most support, I conduct a variety of subgroup analyses to see where the Corps can best utilize their resources. Whether it is increasing leave periods, allowing greater leave flexibility, or using existing USMC programs to intervene before childbirth, this study provides information useful to Marine Corps decision-makers.

While scant research exists on parenthood in the military context, I leverage the vast literature in the civilian sector to compare results to my analytical approach. Civilian literature suggests that parents experience both positive and negative effects regarding their health and performance. Significant sleep disturbances caused by newborns can lead to tiredness, and in turn a decrease in physical activity for parents which obviously effects their health (Bellows-Riecken & Rhodes, 2008). Conversely, the responsibility of caring for a new baby may encourage parents to improve their health behaviors not only for their own sake but also for their child's (Gay et al. 2004). And although much of the literature written on the topic comes from the civilian setting, these issues are prevalent in the military, which contributes to this study's motivation. This paper represents the first research, to my knowledge, which analyzed the effects of parenthood in the U.S. Marine Corps. Furthermore, while this study simply analyzes parenthood impacts in the Marine Corps, the other services can replicate it so that the DOD understands the impacts on parents. Understanding the impacts across services can provide insight as to whether certain service-specific policies or programs aimed at parenthood are effective.

B. SCOPE AND METHODOLOGY

The Department of Defense (DOD) and the Marine Corps present a unique opportunity to study the effects of parenthood and several family support policies because of the quality data kept by the organization. The Marine Corps consistently tracks and reports data that includes measures of health and worker productivity. These measures include up to date demographic information, test scores, physical fitness records, and job

performance evaluations. Using personnel data from 2013 to 2019 on all active-duty Marines, I conduct a time series analysis establishing pre- and post-birth trends to estimate the effects that childbirth has on first-time parents. The analysis uses dependent birth data to compare outcomes before and after the birth, relative to Marines who did not have a child. The health outcomes I estimate include changes to a Marine's physical fitness score as well as the likelihood that they attain a first-class fitness score. More than other services, the Marine Corps places a high value on physical fitness, which makes it a useful proxy when analyzing an individual's overall health. The health variables include scores from the physical fitness test (PFT), and the combat fitness test (CFT). Job performance outcomes include a Marine's individual performance evaluation scores including fitness report (FITREP) scores for officers and senior enlisted and proficiency and conduct (PROCON) scores for junior enlisted.

I hypothesize that (1) parenthood is initially detrimental to both mothers' and fathers' health, (2) parents eventually recover, and (3) more generous parental support policies and programs improve outcomes. This research will uncover how parenthood impacts parents' health and performance—and how patterns differ among subgroups that include mothers vs. fathers, officers vs. enlisted, and different military occupational specialties (MOS).

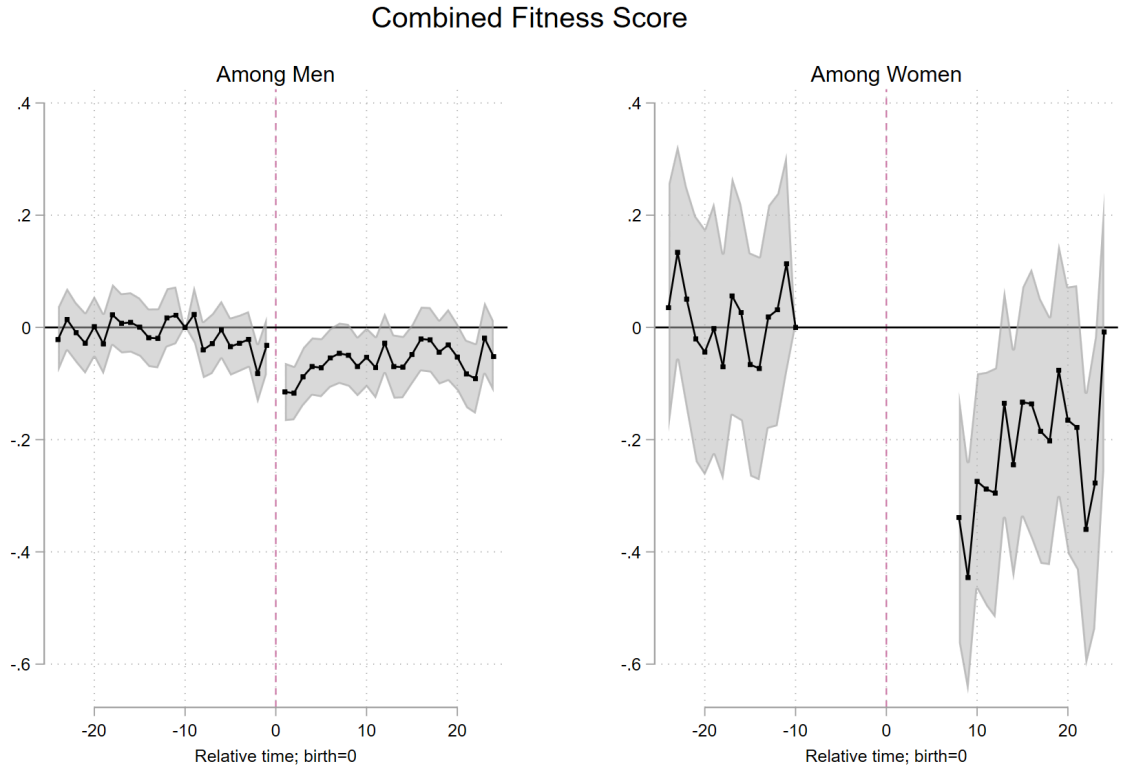
A strength in this model is that I can observe which control group is most like the treatment group with regards to demographics and baseline trends. Further, the time series method is used because the data lends itself nicely to establish pre- and post-birth trends and to compare them among control and treatment groups. Further, the study evaluates four distinct periods during the parental cycle to see the magnitude of impacts through time. These periods include (1) 9 months prior to childbirth, (2) the immediate 2 months post-birth, (3) 3-12 months post-birth, and (4) 13-36 months post-birth. Evaluating the impacts across these periods will provide insight into how and to what duration parents are affected by childbirth. The Marine Corps can only build a culture of health around parenthood if they know the impacts of it and what programs best keep parents healthy.

A limitation of the study is the lack of statistical power associated with the subgroup analysis. There are a limited number of first-time parents in the four MOS subgroups I

analyze which yield large standard errors. Further research can be conducted using additional years of TFDW data. This will provide useful insight into how each MOS category differs especially as more females enter combat-related jobs.

C. RESULTS AND FINDINGS

As expected, there is an impact on the physical health of first-time parents in the study. Both first-time fathers and mothers experience a drop in their combined fitness score following childbirth but eventually recover to their health levels before pregnancy. For reference, Figure 1 highlights those impacts to a first-time parent's combined fitness score. This figure is also displayed in the results section.



Notes: Figure displays monthly coefficients from time-series regressions. The outcome includes standardized (mean=0, SD=1) scores from physical/combat fitness tests. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse.

Figure 1. First-Time Marine Parents' Combined Fitness Scores

Additional results can be found in Chapter V. For the job performance measures, Marine fathers do not face a significant effect before or after childbirth while Marine mothers face a slight drop in their performance upon returning to work after 12 weeks of maternity leave. For the subgroup analysis, enlisted Marine parents and those in the combat service support and other MOS groups face the largest impacts compared to their counterparts. The main recommendations from this study include a more continuous dissemination of information to Marines regarding family support services as well as updating the current Marine Cords Order on pregnancy and parenthood to reflect both societal and organizational changes over the last decade.

D. ORGANIZATION OF CHAPTERS

Chapter II discusses the current Marine Corps policy regarding parenthood and provides statistics to show the first-time parents analyzed in this study. Next, I examine the vast civilian literature on parenthood to show how health and job performance affects parents in that sector. Chapter IV includes the full data and method section followed by the results. The recommendations and further research chapter includes a brief discussion on the potential impacts of a yearlong maternity leave policy.

II. BACKGROUND

In July of 2015, then-Secretary of the Navy, Ray Mabus, announced a Department-wide change in both the maternity and paternity leave policies. This policy expanded paternity leave for male Marines and sailors from 10 to 14 days of uncharged leave. For females, the change was even greater, as the maternity leave period expanded from 6 to 18 weeks (Mabus, 2015). Shortly after the Navy changed its policy, the Secretary of Defense then instituted a DOD-wide policy that standardized the maternity leave period at 12-weeks for all services. This change seemed unprecedented for such a large organization like the DOD, however, it highlighted what has become a shift towards more progressive policies and rhetoric aimed towards military families. The Marine Corps adopted the Department-wide changes and so began a change within the culture of the Corps focused on building support for Marine parents.

In response to the shift in the Department's parental leave policy, research suggests that while no causal effects exist for birth outcomes, pregnancy, or retention, the shift itself contributes to a change in culture in the military surrounding parenthood (Laurita & Molloy, 2019). Developing new ways to recruit and retain talent by introducing increase support for parents like the leave policy could be a part of this shift. Policies like offering service retention bonuses only go so far in recruiting and retaining individuals, if the Corps changes its perceived culture to be more inclusive of parents, it could attract more people. Further, Laurita and Molloy (2019) found that particular to the Marine Corps, mothers and fathers increased their leave-taking trends and partially attributed this to the result of an improvement in the culture surrounding leave-taking in the Corps, especially for fathers. So, as the recent changes to the leave policies have begun to shift the culture around parenthood, this study aims to contribute to that by providing information regarding the impacts that Marines face.

In July of 2019, the new Commandant of the Marine Corps, General David Berger began his own culture shift surrounding parenthood in his initial strategic planning guidance. According to Berger,

> Our parental / maternity leave policies are inadequate and have failed to keep pace with societal norms and modern talent management practices. We fully support the growth of our Marine families and will do everything possible to provide parents with opportunities to remain with their newborns for extended periods of time. (United States Marine Corps, 2019, p. 7).

The Commandant's message contributes to the growing support for progressive policies and programs targeted at military parents. And in an organization that takes care of its people, by providing medical care, life insurance, formidable wages, and access to childcare (Wilmoth & London, 2013), the Corps has an opportunity to expand on the Commandant's guidance and explore additional resources in support of their families.

A. PARENTHOOD IN THE U.S. MARINE CORPS

General David Berger also stated in his initial planning guidance that; "We should never ask our Marines to choose between being the best parent possible and the best Marine possible. These outcomes should never be in competition to the extent that success with one will come at the expense of the other" (United States Marine Corps, 2019, p. 7). The document focuses on the emerging capabilities that the Corps will inevitably face soon. From the growing threat in the Pacific to technological advancements in the cyber domain, Marines will need to be manned, trained, and equipped to answer these missions. As the Nation's Expeditionary Force in Readiness, Marines are to be ready to answer any mission at a moment's notice. However, Marines are also human beings that experience the same life events as their civilian peers. From marriage to parenthood, Marines aim to find a work-life balance like the rest of the nation they represent.

Yet, in an already difficult profession, these life events create added stress that Marines must deal with. And while inherently resilient, Marines are not immune to the impacts associated with parenthood. Therefore, to ensure Marines stay ready, it is important to understand to what extent Marines cope with events like becoming a new parent. To make sure Marines understand, General Berger has emphasized the necessity to look at all existing programs, including family support programs included, so that they best support Marines. His intent aligns with the modern societal changes currently taking place

around parental care in the U.S. (Laurita & Molloy, 2019). Thus, there is an appetite for new, progressive policies that help Marine parents.

The current Marine Corps policy with respect to pregnancy and parenthood is outdated. Written in December 2004, the Marine Corps Order does not reflect organizational and societal changes that have occurred since its inception. Further, the Corps' policy does not describe the impacts of parenthood on the health and performance of its Marines. The lack of information on the impacts of parenthood in the military is unfortunate because existing family readiness programs could target expectant parents and provide them with resources to help minimize these effects. Such programs include the Military Family Life Counselor (MFLC) and the Force Fitness Instructor (FFI) program. Because these programs currently exist, any recommendations from this report aimed at restructuring them are technically feasible and implementable at a relatively tolerable cost. Additionally, recommendations will focus on improving manpower efforts regarding recruitment and retention of parents. At a minimum, this research will contribute to bridging the knowledge gap between civilian and military literature on parenthood using econometric analyses to estimate impacts.

Regarding existing programs aimed at helping families within the Marine Corps, the Military Family Life Counselors' mission is to provide non-medical support to service members. These counselors are available at most Marine Corps operational units. However, MFLC's are being underutilized across the Corps. In a RAND study by Trail et al. (2018) the authors analyzed the effectiveness of non-medical counseling programs in the DOD, like the MFLC program, and found a significant reduction in the total number of times a service member's family issues affected their job performance after receiving counseling. While the study could not draw causal effects regarding these programs and their impact on military families, the results speak to their relative effectiveness (Trail et al. 2018). The main recommendation from that study spoke to the necessity of taking steps to increase awareness of the program because people simply did not know the resource was available, or how to access it.

The RAND study further suggests that added efforts involve the wider distribution of information about the services that programs like the MLFC provide. Therefore, as the

Corps continues to develop a culture around health and support for families, they can leverage and encourage Marines and their families to seek help from programs like these. Additionally, if significant impacts on health and performance occur after childbirth, non-medical programs can be proactive in identifying expectant parents and inform them of the possible impacts.

Additionally, choices made about work and parenthood are not isolated events, rather, they are often made in combination with a variety of other social circumstances (Hogan & Astone, 1986; Shanahan, 2000). Expectant parents consider factors such as location to adequate schooling, and career timing when considering parenthood. In the unique military context, where families consistently change locations every three years, the decision about work and parenthood has additional contexts and considerations. These include coordination with non-military spouses and their work, access to quality childcare and education, as well as the decision whether to stay in or attrite. All these factors contribute to a Marine's decision to become a parent. In a U.S. Air Force study on work-life balance and its interaction with a family's satisfaction regarding life in the military, authors found that service members with more positive perceptions of their family's satisfaction with a military lifestyle were observed having fewer work-life issues (Heilmann, Bell, & Mcdonald, 2009). The study used self-reported data from male and female Air Force parents and further suggested that family satisfaction was positively correlated with retention among parents. So, building a culture that supports military parents is key to not only organizational productivity, but retention as well. And while civilian literature surrounding parenthood provides a useful foundation for analyzing policy impacts, military parenthood comprises of additional decision-making lenses based on the complexity of the profession.

