

The Relationship Between Colocation and Reenlistment in the Navy (Vol. 1)

Lauren Malone, David Gregory, and Ann Parcell

May 2018



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SPECIFIC AUTHORITY: N00014-16-D-5003 5/9/2018

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Molly McIntosh, Research Team Leader
Defense Workforce Analysis
Resource Analysis Division

REPORT DOCUMENTATION PAGE				<i>Form Approved</i> OMB No. 0704-0188	
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1. REPORT DATE (DD-MM-YYYY) May 2018		2. REPORT TYPE Final		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE (U) The Relationship Between Collocation and Reenlistment in the Navy (Vol. 1)				5a. CONTRACT NUMBER N00014-16-D-5003	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER N/A	
6. AUTHOR(S) Lauren Malone, David Gregory, and Ann Parcell				5d. PROJECT NUMBER N/A	
				5e. TASK NUMBER B774.20	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Center for Naval Analyses 3003 Washington Blvd Arlington, VA 22201				8. PERFORMING ORGANIZATION REPORT NUMBER DAB-2018-U-016844-Final	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Financial Management and Budget Branch (OASN-FM&C) Navy Department Washington, D.C. 20350				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Statement A (Public release/Unlimited)					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT In this annotated briefing, we examine the relationship between dual-enlisted couples' collocation and reenlistment in the Navy. 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)).					
15. SUBJECT TERMS colocation, reenlistment, personnel, policy					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Knowledge Center/Dana Smith
U	U	U	SAR	26	19b. TELEPHONE NUMBER (include area code) 703-824-2123

The Relationship Between Colocation and Reenlistment in the Navy (Vol. 1)

Final documentation

May 2018

Lauren Malone

with

David Gregory and Ann Parcell



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In this annotated briefing, we examine the relationship between dual-enlisted couples' colocation and reenlistment in the Navy. 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)).

Background for study

- As defense budgets were tightened in recent years, all Department of the Navy (DON) budget categories were required to be managed more effectively and efficiently
- Active duty personnel make up a large share of the DON budget
 - FY18 President's Budget baseline submission for FY18
 - Navy = \$135.4 billion; Marine Corps (MC) = \$23.5 billion
 - Military Personnel, Navy (MPN) account = \$29.3 billion (21.6% of Navy total)
 - Military Personnel, MC (MPMC) account = \$13.4 billion (57.0% of MC total)
 - MPN and MPMC do not include the costs of recruiting, training, quality-of-life programs, and other personnel costs
- DON also seeks to increase female share of accessions and inventory
 - Historically, women have not retained as well as men
 - Increasing female shares must be balanced with cost containment
- Goal of study is to identify cost-effective policies that increase retention to improve personnel system efficiency
 - Study organized around four issues related to cost of DON servicemembers
 - Three of four issues directly address female share of active component



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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 the fleet. Historically, women in the Navy have not retained as well as men. In addition, pregnancy and operational deferment, along with higher limited duty rates for females, can make manning the fleet more challenging.

The research agenda for this project revolves around four issues related to the cost of DON uniformed personnel. (These four 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.

Colocation: 1 of 4 issues addressed in a larger study

- Issues to be addressed
 1. How will increasing female shares of Navy and MC accessions and inventory affect manning and personnel costs?
 2. How will change in maternity leave policy for uniformed personnel affect manning and personnel costs?
 3. What is the relationship between colocation and retention?
 4. Are there nonmonetary personnel policy changes and management actions that might be more cost-effective tools for increasing retention?



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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 Navy is when two servicemembers who are married to each other (also known as a dual-military marriage or couple) are assigned to units no further than 90 (driving) miles apart. A dual military couple is not colocated if the units to which they are assigned are greater than 90 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 often are dual-enlisted Navy couples able to be colocated?
- How does colocation of dual-enlisted Navy couples affect reenlistment decisions?
- As a result, what are the potential implications for personnel costs?

The remaining three issues in the larger study are addressed in other research documents.

Approach

- Use Navy personnel records to identify sailors married to other military personnel
 - Focus on enlisted Navy-Navy couples (greatest number of dual-military couples among active component DON personnel)
- Determine whether the couple is colocated by calculating the distance between their assigned locations each quarter
 - Colocated if locations are 90 miles apart or less (we also tested 50 miles apart or less)
 - Not colocated
- Determine when the enlisted Navy-Navy spouses make reenlistment decisions using CNA's reenlistment decision file
- Estimate effect of colocation on the probability of reenlistment
- Consider the costs and benefits of colocation
- Repeat the steps above for enlisted MC-MC couples
- If sample sizes and resources allow, repeat effort for officers and for dual-military couples in which one member is Navy and the other is MC



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Our approach is to use Navy personnel records to identify sailors who are married to other service personnel, including other sailors. We focus on enlisted Navy-Navy couples because the Navy enlisted force is the largest of the DON active components and has the greatest share of women.

Per Navy policy, an enlisted Navy-Navy couple is defined as being colocated if the two sailors' assigned locations are within 90 (driving) miles of each other. Our distance measure only allows us to determine whether the Navy-Navy couple is assigned to units that are 90 miles apart (not 90 *driving* miles). Note that the Navy policy measure, and the measure we use in this analysis, is distance between assignments, not distance from residence to assignments. (We also tested a difference of 50 miles to determine whether there were significantly different effects from being assigned to locations closer than 90 miles, and there were not.)

