CNA’s annotated briefings are either condensed presentations of the results of formal CNA studies that have been further documented elsewhere or stand-alone presentations of research reviewed and endorsed by CNA. These briefings represent the best opinion of CNA at the time of issue. They do not necessarily represent the opinion of the Department of the Navy.

Distribution

DISTRIBUTION STATEMENT A. Approved for public release: distribution unlimited.  
SPECIFIC AUTHORITY: N00014-16-D-5003  10/15/2018

Request additional copies of this document through inquiries@cna.org.

Approved by:  

October 2018

Molly McIntosh, Director  
Navy Compensation and Personnel Policy  
Resources and Force Readiness Division

This work was performed under Federal Government Contract No. N00014-16-D-5003.  
Copyright © 2018 CNA
In this annotated briefing, we examine the relationship between colocation and reenlistment in the Marine Corps. This analysis is part of a larger CNA project titled “The Effects of Personnel Policy Changes on Budgets and Manpower Inventories” sponsored by the Office of the Assistant Secretary of the Navy (Financial Management and Comptroller) (ASN(FM&C)).
In the larger project, we aim to identify and explore ways to reduce personnel costs while maintaining or even improving retention. The impetus for the project is that military personnel costs, including those in the Department of the Navy (DON), are quite large and are always under scrutiny. DON must continuously strive to make the personnel system more effective and efficient.

Additionally, DON has pushed to increase the female share of accessions and inventory. This has implications for retention and manning. Historically, female servicemembers in DON have not retained as well as men. In addition, pregnancy and operational deferment, along with higher female limited duty rates, can make manning more challenging.

The research agenda for this project revolves around four issues related to the cost of DON uniformed personnel. (These four main issues are briefly described in the next slide.) In particular, the sponsor is interested in how costs may change as the female share of the uniformed personnel in DON increases; three of the four issues directly relate to the female share of the active component inventory.
These are the four main issues to be addressed in the larger project.

In this annotated briefing, we address issue number three. Colocation in the USMC is when two servicemembers who are married to each other (also known as a dual-military marriage) are assigned to units no further than 50 miles apart. A dual military couple is not colocated if the units to which they are assigned are greater than 50 miles apart.

Our analysis is motivated by the possibility that, as the share of women in the services increases, there may be an increase in dual-military marriages, as well as an increase in the demand for colocation. Therefore, it is increasingly important to examine the third question above—that is, to know whether the decision of servicemembers in dual-military marriages to reenlist may be affected by colocation. In this annotated briefing, we specifically examine the following aspects of this question:

- How prevalent is colocation among enlisted Marine-Marine couples?
- How does colocation of enlisted Marine-Marine couples affect reenlistment decisions?

The remaining three issues in the larger study are addressed in other research documents.
Our approach is to use Marine Corps personnel records to identify Marines who are married to other service personnel, including other Marines. We focus on enlisted Marines because the Marine Corps’ enlisted force is the largest in the Marine Corps’ active component and has the greatest share of women (greater than the female share of commissioned officers and of warrant officers). In addition, we limit our analysis to Marine-Marine couples, since we only information on spouses’ unit location for Marines who are married to other Marines.

Per Marine Corps policy, we define an enlisted Marine-Marine couple as being colocated if the two Marines’ assigned locations are within 50 miles of each other. For 6 percent of the sample, we were not able to calculate a mileage distance, since we did not have the latitudes and longitudes for at least one of the Marines’ units. The most common reason for this was that the unit address was an Air/Army Post Office (APO) or Fleet Post Office (FPO), neither of which has zip codes indicating the exact location of a unit. In other cases the unit was located in a foreign country to which zip codes do not apply or the unit zip code was simply not listed on the Marine’s personnel file. In these cases, we compared the three-digit geo-location codes of the Marine and his or her spouse. The couple was determined to be colocated if the geo-location codes matched.

Using CNA’s decision file, we determined the marital and colocation status of Marines at the time of their reenlistment decisions. We then estimated the relationship between colocation and the probability of reenlistment. We considered the costs and benefits of colocation compared with other reenlistment incentives.

This annotated briefing presents our enlisted Marine-Marine results. An earlier report presented the enlisted Navy-Navy results.¹

¹ DAB-2018-U-016844-Final
Our estimates suggest that colocation is associated with a higher estimated propensity to reenlist for certain groups only—namely, Zone A women, Zone B men, and Zone C women. Specifically, at the Zone A reenlistment decision, colocated female Marines are 3.7 percentage points (ppts) more likely to reenlist than their noncolocated counterparts (40 vs 36.3 percent). The estimated effect for men is insignificant: colocated and noncolocated Zone A male Marines reenlist at different but statistically indistinguishable rates (50.9 vs 47.8 percent).