Finally, in a 2019 report from the Defense Advisory Committee on Women in the Services (DACOWITS) regarding pregnancy in the military, survey results show how service members feel about the topic. The report, prepared by Gaddes et al. (2019) explains that the DACOWITS group is comprised of both civilian and military members who analyze information and offer recommendations to the Secretary of Defense on issues associated with the "recruitment, retention, employment, integration, well-being, and

treatment of servicewomen in the Armed Forces" (p.130). Regarding the challenges females face with career and family planning, most respondents stated that trying to both start a family and advance in a military career was somewhat or very difficult (Gaddes et al. 2019). Reasons for the difficulty included a lack of parental resources and a negative stigma surrounding pregnant servicewoman and their effects on unit cohesion. Participants also described difficulties associated with Service member confusion about pregnancy-related policies and medical challenges women could experience while working in military environments. To combat these prevalent issues, this study provides information about the impacts of parenthood and what programs and policies can best address support military families.

1. The Culture of Parenthood in the USMC

Within the Marine Corps, a combat mission-focused organization, rarely are family issues like childbirth and parental health talked about. As a result, issues that stem from these life events often cause the Corps to be reactionary vice proactive when addressing them. Therefore, at a time where the operational tempo is at a relative lull, research contributing to the knowledge of childbirth and its impact on Marines should be welcomed. This research aims to reduce the uncertainty surrounding this issue and exploit opportunities within specific Marine Corps programs.

Additionally, while the warrior culture within the Corps has served them well throughout their history, as the operating environment shifts and becomes more demanding, the Corps' ability to recruit and retain manpower becomes more important as well. And as the demographics and characteristics of those in our Nation who are eligible to serve changes, the Corps must look at changing their culture to attract this diverse group of men and women. Talent management is key and by developing a culture around health that supports Marines the Corps will be able to recruit and retain quality Marines while also improving organizational effectiveness. In the Recommendations and Further Research section of this study, I develop costs and benefits to the Commandant's proposed yearlong maternity leave policy, which is aimed at Marine mothers, allowing them more

time at home and the ability to return to a fully deployable and productive status after childbirth.

The DACOWITS report also mentions how culture plays a role in the difficulties surrounding parenthood in service. Female respondents report they experienced prejudice or stereotyping because of their gender. They went on to say that those experiences included confrontations based on the perception that women were unequal to men. In turn, this led women to believe they had to perform harder at work simply to prove themselves in the male-dominated military culture. Respondents also reported that this culture places a higher value on male servicemember voices and discriminates towards women when it comes to pregnancy and childcare (Gaddes et al. 2019). And as mentioned above, the stigma surrounding pregnancy and childrearing created challenges for female servicemembers as they tried to navigate their careers while also planning to start a family.

Finally, this research is important because from my limited perspective during my time in the Corps I have seen firsthand how a societal issue like parenthood becomes trivialized as a unit focuses on its other combat priorities. No organization can allocate ample time to every issue, however, a growing culture of support for parents will enable leaders to be more informed and better able to tackle parenthood issues. My perspective comes from that of one of the Corps' most dynamic and demanding jobs; the infantry. We train to win in combat and that mission does not stop when our Marines begin their families. Marines, often 22–25 years old must balance the fast-pace training tempo that comes with being an infantryman, while also being a good father, mother, and leader. The Corps demands so much of their young Marines, which contributes to any analysis that best supports them.

2. Statistics of Parents in the USMC

The first female served in the Marine Corps in 1918. And while the Marine Corps remains the least female of all the services, they continue to grow their numbers. Since 2000, the proportion of women serving in the Corps has increased from 6.3% to 8.5% as of March 2018.[2] While this percent increase of females in the Corps is not economically significant, the quantity and scope of military policies initiated since 2000 as a means to recruit and retain women is significant (Laurita & Molloy, 2019). The Marine Corps is the only branch of the military that has a larger number of active-duty members than it has family members. (United States Marine Corps, 2016). In 2016, the Corps was composed of 183,594 active-duty members and 167,546 dependent family members. Of those family members, 72,124 were spouses, and 95,272 were children (United States Marine Corps, 2016).

In this study, I estimate the impacts of parenthood on 1,517 new Marine mothers and 14,828 new Marine fathers. The Marine Corps is the youngest (66% of Marines are 25 or younger), most junior (40% are LCpl or below, other services are between 19% and 23%), and least married of the four military services (United States Marine Corps, 2016). These statistics show that Marines are also having their first child at younger ages (24) compared to other services, and the 2015 reported national average for men of 30 years old (Khandwala et al. 2017). Having children at earlier ages creates its own set of personal and professional issues (O'Laughlin & Anderson, 2001), especially as Marines try to balance work-life responsibilities. Marines are getting married and having children younger, which contributes to understanding the impacts of parenthood and exposing them to Marine families early. As a result, the Corps faces unique challenges when it comes to developing and implementing parental policies for its Marines.

Figure 2 highlights the number of first-time parents, by rank, and by gender in this analysis. The scales are 10:1 with most first-time parents being men. Additionally, the newest parents come from the youngest ranks in the Marine Corps. The PVT-LCPL and NCO labels are the most junior enlisted ranks where Marines range from 18-26 years old.

[2] USMC Demographic Statistics. Source: Defense Manpower Data Center (2016).

The SNCO label includes the E6-E9 ranks, Company includes (O1-O3, WO1), and Field includes (O4-O6, WO2-WO5).

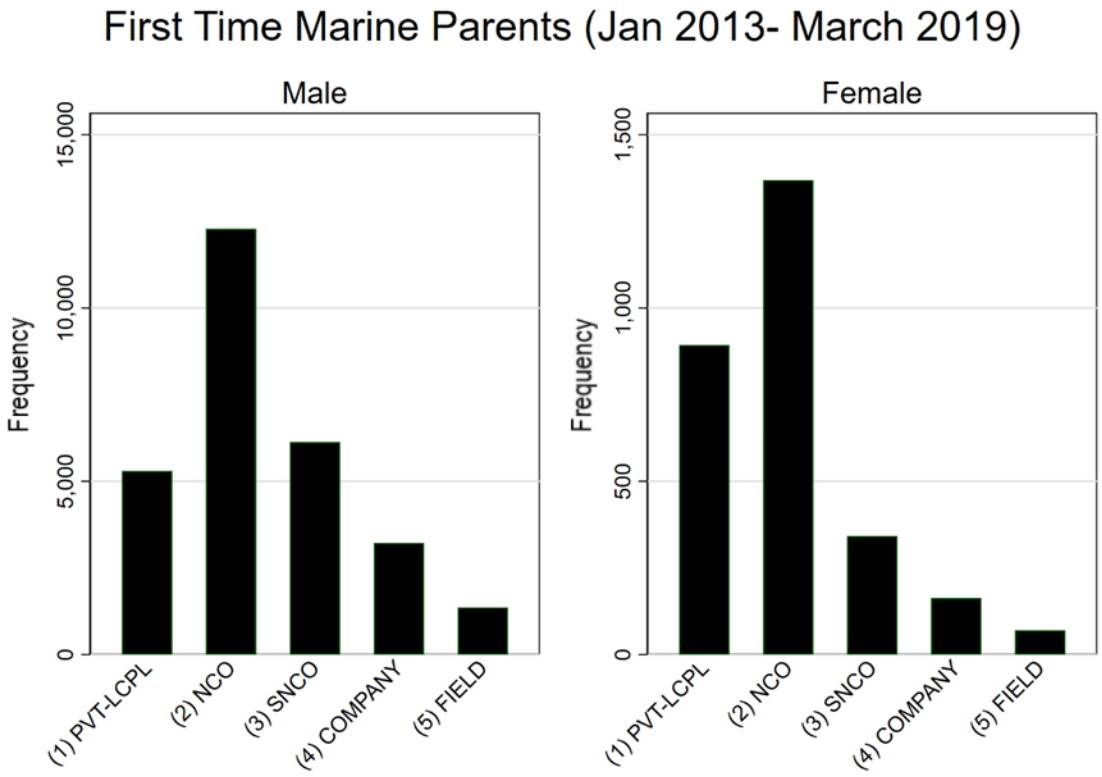


Figure 2. First-Time Marine Parents in the Sample, by Rank. Source: Total Force Data Warehouse Data.

The Marine Corps can only improve first-time parents' readiness if they know what programs bring parents back to their original levels. Given the variation in health and performance measures in the sample, the military offers a unique opportunity to study the impacts on new parents. So, whether new mothers and fathers exhibit poorer health and experience a dip in performance, or they become more productive because of parenthood, remains unclear. Civilian studies show that both can occur, and this study aims to provide insight using physical fitness measures and performance evaluation scores to understand the magnitude of any changes due to childbirth. The next chapter examines parenthood and its effect in the civilian sector of the U.S. and international communities.

III. LITERATURE REVIEW

A. PARENTHOOD AND HEALTH

Civilian literature suggests that the impacts of parenthood are significantly greater for females regarding the effects on one's health and performance. Evidence regarding fatherhood and its impacts is relatively inconclusive; estimating both positive and negative effects. Inevitably, childbirth dramatically impacts parents' lives in that they experience various physical and mental changes throughout a pregnancy cycle (Bellows-Riecken & Rhodes, 2008; Saxbe et al., 2018). In an already stressful profession like that of a Marine, these issues are magnified, especially for women. In an article addressing the 2015 parental leave policy changes, Marine Corps Major Eve Baker notes that female Marines who give birth already face a significant amount of stress coupled with having to quickly drop weight, and return to good shape to complete a PFT or CFT after birth simply adds to that stress (Baker, 2015). Estimating and understanding the effects of parenthood on a Marine's health can enable the Corps to identify and provide mothers and fathers with resources to help reduce these effects.

Research also shows that dads with dependent children are more inactive than non-parents (Bellows-Riecken & Rhodes, 2008). Fathers reduce their physical activity more in the short-term while adjusting to their new lifestyle. And since the comparison between the physical activity of parents and non-parents has received extremely limited research considering the size of the effect, Bellows-Riecken and Rhodes (2008) suggest there can be additional research done on the topic. The authors state that much of the current research focuses on new-mothers and rely on cross-sectional models using individually reported data, which could provide certain biases into the research (Bellows-Riecken & Rhodes, 2008). As a result, my study uses observational data and measures parental health trends before and after birth to isolate the impacts of parenthood. This analytic design will minimize some of the issues in cross-sectional and self-reported techniques.

Additionally, parents may experience different impacts during various stages of a pregnancy period. Genesoni and Tallandini (2009) analyzed the prenatal, labor and birth,

and postnatal stages to see what effect each had on new fathers. The authors found the pregnancy period to be the most mentally demanding, while the actual birth period included the most emotional events, and that the postnatal stage was most influenced by societal factors. Societal factors are often associated with work-life balance and other forgone activities by parents once they have children. Additional research suggests that the pre-birth situation a family finds itself in can have far-reaching impacts on a child's development (Glover et al. 2018). Mothers and fathers can shape their pre-birth situation either positively by cutting back on smoking habits and getting adequate sleep, or negatively by creating unnecessary stress into a relationship. Research also suggests that fathers struggled in the postnatal period due to the new realization of being a first-time father (Genesoni & Tallandini, 2009). I use a parsimonious model that captures effects during four stages of the pregnancy cycle including both pre- and post-birth periods. It is important to isolate these effects so that Marines understand that impacts may occur before the baby is born and last up to 24-months post-birth.

Conversely, parenthood can lead parents to improve health measures. The responsibility of caring for a new baby may induce parents to improve their health behaviors for their own sake and for their child's (Krapf et al. 2017). Some studies suggest that men who become new fathers report enhancing their health behaviors, saying they increase their physical activity, improved eating habits, and reducing their alcohol consumption (Garfield et al. 2006). And while Garfield et al. (2006), mainly focuses on fathers, it provides insight into self-reported behaviors of parents. My study design uses observational rather than self-reported data to contribute to the literature involving parenthood and health. Drastic changes associated with parenthood, positive or negative, could influence the mother's and father's physical performance in the workplace. To perform effectively, all Marines need proper exercise and adequate sleep, so understanding the impacts can be useful. Additionally, the DACOWITS report suggested providing additional nutrition-related resources, increasing access to fitness facilities, providing healthier food options on installations, and increasing promotion of currently available health and wellness resources to better support Servicemembers' wellness and fitness.

Finally, regarding physical activity, Keizer and Pot (2016), compared the time spent on what they called moderate to vigorous physical activity (MVPA) for fathers and non-fathers. They found that fathers reduced their time spent on MVPA, relative to their childless counterparts. Regardless of age or parenthood, the Corps expects its Marines to uphold a standard of physical fitness like MVPA. The PFT and CFT simulate combat endurance and test the individual Marine's ability to endure extended periods of physical activity. The study showed the greatest disparities of time spent engaged in MVPA were among non-dads and dads with younger children, which they defined as being less than six years old (Keizer & Pot, 2016). Identifying the impacts on a Marines' physical performance due to parenthood is another method to help contribute to building a culture around parenthood.

B. PARENTHOOD AND WORK PERFORMANCE

While parenthood undoubtedly increases the non-work responsibilities of mothers and fathers, the literature suggests that it may lead to an increase in work effort out of necessity to provide for their families. Research shows that parents, while often having more responsibilities than non-parents, could either be either more distracted at work or more productive on-the-job, relative to their childless counterparts (Kmec, 2011; Krapf et al. 2017). The Kmec (2011) study shows that mothers actually increase their engagement at work compared to men after the birth of a child. Other research estimates that despite known drops in wages and overall employment for new moms, and wage increases for men after pregnancy, there exists no significant difference in work effort in terms of hours worked among the two groups (Kleven et al. 2019). Despite this literature, in terms of actual work performance, I am unaware of any research that measures how new parents perform while on the job, relative to employees without children. Therefore, my research will contribute to the literature by using non-parents as a part of the control group to estimate the effects on work performance for Marine parents.

Additionally, in their paper on the gender gap pay among parents, Budig and Hodges (2014) analyze the effect of childbirth on men and women's pay using a large sample of American workers. Their results suggest that men exhibit an increase in wages

while women suffer what they refer to as a *motherhood penalty,* which is associated with a decrease in a women's pay post-pregnancy (Budig & Hodges, 2014). While the military pay scale is not based on pay for performance per se, high performers tend to promote more quickly relative to average or low performing workers, which ultimately affects a service member's pay. Also, while the military pay structure does not discriminate based on gender or parenthood, their paper points out possible work-related effects for parents and how perception may play a role after childbirth. In the warrior culture of the Marine Corps, these perceptions could affect performance, which contributes to the necessity to build a culture around parenthood.

Among schoolteachers, post-childbirth, research suggests that proposals aimed at increasing teacher retention often emphasize wage increases and reduced class sizes, but seldom address a primary reason for teachers leaving in the first place: family-related issues (Sparks, 2018). The same issues are present in the Marine Corps, especially for females. Re-enlistment bonuses and increased leadership responsibilities are often effective tools of retention, but for parents, especially mothers, the access and availability to childcare and other family support programs are often more important (Gaddes et al. 2019). The peace of mind these programs provide parents can be invaluable to both the individual and the organization as it can lead to increased productivity.

