Gender Differences in Post-Bootcamp, Pre-Fleet Losses

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Abstract

Despite increases in the female share of Navy accessions and in women's entry qualifications over the last several decades, growth in female representation in the inventory has not kept pace. We examine one specific driver of the female share of the inventory: differential losses between bootcamp and reaching the fleet by gender. We find that the issue of higher female loss rates is not a general one. Rather, it is concentrated in highly technical ratings, such as the Advanced Electronics and Computer Field, Nuclear Field, and some Cryptologic Technician specialties. Evidence from loss codes and reenlistment recommendation codes suggests that health (physical and mental) and family issues—not behavioral problems—may be behind these higher female losses. Yet, the timing of these health- and family-related losses is puzzling given that these Sailors successfully completed bootcamp. We conclude with a set of recommendations that, if adopted, could provide the Navy with a more detailed understanding of why there is a sizable gender gap in attrition rates in these highly technical ratings.

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Executive Summary

The female share of Navy accessions has increased over the last several decades. Women's entry qualifications have increased over that time as well; however, there still appear to be barriers to female representation in the Navy inventory. Historically, for example, women in the Navy have retained at lower rates than men, and they have continued to do so to the present. Depending on the rating, female retention rates to the second term (i.e., after four to six years of service) are anywhere from 5 to 75 percent lower than those of their male counterparts.

This research memorandum is part of a larger CNA project sponsored by the Office of the Assistant Secretary of the Navy (Financial Management and Comptroller) (ASN (FM&C)) that is intended to explore cost-effective ways to maintain or even improve retention. This is of particular interest as the female share of accessions continues to rise. Here, we examine one specific driver of female representation in the inventory: female-male differences in post-bootcamp, pre-fleet losses from the Navy. During this part of their careers, accessions are undergoing rating-specific training.

We focus in particular on highly technical ratings requiring high ASVAB scores for entry and having long training pipelines because these Sailors are the most expensive to recruit and train. Using data from CNA's Enlisted Street-to-Fleet database and other sources, we find that in such ratings as the Advanced Electronics and Computer Field (AECF), the Nuclear Field (NF), and some Cryptologic Technician (CT) fields, female loss rates after bootcamp but before reaching the fleet have exceeded those of men by 50 to 100 percent or more fairly consistently since the 1990s. The matter of higher female loss rates is not a general issue across the Navy but is instead concentrated in these highly technical ratings, and the differences persist even after controlling for other factors that might be associated with losses, such as test scores. Using data on loss codes, we find that women who leave the Navy after bootcamp but before going to the fleet are more likely than men to be assigned codes associated with health (physical and mental) or family issues, such as "Medical," "Pregnancy," or "Parenthood." Male losses are more likely to be assigned codes associated with behavioral issues, including "Drugs," "Alcohol," "In lieu of court martial (CM)," and "Other misconduct." With respect to reenlistment quality codes (RQCs), female attriters are more likely to be assigned the "Parent," "Physical disability," or "Condition" codes (indicating a personality or other condition, such as fear of flying, that does not rise to the level of a disability but does impair a person's ability to perform military tasks) in technically advanced fields. This evidence suggests that misbehavior is not driving higher female losses from the post-bootcamp, pre-fleet training pipeline in these fields.

It is not a new finding that women leave the Navy in the first term for health or family-related reasons at higher rates than men. It is puzzling, however, that the higher rates

of female losses occur *after* these recruits have completed bootcamp and almost exclusively in ratings requiring very high test scores.

We conclude with a set of recommendations that, if adopted, would provide the Navy with a deeper understanding of exactly why we see higher female attrition in certain ratings compared with their male counterparts:

- Review the loss code assignment process.
- Take steps to better understand differences in women's and men's experiences in the training pipeline, including analyzing existing or newly developed exit interviews or surveys that ask servicemembers about their reasons for leaving and about their experiences during training.
- Review decision-making processes that determine how Sailors who are experiencing problems in the training pipeline are identified and whether such Sailors are reassigned to new ratings.

