



Original research article

Contraceptive use and childbirth rates by service branch during the first 24 months on active duty in the United States military from 2013 to 2018: a retrospective cohort analysis☆☆☆



Timothy A Roberts^{a,*}, Joshua M Smalley^b, Larissa F Weir^c, William P Adelman^a

^a Division of Adolescent Medicine, Children's Mercy Hospital, University of Missouri, Kansas City, School of Medicine

^b Division of Adolescent Medicine, San Antonio Military Medical Center, Fort Sam Houston, Texas

^c Department of Obstetrics and Gynecology, San Antonio Military Medical Center, Fort Sam Houston, Texas

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ABSTRACT

Objective: To measure the association of military branch-specific contraceptive education and access policy during basic training with contraceptive use and childbirth among new recruits.

Study design: Secondary analysis of insurance records from 92,072 active duty servicewomen who started basic training between 2013 and 2017.

Results: Exposure to reproductive health education and access to contraception during basic training differ by military branch. Highly effective contraception use (pills, patch, ring, shot, implants or intrauterine contraception) at 6 months on active duty [Army (18.1%), Air Force (27.4%), Marines (26.5%) and Navy (37.6%), $p < .001$], long-acting reversible contraceptive method use (implant or intrauterine) at 6 months [Army (2.0%), Air Force (3.7%), Marines (11.0%) and Navy (19.6%), $p < .001$] and childbirth in the first 24 months of service [Army (11.1%, 95% CI 10.7–11.5), Air Force (6.0%, 95% CI 5.6–6.4), Marines (8.4%, 95% CI 7.8–9.0) and Navy (6.7%, 95% CI 6.3–7.1)] varied by service branch. After adjusting for age at basic training and contraceptive use at 6 months on active duty, childbirth rates differed among all branches. The Army (hazard ratio 1.86, 95% CI 1.71–2.01), Marines (1.48, 95% CI 1.33–1.65) and Navy (1.24, 95% CI 1.13–1.35) all had a higher risk of delivery than the Air Force.

Conclusion: Variation in branch-specific contraceptive education and access policy during basic training is associated with differences in rates of contraceptive use at 6 months on active duty and childbirth prior to 24 months on active duty. This occurs despite all recruits having access to an identical medical benefit including no-cost access to contraception after completing initial training. Further study is needed to determine the etiology of these differences.

Implications: Guidelines for contraceptive education and access during basic training, highly effective contraception use after 6 months of service and childbirth in the first 24 months of service vary among branches of the United States military. Reducing this variability may reduce childbirth rates and improve the reproductive health of junior enlisted servicewomen.

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1. Introduction

Active duty servicewomen in the United States military have a higher unintended pregnancy rate than the general population of the United States and the militaries of other nations [1–6]. The differences

in pregnancy rates decrease, but persist, after adjusting for the demographic profile of the active duty population [5]. These unintended pregnancies are associated with adverse socioeconomic and medical outcomes for the infant and mother and have a negative impact on both military unit effectiveness and healthcare costs [1,5,7,8]. Junior enlisted servicewomen are at particular risk for these negative outcomes because of higher pregnancy rates overall, higher rates of unintentional pregnancy and socioeconomic challenges after delivery [3,4,9–13].

Consistent use of effective contraception prevents pregnancy, but servicewomen, particularly junior enlisted, experience multiple barriers to use of highly effective contraception (reversible contraception with a less than 10% failure rate with typical use including hormonal pills, patches, rings, shots, subdermal implants, and both hormonal and non-hormonal intrauterine contraception) [4,8–10,14–25]. Barriers to contraceptive use include cultural stereotypes about contraceptive use,

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* Corresponding author. Tel.: +1 757 647 4796.

E-mail address: taroberts@cmh.edu (T.A. Roberts).

inconsistent availability of contraception in operational environments and erratic work schedules [22–24]. Policies on contraceptive education and access during basic training also differ by military branch, creating variable barriers to contraceptive use among junior enlisted during initial training. In a study of Army enlistees, use of highly effective contraception declined after entry to active duty despite the military health benefit of no-cost reproductive healthcare [16]. Most enlisted servicewomen completing initial training (81.8%) express a desire to avoid pregnancy for at least the next 6 months, but only 35.1% used highly effective contraception at the last episode of intercourse, and another 30.4% used a barrier method only [15].