Finally, work-life balance is an issue that all Marines deal with because of the nature of the job. You are a Marine 24/7 while on active duty and expected to maintain a standard of discipline and humility, which can make it challenging for some to truly find a balance between work and their home life. These challenges become magnified for new parents. Lazar, Osoian, and Ratiu (2010) analyzed how effective work-life balance techniques can improve organizational productivity in Europe's civilian workforce. They found that even though work-life issues can have drastic organizational costs such as decreased employee engagement, increased absences, higher attrition rates, and overall lower productivity levels, there are factors that organizations can implement to help workers deal with the balance (Lazar et al. 2010). Some factors include implementing programs and policies aimed at allowing greater flexibility for workers to spend time with their families. Also, Genesoni and Tallandini (2019) found that men who have issues

transitioning to fatherhood often grapple with the societal changes that come with being a father. With their home life drastically changing, men experience changes in their work performance as a result (Genesoni & Tallandini, 2019). The Corps can address these potential issues by targeting new fathers close to the end of their active service commitment and provide them with adequate resources as they complete both transitions.

C. PARENTHOOD AND LABOR FORCE PARTICIPATION

A consideration when studying labor force trends among new parents is how the effects of parenthood like added stress and less sleep change a parent's perception towards working. While these effects are often associated primarily with motherhood, men can be susceptible as well. Research by Kuziemko, Pan, Shen, and Washington (2018), examines the effects of motherhood on labor force participation and highlights how becoming a parent affects one's propensity to stay or leave their job. The authors attribute changes in workforce participation to the underestimation of employment costs, both tangible and intangible, related to motherhood. Tangible costs include childcare while intangible costs are associated with detachment and guilt, for returning to the workforce. The research analyzes the effects of these costs in both the short and long term. Kuziemko et al. (2018) estimated that women were 25 to 40 percentage points less likely to work after motherhood, compared to new fathers. They further attributed some of this change to a shift in attitudes towards the labor participation of mothers and estimated that anti-work attitudes increased upon motherhood along with the unexpected demands of parenthood. And while both male and female Marines are contractually bound to fulfill their service requirements post-pregnancy, the choice of whether to remain in service or attrite can be linked to shifts in attitude associated with parenthood, especially for women.

Additionally, the United States, over the last couple of decades, has experienced a major societal shift in maternal employment and childcare needs as the design of the traditional American family began to change. The proportion of women in the labor market with young children (under the age of three) has dramatically increased, rising from 34% to 62% as of 2018 (Bureau of Labor Statistics, 2019). As a result, families now rely on more out-of-home childcare than ever before. A study estimates that since 1975 there was

a more than 50% growth in the amount of preschool-aged children enrolled in a school-type atmosphere today compared to the same group in 1975 (Chaudry & Datta, 2017). Despite these shifts in family life overtime, however, the development, implementation and evaluation of policies in America aimed at supporting working families are only beginning to catch up, especially in the defense arena (Laurita & Molloy, 2019). Again, the appetite for building a culture around parenthood is gaining traction. And if the Corps hopes to appease a larger female population on recruiting and retaining them, it will take advantage of that momentum.

Another factor that could affect parents' job performance includes paid family leave (PFL) policies in the workplace. More research suggests that the amount of parental leave offered to parents has effects on their labor force decisions. And with the recent increase in both the paternity and maternity leave policies, it further supports the Department's growing focus towards building a culture around parenthood. Berger and Waldfogel (2004) analyzed the effects of leave policies and their impacts on women in the workplace and found that those offered maternity leave were 40% more likely to come back to the work after having a child compared to their peers that were not offered leave. The military is unique in that it offers full PFL for both moms and dads, thus minimizing any effects that may occur in a civilian's job performance related to unpaid time away from the job to care for newborns.

The Berger and Waldfogel (2004) study also showed that inadequate lengths of parental leave could lead to a decrease in work performance since parents have less time at home out of growing expectations to quickly return to work (Berger & Waldfogel, 2004). This can affect both a parent's health and job performance. And as research suggests, allowing service members to take extended leave can enable parents, mothers, in particular, to best prepare for and ultimately recover from, the birth of a child beyond the standard 3-month period (Rossin-Slater, 2017). Thus, the generous parental compensation packages offered to service members can enable them to adequately plan for post-birth events and lessen any potential financial burden they may face.

Bailey, Byker, Patel, and Ramnath (2019) analyze the impacts of the Paid Family Leave Act (PFLA) recently adopted in California. The authors estimate that no significant

evidence exists that shows the PFLA had any effect on a mother's wage, employment status, or retention levels (Bailey et al. 2019). While not statistically significant, the authors show that new moms who took advantage of the policy decreased their employment levels by 7% and saw their wages drop by nearly 8% following the birth. The main conclusions were that, on average, there was a lower number of children being born, a decrease in the time spent by new moms at work, and as a result, a rise in the amount of time at home with their children (Bailey et al. 2019). Therefore, while it is not clear that simply giving parents more leave solves labor force participation and wage issues, however, these policies could have long-term effects as the perception of parenthood changes in the workforce. Other analysis could look at the implications of the Marine Commandant's proposed year-long maternity leave policy and the impacts that it could have on the retention and performance of mothers.

Finally, the U.S. recently implemented a government-wide PFL policy, that will allow new mothers to take up to 12-weeks of paid maternity leave, starting October 1, 2020 (Yoder, 2019). And while the military has always had a PFL policy, the wider dissemination to all federal employees points to the growing support for parents. Therefore, to ensure the Corps, and DOD at large is still competitive in the recruitment and retention of quantity talent, they too should expand their scope on support for families. This research will contribute to that expansion.

D. GLOBAL PERSPECTIVES

Although the U.S. recently implemented this PFL policy for government workers, it still remains one of the only developed countries that does not offer federally mandated paid leave to parents following childbirth ("Parental Leave Systems," 2017). And while the U.S. does mandate 12-weeks of non-paid leave, all workers do not necessarily qualify and those that do bear the full financial costs associated with taking time off (Klerman et al. 2012). Without national paid leave, the average mother in the U.S. returns to work three weeks after having a child (Rossin-Slater et al. 2013) and the average father returns to work after only one week off (Bartel, Rossin-Slater, Ruhm, Stearns, & Waldfogel, 2018). In comparison, parents in countries like Germany receive 12-months of paid leave and in

Canada, women are granted 15-weeks of paid leave after childbirth and both parents are eligible to share an additional 35-weeks of paid leave thereafter (Olivetti & Petrongolo, 2017). So, as the U.S. continues to analyze the topic of parenthood, they can use other developed countries as a foundation for comparing potential policies and programs surrounding parenthood.

Olivetti and Petrongolo (2017) studied PFL among Organization for Economic Cooperation and Development (OECD) countries and further purported that United States policy supporting PFL has trailed other developed countries, whose PFL policies shifted progressively during the 20th century. They state that economic reasons for implementing aggressive PFL policies are to improve female employment and gender pay gaps (Olivetti & Petrongolo, 2017). And while gender pay gap issues are not prevalent in the military, the retention of females is important to the Corps as it looks to increase its retention of women with new policies like adding 12-weeks of maternity leave. This analysis can supply insight into more policies that may assist in female retention.

Finally, regarding health, labor participation, and paid leave policies, a recent study found that Norway's introduction of paid leave for mothers in 1977 improved a mothers' overall health by reducing both mental and physical pain while increasing their likelihood to exercise and minimize smoking (Butikofer et al. 2018). Ensuing extensions of the leave policy after 1977 yield comparable benefits, but to a lesser extent as the duration of the leave increased. In Sweden, when fathers were granted the ability to take paternity leave simultaneous with a mother's maternity leave, women's health improved (Persson & Rossin-Slater, 2019). The Swedish study by Persson and Rossin-Slater (2019) reported that moms were less likely to visit a doctor regarding post-birth complications or seek any over the counter medications, which suggest that women received additional benefits from the improvement of their physical and mental health as a result of the PFL policy.

To summarize, the academic literature highlights the following: parents may experience sleep disruption that leads to fatigue, physical inactivity, and neurobiological changes compared to non-parents. These effects can negatively change parents' health and well-being. Conversely, the responsibility of caring for a new baby may induce parents to improve their health behaviors not only for their own sake but also for their child's. Also,

parents may find themselves to be more preoccupied, yet also more productive at their jobs because of the added responsibilities associated with parenthood compared to non-parents. Finally, family support policies like paid family leave and access to childcare improve parents' health and well-being. The next chapter examines the data and analytical design used in this study.

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IV. DATA AND METHODOLOGY

A. DATA DESCRIPTION

I use panel data from the Marine Corps' Total Force Data Warehouse (TFDW) to analyze health and performance changes before and after birth for first time Marine parents. The dataset includes monthly observations for all active-duty Marines from January 2013 through March 2019. The data source includes basic demographic information for each Marine such as age, gender, rank, race/ethnicity, marital status, general classification scores (a measure of intelligence), and education status. I also have dependent data for spouses and children including date of birth, gender, race/ethnicity, location, and if the spouse is dual military. This allows me to find new parents in the sample and establish pre- and post-birth trends. The outcome variables include individual Marines' physical fitness scores and performance evaluations. An observation in this study is a monthly snapshot of an individual Marines' demographic, health, and job performance measures.

I use two samples that vary by the amount of observation time a new Marine parent has within the dataset. The first, and less restrictive sample, only requires new parents to be in the data for at least 12 months before and after birth. The more conservative approach restricts the sample to new Marine parents who are in the data for at least 24 months before and 24 months after birth. This enables adequate health and performance trends to develop for the control and treatment groups. I define Non-parents as service members with at least four years of service by the beginning of 2015, but who did not have a child during the sample window (January 2013 to March 2019). This includes Marines who are childless and Marines who have children prior to the sample dates. Alternate control groups could include separating the two and having (a) only individuals who remain childless during the entire window and (b) only parents who have no additional kids during the window. The combination of both groups to serve as the control provide a better representation of the variety of Marines who choose to become parents.

1. Summary Statistics

Table 1 displays summary statistics for the control and treatment groups, separately for males and females. The control groups include Marines not seen having a child in the observation period. This includes Marines who have never had a child and those who had a child prior to January 2013. The treatment groups are Marines who have their first child in the sample timeframe. Those first-time parents with adequate observation time in for the conservative sample total 13,414 fathers and 1,730 mothers. The control group includes 331,799 men and 30,948 women.

For the treatment group demographics, I use the monthly data in which the Marine has the child. For the controls, I chose a random monthly observation in the data set. I am not simply using the first observation seen in the sample for non-parents, rather a random snapshot between January 2013 and March 2019. This allows for a more balanced demographic sample. The p-value for the t-tests shows how similar the control and treatment groups are to one another. For men, the control and treatment group do not exhibit many similarities eleven of the twelve demographic variables are statistically different. New fathers have higher GCT scores, more college education, and they are older, more likely to be married, and be an officer compared to the control group. Despite these differences, results show no significant difference exists in the pre-birth trends for new dads compared to their controls. Therefore, I keep the control individuals in the analysis to account for any time changes in the measurement of the outcomes. Moreover, since there is no difference in pre-birth trends despite the differences in demographic characteristics, I am confident that casual effects are likely.

A key element for this design to yield causal estimates is that the pre-pregnancy health and performance trends for the control and treatment group do not differ from zero. That is, prior to childbirth, the two groups perform similarly, and only deviate their health and performance trends once the treatment group finds out they will become a parent. Put differently, non-parents in the model approximate what health and work outcomes would have looked like for parents had they not had a child. If the trends in outcomes of those who remain childless during the study window are not adequate proxies (e.g., there are

significant differences in pre-birth trends), then results would contain biased estimates of the health and work consequences of parenthood.

New mothers also have higher GCT scores, more college education, and are slightly older, more likely to be married and an officer, compared to the female control groups. The differences among the control and treatment groups are fewer than for the men with six of the twelve variables being statistically significant, but the same holds true of the results that show no difference in pre-birth trends among the groups. Finally, there are many more men than women in the sample as the Marine Corps remains a predominately male organization.

For the subgroup analysis between the various jobs in the Marine Corps, I divide the sample into four categories based on the job characteristics of each individual MOS. For example, the Combat_MOS includes infantry, artillery, tanks, and combat engineers; while the CSS_MOS includes support, jobs like admin, logistics, supply, and maintenance. The AVN_MOS includes all flight-related jobs such as pilots, aircraft maintenance, and air traffic controllers. The above MOS categories are relative to the Other_MOS category, which includes jobs like those in the Marine Band, legal, and public affairs.

Table 1. Descriptive Statistics of Demographics for Marines

	Women			Men		
	Controls	New mothers	*p-value* of *t*-test	Controls	New fathers	*p-value* of *t*-test
AFQT Score	57.478 (21.58)	53.901 (20.98)	0.000***	59.652 (22.16)	56.343 (25.70)	0.000***
GCT Score	101.960 (17.47)	102.633 (12.07)	0.138	107.177 (19.08)	110.357 (14.58)	0.000***
Some college (0/1)	0.050 (0.218)	0.044 (0.206)	0.314	0.041 (0.197)	0.046 (0.210)	0.001***
College (0/1)	0.089 (0.284)	0.098 (0.297)	0.242	0.081 (0.273)	0.166 (0.372)	0.000***
Age	21.506 (4.827)	21.857 (4.401)	0.006**	22.437 (5.875)	24.628 (5.218)	0.000***
Married (0/1)	0.158 (0.364)	0.244 (0.430)	0.000***	0.232 (0.422)	0.529 (0.499)	0.000***
Black (0/1)	0.138 (0.345)	0.169 (0.375)	0.001***	0.095 (0.293)	0.112 (0.315)	0.000***
Hispanic (0/1)	0.216 (0.411)	0.243 (0.429)	0.013*	0.158 (0.365)	0.155 (0.362)	0.318
Officer (0/1)	0.053 (0.224)	0.079 (0.270)	0.000***	0.062 (0.240)	0.149 (0.356)	0.000***
Combat_MOS	0.058 (0.234)	0.061 (0.489)	0.637	0.319 (0.466)	0.289 (0.239)	0.000***
AVN_MOS	0.201 (0.401)	0.212 (0.409)	0.283	0.205 (0.404)	0.253 (0.409)	0.000***
CSS_MOS	0.577 (0.494)	0.603 (0.489)	0.032	0.376 (0.484)	0.362 (0.489)	0.002**
Observations	30,948	1,730		331,799	13,414	

Notes: Mean coefficients of demographic variables; standard deviations in parentheses. Include a simple *t*-test of the difference in means between controls and new parents by gender. Estimates are taken at the first observation in the data. The sample includes first-time parents observed at least 12 months before and at least 12 months following childbirth, as well as a control group who are not observed having a birth in the data range (January 2013–March 2019). AFQT and GCT are measures of cognitive ability taken during recruitment/assignment and partially used to assign Marines to occupational specialties. Some college and college are categorical variables measuring education (high school is the reference category). The age variable is the first observation of an individual in the sample. Married, black, Hispanic, and officer are indicator variables at the first observation of the individual. Data source: USMC Total Force Data Warehouse.