Using CNA's decision file, we determined the marital and colocation status of sailors 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 Navy-Navy results. Our next report will present the enlisted MC-MC results. Once that analysis is complete, we will consider whether sample sizes and resources allow for analysis of Navy and MC officer colocation as well as analysis of colocation of spouses in which one member is in the Navy and the other is in the MC.

Summary of findings

- We estimate that colocated sailors are more likely to reenlist than their noncolocated counterparts at a statistically significant rate
 - Differences (in percentage points (ppts)) are especially pronounced for women
 - Zone A: 8.6 ppts for women, 5.5 ppts for men
 - Zone B: 11.6 ppts for women, no difference for men
 - Zone C: 10.1 ppts for women, 8.5 ppts for men
- Differences between colocation and civilian spouse estimates suggest
 - Spousal cohabitation—with either a Navy or civilian spouse—appears to be more important for Zone A female sailor reenlistment decisions
 - Cohabitation with a Navy spouse appears to be more important for Zones A and B male sailor reenlistment decisions and for Zone B female decisions
- Single female sailors have a *higher* estimated probability of reenlisting than single male sailors in Zone A; similar probabilities in Zones B and C



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Our estimates suggest that colocation is associated with a higher probability of reenlisting, and that the impact is especially large for women. For example, at the Zone A reenlistment decision, we estimate that colocated female sailors are 8.6 percentage points (ppts) more likely to reenlist than their noncolocated counterparts (51.3 vice 42.6 percent). The estimated effect for men is smaller but still positive; we estimate about a 5.5-ppt increase in Zone A reenlistment rates for colocated vice noncolocated male sailors (69.7 vice 64.2 percent).

At Zone B, our estimates suggest that colocated women are 11.6 ppts more likely to reenlist than their noncolocated counterparts (62.9 vice 51.3 percent). We find no statistically significant difference in the estimated probability of reenlisting for colocated vice noncolocated men at Zone B (i.e., we find an estimated difference of 74.4 vice 70.4 percent, but the difference is not statistically different from zero).

At Zone C, the difference in the estimated probability of reenlisting for colocated vice noncolocated women is 10.1 ppts (81.8 vice 71.7 percent). For men, the difference is 8.5 ppts (86.6 vice 78.1 percent).

If we assume that most sailors who have civilian (civ) spouses are able to live with their spouses, we can compare the estimated probabilities of reenlisting for colocated sailors vice those with civ spouses to isolate the specific effect of Navy spousal cohabitation. We find that spousal cohabitation with *either* a Navy or a civ spouse appears to be more important for Zone A female sailors' reenlistment decisions, whereas cohabitation with a Navy spouse appears to be more important for Zones A and B male sailors' reenlistment decisions and for Zone B female sailors' decisions.

Finally, we report an unexpected result: at the Zone A decision point, single female sailors have a *higher* estimated probability of reenlisting than single male sailors. Single sailors make up the majority of both female and male sailors at the Zone A decision point, so the result reflects the behavior of the majority of first-term decision-eligible sailors.

Identifying dual-enlisted Navy marriages, locations, and reenlistment decisions

- In September 2015, there were 15,127 active component (AC) sailors whose personnel records indicated that they were married to military spouses
- About 11,630 of those enlisted sailors were married to other AC sailors, creating 5,815 Navy-Navy enlisted couples*
- We repeated this process and identified all Navy-Navy enlisted couples from FY05 to FY15
- We found assignment locations (and distances between the locations) for nearly all
- We merged the colocation information and sailor reenlistment decisions from FY05 to FY15

*There were just over 300 Navy enlisted/Navy officer marriages.



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To put our analysis in context, we present some basic statistics on the number of Navy-Navy enlisted marriages as of September 2015. Using the Navy enlisted master file personnel records for the quarter ending September 2015, we found 15,127 enlisted sailors who had military spouses. Among these 15,127 sailors, about 75 percent, or 11,630, were married to other active component (AC) enlisted sailors. Of the remaining 3,497 sailors, 75 percent were married to non-Navy servicemembers and 25 percent had missing or invalid/incomplete social security numbers for their spouses. We identified 5,815 enlisted Navy-Navy *marriages* in September 2015.

We were ultimately able to identify the assignment locations for each spouse (and thus the distance between them) in nearly all of the 5,815 enlisted Navy-Navy couples.

We repeat this process for all quarters from FY05 through FY15 to identify all enlisted sailors married to other enlisted sailors in this time period. We then calculate the distance between assignment locations for the spouses and merge this information to a file containing each sailor's decision history.