At Zone B, our estimates suggest that colocated men are 5.2 ppts more likely to reenlist than their noncolocated counterparts (81.5 vs 76.3 percent), while we find no statistically significant difference in the estimated probability of reenlisting for colocated vice noncolocated women (70.6 vs 69.2 percent). At Zone C, the difference in the estimated probability of reenlisting for colocated vice noncolocated women is 5.0 ppts (87.8 vs 82.7 percent). For men, the difference is 0.9 ppts (91 vs 90 percent), but it is not statistically significant.
We also compared male and female Marines in the different marital categories to their respective single counterparts.

For married male Marines, we find that they are more likely to reenlist than their single male counterparts, regardless of whether they are married to a civilian spouse, a colocated Marine spouse, a noncolocated Marine spouse, or an other-service spouse.

For female Marines, however, the differences between single and married reenlistment rates are less consistent across the various spouse types. Among married female Marines, only those who are married to other Marines and are colocated are more likely than their single counterparts to reenlist. Single female Marines have higher estimated reenlistment rates than female Marines with noncolocated Marine spouses in Zones A and C, and although noncolocated female Marines have higher estimated reenlistment rates than their single counterparts in Zone B, the difference is not statistically significant.

The overall single v. married comparisons for female Marines suggests that, on average, female Marines may have a harder time maintaining their service career while married to a non-Marine or a Marine with whom they are not colocated than male Marines do.

Finally, we report an unexpected result: at the Zone A decision point, single female Marines have a notably higher estimated probability of reenlisting than single male Marines (40 percent v. 25 percent). Single Marines make up the majority of male Marines and a plurality of female Marines at the Zone A decision point, so this finding summarizes the reenlistment behavior of a significant portion of first-term decision-eligible Marines.

**Summary of findings: married vs. single**

- Male Marines married to other Marines are the most likely to reenlist, regardless of colocation status.
- Compared to single female Marines, colocated female Marines have the same likelihood of reenlisting in Zone A and a greater likelihood in Zones B, C.
- In all zones, other married female Marines are statistically no more likely to reenlist than single female Marines; in some zones, they are actually less likely to reenlist:
  - Includes noncolocated women married to other Marines, women married to other-service spouses, and women married to civilian spouses.
  - Suggests it may be difficult for female Marines to continue service while married to a non-Marine spouse.
- Single female Marines have a higher estimated probability of reenlisting than single male Marines in Zone A; similar probabilities in Zones B and C.
To put our analysis in context, we present some basic statistics on the number of Marine-Marine enlisted marriages as of September 2017. Using the Marine Corps’ enlisted personnel records from the Total Force Data Warehouse (TFDW) for the quarter ending September 2017, we found 6,403 enlisted Marines who had military spouses. Among these 6,403 Marines, about 64 percent, or 4,132, were married to other active component (AC) enlisted Marines. The remaining 2,271 Marines were either married to non-Marine servicemembers (we expect that most fall in this category), had an invalid spouse SSN, were married to a Marine officer, or were married to a Marine who recently left the service and the dependent relationship and spouse SSN had not yet been updated on their file. For these reasons we are ultimately able to identify a Marine spouse for only 4,132 of the 6,403 enlisted Marines with military spouses, allowing us to identify 2,066 enlisted Marine-Marine marriages in September 2017.

We were able to identify the assignment locations for each spouse (and thus the distance between them) in nearly all of the 2,066 enlisted Marine-Marine couples. Specifically, of the 4,132 AC enlisted Marines who we identified as being married to other AC enlisted Marines, we were able to identify zip codes and therefore compute distance for 94 percent of them. Colocation for the remaining 6 percent was defined by whether the two Marines had the same three-digit geo-location code.