2. Health and Job Performance Outcomes

I use the following health and performance outcomes to estimate the impacts of parenthood:

- *Combined Fitness Score*: a standardized variable where the mean=0, and SD=1, based on the combined scores from the physical and combat fitness tests. Both the PFT and CFT use a 300-point scale (100 maximum points for each event).

- *Top performance on Fitness Test*: the probability that a Marine achieves a first-class fitness score, (235 points or higher for both the PFT and CFT) measured separately for males and females.

- *Job Performance Rating*: a standardized supervisor-rated job performance evaluation for both officers and enlisted. Appendix A describes the characteristics of each evaluation.

Because the PFT and CFT are different tests, taken during different periods of the year, I standardize the scores, by year and gender to make them comparable, I then combine them into one measure called the combined fitness score. This results in two scores in fitness per year: one from the PFT (from January-June) and one from the CFT (from July-December). For interpretability, I convert these scale scores into Z-scores by year, and gender. The combined variable accounts for the variation in childbirths throughout the calendar year. For example, if a female Marine had a child in March of 2020, according to regulations, she is exempt from taking a PFT during the entirety of her pregnancy and six months post-birth. However, she must take a CFT before December 31, 2020, according to the order. As a result, the combined score incorporates when a Marine takes either of the fitness tests.

Additionally, because the FITREP and PROCON are different evaluations, I again standardize by year and gender to make them comparable, then I combine them into one measure called job performance. This results in a score for each time an individual is evaluated within a year.

Also, while parental leave policies were changing, the Marine Corps physical fitness program enacted changes as well. Table 2 displays the events of the PFT and CFT as well as the timeframes Marines take them. The changes to the tests included an increase in standards across the board for both tests to challenge Marines more. Additionally, females now must execute pull-ups instead of the previously accepted flexed arm hang. These new standards came about to challenge Marines in hopes of improving the overall physical readiness of the Corps. These changes were the most significant to the Corps' physical fitness programs since 2009 (Le, 2016). The analytical design for this study accounts for this service-wide policy change in mind using year fixed effects. Therefore, the results on the health and performance outcomes are a net negative or positive after accounting for the increased standards.

Table 2. USMC PFT/CFT Events

Physical Fitness Test (PFT)	**Combat Fitness Test (CFT)**
January–June	*July–December*
Pull-ups: max repetitions	Movement to Contact: 880 Yard Run
Crunches: max repetitions in 2 minutes	Ammo Can Lifts: max repetitions in 2 minutes
3-Mile Run	Maneuver Under Fire: 300 Yard Obstacle Course

For reference, an example of a male first-class PFT (the highest of the three classes) for a 24-year-old includes 97 crunches, 17 pull-ups, and a 22-minute 3-mile run. For females, an example first-class PFT includes 92 crunches, 6 pull-ups, and a 25-minute and 55-second 3-mile run. Additionally, an example of a 24-year-old male and female first-class CFT includes the following; 3:00/3:30 minute movement to contact, 100/60 ammo can lifts, and a 2:35/3:35 minute maneuver under fire, respectively.

B. METHODOLOGY

To find the causal impacts of childbirth on Marine parents' health and work outcomes, the ideal research design would be the random assignment of parenthood to individual Marines. Random assignment isolates any observed differences in the outcome variables of parents and non-parents and attributes those differences to the birth event, rather than any underlying factors that led individuals to have a child or seek family support in the first place. The random assignment would yield the most reliable casual estimates for the impact of parenthood on health and performance. However, for ethical and legal reasons, this design is unavailable.

Absent a random assignment experiment, I use two different strategies to measure the primary outcome variables in Equations (1) and (2). Both analytic strategies leverage the longitudinal nature of USMC data, which tracks Marines' demographics and performance over time. I conduct a time-series event study analysis to estimate differences between the control and treatment groups. The time-series approach is similar in nature to Jacobson, LaLonde, and Sullivan's (1993) paper on earnings losses of displaced workers. The authors analyze the quarterly earnings of two groups of men—job separators and job stayers—over time, before and after the job separation event. Their results show that displaced workers experience a dip in earnings post layoff, but then slowly recover over time nearly reaching pre-displacement levels.

Like Jacobson et al. (1993) this study measures the health and job performance outcomes of first-time parents after the childbirth event, compared to non-parents over time. I expect that parents experience a dip in both health and job performance but eventually recover and approach pre-birth levels of both outcomes. Again, this design can effectively produce causal outcomes based on the similarities between the control and treatment groups before the pregnancy period, for both males and females. In other words, the trends in the outcomes before birth are not distinguishably different from zero, which means there is no difference between first-time parents and the control group. This confirms the choice of the control group.

In the first model, I estimate the monthly impact of parenthood on first-time parents. To analyze the health and performance outcomes, I use the following approach:

$$Y_{it} = \sum_{k \geq -m}^{l} M_{it}^{k} \, \delta_k + X_{it}\beta + \gamma_i + \tau_t + \varepsilon_{it} \qquad (1)$$

The outcome estimates, Y_{it} in Equation (1) includes both parents and non-parents and separate calculations for men and women. The variables included in M_{it}^{k}, represent monthly dummy variables for the pre- and post-birth periods. These variables range from *m* months before birth to *l* months after birth. The primary model I use has *m=-24* and *l=24.* Therefore, the coefficient δ_k indicates the estimated effect of childbirth on parents' outcomes *k* months before and after birth. X_{it} represents the time-changing individual characteristics of a Marine to include; age, rank, time in service, and location. The τ_t is a time fixed effect to account for general changes over time to include any service-wide policy changes, γ_i is an individual fixed effect measure that accounts for individual changes that occur during the study, and ε_{it} is the error term.

The model used in Equation (1) calculates individual month coefficients δ_k, which provides insight into isolated snapshots of the outcome variables during the full pre- and post-pregnancy period. The second analytical model of interest is a more general or parsimonious model that captures the effects during four distinct periods throughout the pregnancy period. This model identifies any during-pregnancy trends in performance before birth, any postnatal drops immediately following birth, and any trends in recovery following the postnatal period up to two years post-birth. To create a more parsimonious model of health and performance changes over time relative to 10 months before birth, I define:

P_{it}^{1}= 1 for months -9 to -1 for male and female job performance measures if the Marine has a baby, and P_{it}^{1}=0 otherwise. Females do not receive this coefficient for health measures. This establishes *Pregnancy* trends.

BJ_{it}^{1}= 1, for months 1–2 for males, 8–12 for females, if the Marine has a baby, and BJ_{it}^{1}=0 otherwise. This establishes any immediate postnatal trends.

BJ_{it}^{2}= 1, for months 3–12 for males, 13-24 for females, if the Marine has a baby, and BJ_{it}^{2}=0 otherwise. This establishes additional postnatal trends.

BJ_{it}^{3}= 1, for months 13–24 for all male Marines who have a baby. This establishes trends beyond the first year of birth. Females do not receive this variable.

As a result, using Equation (2), I can re-estimate the impact of childbirth on health and job performance as:

$$Y_{it} = P_{it}^{1}\alpha_1 + BJ_{it}^{1}\alpha_2 + BJ_{it}^{2}\alpha_3 + BJ_{it}^{3}\alpha_4 + X_{it}\beta + \gamma_i + \tau_t + \varepsilon_{it} \qquad (2)$$

where α_1, α_2, α_3, and α_4 represent the effect of the pregnancy trends, the immediate postnatal drop (*Birth jump 1*), and additional post-birth trends up to 24 months (*Birth jump 2 and 3*), all relative to pre-pregnancy trends. This model forces the gap between parents and non-parents to (i) be zero in the pre-pregnancy period (10 to 24 months before birth), (ii) grow or decline in the 9 months before birth, (iii) grow or decline in the 1–12 months following birth, and (iv) grow or decline in months 13–24 post-both. Forcing the gap to be indistinguishable from zero for parents and non-parents simply means they two groups do not differ in their health and performance measures before a Marine in the treatment group has a child. This is where the causal impacts come from. In the first model, results are relative to 10 months before birth to capture a typical pregnancy period of 268 days (Jukic et al. 2013). The parsimonious model results are relative to 10 to 24 months before birth, the pre-pregnancy period. The variables, $X_{it}\beta$, γ_i, τ_t, ε_{it}, remain the same from Equation (1). I use both these models to compare outcomes between new Marine mothers and fathers. In my subgroup analysis, I use the models to estimate the impacts among officers and enlisted, and different MOS groups.

C. SCOPE AND LIMITATIONS

A limitation to the research design is that some female PFT/CFT entries that occur before pregnancy may be still in the data, which would affect the pre- and post-birth health and performance trends. For example, a PFT score recorded 11-months before birth may show up in the data until they take another one when they return to full duty post-birth. To combat this, I do not estimate fitness scores for females nine months before birth and until

seven months post-birth. This will alleviate any potential carryover of pre-birth scores. Moreover, while the Marine Corps policy requires new mothers to take a PFT or CFT six months post-birth, the data is inconsistent into whether the policy is being adhered to consistently across the service. The same may be true for female performance evaluations during the maternity leave time. Since women are out of work for up to three months and in a non-deployable capacity for up to six months after birth, the performance results might be off if the data is simply a repeat entry from their previous job evaluation score. As a result, the pregnancy period for females and their health outcomes extends from nine months before birth to seven months after, with month eight being the first estimate. Since females still receive job evaluations up until birth, I still include estimates from nine to one month before birth, but I do not estimate the immediate seven months following birth to account for the maternity leave period and the moms return to a status where they are required to take a PFT or CFT.

In the outcome variables for fathers, I do not estimate the effects in the actual month of birth (month zero), because the data does not specify the exact entry date of a fitness or performance evaluation into the system. Therefore, it is unclear if that evaluation took place before or after the birth of the child in month zero. For example, if a Marine took a PFT on 10 January and had a baby born on 15 January, the zero-month estimate would technically be a part of the pre trend calculations, not the post-birth trends.

Another limitation that I addressed above was the Marine Corps policy changes to the physical fitness program and the parental leave policy. Physical fitness standards increased for all Marines, which could contribute to the increased run times and decreased overall scores. These changes in parental leave policy (2015) could affect not only decisions to remain in the service but also an individual's health and performance since they now have more time to prepare. The individual and time fixed effects included in the model account for these potential impacts.

A potential issue regarding the FITREP measures is that there are three different values for a FITREP in the data set. Since senior Marine officers give FITREPs, the system creates a raw score and two relative scores to account for changes in the evaluators over time. Every Marine Officer that writes FITREPs has a profile based on all previous reports

they have written. Officers manage their profiles to ensure that they do not have inflated evaluations that can skew their profiles. As a result, the revaluation systems calculate relative values for each individual FITREP to account for changes to an evaluator's profile as they give more reports. To account for this, I use the raw score in the data set to calculate the job performance measure since it provides the most consistent and unbiased score during a given time. Further, the evaluation length for an individual FITREP, and PROCON measure as well can vary by individual. Depending on career timing, and supervisor turnover, Marines have evaluations that vary from three months to up to a year. Additional research can analyze how different lengths of job evaluations interact with parenthood and performance.

Finally, like an event study design by Lafortune, Rothstein, and Schanzenbach (2018), my analysis is a form of a difference-in-differences (DD) technique where I analyze two groups before and after a *shock* (parenthood) to the system. The identifying assumption is that without a parent having a child, outcomes for the control and treatment groups would have moved in parallel over time. The event study strategy is robust to the physical fitness policy shock that took place in 2017 since the policy had similar effects on every Marine, regardless of if they became a parent or not. The parallel trajectories of the control and treatment groups before the pregnancy period and changes in those trends during pregnancy and post-childbirth provide compelling evidence that childbirth has a casual effect on a parent's health and performance (Lafortune et al. 2018).

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V. RESULTS

A. PARENTHOOD AND HEALTH

I first explore the health outcomes of new parents using Figures 3 and 4, which display estimates for the combined and first-class fitness scores. The time series estimates are relative to 10 months before birth, measured separately for men and women. For each figure, the vertical dotted line depicts the child's birth month. For reference, Table 3 highlights the average score for each test in the sample.

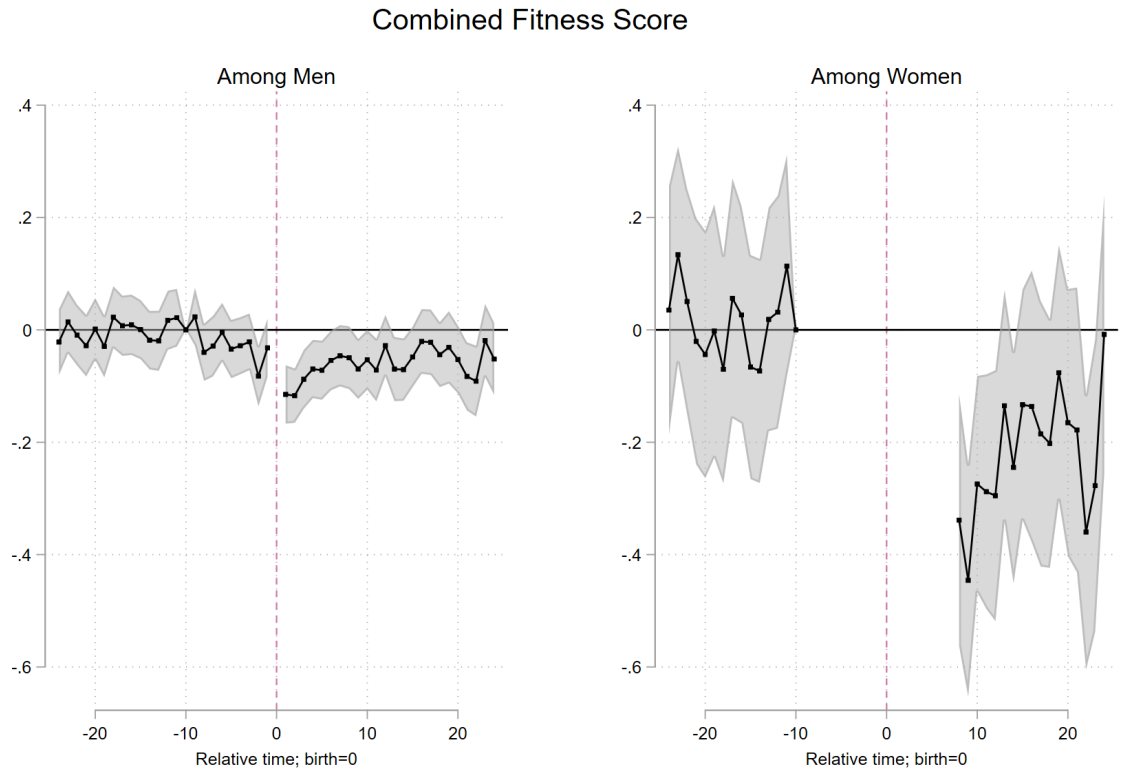
Table 3. Average PFT and CFT Scores in Sample

	Parents		Non-Parents	
	PFT Score	CFT Score	PFT Score	CFT Score
2013	251.96	288.38	252.82	287.94
	(30.84)	(12.40)	(31.34)	(12.54)
2018	250.92	261.95	247.99	266.76
	(28.11)	(28.14)	(30.60)	(27.76)

Notes: Table displays averages for both PFT and CFT scores before and after the 2017 physical fitness policy change. In 2017, Marine Corps policy increased standards for both tests. Standard errors in parentheses. Averages measured separately for control (non-parents) and treatment (parents) groups. Data source: Total Force Data Warehouse.