Sample sizes by colocation/marital status subgroup

Colocation/marital status			Zone A decisions		Zone B decisions		Zone C decisions	
			Number	Percentage	Number	Percentage	Number	Percentage
Military spouse	Navy spouse	Colocated within 90 miles	10,615	4.48%	6,477	5.03%	3,813	5.64%
		Not colocated	3,273	1.38%	1,796	1.40%	779	1.15%
	Other service spouse	Colocation unknown	3,129	1.32%	1,791	1.39%	820	1.21%
Civilian spouse			92,766	39.17%	71,906	55.88%	44,529	65.85%
Single			127,074	53.65%	46,698	36.29%	17,680	26.15%
TOTAL			236,857		128,668		67,621	



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Our final sample includes all sailors who made reenlistment decisions some time between FY05 and FY15. Each enlisted sailor is coded as being in one of the following colocation categories, which are a combination of marital and colocation statuses:

1. Married to another sailor and assigned to a location within 90 miles of spouse's assignment (colocated)
2. Married to another sailor and assigned to a location more than 90 miles away from spouse's assignment (not colocated)
3. Married to a non-Navy military spouse (colocation unknown)
4. Married to a civilian spouse
5. Single*

The data are organized as an 11-year collection of snapshots of decisions (i.e., a cross-sectional dataset) rather than as observations that follow each sailor over time (i.e., a longitudinal dataset). At the time of Zone A decisions, roughly 4.5 percent of our sample is colocated compared to 5 percent and 5.6 percent at the time of Zone B and Zone C decisions, respectively. In Zone A, the majority of decision-making sailors are single, whereas in Zone B and C decisions the majority have civilian spouses. Overall, our sample consists of about 237,000 Zone A decisions, 129,000 Zone B decisions, and 68,000 Zone C decisions.

*If sailors followed the marital patterns in the overall U.S. population, there should be a growing number of unmarried sailor couples in our sample of single sailors 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.

Gender differences in marital status and colocation

- At Zone A, the majority of men are single; at Zones B and C, a sizable majority of men have a civilian spouse
- At Zones A and B, the majority of women are single; at Zone C, almost half of women are single
- At all zones, a higher percentage of women than men are married to military spouses (e.g., at Zone A, 21% vice 4%)
- At all zones, a higher percentage of women than men are married to Navy spouses (e.g., at Zone A, 17% vice 3%)
- Additional details in backup slides



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We highlight some key differences between the male and female samples. First, at Zone A, the majority of both men and women are single (53 and 57.5 percent, respectively). Among older sailors at later decision points, men are more likely to be married than women. At Zone B, 66 percent of men are married vice 48.7 percent of women. At Zone C, 78 percent of men are married vice 54 percent of women.

The female sailors 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 5 times greater than that for men (21 percent vice 4 percent, respectively). At Zones B and C, the share of sailors married to military spouses increases for both women and men, but the relative gender difference in the shares remains about the same across the zones.

Similarly, the women in our sample are much more likely than the men to be married to another sailor. At Zone A, the share of women who are married to a Navy spouse is more than 5 times greater than the share of men who are (17.4 percent vice 3.2 percent, respectively). At Zones B and C, the share of both women and men who are married to other sailors grows, but the difference between the female share and the male share remains about the same.

Two backup slides present the colocation status subsamples for both women and men.

Reenlistment model and factors we control for

- We estimate the probability of reenlisting for sailors in Zones A, B, and C separately using linear regression analysis
- In addition to colocation/marital status, we control for
 - Navy career characteristics
 - Armed Forces Qualification Test (AFQT) score, enlisted management community (EMC), Selective Reenlistment Bonus (SRB) level, paygrade, time in grade, length of service, previous sea duty, current sea duty status
 - Promotions/demotions in past 12 months
 - Medical accounting code in previous 12 months
 - Sailor demographics
 - Gender, age, race/ethnicity, children, education level, citizenship status
 - Economy and time trend
 - CNA economic index (collapses nine U.S. economic measures into one index, with three measures being most influential: unemployment rate, 3-month Treasury bill, and 10-year Treasury note)
 - Fiscal year of decision