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Glossary

AECF	Advanced Electronics and Computer Field
AFQT	Armed Forces Qualification Test
AR	Arithmetic Reasoning
ASN(FM&C)	Assistant Secretary of the Navy (Financial Management and Comptroller)
ASVAB	Armed Services Vocational Aptitude Battery
BC	bootcamp
CIC	Combat Information Center
CM	court-martial
CT	Cryptologic Technician
CTM	Cryptologic Technician (Maintenance)
CTT	Cryptologic Technician (Technical)
DON	Department of the Navy
EMC	Enlisted Management Community
EMNUCSW	Electrician's Mate, Nuclear (Surface)
ET	Electronics Technician
FC	Fire Controlman
GSE	Gas Turbine Systems Technician - Electrical
HM	Hospital Corpsman
LAN	local area network
MK	Mathematical Knowledge
MM	Machinist's Mate
MMNUCSW	Machinist's Mate, Nuclear (Surface)
NF	Nuclear Field
NITRAS	Navy Integrated Training and Resource Administration System
OS	Operations Specialist
RQC	reenlistment quality code
SSN	Social Security Number
STG	Sonar Technician - Surface
YOS	years of service

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Introduction

This research memorandum is part of a larger CNA project, *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)). The project is motivated by the fact 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. The point of this CNA project is to identify and explore ways to meet retention goals in cost-effective ways.

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

The overarching CNA project is organized around four issues related to how costs may change as the female share of uniformed Sailors and Marines increases:

1. What are the differences in female and male accession percentages and representation in inventories, initial training outcomes, military occupation assignment/choice, reenlistment rates, and promotion rates?

   a. How might these differences affect manning?

   b. How will an increase in the female share of accessions potentially affect manning? How might the effect on manning affect personnel costs?

   c. Are there other ways that increasing the female share of accessions may affect overall personnel costs?

2. How might the new 12-week maternity leave policy affect manning and hence personnel costs? For the Navy, what are the potential effects on both sea and shore manning and the potential costs associated with addressing shortages?

3. What is the relationship between colocation and retention for married military couples?

4. What factors other than compensation could lead to increased retention? How could the Navy and Marine Corps use such factors in place of special and incentive pays or pay-table increases? What changes to current compensation packages could result in more efficiency and effectiveness?

In this research memorandum, we examine one driver of female representation in Navy inventories in particular: gender differences in losses in the period after completion of bootcamp but before reaching the fleet. During this period, accessions are undergoing rating-specific training. We focus on highly technical ratings that have persistent gender differences in losses from the post-bootcamp, pre-fleet portion of the training pipeline.[1] We seek to understand why these differences exist to inform possible changes to improve personnel management.

Background

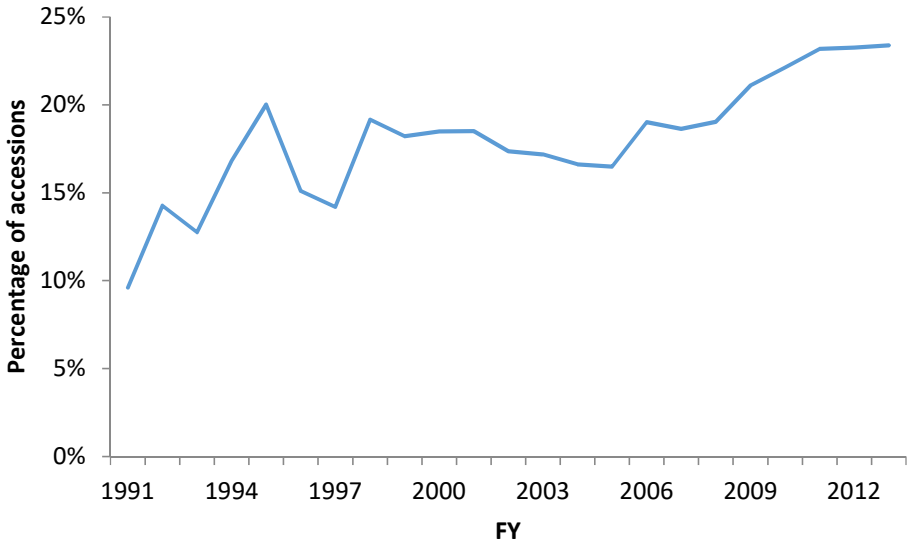
For the last several decades, the Navy has worked to fully integrate women at all experience levels—including in leadership positions—across occupations. At its core, integrating women into the Navy is an issue of using all talent available to the maximum extent. As Figure 1 indicates, the female share of accessions has more than doubled since 1991, reaching 23 percent by FY13.

Moreover, until the last few years, there has also been a steady increase in the proportion of enlisted women who qualify for the Navy's most technically demanding occupational fields [1]. Navy accessions with higher Armed Forces Qualification Test (AFQT) scores are eligible for more technical ratings and training.[2] Those scoring 80 or higher on the AFQT tend to be eligible for most or all technical ratings [2, pp 21-22]. Figure 2 uses data from the CNA street-to-fleet database to show the percentage of Navy female accessions meeting a series of quality standards: Tier 1, A-cell, technically qualified, and highly qualified.