For the combined fitness scores in Figure 3, the vertical axis is measured in standard deviations from the mean. Directly following childbirth in month one, on average, new fathers experience a 0.115 standard deviation drop in their combined fitness score. This is about an 8-point drop on the PFT or a 2-point drop on the CFT. For men, months 2-6 post-birth are all statistically significant estimates and show that fathers begin recovering to pre-birth levels but remain below their pre-birth averages. After a year and a half post-birth, fathers return to near pre-birth levels as the combined fitness scores are no longer consistently statistically different from zero. For women, the post-birth drop in their combined fitness score is double that of men. Figure 3 shows that new mothers experience a 0.339 standard deviation drop, relative to their pre-pregnancy scores. A drop of 0.339

below the mean translates to a 10-point drop from the average PFT score and a 4-point loss from the average CFT score. Marine moms recover to pre-pregnancy levels overtime at least, but not after the 24 months they are observed in the sample. The size of these impacts could be the difference between a first- or second-class fitness test, which can affect the likelihood of promotions. To explore this, Figure 4 highlights the likelihood of a new parent achieving a first-class fitness score.

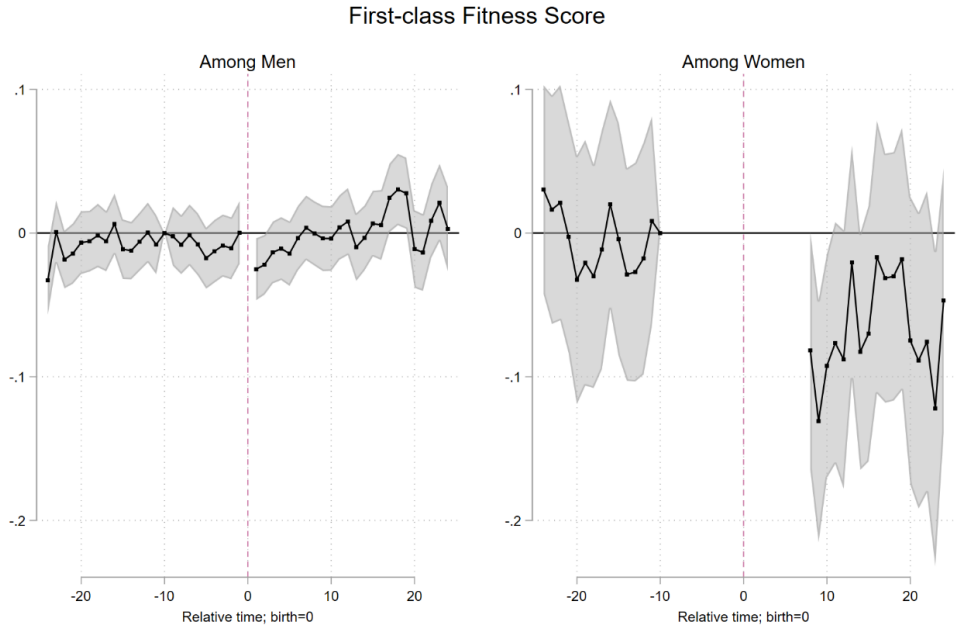


Notes: Figure displays monthly coefficients from time-series regressions. The outcome includes standardized (mean=0, SD=1) scores from physical/combat fitness tests. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse.

Figure 3. Fitness Outcomes among Marine Mothers and Fathers

In Figure 4, the first-class fitness results are percentage point changes, relative to 10 months before birth. The first-class score for both the PFT and CFT is a total score of 235 points or higher. Results for men show that prior to birth, during the pregnancy period,

no significant change exists for their chances of achieving a first-class score. In the two months post-birth, however, first-time fathers' probabilities of achieving a first-class PFT or CFT drop by 2.5 and 2.2 percentage points, respectively. After two months, fathers begin to recover towards pre-pregnancy levels and even exceed those levels 15-months post-birth where they have a 2.5 percentage point higher chance of getting a first-class score. Similar to the combined fitness results, women experience significantly larger impacts in their first-class score compared to Marine fathers. This large drop is depicted in month eight post-birth for women and estimates show that a woman's chances to achieve a first-class score drop by 8.2 and 13.1 percentage points in the two months after they are required to take either test. These results are consistent with the combined fitness scores and highlight periods where additional fitness support can be allocated to new parents. Further, the outcomes show that while women begin to recover over time, but not in the 24 months post-birth.

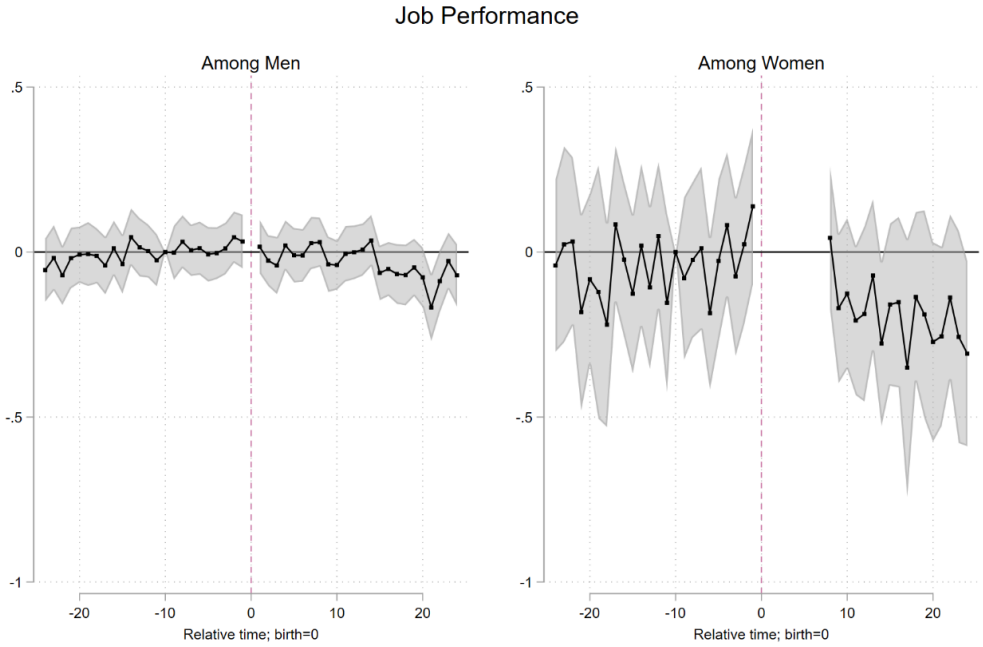


Notes: Figure displays monthly coefficients from times series regressions. The outcome includes the percentage-point change in the probability that a Marine achieve a first-class fitness score. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse.

Figure 4. First-Class Fitness Outcomes among Marine Mothers and Fathers

B. PARENTHOOD AND PERFORMANCE

I next examine job performance. Figure 5 displays monthly estimates for the standardized job performance outcome, measured separately for men and women. Like the combined fitness score, the performance variable calculates as standard deviations above or below pre-pregnancy trends (mean=0, standard deviation=1). Additionally, the job performance measure includes both FITREP and PROCON scores, and like most job evaluations, these scores cover an individual's performance over an extended period of time. Therefore, any post-birth changes in scores could be attributed to a Marines performance before, during, and after childbirth. The average raw FITREP score in the sample is 3.73, the average proficiency score is 43.22, and the average conduct score is 43.12. While there is not a consistent interpretation across the individual performance evaluation scores, any drop in the evaluation score could affect a Marines' promotion chances.



Notes: Figure displays coefficients from time-series regressions. The outcome is the standardized job-performance rating (mean=0, SD=1). The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse.

Figure 5. Job Performance Outcomes among Marine Mothers and Fathers

The estimates in Figure 5 show that there is no distinguishable difference from the mean for new fathers except in month 20 post-birth, where they experience a 0.168 standard deviation drop in performance, relative to pre-pregnancy. The performance drop for new fathers persists for the next two months at statistically significant levels. After childbirth, men often do not have to reintegrate into their units since they are only out of work for up to 14 days. This could be why results do not show any immediate impact on performance. The dip in performance almost two years post-childbirth is interesting because it highlights a potential time where fathers could use added resources and support. However, this dip only occurs in one month and months 18–24 are not jointly significant, which means the results could be statistical noise. Marine women, who may be away from their units for up to four months during a pregnancy cycle, experience a greater impact on their performance compared to their male counterparts. New mothers face a consistent drop in their performance post-birth, with the most significant drops in months 11–14 post-birth. The average drop in this time period is 0.278 standard deviations, relative to mothers' pre-pregnancy scores.

C. PARSIMONIOUS MODEL

The parsimonious model examines four different periods throughout pregnancy and childbirth to isolate the health and job performance impacts on a first-time parent. In Tables 4 and 5, the odd columns display coefficient estimates for new moms and dads observed in the sample for a minimum of 12 months before and 12 months after birth. The even columns represent the more conservative estimates in which new parents have a minimum of 24 months before and 24 months after birth. All estimates are relative to 10-months before the birth and earlier (-24 to -10) to capture changes from pre-pregnancy levels. The coefficient estimates are the average increase or decrease for the period specified in each phase.

For men, in Table 4, column (1) results show that first-time fathers experience a significant drop in their combined fitness score during the months prior to childbirth. The combined fitness score is statistically significant in the less restrictive sample as new fathers face a 0.254 standard deviation drop during each month of the pregnancy period.

This translates to a drop of 7 and 3 points on the PFT and CFT, respectively. After this initial drop, fathers begin to recover but still face a significantly negative impact in the month immediately following the birth. In months 3–12 the gap continues to close, but it still significantly different from new fathers' pre-pregnancy levels. Finally, the estimate for Birth Jump 3 in column (1) shows that the impacts stay negative up to two years after birth. Comparing these results to the more conservative sample in column (2) show that when new fathers are observed longer, the impacts are reduced, with only the Birth jump 1 and 2 periods containing statistically significant results. These results could point to the fact that those who choose to stay in service perform better physically than those that choose to leave after having a child.

The first-class fitness score results in column (3) show that the most significant impacts on fathers occur immediately after childbirth, denoted by the Birth Jump 1 coefficient estimates. On average, new fathers experience a 1.7 percentage point drop in their probability of achieving a first-class fitness score in the first-month post-childbirth.

Table 4. Parsimonious Time Series Results for Marine Fathers

	(1)	(2)	(3)	(4)	(5)	(6)
	Combined Fitness Score		First-class Fitness Score		Job Performance	
Pregnancy (-9 to -1 months)	-0.254***	-0.0014	-0.001	0.004	0.031**	0.0230
	(0.008)	(0.009)	(0.003)	(0.003)	(0.014)	(0.018)
Birth jump 1 (1 to 2 months)	-0.113***	-0.071***	-0.017**	-0.004	0.002	-0.240
	(0.014)	(0.019)	(0.001)	(0.007)	(0.022)	(0.028)
Birth jump 2 (3 to 12 months)	-0.059***	-0.130*	0.003	0.015***	0.0140	0.056***
	(0.008)	(0.009)	(0.003)	(0.004)	(0.015)	(0.018)
Birth jump 3 (13 to 24 months)	-0.049***	0.002	0.013***	0.0243***	-0.022	0.0188
	(0.009)	(0.011)	(0.003)	(0.004)	(0.017)	(0.019)
Observations	1,633,040	1,617,780	1,633,040	1,617,780	1,230,559	1,219,071
R-squared	0.618	0.618	0.415	0.414	0.457	0.457
+/-12 months	X		X		X	
+/-24 months		X		X		X

Notes: Displays coefficients from time-series regressions. Outcomes include standardized (mean=0, SD=1) scores from physical/combat fitness tests, percentage-point change in the probability that a Marine achieve a first-class fitness score, and standardized job-performance rating (mean=0, SD=1), measured separately for males. Odd columns require fathers to be observed in the data at least 12 months prior to and 12 months after the birth; the more restrictive even columns require parents to be observed in the data at least 24 months prior to and 24 months after the birth. Regressions include individual and year fixed effects. The reference period is 10 months before childbirth and earlier (-24 to -10). The variable pregnancy is an indicator variable that applies to the -9 to -1-month timeframe for parents, representing the change in the outcome by the month of pregnancy. Birth jump 1 is an indicator variable equal to 1 in the immediate 2 months following pregnancy for parents. Birth jump 2 is an indicator variable equal to 1 in the 3–12 months following pregnancy, which provides an estimate of whether there is a sudden shift in the outcome after the initial months of birth. Birth jump 3 is an indicator variable equal to 1 in the 13–24 months following pregnancy to estimate changes up to two years post-birth. Standard errors are clustered for individuals and displayed in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Data source: Total Force Data Warehouse..

After this initial drop in the first-class score, results show that men begin to recover. The Birth jump 2 and the Birth jump 3 variables in both samples are positive, suggesting that men who chose to stay in the Marine Corps at least two years post-birth return to or exceed their pre-birth fitness levels.

The job performance estimates in column (5) highlight that new fathers increase their performance during the pregnancy period and then return to pre-pregnancy levels after childbirth as the results do not differ from zero. Results in column (6) are similar but show an increase in performance during the 3–12 months post-birth. Overall, there appears to be no significant impact on first-time fathers' job performance before or after childbirth.

Next, I discuss the parsimonious results for women. Results in Table 5 depict that new mothers experience significant drops to both fitness measures, in each Birth jump period, for both samples. The most significant impacts occur during the first Birth jump phase where women face a 0.326 and 0.311 drop in their combined fitness scores for both samples, respectively. The first-class fitness scores are also significant in the initial post-pregnancy phase. These significant impacts persist as women never fully recover to pre-pregnancy levels. Marine mothers must take either the PFT or CFT as early as 7-months after birth and the results show that they experience an effect on their physical performance. Getting back into shape is difficult and these outcomes point to an area where the Corps can intervene to help new mothers minimize these effects.