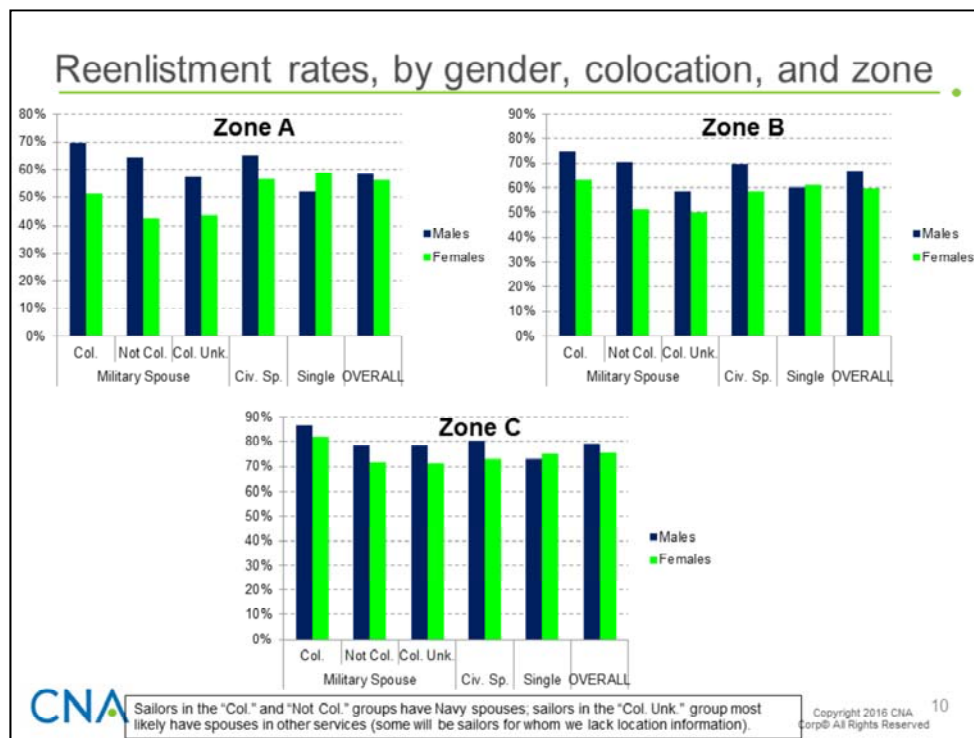


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We model the likelihood of reenlistment as a function of such factors as sailor demographics, Navy career characteristics, and our variables of interest—the colocation/marital status categories. We estimate three separate models (one each for Zones A, B, and C) to allow the influence of each factor on reenlistment decisions to differ by zone. We use linear rather than nonlinear regression to estimate the models because, after extensive testing, we found that the linear model fit the data better and yielded results that were easier to interpret. A more detailed description of our modeling methodology can be found in the accompanying research memorandum, *The Relationship Between Colocation and Reenlistment in the Navy: Technical Background* (Vol. 2) (DRM-2018-U-016843-Final).

The list of model factors includes AFQT score, the sailor's EMC, the maximum level of SRB offered to that sailor at the decision point, paygrade, time in grade, years of service, total months of previous sea duty, and whether the sailor (a) was on sea duty 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 sailor 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 sailor's reenlistment decision, such as the political climate, Navy-wide reenlistment opportunities, and operational tempo. Finally, we have categorical variables denoting the sailor'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 sailors to estimate each of our reenlistment models. Each model yields an estimated reenlistment rate for each sailor in each sample and allows us to estimate the effect of each factor on the probability of reenlisting.

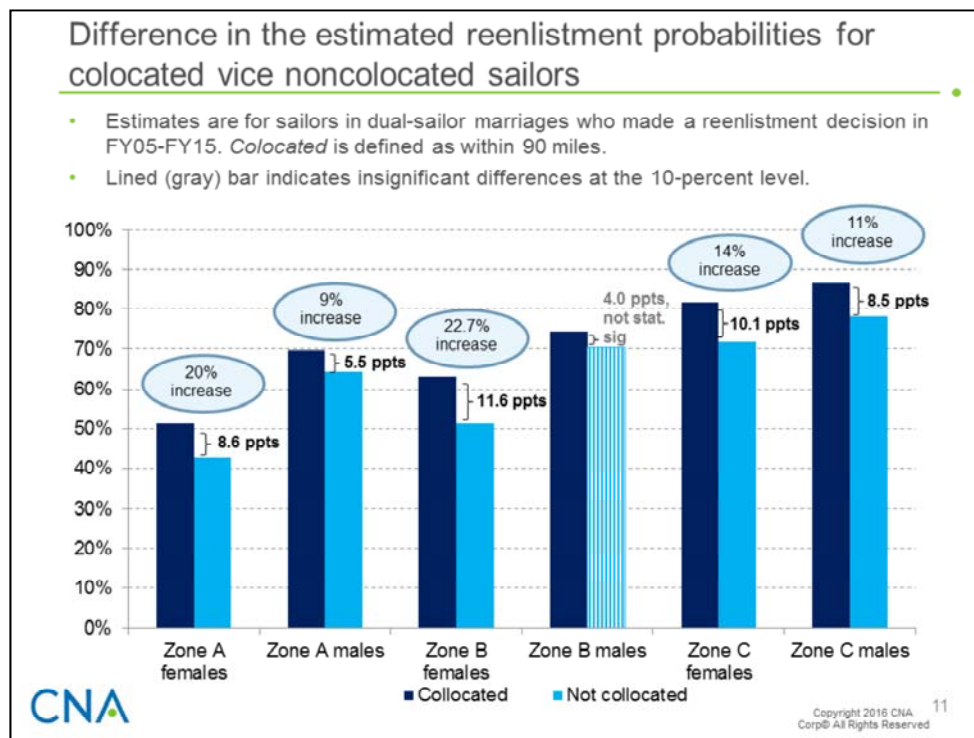


The charts on this slide summarize the average estimated reenlistment probabilities by gender and colocation/marital status for each of the three zones. Controlling for other factors that might affect the estimated probability of reenlisting, male reenlistment rates are higher than female reenlistment rates in all zones and colocation/marital statuses with two exceptions: single sailors in Zones A and C. Single female Zone A sailors are in fact *more* likely to reenlist than their male counterparts, all else equal: 58.7 percent of single female sailors reenlist at their Zone A decision compared with 52.1 percent of similar male sailors. Likewise, in Zone C, single female sailors have an estimated probability of reenlisting of 75.1 percent compared with 73.1 percent for men.

The figures also show that, for men, colocated sailors have the highest reenlistment rates in all zones. For women, colocated sailors have the highest reenlistment rates in Zones B and C; in Zone A, however, singles and sailors with civilian spouses have higher reenlistment rates than their colocated counterparts.

The colocation-unknown group and the not-colocated group appear to have similar reenlistment behavior, especially among women. We suspect that this is because the majority of those with colocation-unknown status have Army, Marine Corps, or Air Force spouses, and spouses in different services may be less likely to be colocated.