Previous studies demonstrated variation in contraceptive use between service branches across the military, but no studies have specifically examined service-specific variation among junior enlisted servicewomen or described branch-specific policies on contraceptive education and access during initial training [26,27]. In this project, we assessed differences in contraceptive uptake among enlisted servicewomen during the first 6 months of initial military training, childbirth rates during the first 2 years of military service and branch-specific contraceptive education and access policies during Basic Training to describe the association between contraceptive policies and reproductive health outcomes among new female recruits. We hypothesized that branches with military policies that foster initiation of highly effective contraception will have higher rates of highly effective contraceptive use at the completion of initial military training and lower childbirth rates in the first 24 months of active duty service.

2. Methods

We conducted a retrospective cohort analysis using insurance billing records from the Military Health System Management Analysis and Reporting Tool (M2) to assess contraceptive use in the first 6 months of active duty and childbirth rates in the first 24 months of active duty among enlisted female recruits in the US military who started basic training between October 2013 and October 2017. M2 contains a longitudinal record of insurance enrollment and healthcare utilization by active duty servicewomen in the civilian and military healthcare systems.

We used the following combination of data elements to identify new recruits: beneficiary category=active duty, ambulatory care value=reliant (service member assigned to a provider in a military unit for primary care rather than a provider in a medical clinic), age between 17 and 35 (reflecting the age range of women who are eligible to enlist in the military), sponsor rank=junior enlisted (lowest three enlisted ranks), no active duty service in the previous 12 months and >6 months of continuous active duty service after study entry. Junior enlisted recruits are generally high school graduates who have not completed a college degree. We recorded age, service branch and month of enlistment for each woman. We did not include race/ethnicity, marital status or military deployment in our analyses as these are unreliable variables with frequent missing values in the M2 database.

We used pharmacy records and clinical procedure codes to identify episodes of contraceptive initiation and discontinuation during the first 6 months of active duty service. Women who had a visit for removal of a LARC method during the first 12 months of active duty service without a previous visit for insertion were recorded as being on a LARC method at the time of service entry. We assumed that women prescribed contraceptive pills, patches and vaginal rings used the method as directed and completed the entire prescription unless another method was prescribed. We examined highly effective contraceptive use at 6 months on active duty rather than examining contraceptive continuation or use across the entire first 2 years of active duty because we wanted to focus on the effect of military policy on reproductive health outcomes among new recruits. New recruits spend approximately the first 6 months on active duty completing basic and advanced military training programs prior to transfer to their first duty station. During initial training, all recruits are exposed to a standardized

branch-specific curriculum and rules on access to contraceptive options. Therefore, we felt that branch-specific contraceptive education and access policy would have the greatest impact during this time period. We also used inpatient insurance records to identify admissions for childbirth during the first 24 months on active duty.

We conducted semistructured, qualitative interviews with providers from the Navy, Army, Air Force and Marine Corps Basic Training sites to identify current branch-specific policies on contraceptive education, restrictions on access for recruits and interventions attempted to facilitate uptake of highly effective contraception during basic training. The Navy, Air Force and Marine Corps have only one training location for all female recruits, while the Army has two sites that follow common curriculum and policies.

We used χ^2 analyses to assess the association of service branch with age group (17–18 years of age, 19–27 years of age and 28–34 years of age) and contraceptive type selected. We used Kaplan–Meier analyses to assess for branch-specific differences in the time to initial prescription for contraception in the military healthcare system. We used Kaplan–Meier and Cox regression analyses to assess the impact of age group, contraceptive type used at 6 months on active duty and service branch on delivery rates during the first 24 months of service. We adjusted for age at service entry, branch and contraceptive use at 6 months during our regression analyses, as all of these variables were associated with our outcomes in bivariable analyses. We censored women from further analysis if they reached the end of the study period (April 2018) or separated from the US military. All analyses were conducted using SPSS version 24 software. This study was approved by the institutional review board of the Air Force 59th Medical Wing and the Defense Health Agency Data Review Board.