Regarding performance, new mothers do not face significant changes during the pregnancy phase, however, they face changes during both post-birth time periods. In months 8 to 12 following birth when observed for at least 12 months before and after birth, females, on average, experience a 0.069 decrease in their job performance scores, relative to pre-pregnancy levels. The impact is the largest in the Birth jump 2 period where women face a 0.134 drop in performance. Both the health and performance results suggest that women, on average, experience significant impacts after childbirth.

Table 5. Parsimonious Time Series Results for Marine Mothers

	(1)	(2)	(3)	(4)	(5)	(6)
	Combined Fitness Score		First-class Fitness Score		Job Performance	
Pregnancy	-	-	-	-	0.042	-0.042
(-9 to -1 months)	-	-	-	-	(0.036)	(0.055)
Birth jump 1	-0.326***	-0.311***	-0.087***	-0.059***	-0.069*	-0.067
(8 to 12 months)	(0.035)	(0.044)	(0.016)	(0.019)	(0.046)	(0.059)
Birth jump 2	-0.168***	-0.164***	-0.050**	-0.054***	-0.134***	-0.077
(13 to 24 months)	(0.034)	(0.041)	(0.014)	(0.016)	(0.047)	(0.054)
Observations	128,464	126,977	128,464	126,977	105,888	103,917
R-squared	0.611	0.611	0.405	0.404	0.455	0.455
+/-12 months	X		X		X	
+/-24 months		X		X		X

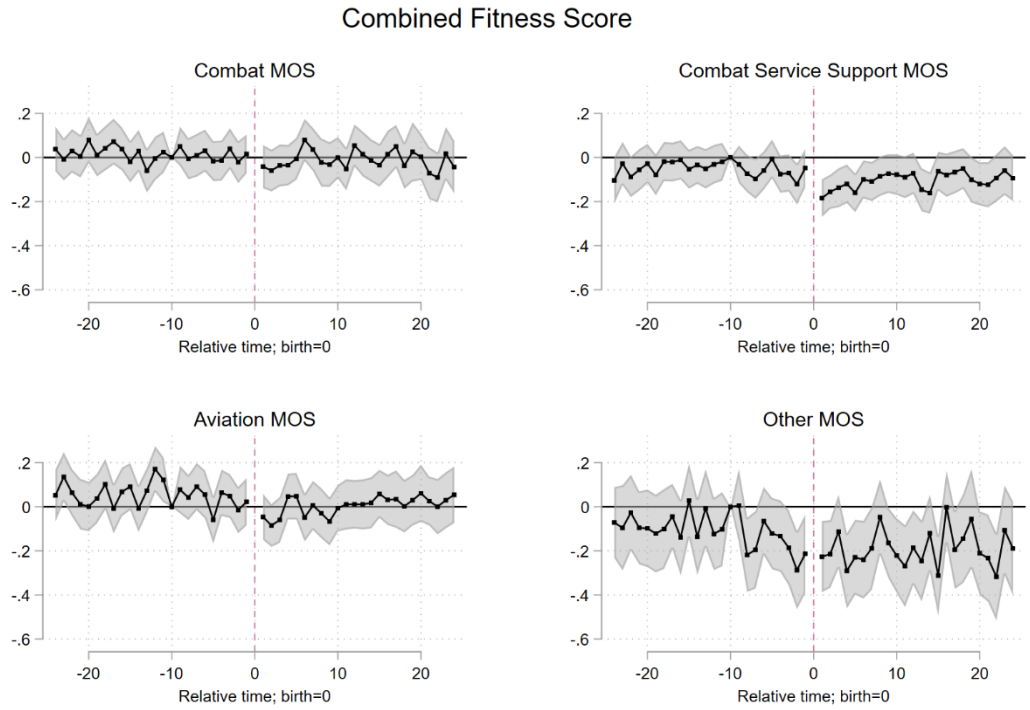
Notes: Displays coefficients from time-series regressions. Outcomes include standardized (mean=0, SD=1) scores from physical/combat fitness tests, percentage-point change in the probability that a Marine achieve a first-class fitness score, and standardized job-performance rating (mean=0, SD=1), for females. Odd columns require parents to be observed in the data at least 12 months prior to and 12 months after the birth; the more restrictive even columns require parents to be observed in the data at least 24 months prior to and 24 months after the birth. Regressions include individual Marine and year fixed effects. The reference period is 10 months before birth and earlier (-24 to -10). The variable pregnancy is an indicator variable that applies to the -9 to -1-month timeframe for parents, representing the change in the outcome by the month of pregnancy. Birth jump 1 is an indicator variable equal to 1 in month 8–12 following pregnancy for females to estimate changes once they return to full duty status. Birth jump 2 is an indicator variable equal to 1 in the 13–24 months following pregnancy to estimate changes up to two years post-birth Standard errors are clustered for individuals and displayed in parentheses. + $p < 0.10$, ∗ $p < 0.05$, ∗∗ $p < 0.01$, ∗∗∗ $p < 0.001$. Data source: Total Force Data Warehouse..

D. SUBGROUP ANALYSIS

In this section, I estimate differences in health and performance outcomes among different MOS groups as well as between officers and enlisted Marines. Figures 6 through 11 display the outcomes for the four MOS subgroups, by gender. Each MOS subgroup includes both officer and enlisted Marines. Tables 6 and 7 display the parsimonious model estimates for officer and enlisted ranks, measured separately for men and women.

For each outcome, I use the less restrictive sample that includes parents with at least 12 months of observation time before and after birth. In Figure 6, there is an immediate negative effect for each group, with the largest occurring in the CSS and Other MOS categories. New fathers in the CSS group experience a 0.185 standard deviation drop while those in the Other category face a 0.213 drop. The negative impact of both groups persists for the duration of the observation period. The overall effect of the combined fitness score

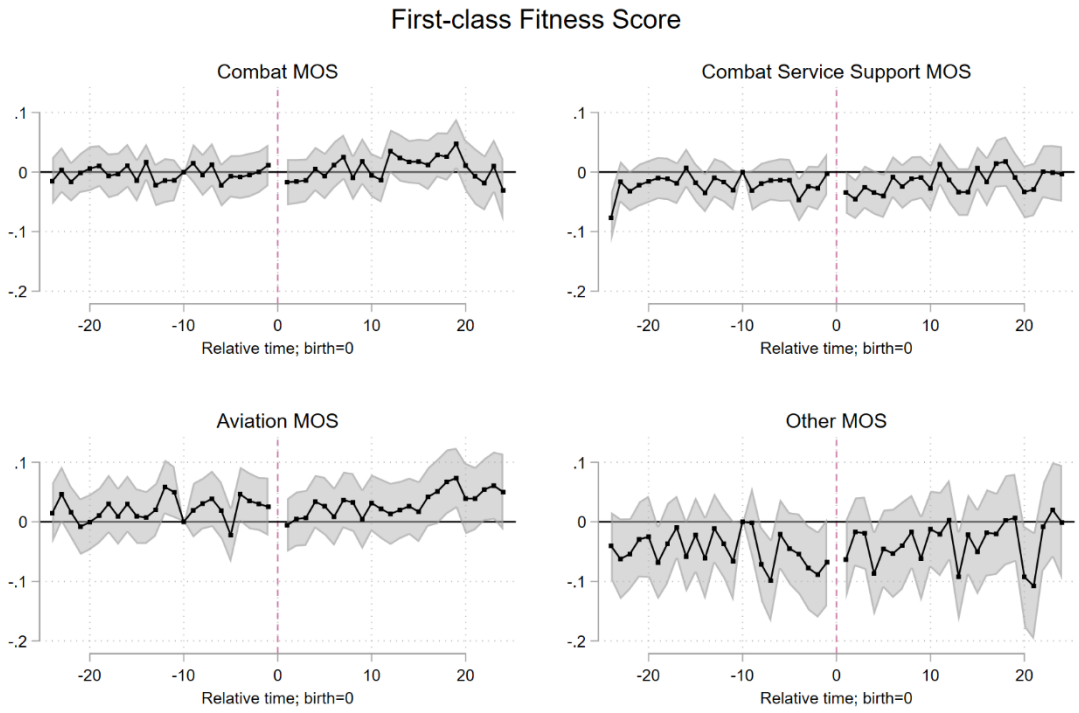
on first-time fathers is driven by these two groups. Men in the Combat and Aviation groups do not face any changes relative to pre-pregnancy levels.



Notes: Figure displays monthly coefficients from time-series regressions. The outcome includes standardized (mean=0, SD=1) scores from physical/combat fitness tests, measured separately for each male MOS subgroup. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse..

Figure 6. Fitness Outcomes among Marine Fathers across MOS subgroups

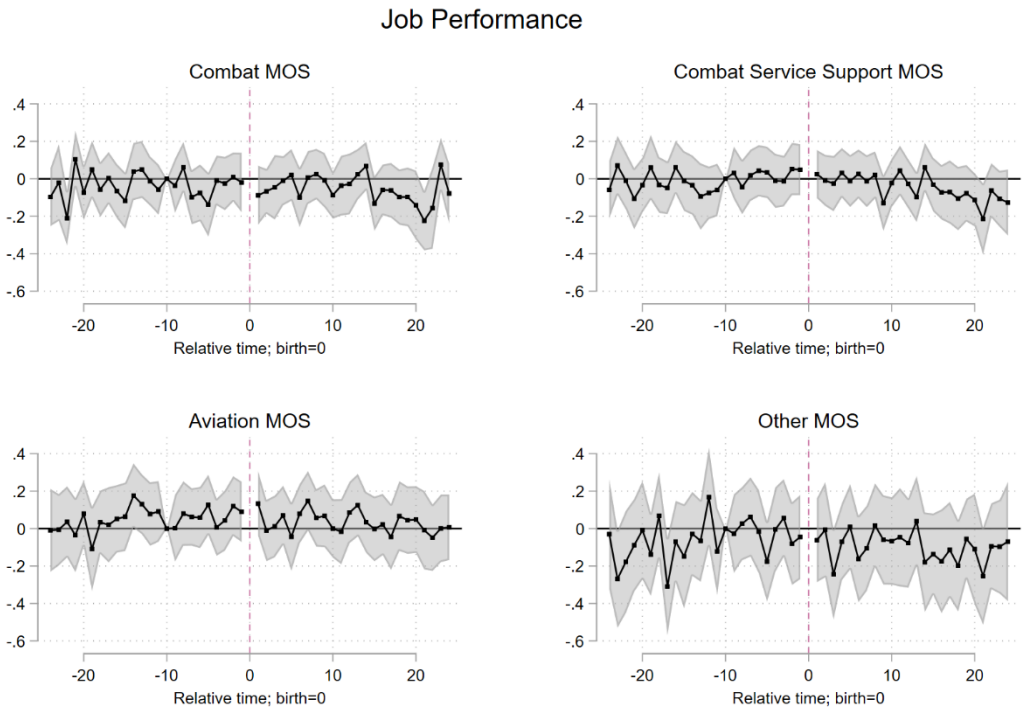
Depicted in Figure 7 is the first-class fitness score for men, measured by MOS. The first-class fitness impacts are largest among the Other MOS category; however, the standard errors are also largest for that group. There is an initial drop in the probability of achieving a first-class score for each group except the Aviation group, but the results are not distinguishably different from zero. The Aviation subgroup exceeds pre-pregnancy levels after approximately a year and a half post-birth with a 1.6 percentage point increase in the likelihood of achieving a first-class score.



Notes: Figure displays monthly coefficients from times series regressions. The outcome includes the percentage-point change in the probability that a Marine achieve a first-class fitness score, measured separately for each male MOS subgroup. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse..

Figure 7. First-Class Fitness Outcomes among Marine Fathers across MOS Subgroups

In Figure 8, for job performance, there are no statistically significant impacts for any MOS group during and immediately after pregnancy. However, three of the four groups experience a drop in their performance nearly two years after birth, with those in the Combat MOS facing the largest drop. Those in the Combat MOS experience a 0.23 standard deviation drop in performance close to two years post-birth but then recover to pre-pregnancy levels. These job performance results are consistent with the overall father estimates.

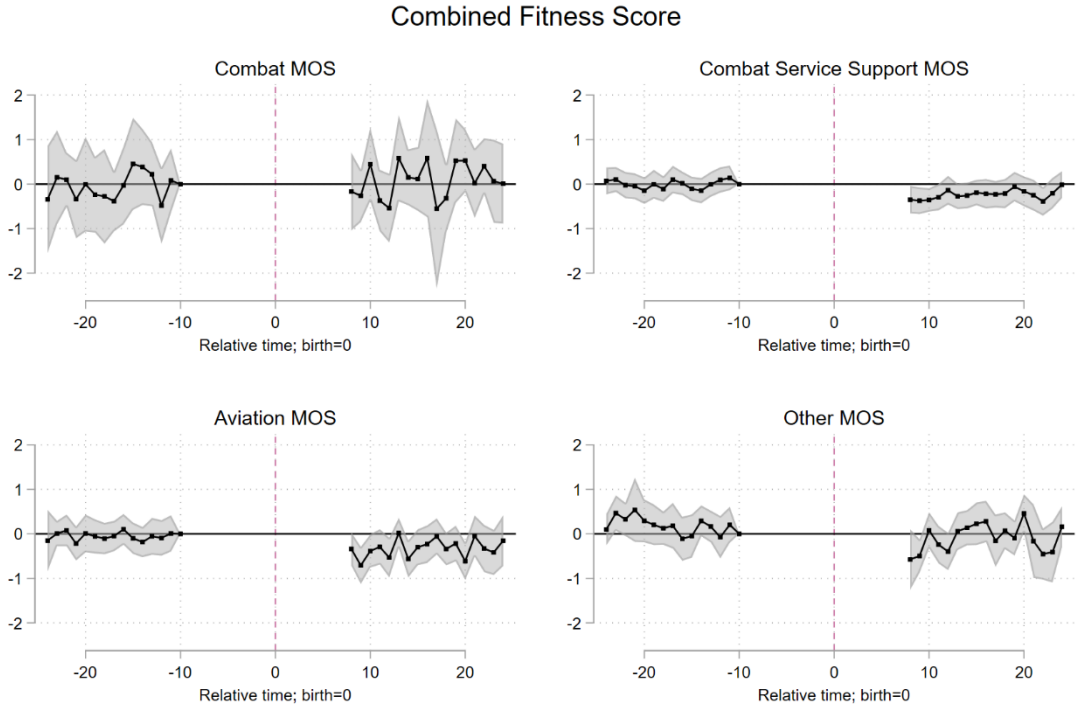


Notes: Figure displays coefficients from time-series regressions. The outcome is the standardized job-performance rating (mean=0, SD=1), measured separately for each male MOS subgroup. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse..