The differences in the 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 except single sailors in Zone B.

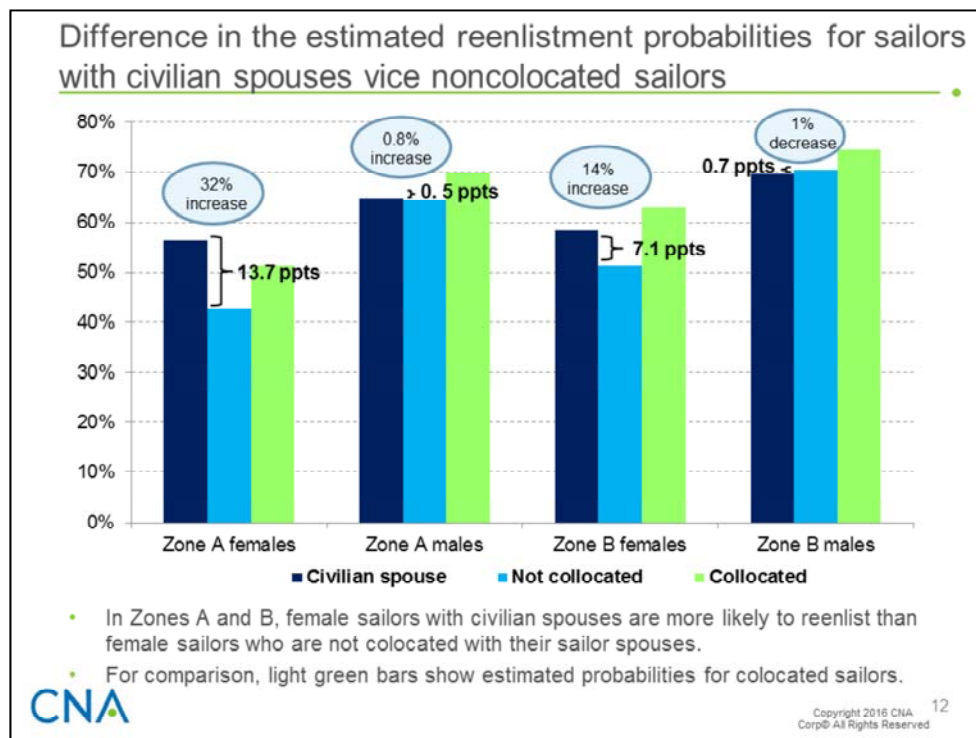


In this slide, we focus on the correlation between the estimated probability of reenlisting and colocation. The key takeaway is that colocation has real and sizable impacts on estimated reenlistment probabilities, especially for female sailors.

The dark blue (left-hand) bars represent estimated reenlistment probabilities for colocated sailors 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 sailors within a gender and zone subsample (e.g., the first two bars compare estimated reenlistment probabilities for colocated and noncolocated Zone A women).

In all cases, the estimated reenlistment probabilities are higher for colocated sailors than for noncolocated sailors, all else equal. All of these differences are statistically significant at the 10-percent level or better with one exception: Zone B men (note the lined bar, which indicates statistical insignificance.) See the accompanying research memorandum for estimation details.

Although both men and women experience gains from colocation, the gains for women are noticeably larger, both in terms of the *percentage-point* increase and the *percentage* increase in the estimated probability of reenlistment. For example, Zone A colocated women are 8.6 ppts more likely to reenlist than their noncolocated counterparts, resulting in an overall 20-percent increase in their overall reenlistment rate (the corresponding numbers for Zone A men are 5.5 ppts and 9 percent). These differences persist through Zones B and C as well, although the percent gain that women experience from colocation decreases for Zone C.



It may be that the estimated colocation effects are representative of the gains from *spousal cohabitation*, including the overall increased quality of life and stability experienced from living with one's spouse. Or, the estimated colocation effects may represent the gains specifically from *cohabiting with a Navy spouse*, which could be even greater than the gains from cohabitation with a civilian spouse. Spouses working for the same organization may have a greater understanding of the demands of each other's jobs and, therefore, an ability to offer each other additional support.

In this slide, we assume that sailors with civilian spouses are often colocated because civilian spouses are likely able to move as assignments change. We examine the differences in estimated reenlistment probabilities for sailors with civilian spouses, noncollocated sailors, and colocated sailors. We find that female sailors with civilian spouses are more likely to reenlist than their noncollocated counterparts in Zone A. In addition, for Zone A women, the estimated gains from having a civilian spouse are *larger* than those from being colocated: a 13.7-ppt increase in their estimated reenlistment probability compared to an 8.6-ppt increase from being colocated (the green bars show our estimated probabilities for the colocated populations). For Zone B women, the story changes. The estimated effect of having a civilian spouse is about 40 percent *smaller* than the estimated colocation effect (7.1 vice 11.6 ppt greater than the noncollocated reenlistment rate, respectively). Male sailors with a civilian spouse experience only minor changes in their reenlistment probabilities compared to their noncollocated counterparts (a small increase in Zone A and a small decrease in Zone B). Zone C differences are not shown here because they are not statistically significant for either men or women. (A figure comparing the civilian-spouse and not-colocated populations for all three zones can be found in the backup slides.)