3. Results

We identified 92,072 women who enlisted in the active duty United States military and attended basic training between October 2013 and October 2017. The average age of these women was 20.4 (± 3.1) years. Army recruits were the largest group in our sample, and Marine recruits were younger than the other three services (Fig. 1). Use of contraceptive pills, patches and rings declined from 18.4% to 15.3% between 2013 and 2017, and LARC use increased from 6.7% to 10.2% (Fig. 2).

The childbirth rate in the first 24 months of active duty service was 8.3%. It was highest among women who were not prescribed highly effective contraception at 6 months on active duty, followed by women using a contraceptive pill, patch or ring; the lowest rate was among women using depot medroxyprogesterone (DMPA), intrauterine contraception or subdermal implants (Table 1). The 24-month delivery rate was highest among women 19–27 years old and lowest among

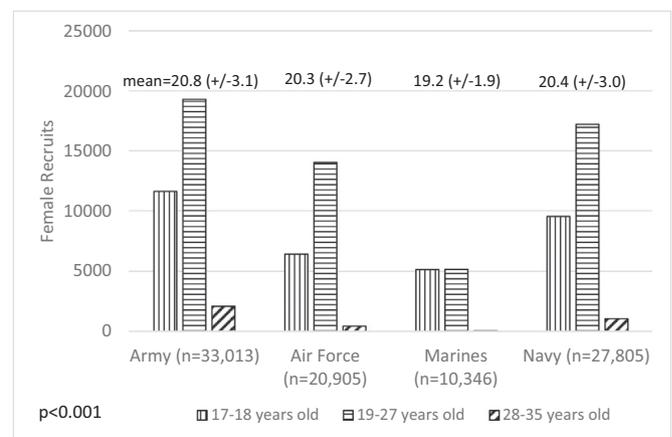


Fig. 1. United States enlisted servicewomen attending basic training between October 2013 and October 2017 ($n=92,072$).

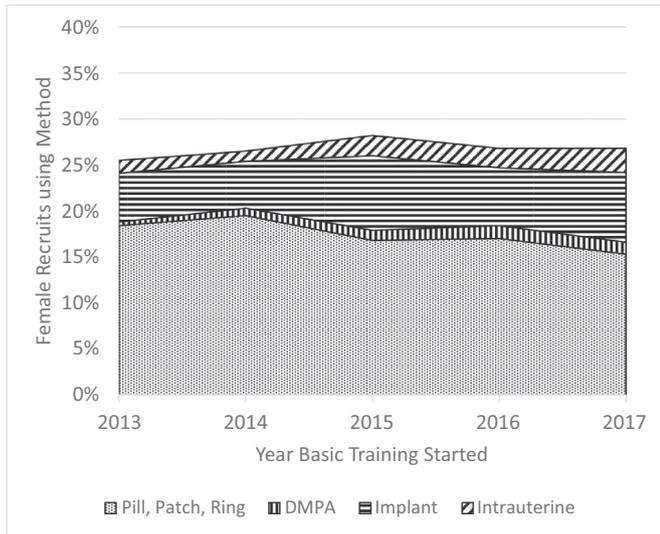


Fig. 2. Highly effective contraceptive use by new female recruits at 6 months of service (2013–2017).

women who were 28–34 years old at the beginning of basic training (Table 1).

The current contraceptive education and access policies of the four branches are listed in Table 2. The Marines and Air Force offer group education once a week to women requesting contraception. The Army and Marine Corps discuss relative contraceptive method efficacy but do not focus on the most effective methods. Marine Corps education emphasizes the benefits of DMPA for menstrual suppression. The Navy offers individual contraceptive counseling with a provider to all service-women immediately following the standardized group education and has same-day, walk-in access to all contraceptive methods throughout the 8 weeks of basic training. The Air Force supplements contraceptive access via individual sick-call appointments 2 days a week with a once-a-week, group, contraceptive education and access clinic. The Army offers LARC methods by referral only. The Marine Corps offers implants 2 days a week during the last 2 weeks of Basic Training (weeks 11–12). The Air Force offers implants 1 day a week during the last 5 weeks of Basic Training (weeks 4–8). Neither the Air Force nor Marines offer intrauterine contraception during basic training.