Figure 8. Job Performance Outcomes among Marine Fathers across MOS Subgroups

For Marine mothers, Figures 9 through 11 highlights the subgroup results across MOS. Compared to fathers, new moms face more significant impacts on both health and job performance measures. For each outcome, the standard errors are largest for the Combat MOS group as that group has the fewest number of first-time moms in the sample. Further research should examine the impacts on those in the Combat MOS group as more females enter those jobs. The effects on the CSS group are consistently below pre-pregnancy levels as shown in Figure 9, these impacts are likely driving the overall effect on women.

In month eight post-birth new moms in the CSS and Other jobs face a 0.342 and 0.346 standard deviation drop-in score, respectively. Results for the Combat MOS may be driven by the fact that women are relative newcomers to these types of jobs and must adapt to a new tempo while also caring for their newborns. Results show that women in all categories eventually reach pre-pregnancy levels over time.

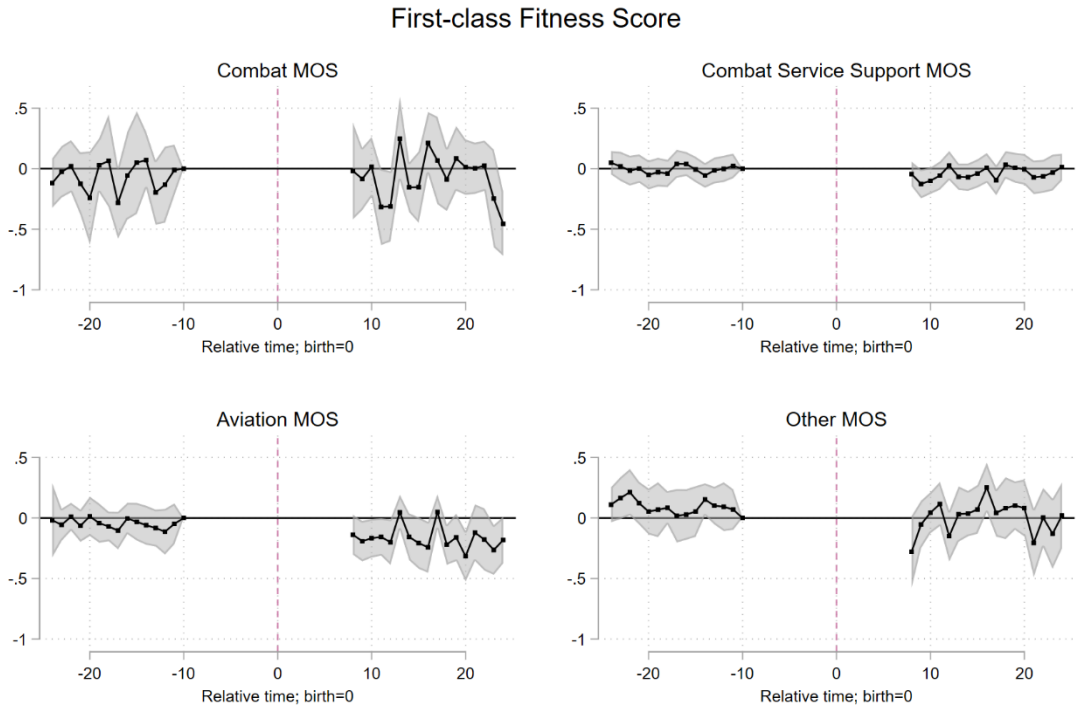


Notes: Figure displays monthly coefficients from time-series regressions. The outcome includes standardized (mean=0, SD=1) scores from physical/combat fitness tests, measured separately for each female MOS subgroup. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse..

Figure 9. Fitness Outcomes among Marine Mothers across MOS Subgroups

Figure 10 shows results for the first-class fitness probabilities among women MOS groups and is consistent with the combined fitness score outcomes in that the Combat and CSS Marines experience the most significant impacts on their probability of achieving a first-class score. The outcomes depict that on average, new moms in Combat jobs are approximately 42.1 percentage points less likely to achieve a first-class fitness score eleven

months post-birth. New moms in CSS jobs are 13.4 percentage points less likely during the nine months post-birth. The estimates for the Combat and CSS groups recover to pre-pregnancy levels while moms in the Aviation group face score drops up to 24-months after childbirth.



Notes: Figure displays monthly coefficients from times series regressions. The outcome includes the percentage-point change in the probability that a Marine achieve a first-class fitness score, measured separately for each female MOS subgroup. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse..

Figure 10. First-Class Fitness Outcomes among Marine Mothers across MOS Subgroups

Finally, Figure 11 depicts job performance results and shows that all MOS have relatively consistent patterns before and after birth. That is, there are no statistically significant results that differ from a Marine mother's job performance 10-months before birth.

Notes: Figure displays coefficients from time-series regressions. The outcome is the standardized job-performance rating (mean=0, SD=1), measured separately for each female MOS subgroup. The sample includes first-time parents observed at least 12 months before after birth, and a control group of Marines in the sample not observed having a child. Regressions include individual and year fixed effects. Estimates relative to 10 months before birth. Month 0 denotes the month of childbirth. Standard errors are clustered for individuals and depicted in grey, representing a 95% confidence interval. Data source: Total Force Data Warehouse..

Figure 11. Job Performance Outcomes among Marine Mothers across MOS Subgroups

The operational tempo varies among MOS groups, which could serve as an underlying factor in these results, for both men and women. For example, Marines in combat jobs that were recently opened to all women in 2015, have higher work tempos than their counterparts in combat service support and aviation jobs, on average. It is not to say that non-combat MOS jobs are not demanding, but that those in combat jobs tend to train and deploy at higher rates, which contributes to the difference in outcomes. Further, since Marines in combat jobs do tend to train and deploy at higher rates, they also spend less time at home with their families, which may have an impact on both their mental and physical health.

Next, I present the subgroup parsimonious model where I analyze differences across the officer and enlisted ranks, measured separately for men and women. Both tables include results from the less restrictive sample where parents are in the sample for at least 12 months before and after birth. Of note, I chose the less conservative sample because they include a greater number of observations to analyze compared to the more conservative sample. Tables 6 and 7 highlights estimates for fathers and mothers, respectively. The even columns in the tables depict officer results while the odd columns are enlisted estimates.

Results from Table 6 show that, on average, enlisted Marine fathers face more significant impacts in each outcome variable, relative to Marine officers. The largest differences occur in both health estimates, suggesting enlisted Marines do not cope as well physically with the impacts of parenthood. The differences in the health measures continue throughout each post-birth period.

While the job performance measure for enlisted Marines in every period is not significant, the estimates are consistently negative while the officer's outcomes are positive. The exception is in the pregnancy period, where both estimates are positive. The largest differences among the groups occur during the Birth Jump 1 period immediately after birth. With more experience, it appears officers cope more effectively with the responsibilities of parenthood and therefore experience fewer effects. Further, Birth Jump 3 results show that these impacts persist over time for enlisted Marines for both health and performance outcomes.

Table 6. Parsimonious Time Series Results for Officer and Enlisted Marine Fathers

	(1)	(2)	(3)	(4)	(5)	(6)
	Combined Fitness Score		First-class Fitness Score		Job Performance	
	Officer	**Enlisted**	**Officer**	**Enlisted**	**Officer**	**Enlisted**
Pregnancy (-9 to -1 months)	-0.014	-0.027***	0.003	-0.001	0.084**	0.020
	(0.014)	(0.009)	(0.003)	(0.004)	(0.030)	(0.015)
Birth jump 1 (1 to 2 months)	-0.024	-0.129***	0.004	-0.021***	0.043	-0.010
	(0.024)	(0.016)	(0.007)	(0.007)	(0.050)	(0.024)
Birth jump 2 (3 to 12 months)	-0.052***	-0.062***	0.006	0.002	0.097***	-0.006
	(0.016)	(0.010)	(0.004)	(0.004)	(0.032)	(0.017)
Birth jump 3 (13 to 24 months)	-0.011	-0.060***	0.014*	0.012**	0.096***	-0.050**
	(0.173)	(0.011)	(0.005)	(0.004)	(0.037)	(0.020)
Observations	157,213	1,458,825	157,213	1,458,825	105,365	1,106,925
R-squared	0.638	0.610	0.305	0.413	0.629	0.455
+/-12 months	X	X	X	X	X	X

Notes: Displays coefficients from time-series regressions. Outcomes include standardized (mean=0, SD=1) scores from physical/combat fitness tests, percentage-point change in the probability that a Marine achieve a first-class fitness score, and standardized job-performance rating (mean=0, SD=1), for males. Outcomes measured for officer and enlisted Marines. The sample includes first-time fathers in the 12 months after the birth and earlier, as well as a control group of male Marines who are not observed having a birth. Regressions include individual Marine and year fixed effects. The reference period is 10 months before birth and earlier (-24 to -10). Regressions include individual Marine and year fixed effects. The variable pregnancy is an indicator variable that applies to the -9 to -1-month timeframe for parents, representing the change in the outcome by the month of pregnancy. Birth jump 1 is an indicator variable equal to 1 in the immediate 2 months following pregnancy for parents. Birth jump 2 is an indicator variable equal to 1 in the 3–12 months following pregnancy, which provides an estimate of whether there is a sudden shift in the outcome after the initial months of birth. Birth jump 3 is an indicator variable equal to 1 in the 13–24 months following pregnancy to estimate changes up to two years post-birth. Standard errors are clustered for individuals and displayed in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Data source: Total Force Data Warehouse..

Table 7 displays a similar story for enlisted mothers in that they experience larger impacts on their fitness scores compared to their officer counterparts. But female officers do face significant impacts on their combined fitness score in both post-birth periods. Results show that officers face a larger drop in job performance scores during the 8–12 months following birth compared to enlisted moms. Over time that trend reverses to enlisted moms being more affected in the 13–24 months after birth. A key takeaway is that both groups of females see their performance affected.

Table 7. Parsimonious Time Series Results for Officer and Enlisted Marine Mothers

	(1)	(2)	(3)	(4)	(5)	(6)
	Combined Fitness Score		First-class Fitness Score		Job Performance	
	Officer	**Enlisted**	**Officer**	**Enlisted**	**Officer**	**Enlisted**
Pregnancy	-	-	-	-	-0.046	0.051
(-9 to -1 months)	-	-	-	-	(0.109)	(0.038)
Birth jump 1	-0.232***	-0.326***	0.009	-0.087***	-0.309**	-0.048
(8 to 12 months)	(0.081)	(0.037)	(0.023)	(0.017)	(0.163)	(0.048)
Birth jump 2	-0.188***	-0.158***	-0.009	-0.046***	-0.161	-0.131**
(13 to 24 months)	(0.086)	(0.036)	(0.021)	(0.015)	(0.136)	(0.050)
Observations	12,711	114,814	12,711	114,814	9,794	95,260
R-squared	0.624	0.588	0.291	0.400	0.581	0.436
+/-12 months	X	X	X	X	X	X

Notes: Displays coefficients from time-series regressions. Outcomes include standardized (mean=0, SD=1) scores from physical/combat fitness tests, percentage-point change in the probability that a Marine achieve a first-class fitness score, and standardized job-performance rating (mean=0, SD=1), for females. Outcomes measured for female officers and enlisted Marines. The sample includes first-time mothers observed in the data at least 12 months prior to and after birth, as well as a control group of female Marines who are not observed having a birth. Regressions include individual Marine and year fixed effects. The reference period is 10 months before birth and earlier (-24 to -10). The variable pregnancy is an indicator variable that applies to the -9 to -1-month timeframe for parents, representing the change in the outcome by the month of pregnancy. Birth jump 1 is an indicator variable equal to 1 in month 8–12 following pregnancy for females to estimate changes once they return to full duty status. Birth jump 2 is an indicator variable equal to 1 in the 13–24 months following pregnancy to estimate changes up to two years post-birth. Standard errors are clustered for individuals and displayed in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Data source: Total Force Data Warehouse..

E. DISCUSSION

Time away from a unit for any reason will inevitably affect performance because the Marine Corps is largely a what have you done for me lately organization. And since new mothers spend a significant amount of time away from work, their performance scores may take a hit. In fact, during each post-birth period in the parsimonious model, new mothers have significantly lower performance scores, relative to their childless counterparts. Of note, neither men nor women face a significant drop in performance during the months before childbirth, only after spending time away from their units, do they experience a drop. These results contribute to the necessity of building a culture of support for Marine parents to ensure there is no impact to their careers because of their

choice to become a parent. The subgroup analysis, which isolates the job performance impacts across different groups of Marines has more significant estimates.

Additionally, results from both subgroup parsimonious models suggest that enlisted Marines face greater impacts compared to officers. Officers inherently have more Marine Corps and often more life experience than the younger enlisted population. For this reason, officers may be more resilient to the effects of parenthood and have a greater ability to cope with the added responsibilities associated with parenting compared to their enlisted counterparts. Regardless of the underlying reason for the differences, the results show that the Corps should focus its resources on the enlisted population to ensure they are receiving the necessary information and support throughout a pregnancy period.

To summarize, the key findings include:

- Both men and women experience a significant drop in the combined fitness score immediately after childbirth and slowly recover to near pre-pregnancy scores.
- The probability of achieving a first-class fitness score reduces for both men and women following childbirth.
- Regarding job performance, Marine fathers are relatively resilient to any impacts post-childbirth while mothers face an initial drop in performance, yet eventually, recover.
- Among the MOS subgroups, fathers in the Other MOS category and mothers in the Combat Service Support MOS face the largest effects on both health and performance compared to their counterparts.
- The subgroup analysis also shows that enlisted Marines experience greater effects due to parenthood, compared to officers.
- Finally, the less restrictive sample where parents are in it for only 12-months before and after birth yields more significant results for the health and job performance measures. This sample includes a larger number of

observations including parents who may have chosen to leave the Corps shortly after birth due to their own poor health and job performance, which could create bias in the results.

These results show potential groups and periods during a parent's pregnancy where the Marine Corps can intervene and provide resources. In the next section, I discuss recommendations that could be useful in minimizing these effects Corps wide.

VI. RECOMMENDATIONS AND FURTHER RESEARCH

A. RECOMMENDATIONS

As a result of the key findings, and using the information on current military family support programs, I make the following recommendations about parenthood in the Marine Corps.

Ultimately, the responsibility to seek out the variety of programs and resources available internally and externally to the Marine Corps lies on the individual Marine and his or her family. However, I believe more can be done on the organizations part to increase awareness of these programs and ensure Marines receive the assistance available to them.

The Corps must strive to build and strengthen a culture surrounding parenthood that focuses on supporting parents through both new and existing programs and policies. Currently, parenthood is not a top priority within the Corps. And while the organization's mission is to fight and win wars, the culture can adapt to be more inclusive of these types of issues to ensure Marines receive support. To ensure Marine parents are ready, the Corps must adapt its current zero-defect mentality and allow flexibility for new fathers and mothers as they transition into parenthood. Through leaders ensuring Marines know and understand the resources available to them, the Corps can shift its focus on family support and make it more of a priority. Also, this main issue currently surrounding parenthood is that Marines are simply not abreast of the information available to them. Therefore, the flexibility starts with ensuring information on parental support is consistently available to Marines throughout their time in the Corps.