This suggests that our estimated colocation effects for Zone A women are largely driven by the gains from *spousal cohabitation* as opposed to the gains from *specifically cohabiting with Navy spouses*. Conversely, it appears that the male Zone A and B and the female Zone B colocation effects are related to gains *specific to cohabiting with Navy spouses*.

Conclusions from colocation estimates

- We estimate that colocated sailors—especially women—are more likely to reenlist than their noncolocated counterparts
 - Estimated Zone A gains are 8.6 ppts for women; 5.5 ppts for men
 - Estimated Zone B gains are 11.6 ppts for women; no gains for men
 - Estimated Zone C gains are 10.1 ppts for women; 8.5 ppts for men
- At Zone A, female sailors with civilian spouses are also more likely to reenlist than their noncolocated counterparts
 - Spousal cohabitation—with either a Navy or civilian spouse—appears to be more important for Zone A female sailor reenlistment decisions
 - Cohabitation with a Navy spouse appears to be more important for Zone B female sailor and for Zones A and B male sailor reenlistment decisions
- At Zone A, single female sailors have higher reenlistment rates than their male counterparts



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We estimate that, on average, colocated sailors are more likely to reenlist than their noncolocated counterparts. These effects are more pronounced for women than for men. At Zone A, we estimate that the colocation effect for female sailors is about 1.5 times the size of the estimated effect for men (8.6 vice 5.5 ppts). At Zone B, we estimate that colocated women are 11.6 ppts more likely to reenlist than their noncolocated counterparts, while we find no statistically significant difference for men. At Zone C, the estimated colocation effect is about 1.2 times larger for women than for men (10.1 vice 8.5 ppts).

We also find evidence that the Zone A female sailors' colocation effects were the result of gains from spousal cohabitation. That is, they were *not* specific to cohabitation with a Navy spouse. For female sailors at Zone B and for male sailors at Zones A and B, however, the colocation effects *were* specific to colocation with a Navy spouse. That is, we did not find evidence of large cohabitation effects for women in Zone B or for men in Zones A and B.

These findings suggest that, if the Navy expands its colocation of dual-Navy spouses, it could experience improved retention, especially for Navy women. To maximize the improvement in retention, we recommend that the Navy continue in its efforts to colocate female sailors with military spouses in other services as well.

Finally, we found one particularly surprising result: at the Zone A decision point, single female sailors have a higher estimated probability of reenlisting than single male sailors.

Benefits and costs of colocation

- We estimated the benefits (i.e., positive contribution) that colocated sailors make to reenlistment rates
- Costs of colocation are complex, difficult to measure
- For context, we can estimate how much it would cost the Navy to “buy” the amount of female reenlistment associated with colocation by some other means (e.g., SRBs)



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At a minimum, the benefits of colocation can be summarized by its effect on the estimated probability of reenlisting. The benefits of colocation may extend beyond improvement in reenlistment rates. If sailors perform better when colocated than when not colocated, readiness may also improve, all else equal. It is beyond the scope of this study to estimate those potential benefits, but we note that our estimate of the benefits of colocation may be a lower bound.

Colocation likely incurs costs as well, however. Attempts to colocate married sailors is an additional constraint in an already constrained personnel detailing system. Indeed, there are likely limits to how much colocation the Navy can achieve. Directly estimating the costs of attempting to colocate married sailors is complex and may not even be possible to calculate. Instead, as a thought experiment, we consider how much it would cost the Navy to increase reenlistment rates via SRBs by the amount that is associated with colocation.

Decrease in Zone A reenlistment rate without colocation

- Assuming that if Zone A colocated sailors were not colocated, they would reenlist at the same rate as their noncolocated counterparts,
 - Rate for women would decrease from 51.3 to 42.7 percent
 - Rate for men would decrease from 69.8 to 64.3 percent
- Overall female Zone A reenlistment rate would decrease from 55.9 to 54.8 percent, a loss of 1.1 ppts
- Change in male Zone A reenlistment rate is negligible



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To estimate how much the Navy would have to pay in SRBs to achieve the portion of the Zone A female reenlistment rate attributable to colocated sailors, we must first estimate the share of overall female Zone A reenlistment that is attributable to colocation. Colocated female sailors have a Zone A reenlistment rate of about 51.3 percent, while their noncolocated counterparts have a reenlistment rate of about 42.7 percent. Assuming that colocated sailors would reenlist at the noncolocated rates if they were not colocated, we estimate that the overall female Zone A reenlistment rate would decrease from 55.9 to 54.8 percent, or about 1.1 ppts.

The change in overall male Zone A reenlistment rates is negligible because male sailors married to other sailors make up a very small share of all male sailors (about 3.2 percent). Therefore, we focus on how much it would cost the Navy to restore female Zone A reenlistment rates if no female sailors were colocated.