Table 1
Admissions for childbirth in the first 24 months of military service

Demographic variable	Delivery rate	Independent hazard of delivery prior to 24 months on active duty <i>adj</i> HR (95% CI)
	KM estimate (95% CI)	
Overall	8.3% (8.1–8.5)	
Age at beginning of basic training		
17–18 years old	7.9% (7.5–8.4)	1.26 (1.07–1.47)
19–27 years old	8.6% (8.4–8.8)	1.42 (1.22–1.66)
28–34 years old	6.9% (5.9–7.9)	1.00
Military branch		
Army	11.1% (10.7–11.5)	1.86 (1.71–2.01)
Air Force	6.0% (5.6–6.4)	1.00
Marines	8.4% (7.8–9.0)	1.48 (1.33–1.65)
Navy	6.7% (6.3–7.1)	1.24 (1.13–1.35)
Contraception used at 6 mo ^a		
None	9.1% (8.9–9.3)	1.00
Pill/patch/ring	7.7% (7.1–8.3)	0.87 (0.80–0.93)
DMPA	3.4% (1.8–5.0)	0.35 (0.22–0.54)
Contraceptive implant	2.9% (2.3–3.5)	0.31 (0.26–0.38)
Intrauterine contraception	3.0% (2.0–4.0)	0.34 (0.23–0.48)

^a There was no difference in delivery rates between women using DMPA, implants or intrauterine methods ($p > .05$).

Table 2
Branch-specific policy on contraceptive education and access during basic training

Contraceptive education and access policy	Army	Air Force	Marines	Navy
Contraception part of standard curriculum for all women?	Yes	No	No	Yes
Tiered education emphasizing most effective methods?	No	Yes	No	Yes
Contraception offered outside of sick-call visits?	No	Yes	No	Yes
Restrictions on availability of LARC methods?	No	Yes	Yes	No
Same day insertion of LARC methods?	No	No	No	Yes

Patterns of highly effective contraceptive use in the first 6 months on active duty varied across service branches, with highest rates in the Navy and lowest in the Army (Figs. 3 and 4). The risk of childbirth during the first 24 months on active duty also varied by service branch, with the highest risk among Army recruits followed by the Marines, Navy and Air Force (Fig. 5).

In multivariable analyses adjusting for the effects of age, service branch and use of highly effective contraception at 6 months on active duty, the risk of childbirth in the first 24 months on active duty was highest among women in the Army and lowest among women in the Air Force (Table 1).

4. Discussion

This is the first study to examine contraceptive uptake and delivery risk among the population at highest risk for unintended pregnancy in the US military and provides valuable insights into the interaction between military service branch policies and reproductive health outcomes. Use of highly effective contraception at 6 months on active duty and delivery rates during the first 24 months on active duty varied between service branches of the US military despite all women having access to a uniform health benefit that includes no-cost contraception and reproductive healthcare, excluding abortion.

The service with the most robust contraceptive education and access program (the Navy) also had the highest rates of highly effective contraceptive use overall and use of the most effective reversible (LARC) methods after completion of initial training. This highlights the importance of contraceptive education and programs to facilitate contraceptive access, in addition to removing cost barriers, when attempting to increase use of highly effective contraception among young women.