We repeated this process for all quarters from FY05 through FY17 to identify all enlisted Marines married to other enlisted Marines in this time period. We then calculated the distance between assignment locations for the spouses and merged this information into a file containing each Marine’s decision history.
Our final sample includes all Marines who made reenlistment decisions some time between FY05 and FY17. Each enlisted Marine is coded as being in one of the following colocation categories, which are a combination of marital and colocation statuses:

1. Married to another Marine and assigned to a location within 50 miles of spouse’s assignment (colocated)
2. Married to another Marine and assigned to a location more than 50 miles away from spouse’s assignment (not colocated)
3. Married to a non-Marine Corps military spouse (colocation unknown)
4. Married to a civilian spouse
5. Single*

The data are organized as a 13-year collection of snapshots of decisions (i.e., a cross-sectional dataset) rather than as observations that follow each Marine over time (i.e., a longitudinal dataset). At the time of Zone A decisions, roughly 3.5 percent of our sample is colocated compared to 3.8 percent at the time of Zone B and Zone C decisions. In Zone A, the majority of decision-making Marines are single, whereas in Zone B and C decisions the majority have civilian spouses. Overall, our sample consists of about 257,000 Zone A decisions, 63,000 Zone B decisions, and 32,000 Zone C decisions.

*If Marines followed the marital patterns in the overall U.S. population, there should be a growing number of unmarried Marine couples in our sample of single Marines over time. However, the compensation policies for uniformed servicemembers favor married couples over unmarried couples, so our expectation is that there is a lower rate of unmarried couples in the uniformed services than in the general population.
We highlight some key differences between the male and female samples. First, at Zone A, a majority of men and a plurality of women are single (53.5 and 45.1 percent, respectively). Among older Marines at later decision points, men are more likely to be married than women. At Zone B, 75.3 percent of men are married vice 57.4 percent of women. At Zone C, 83.4 percent of men are married vice 58.8 percent of women.

Although their overall marriage rates are lower, the female Marines in our sample are much more likely than men to be married to another servicemember. For example, at Zone A, the share of women who are married to military spouses is more than 11 times greater than that for men (35 percent vice 3 percent). At Zones B and C, the share of Marines married to military spouses stays relatively constant for both women and men, with the shares being 8.5 and 11 times greater for women, respectively.

Similarly, the women in our sample are much more likely than the men to be married to another Marine. At Zone A, the share of women who are married to a Marine Corps spouse is more than 13 times greater than the share of men who have Marine Corps spouses (28.7 percent vice 2.2 percent). At Zones B and C, the share of both women and men who are married to other Marines grows somewhat for women and stays relatively constant for men. The female share is 12.3 times greater than the male share in Zone B and 13.9 times greater in Zone C.

Two backup slides present the colocation status subsamples for both women and men.
We model the likelihood of reenlistment as a function of such factors as Marine demographics, Marine career characteristics, and our variables of interest—the colocation/marital status categories. We estimate three separate models (one each for Zones A, B, and C) to allow the influence of each factor on reenlistment decisions to differ by zone. We use nonlinear regression to estimate the models because, after extensive testing, we found that a nonlinear model fit the data better than a linear model. A more detailed description of our modeling methodology can be found in the accompanying research memorandum, *The Relationship Between Colocation and Reenlistment in the Marine Corps: Technical Background (Vol. 2)* (DRM-2018-U-017652-Final).

The list of model factors includes AFQT score, the Marine’s PMOS, the maximum level of SRB offered to the Marine at the decision point, paygrade, time in grade, years of service, total number of previous combat and noncombat deployments, and whether the Marine (a) was deployed at the time of decision, (b) had been promoted or demoted in the previous 12 months, or (c) had a medical accounting code in the previous 12 months. We include gender, age, race, ethnicity, whether the Marine has dependent children, education level, and citizenship status. We also include the CNA index of the strength of the U.S. economy for the decision quarter and an FY indicator, which measures trends in other factors that may affect a Marine’s reenlistment decision, such as Marine Corps-wide reenlistment opportunities and operational tempo. Finally, we have categorical variables denoting the Marine’s colocation status at the time of decision. We also interact gender with the colocation variables, which allows us to determine whether there are differential effects of colocation on reenlistment decisions for men and women. See the accompanying research memorandum for additional details and citations of previous research.

We use data from the previously described samples of Marines to estimate each of our reenlistment models. Each model yields an estimated reenlistment rate for each Marine in each sample and allows us to estimate the effect of each factor on the probability of reenlisting.
The charts on this slide summarize the average estimated reenlistment probabilities by gender and colocation/marital status for each of the three zones. Controlling for other factors that might affect the estimated probability of reenlisting, male reenlistment rates are higher than female reenlistment rates in all zones and colocation/marital statuses with three exceptions: single Marines in Zones A, B, or C. The single female and single male reenlistment rates in Zones A, B, and C are 40 percent vs. 24.5 percent; 65 percent vs. 58 percent; and 83 vs. 80 percent, respectively.