Restore female Zone A reenlistment rate via increase in SRB

- Recall that nukes are excluded from calculations
- Assume that it costs the Navy about \$3,800 per non-nuke Zone A SRB-receiving sailor to increase SRBs by one level*
- Assume that each one-level SRB increases reenlistment rates by 2.5 pts
- Navy would need to increase SRBs by about 0.44 level (1.1 pts / 2.5 pts)
- Approximate annual cost is \$19.2 million (\$3.2 million for women and \$16 million for men)**
- Raising female retention via SRBs also raises male retention rates and maintains the retention gender gap (colocation helps close it)

*N130 uses a rule of thumb per sailor cost of increasing Zone A SRBs by one level—including SRBs paid to nukes—of about \$10,000. N130 confirms that on average from FY12-FY17, the nuclear portion of the Zone A SRB expenditures was 62 percent. Since we are excluding nukes from this exercise, we reduce the \$10,000 figure to \$3,800.

**If nuclear SRBs are also increased by 0.44 level, the total cost increases to about \$51 million.



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We remind readers that we have excluded the decisions of sailors with the nuclear subspecialty from our calculations, so increases in the costs of higher SRBs for nukes are not included in the following estimates.

We assume that it costs the Navy approximately \$3,800 to increase the SRB level by one for every sailor receiving an SRB, excluding those with a nuke specialty. Previous CNA estimates show that a one-level increase in SRBs increases reenlistment rates by about 2.5 percentage points. To restore female Zone A reenlistment rates if we eliminated colocation, we would only need a 1.1 percentage point increase. Therefore, the Navy would have to increase SRBs by slightly less than one half a level (1.1 / 2.5)—more precisely by 0.44 a level. (Note that we use a previous CNA estimated reenlistment response rate to a one-level increase in SRB here because our colocation model measures the maximum SRB available to the sailor at the time of reenlistment, not the dollar value).

We estimate the average number of women eligible to receive an SRB at the time of making a decision from FY14-FY16 (excluding nukes) to be about 1,900 annually. We multiply that number by 0.44 x \$3,800 to obtain an annual cost of about \$3.2 million to increase female Zone A retention by 1.1 percent.

The costs do not end there, however. SRBs cannot be paid to one gender only. If SRBs are raised by 0.44, men eligible for SRBs will also receive the increase. We estimate the average number of Zone A (non-nuke) men eligible to receive an SRB at the time of making a decision from FY14-FY16 to be just under 9,600 annually. The cost of increasing SRBs by 0.44 level is about \$16.0 million.

We estimate that the cost of increasing female Zone A reenlistment rates by 1.1 percentage points by means of increasing SRBs is about \$19.2 million. A sizeable portion of this cost is “overbuying” male retention.

Summary and concluding thoughts

- The six estimated relationships between colocation and reenlistment for each zone by gender are positive and nearly all are statistically significant
- The effects are especially large for women
- Using SRBs to achieve an increase in Zone A female reenlistment rates equivalent to the estimated effect of colocation is expensive and inefficient
- The Navy should continue its colocation efforts, and when possible, it should expand them
- More generally, the Navy needs to continue to pursue policies that man the fleet efficiently while helping all sailors (and particularly women) achieve both career and family aspirations



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We show that colocation of enlisted Navy-Navy couples positively affects the estimated probability of reenlisting, other factors held constant. The estimated colocation effects are statistically significant for women making decisions at Zones A, B, and C, and for men in Zones A and C.

The estimated effects are especially large for women. Thus, colocation also appears to help close reenlistment rate differences between men and women.

We cannot say how much more colocation the Navy could achieve before it becomes prohibitively expensive. However, the Navy should continue its efforts to colocate dual-military couples, and it should expand those efforts where possible.

As the Navy's understanding of the relationship between naval service and family aspirations improves, it may be able to develop even more effective and efficient personnel policies.

Backup slides

Male sample sizes

Colocation/marital status			Zone A decisions		Zone B decisions		Zone C decisions	
			Number	Percentage	Number	Percentage	Number	Percentage
Military spouse	Navy spouse	Colocated within 90 miles	4,911	2.54%	2,985	2.81%	1,854	3.26%
		Not colocated	1,352	0.70%	812	0.76%	365	0.64%
	Other service spouse	Colocation unknown	1,404	0.73%	919	0.87%	404	0.71%
Civilian spouse			83,539	43.26%	66,306	62.44%	41,499	73.03%
Single			101,919	52.77%	35,173	33.12%	12,706	22.36%
TOTAL			193,125	100%	106,195	100%	56,828	100%

- As is the case for the whole sample, the majority of Zone A men are single; the majority of men in Zones B and C have civilian spouses.
- The number of men with Navy spouses who are not colocated and those with non-Navy military spouses (who therefore have unknown colocation status) are nearly equal.
- The colocated percentages for men are lower than for the whole sample.



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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 193,000 Zone A decisions, 106,000 Zone B decisions, and 57,000 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 two other observations about the male sample. First, in all zones, the number of men who are in Navy-Navy marriages but are not colocated is roughly the same as the number of men married to non-Navy military spouses (who therefore have an unknown colocation status). These two groups of men are small, representing less than 1 percent of all male sailors in each of the three zones. Second, a lower percentage of men are colocated compared to the percentage of colocated sailors in the whole sample. Specifically, at the Zone A decision point, 4.48 percent of the entire sample is colocated, compared to 2.54 percent of men; at the Zone B decision point, 5.03 percent of the entire sample is colocated, compared to only 2.81 percent of men; and at the Zone C decision point, 5.64 percent of the entire sample is colocated vice 3.26 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.