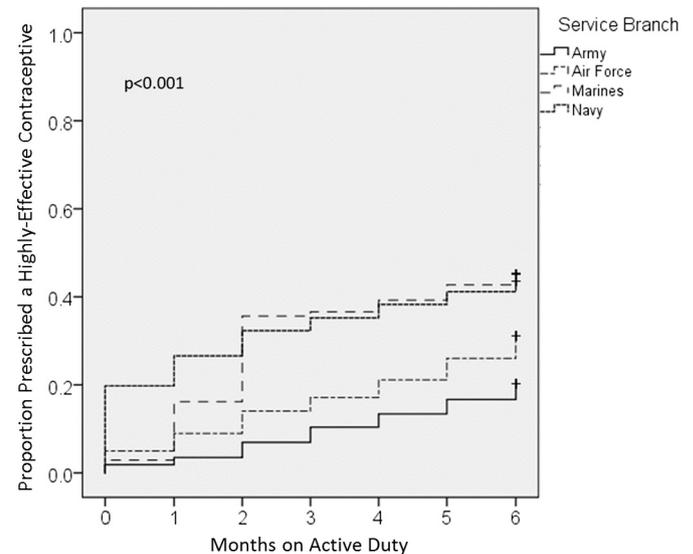


Fig. 3. Time to initial prescription for highly effective contraception in the military healthcare system (method initiation or continuation of pre-military method) by service branch.

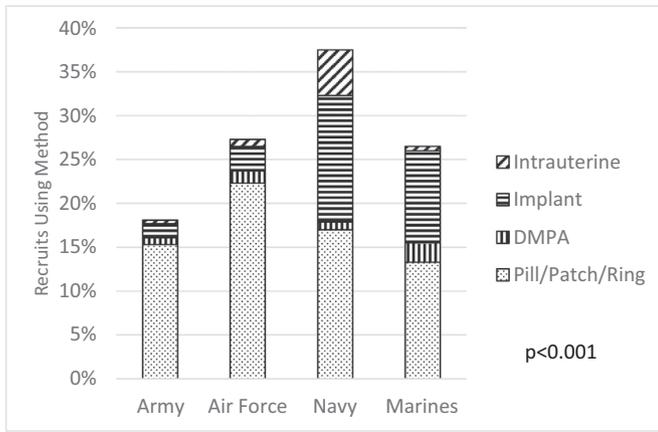


Fig. 4. Use of highly effective contraception at 6 months on active duty by service branch.

The rates of highly effective contraception use we found in our study were lower than rates found in previous studies of military women [26]. This finding likely reflects the lower age and military rank of our study population, consistent with previous studies that have shown lower rates of contraceptive use in this population [26]. However, this finding could also reflect barriers to care that inhibit contraceptive use during initial military training.

Like previous researchers, we found variability in highly effective contraception use among services, with the lowest rates in the Army [26,27]. Unlike a previous study examining contraceptive use among servicewomen between 2008 and 2013, our study found higher rates of LARC use in the Navy and Marines compared to the Air Force [26]. This finding may reflect differences in the populations studied or changes in branch-specific policies that influence contraceptive selection among junior enlisted.

Rates of highly effective contraception use after 6 months on active duty were associated with delivery rates during the first 24 months of service for women in the Army, Marines and Navy. However, women in the Air Force had a lower delivery rate than women in the Navy despite lower use of highly effective contraception after 6 months on active duty. This may reflect differences in the pregnancy intentions of women who choose to enlist in different service branches or differences in branch-specific factors that facilitate or inhibit initiation and continuation of highly effective contraception after completing initial training,

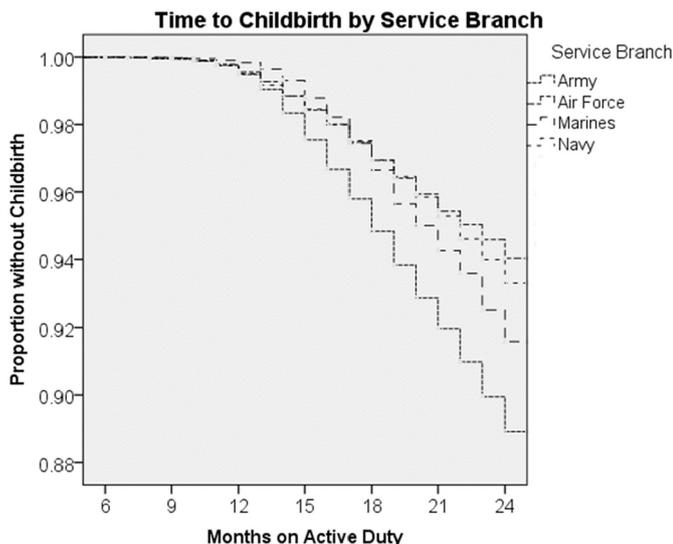


Fig. 5. Time to childbirth in first 24 months of active duty by service branch.