The figures also show that, for men, colocated Marines have the highest reenlistment rates in all zones, although the difference between the colocated and noncolocated reenlistment rates is only statistically significant in Zone B. For women, colocated Marines also have the highest reenlistment rates, although they are only statistically significantly higher than those for noncolocated female Marines in Zones A and C. Thus, the colocated and noncolocated have similar reenlistment behavior in half of the zone/gender cases.

The colocation-unknown group has noticeably lower reenlistment rates, especially for women. We suspect that this is because the majority of those with colocation-unknown status have Army, Navy, or Air Force spouses, and spouses in different services may be less likely to be colocated. The lower reenlistment rate experienced by those with an unknown colocation status appears greater for female Marines than for male Marines. Perhaps this is because when dual military couples decide that one spouse will leave the armed services, it is the woman who is more likely to do so. This conjecture, of course, is speculative, although this is a relatively common outcome for married couples in the civilian workforce.

The differences in the estimated probabilities of reenlisting between men and women in the same colocation/marital status category and zone are statistically significant at the 10 percent level or better for all categories and zones. See the accompanying research memorandum for details.
In this slide, we focus on the correlation between the estimated probability of reenlisting and colocation. The key takeaway is that there are statistically significant and sizable impacts of colocation on estimated reenlistment probabilities in only three cases: for Zone A females, Zone B males, and Zone C females.

The dark blue (left-hand) bars represent estimated reenlistment probabilities for colocated Marines and the light blue (right-hand) bars represent estimated reenlistment probabilities for their noncolocated counterparts. Each pair of bars compares the estimated reenlistment probabilities for colocated and noncolocated Marines within a gender and zone subsample (e.g., the first two bars compare estimated reenlistment probabilities for colocated and noncolocated Zone A women). The pairs of bars that have been grayed out indicate cases for which the differences between the colocated and the noncolocated Marines are not statistically significant.

In three of the six cases, the estimated reenlistment probabilities are higher for colocated Marines than for noncolocated Marines, all else equal. In these cases, the differences are statistically significant at the 10-percent level. See the accompanying research memorandum for details.

The largest percentage increase in the reenlistment rate occurs for Zone A women. They are 3.7 percentage points (ppts) more likely to reenlist than their noncolocated counterparts, resulting in a 10-percent increase in their overall reenlistment rate. The corresponding numbers are 5.2 ppts and 7 percent for Zone B men and 5.0 ppts and 6 percent for Zone C women.
We estimate that, on average, certain colocated Marines are more likely to reenlist than their noncolocated counterparts. These effects are more pronounced for women than for men, in the sense that two groups of female Marines have reenlistment rates that are correlated with being colocated (those in Zones A and C) while only one group of male Marines do (those in Zone B). In addition, there is a noticeably smaller share of all male Marines in Marine-Marine marriages compared with the share of all female Marines in Marine-Marine marriages, suggesting that male Marines, on average, will be less affected by colocation policy.

At Zone A, we estimate that colocated female Marines have a reenlistment rate that is 3.7 ppts higher than that of their noncolocated counterparts, while we find no statistically significance for men. At Zone B, we estimate that colocated men are 5.2 ppts more likely to reenlist than their noncolocated counterparts, while we find no statistically significant difference for women. At Zone C, the estimated colocation effect is about 5.0 ppts for women but insignificant (and thus indistinguishable from zero) for men. These findings suggest that, if the Marine Corps expands its colocation of dual-Marine spouses, it could experience slightly improved retention, especially for women.
We also compared estimated reenlistment rates of single vice married Marines. For men, we find that in all zones, married male Marines, including those married to a civilian spouse, another Marine (regardless of colocation status), or to another service spouse, have the higher reenlistment rates than single Marines.

For women, colocated female Marines have higher reenlistment rates than their single counterparts in all zones. Noncolocated female Marines have lower reenlistment rates than single female Marines in Zone A, but they have higher rates in Zone B. In Zone C, the noncolocated rate is lower than the single rate, but not by much.

There is more consistency in the difference between the reenlistment rates for female Marines with civilian spouses or with spouses in other services and single female Marines across zones. The estimated average reenlistment rates for female Marines with these types of spouses are lower than their single female counterparts in every zone. This suggests that it may be more difficult for female Marines to maintain these marital arrangements alongside their USMC career compared with their male counterparts.

Finally, as we have noted, single female Marines have higher reenlistment rates than single male Marines in all zones, with the most notable difference occurring in Zone A.
We show that colocation of enlisted Marine-Marine couples positively affects the estimated probability of reenlisting in some cases, other factors held constant. The estimated colocation effects are statistically significant for women making reenlistment decisions in Zones A and C and for men in Zone B.