Female sample sizes

Colocation/marital status			Zone A decisions		Zone B decisions		Zone C decisions	
			Number	Percentage	Number	Percentage	Number	Percentage
Military spouse	Navy spouse	Colocated within 90 miles	5,704	13.04%	3,492	15.54%	1,959	18.15%
		Not colocated	1,921	4.39%	984	4.38%	414	3.84%
	Other service spouse	Colocation unknown	1,725	3.94%	872	3.88%	416	3.85%
Civilian spouse			9,227	21.10%	5,600	24.92%	3,030	28.07%
Single			25,155	57.52%	11,525	51.28%	4,974	46.09%
TOTAL			43,732	100%	22,473	100%	10,793	100%

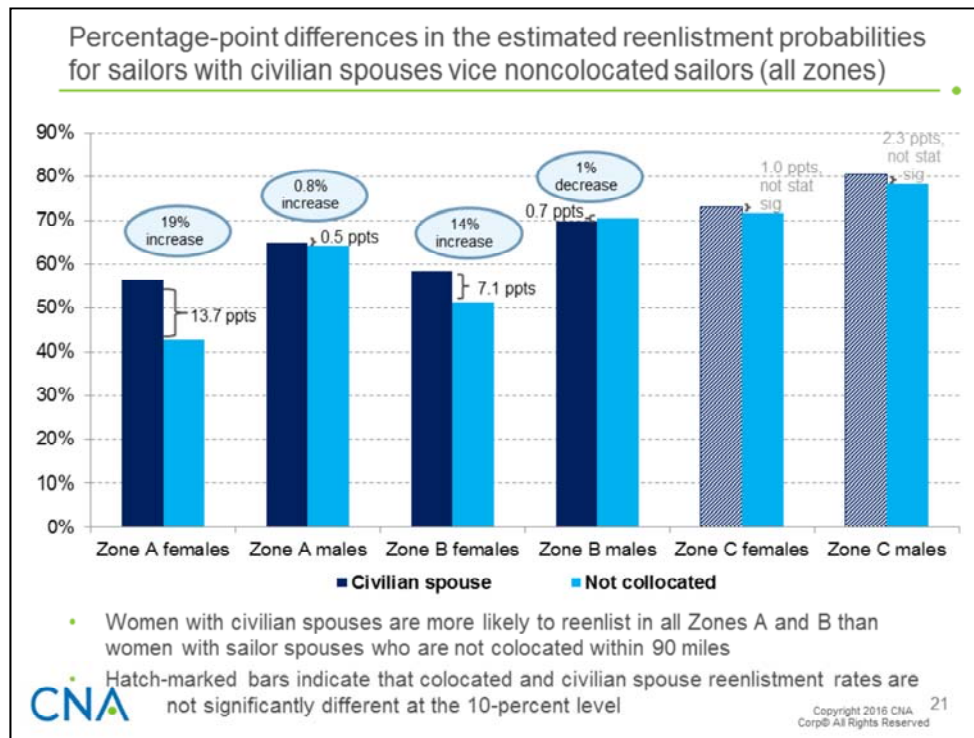
- A noticeably higher percentage of women than men are colocated (and have military spouses).
- Lower percentages of women than men have civilian spouses.
- There are higher percentages of single women than men in all zones.



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Our sample contains far fewer women than men. There are roughly 44,000 women making Zone A decisions, 22,500 women making Zone B decisions, and 11,000 women making Zone C decisions (compared to 193,000, 106,000, and 57,000 men in Zones A, B, and 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—13 percent at the Zone A decision point and 16 percent at the Zone B and C decision points, compared to about 3 percent at each decision point for men. Second, like men, the majority of women are single at the time of their Zone A decision; however, the majority of women are *also* single at their Zone B decision, and a plurality of women are single at their Zone C decision. By contrast, the majority of men have civilian spouses in the later zones.

We might expect the numbers of men and women who are Navy spouses to be close, if not exactly equal, but they are not. There are more women than men in Navy-Navy marriages at each decision point. The difference is created by differences in the timing of male and female reenlistment decisions in dual-Navy marriages as well as differences in the likelihood that they choose to leave. For example, personnel records show that it is more likely, on average, for a woman in a dual-Navy marriage at her Zone A decision point to be married to an older, post-Zone A male sailor than it is for a male sailor making his Zone A decision to be married to an older, post-Zone A female sailor. Many older male spouses were not in a dual-Navy marriage at the time of their Zone A decision (i.e., their wives might not even have joined the Navy yet). However, they *are* both Navy spouses by the time *her* Zone A decision occurs. In addition, if the female sailor in a dual-Navy marriage decides to leave at her Zone A decision, by the time her (older) Navy spouse's next decision occurs, he is once again *not* a Navy spouse. In addition, we removed sailors with the nuclear specialty from our sample of sailors making a decision because they have atypical reenlistment decision points. This removes more men than women from our decision sample.



This figure shows the differences in our estimated reenlistment rates for sailors with civilian spouses vice those who were married to other sailors but were not colocated. The figure includes our Zone C reenlistment rate estimates. (The main text highlighted the estimates for Zones A and B reenlistment decisions.) We estimate that the male and female Zone C reenlistment rates for these two colocation/marital status groups are not statistically significantly different.



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RAD 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.





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