The current procedure that exists in the Corps is that all Marines receive an information brief when they arrive at a new duty station. This brief includes information about the station itself, as well as useful resources available to Marines on board the base. Some of the resources available include the Family Advocacy Program and Military Family Life Counselors. The information about these programs are useful and important, however, the Marines often receive the information at irrelevant times in their careers. For example, the average 18-year-old Marine checking into his or her first unit does not need

information about family support resources available to them. This information often goes in one ear and out the other because these junior Marines' focus is not initially on having a family, but effectively integrating into their new units. I can personally attest to this myself because as a young junior officer, my focus was getting to my unit and starting my job, not about family readiness. And while it is inevitably the individual Marine's responsibility to make good decisions and seek out resources, the organization can improve its techniques to ensure the information is readily available.

The issue with the current procedure is that once a Marine does choose to start a family, they often forget or neglect the information given to them when they first arrived. As a result, these vital resources go unused. This is both a cultural and organizational design issue. We must ensure that Marines consistently receive information and have access to resources throughout their time in the Corps because too often Marines lose this knowledge in the chaos of Marine life. By supplying information about family support resources and routinely filtering them down to individual units and Marines at critical times, the Corps enables its Marines to meet the challenges associated with parenthood.

As a result, I recommend updating the Marine Corps Order (MCO) 1500.12E, *Marine Corps Policy Concerning Pregnancy and Parenthood,* to reflect societal and organizational changes that will supply up to date information to Marines. Some of these changes include the availability of medical and non-medical childcare, the duration of parental leave periods, and the recent changes to the Marine Corps fitness program. This information will supply Marines with effective tools to help in their family care planning. Further, the update can include the physical and mental effects of parenthood from this study so that Marines have the information to minimize these effects.

Upon arrival to any unit, Marines should receive a brief on the resources available to them to help support their families, regardless of age, rank, or marital status. The reason for this is that Marines currently without families often do not receive information on family resources. However, I believe that equipping every Marine with this information consistently throughout their time in service will enable an individual to make a more informed decision about how and when to start a family while in the military. One potential area where these resources could be discussed is during the annual periodic health

assessment (PHA) that every service member receives. During the PHA, the provider and Marine can have a conversation discussing any plans for parenting or pregnancy. Further, by disseminating information regularly, those in leadership positions, regardless if they are married or not, will be more able to support the Marines in his or her charge that seek to start or support their families. As a single officer, I admit that I was naive to the great programs available to Marines, but now that I am, I will carry that knowledge forward for the rest of my time in the Corps. Efficiently timing the dissemination of information is critical because it equips Marines with the information when they need it most. Additionally, as new programs and policies about family support continue to emerge, Marine will be able to leverage up to date knowledge on how to best support their families.

The RAND study by Trail et al. (2019), which focused on non-medical counseling programs like those provided by MLFC's mentioned that increasing awareness of these types of resources was critical to ensure their effectiveness (Trail et al. 2018). Therefore, there should be steps taken to promote and distribute information about these programs, so more people have access to them. Thus, in concert with the annual training program for expectant parents, the Corps should aggressively publicize programs like MFLC to ensure Marines understand their resources and capabilities. The recent emergence of various social media platforms could serve as a way for the Corps to promote family support programs to a wider audience.

Programs including Force Fitness and MFLCs are just two of the programs that could increase their dissemination of information to help support Marine parents. Every Marine unit has Force Fitness Instructors that specialize in physical fitness training. These instructors can design programs targeted towards expectant parents to mitigate the impacts found in this study. Furthermore, Marine leaders should inform the unit's Military Family Life Counselor of expectant Marines to allow for earlier intervention to occur prior to the birth of a child. The Marine Corps speaks about "leaning into" an issue, and parenthood is one that should follow this motto as it will enable Marines to be more prepared for the challenges of parenthood while balancing life as a Marine. Additionally, giving new parents extended time at home before or after work could help them re-integrate more efficiently as they grapple with their new responsibilities. An hour here or there could go

a long way in helping parents adjust. Further, parents should not receive negative treatment or face different standards during leave and when they return to work.

Another recommendation is to develop a standardized training brief given by the Family Readiness Coordinator (FRC) at every unit to expectant parents that focuses on the effects of parenthood. To reach most Marines, I recommend giving this brief on a quarterly basis. Since Marines are consistently checking in and out of units, a quarterly brief will ensure that most expectant Marine parents have access to the brief. The brief should include the impacts on health and job performance that new parents might expect, as well as the service-specific resources available to them. If anything, this will allow parents to expect what potential issues may arise immediately after childbirth in hopes of mitigating those issues.

Finally, participants from the DACOWITS focus group made recommendations to improve the current physical fitness assessments, like the PFT/CFT, in general as well as potentially implement a gender-neutral fitness across the services. While every Marine must maintain a relatively high level of physical fitness, the estimates provide insight into the magnitude of effects and help to identify when and to what group certain resources should be allocated. Moreover, since the Corps' physical fitness programs continue to evolve with the introduction of higher standards and new programs, there is an opportunity to target expectant Marine parent groups to help them minimize the effects on their fitness caused parenthood. There is no fitness program or policy to my knowledge that directly targets parents, so creating a training regimen dedicated to parents could be a step towards mitigating these impacts.

B. FURTHER RESEARCH

As mentioned in the data section, the outcomes measured in model one for new fathers and mothers include observations of 13,414 and 1,730, respectively. Since the Marine Corps is that it is the smallest service with the smallest concentration of females among the services, this research could expand to the other branches to see if the impacts are consistent. A potential limitation with my study is that with the limited number of observations among new mothers for all outcomes, any outliers could have had a greater

impact on estimates. Expanding this design to branches with larger populations of females could help solidify the results found. However, despite the small concentration of females in the study, the estimates suggest that parenthood has significant effects on all females' outcomes.

The study could also expand to include data collected before January 2013 and after March 2019. The additional data would provide greater power to the analysis and enable us to see how changes to the parental leave and physical fitness policies affected parents over time. Since most services recently expanded their paternity leave and/or shifted their parental leave policies to a more gender-neutral platform, a study on the effects of those policy changes could provide more insight on parental health and performance after allotted more leave. The study can also be expanded to look at the Marine Corps Reserve component as well as the other military services to compare any differences that may exist. An essential tenet of the Marine Corps is physical fitness, so analyzing services that may emphasize it less can provide interesting insights.

Finally, I recommend further research include a cost-benefit analysis study on the Commandant's proposed plan of allowing mothers up to one year of paid leave. While generous, this proposal will have significant effects on manpower and organizational culture. Identifying costs and benefits will enable the Corps' leaders to make a more informed decision about implementing this type of policy. Below, I offer some potential implications of that policy proposal.

C. ONE-YEAR MATERNITY LEAVE CONSIDERATIONS

General Berger's proposed extension of the maternity leave policy to a full year has sparked interest among those in the military family readiness community. He states that: "In the future, we will consider up to one-year leaves-of-absence for mothers to remain with their children before returning to full duty to complete their service obligations" (United States Marine Corps, 2019 p. 8). This proposal would be an unprecedented step in providing support for Marine families. If implemented, this policy would enable mothers to return to a fully deployable status after a year spent at home with their newborns. The benefits would extend not only to the individual family as they get to recover and be present

for the formative stages of a child's infancy, but the Corps at large as the mothers return to work as a fully productive Marine, instead of one that is on a non-deployable status for a year after returning to work with the current 12-week policy. This progressive policy could also help shape the culture surrounding parenthood and attract a larger female demographic like the PFL policy in Europe (Olivetti & Petrongolo, 2017). Moreover, the proposal is not so farfetched on the surface as the Corps has a similar program that provides Marines an opportunity to step away from service and pursue alternative professional and personal goals.

The Career Intermission Program (CIP) provides Marines "a one-time temporary transition from active service for a period of one to three years for service members to pursue personal or professional goals/objectives outside the Marine Corps while providing a means for returning to active duty" (United States Marine Corps, 2013). The intent of the CIP is to enable more flexibility in a Marine's career path as they seek external training and development. The program targets Marines who are looking at permanently separating to pursue other goals. To combat losing quality Marines, the Corps developed this program to retain those Marines yet offer them opportunities to gain valuable experiences outside of the service. The potential yearlong maternity leave policy could mirror the CIP and enable Marine mothers more time with their newborns, which could attract more females in the future as the Corps builds a culture of support around parenthood.

As a result, I propose further research include a full-scale cost-benefit analysis on the Commandant's intended proposal. Below are some potential costs and benefits from a yearlong maternity leave policy.

1. Costs

- Individual skill degradation: job skills atrophy without repetition and a year away could result in lower organization productivity as the mother may have to re-learn a significant amount. However, their previous experience will minimize these costs compared to recruiting a new female Marine.

- Effects on career progression and promotion, specifically, does the Corps pause a women's time in service (TIS), or does it continue to accrue while the mother is out of work?

- Manpower implications: (1) Do mothers remain attached to their present units or do we move them to the training, transient, patients, prisoner (T2P2) personnel account during leave? (2) There will also need to be shifts/adjustments to the Authorized Strength Report (ASR) and Grade Adjusted Recapitulation (GAR).

- Costs associated with a potential increase in female recruitment. The Corps has the lowest population of females of the services.

- Do Marine mothers continue to receive their full pay and other military allowances while on yearlong leave?

- There are potential issues that can affect unit and individual morale with females having to reintegrate after a year away from service. Unit cohesion could be impacted creating additional challenges.

- Intangible costs associated with organizational culture and perception surrounding parenthood in the military.

- Direct costs to the budget as a result of increased paid leave which include added healthcare and re-training costs.

- Dual-military spouse assignment realignment: The Corps will have to consider extending a secondary caregiver's time at their assignment if the primary caregiver goes on one-year leave.

- What will the requirement be to participate in Marine Corps training and education programs to include professional military education?

- Opportunity costs to the woman's career by not having the same career progression opportunities due to a gap in time in service which may lead to

lower performance evaluation and physical fitness scores. These scores affect promotion probabilities.

- Costs to the primary caregiver and her/his family due to a loss of base pay and other military compensation.

2. Benefits

- The policy could alleviate issues at child development centers that include long waitlists and burdens on resources and staff.
- There could be positive impacts on emotional and mental health issues as mothers get to spend additional time with their newborns.
- Mothers immediately return to a deployable duty status after a yearlong maternity leave, which increases organization productivity since females will not be on a non-deployable status. They will also be more focused since they had ample time at home to care for their newborn(s).
- Dual military families experience relief since the female gets to stay at home for an extended period, which minimizes schedule conflict and potential relationship conflict.
- There are potential increases to an individual mother's propensity to re-enlist and remain in service because of an increase in parental support.
- If implemented, this policy could make it easier to recruit female Marines as the perception of building a family while serving changes and more women are attracted to the Corps' culture.

Finally, research by Hartel et al. (2006) suggests that organizations can encourage a more effective work-life balance out of employees using various family support programs. These programs include flexible schedules, working from home, improved childcare options, and increased leave options (Hartel et al. 2006). The Corps has the capability to supply many of these programs as an organization. Further, Hartel et al. (2006)

imply the outcomes of these programs to be twofold in that employee well-being increases and the organization gains productivity benefits. The Marine Corps is an industrial age organization when it comes to talent management because of its rigid structure and reliance on the human element for productivity. So, while Silicon Valley human resource tactics like massive data analysis to recruit and retain talent will not work in the Corps, we can explore some of the modern talent management strategies these companies use to help keep quality Marines. These strategies include programs like PFL, working from home, and extending leave periods. Therefore, if the Corps does not adopt a full year-long maternity leave policy, they have a variety of options to explore that can help contribute towards the goal of supporting Marine parents.

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VII. CONCLUSION

Results from this study show that first time Marine parents, especially Marine mothers experience a drop in their health and job performance after childbirth. The results capture how childbirth affects an individual's ability to perform his or her job, which can affect promotion possibilities as well as decisions to stay in service. Based on the analytical design, I claim the results as causal effects of parenthood. Further, these results highlight where resources can potentially support Marine families. And as the Marine Corps shifts its strategy towards a great power competition, talent management remains a priority. To attract, recruit and retain individuals ready and able to fulfill this new mission, the Corps can broaden its strategy and leverage modern family support policies. To do that effectively, the Corps must understand how and why Marines make certain life choices, like parenthood, and the impacts associated with it. Gaining insight into how parenthood affects Marines provides an additional tool the Corps and its leadership can utilize to develop, and shape policies aimed towards parents. While parenthood brings an exorbitant amount of happiness to new mothers and fathers, it also brings added responsibilities that impact Marine parents' health and performance.

To minimize the effects of health and performance caused by parenthood, the Corps can use its existing programs and policies to best support new parents and help retain quality talent. Additionally, the subgroup analysis enables the Marine Corps to target specific groups of parents who need support the most. To ensure future success, it is important for the Corps to continue studying the effects of parenthood on performance, health, and retention to build a culture of support for families.

Finally, this study can translate to the civilian sector because a variety of jobs civilian jobs mirror the physical demands of the Marine Corps. Physical fitness implications could affect individuals in jobs like police, fire, and construction. These jobs demand individuals to maintain a sufficient level of physical fitness to perform effectively. Further, the job performance results can apply to a wider range of jobs as most professions have performance evaluation systems like the Corps.

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APPENDIX. OUTCOME DESCRIPTIONS

Physical Fitness Test (PFT)- annual fitness exam is taken by all Marines between January and June. The max score one can receive is 300 (100 for each of the 3 events):

Pull-ups (or push-ups): maximum repetitions
Crunches: maximum repetitions in a 2-minute time limit
3-Mile Run: Marines receive maximum points with a time 18:00 minutes or below

Combat Fitness Test (CFT)- annual fitness exam taken by all Marines between July and December. The max score one can receive is 300 (100 for each of the 3 events):

Movement to contact (MTC): 800-meter run
Ammo Can Lift: shoulder press of a 35lb ammo can in 2-minute timeline
Maneuver under fire (MANUF): 350-yard obstacle course that simulates combat activities

Fitness Report (FITREP)- performance evaluation document used for senior enlisted (E5-E9), and all officers. The FITREP evaluates Marines on 11 characteristics from leadership ability to initiative. The report ranges from 0-5 in value. The average in this study is 3.73. The length of observation varies but usually is between 3 and 14 months.

Proficiency Score (PRO)- job performance measure for junior enlisted Marines (E1-E4)
PRO score average in this sample is 43.22

Conduct Score (CON)- individual conduct measure for junior enlisted Marines (E1-E4)
CON score average in this sample is 43.12
Junior Marines receive PRO/CON scores bi-annually

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