As compared to their single counterparts, married male Marines are consistently and significantly more likely to reenlist, regardless of the specific type of marriage they are in. By contrast, as compared with their single female counterparts, married female Marines are less likely to reenlist at all zones if they are married to a civilian or a non-Marine servicemember. However, female Marines in colocated Marine-Marine marriages are more likely to reenlist in all zones than their single counterparts.

We conclude that colocation may not be the most effective policy tool for increasing retention for men, but for women, it appears that it could be offsetting some of the challenges of navigating a Marine Corps career and marriage to another Marine.

We find that, on average, colocation is associated with higher reenlistment rates, although not consistently for all zones and both genders. This suggests that the Marine Corps should consider colocating married Marines among its policy options to increase reenlistment rates. We also recommend that the Marine Corps explore ways to increase colocation rates.

At a minimum, it is important to continue exploring policy options that simultaneously (1) efficiently man the force and (2) help Marines achieve their career and family aspirations. Those Marines who can achieve both their career and family aspirations while serving appear to be more likely to reenlist.

Summary and concluding thoughts

- Three of the six estimated relationships between colocation and reenlistment for each zone by gender are positive and statistically significant (as compared to the noncolocated spouses)
  - There are effects in Zones A and C for women and in Zone B for men only
- More generally, the Marine Corps needs to continue to pursue policies that man the force efficiently while helping all Marines achieve both career and family aspirations, especially as more women are brought into the Corps
- This may mean exploring the how the Marine Corps could improve colocation with other-service spouses

We find that, on average, colocation is associated with higher reenlistment rates, although not consistently for all zones and both genders. This suggests that the Marine Corps should consider colocating married Marines among its policy options to increase reenlistment rates. We also recommend that the Marine Corps explore ways to increase colocation rates.

At a minimum, it is important to continue exploring policy options that simultaneously (1) efficiently man the force and (2) help Marines achieve their career and family aspirations. Those Marines who can achieve both their career and family aspirations while serving appear to be more likely to reenlist.
Backup slides
In this slide and the next, we present the male and female samples by colocation/marital status subgroups for Zone A, B, and C decisions. Our male sample consists of about 240,000 Zone A decisions, 58,000 Zone B decisions, and 30,000 Zone C decisions. Note that some men make a Zone A decision early in our sample period and make a Zone B decision later in the sample period (the same is true for some men at the Zone B and Zone C decision points).

As is true for the overall sample, the majority of Zone A men are single; whereas the majority of Zone B and C men have civilian spouses. We highlight one other observation about the male sample: a smaller percentage of men is colocated compared with the percentage of colocated Marines in the whole sample. Specifically, at the Zone A decision point, 3.50 percent of the entire sample is colocated, compared with 1.96 percent of men; at the Zone B decision point, 3.84 percent of the entire sample is colocated, while only 2.11 percent of men are; and at the Zone C decision point, 3.78 percent of the entire sample is colocated vice 2.06 percent of men. This suggests that female colocation rates are higher than male colocation rates in all three zones, as we confirm on the next slide.
Our sample contains far fewer women than men. There are roughly 17,000 women making Zone A decisions, 4,500 women making Zone B decisions, and 2,000 women making Zone C decisions (compared to 240,000, 58,000, and 30,000 men in Zones A through C, respectively). We note several other key differences between the female and male samples. First, a noticeably higher percentage of women than men are colocated—25 percent at the Zone A and B decision points and nearly 30 percent at the C decision point, compared with about 2 percent at each decision point for men. Second, a plurality of women is single at the time of their Zone A decision (no majority is achieved). Likewise, a plurality of women are also single at their Zone B and C decisions. By contrast, the majority category for men shifts to civilian spouse in the later zones.
For context, the figures in this slide show the simple cross-tabulations of reenlistment rates by gender and colocation/marital status for each of the zones. We do not control for other factors that could influence reenlistment rates, such as PMOS, paygrade, and number of deployments.
CNA

This report was written by CNA’s Resources and Force Readiness Division (RFR).

RFR provides analytical services—through empirical research, modeling, and simulation—to help develop, evaluate, and implement policies, practices, and programs that make people, budgets, and assets more effective and efficient. Major areas of research include health research and policy; energy and environment; manpower management; acquisition and cost; infrastructure; and military readiness.
CNA is a not-for-profit research organization that serves the public interest by providing in-depth analysis and result-oriented solutions to help government leaders choose the best course of action in setting policy and managing operations.

Nobody gets closer— to the people, to the data, to the problem.