such as work schedules or military deployments. Further research is needed to identify these factors. Our study confirms the findings of a previous study that found a higher pregnancy rate in the Marines and Navy compared to the Air Force [26]. However, in contrast to that study, we also found a higher delivery rate among women in the Army than in any of the other service branches. This finding likely reflects differences in outcome measures and the populations studied, as we examined delivery rates among new recruits rather than pregnancies across the entire active duty population. Additionally, our study may capture changes in contraceptive use patterns that occurred after 2011, when the data for the previous study were collected [26]. Delivery rates among all services in our study were higher than pregnancy rates among women in the Israeli Defense Force (IDF). This occurred despite women in United States military having access to a more generous health benefit that offers LARC methods free of charge in addition to no-cost oral contraceptives and DMPA [6]. This may reflect differences in the populations studied, length of service required, enlistment and retention standards, or efforts by the IDF to improve contraceptive education and access for female recruits. Further research is needed to determine if the policies employed by the IDF can be successfully applied to the US military.

There are several potentially important factors that we did not assess including marital status, race/ethnicity, pregnancy intentions and military deployment. Marital status and race/ethnicity were associated with unintentional pregnancy rates among servicewomen in the United States military in previous studies [3,4]. Only 11.3% of female recruits are married at the time of service entry, but the marriage rate rises with time in service [28]. This suggests that marital status would not have a large effect on overall delivery rates initially, but the effect would increase over time. We were also unable to assess if a pregnancy was intended. Previous studies demonstrated that over half of pregnancies among United States servicewomen were unintended, with rates of 68% among servicewomen ages 18–24 and higher rates of unintentional pregnancy in the Navy and Marine Corps [3,4]. These studies suggest that most of the deliveries we identified in our study were the result of unintended pregnancies and that differences in delivery rates between the Navy and Marines and other branches might underestimate differences in unintended pregnancy rates. Additionally, we did not measure deployment after completion of initial training. Military deployment is not associated with a change in the unintentional pregnancy rate, but it is associated with a decrease in use of highly effective contraception [3]. New recruits are not sent into operational settings until after initial training, so deployment would not be a factor in contraception uptake in the first 6 months of active duty service. However, if a woman is deployed after completing initial training, inconsistent availability of contraception in operational settings could increase the risk of method discontinuation and unintentional pregnancy. Finally, we did not account for changes in branch-specific policy that occurred during our study period that might have influenced subject outcomes, as the focus of this study was demonstrating that differences in policy and outcomes existed rather than focus on the effects of specific policies. Future studies examining the association of contraceptive use and pregnancy rates with changes in branch-specific contraceptive policies should account for these factors. There is also wide variability in contraceptive policies between militaries of different nations [29]. Education programs range from universal education on reproductive health for men and women led by a medical provider to no discussion of reproductive health at all. Coverage of contraception varies from coverage of all methods to no coverage of contraception [29]. Further research is needed to determine how these differences in policies influence contraceptive use and pregnancy rates among active duty service women and identify policies that are associated with more favorable outcomes.

In conclusion, rates of highly effective contraception use during initial military training and childbirth during the first 24 months of active duty vary among military branches. Highly effective contraception use at the end of initial training was highest among women in the service

with the most robust basic training contraception program. This suggests that variations in branch-specific contraceptive education and access policy, or policy differences between the militaries of different nations may produce different outcomes among women in the military. Identification of military policies that account for these differences would allow for implementation of best practices in military services around the world, improving the reproductive health outcomes of junior enlisted servicewomen and increasing military readiness. The lessons learned in this research could also be applied to other programs outside the military that are attempting to decrease the rate of unintended pregnancies among young adult women.

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