[1] A Navy rating is a general enlisted occupation. A promised rating can include multiple Enlisted Management Communities (EMCs). For example, an accession promised the Nuclear Field (NF) rating may reach the fleet in any one of eight associated EMCs: Electrician's Mate-Nuclear, Machinist's Mate-Nuclear, Engineering Laboratory Technician-Nuclear, or Electronics Technician-Nuclear, for either surface warfare or submarines. In our data, an accession is considered to have reached the fleet in a promised rating if he or she reached the fleet in any of the EMCs associated with that rating. Our analysis focuses on promised ratings because accessions promised a given rating have common qualifications and share training experiences that may be related to continuation behavior.

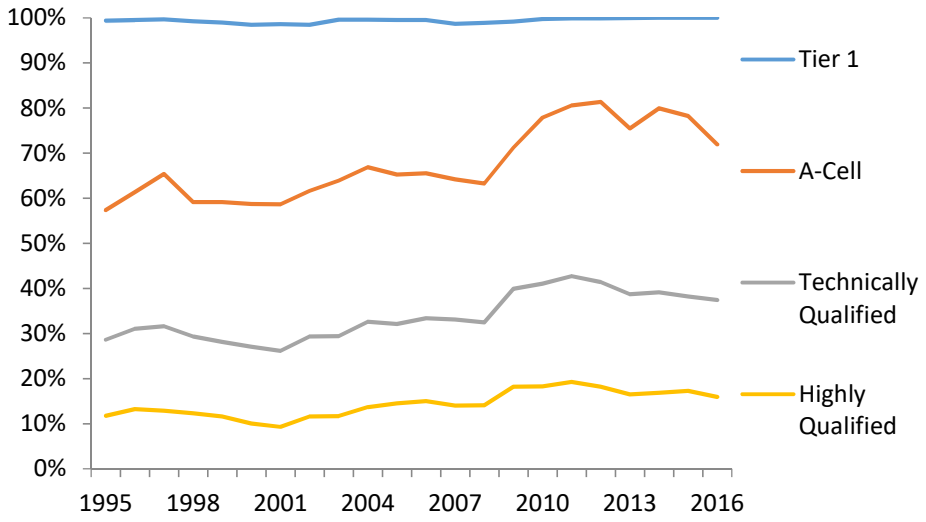
[2] AFQT scores are computed using the Standard Scores from four Armed Services Vocational Aptitude Battery (ASVAB) subtests: Arithmetic Reasoning (AR), Mathematics Knowledge (MK), Paragraph Comprehension (PC), and Word Knowledge (WK).

Figure 1. Female share of Navy enlisted accessions, 1991-2013



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Figure 2. Percentage of female accessions meeting quality standards, 1995-2016



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Definitions of the four quality standards shown in Figure 2 follow:

- *Tier 1:* Accession holds a high school diploma or equivalent credential.
- *A-cell:* Accession holds a high school diploma or equivalent credential and has an AFQT score of 50 or higher.
- *Technically qualified:* Accession holds a high school diploma or equivalent credential and has an AFQT score of 67 or higher.
- *Highly qualified:* Accession holds a high school diploma or equivalent credential and has an AFQT score of 80 or higher.

The percentage of female Navy accessions meeting the highly qualified standard more than doubled from 9 percent in 2001 to 19 percent in 2011, while the percentage meeting the technically qualified standard rose from 26 to 43 percent during the same period.[3]

Increasing shares of female accessions also qualify for the Navy's most highly technical fields. Based on Armed Services Vocational Aptitude Battery (ASVAB) test scores, the percentage of female accessions who qualify for the Advanced Electronics and Computer Field (AECF) increased by one-third in the last decade, while the proportion who qualify for the Nuclear Field (NF) nearly doubled.[4] Although the most recent data show that the average test scores for women have decreased somewhat, the progress made over the last two decades in both the female share of accessions and the quality of those accessions is impressive.

Despite these successes, however, barriers to female representation in the Navy remain. Historically, women in the Navy have not retained at the same rates as have men, and this pattern continues to be the case [1].[5] Parcell and Parvin [5], for example, estimate cumulative continuation rates (the product of one-year retention rates) for years of service (YOS) 0 through 7 for a number of surface ratings based on data from 2008 through 2012. These calculations are summarized in Table 1.

[3] During that 2001–2011 period, the percentage of male accessions meeting the highly qualified standard increased from 19 to 31 percent, and the percentage meeting the technically qualified standard rose from 38 to 55 percent.

[4] These figures are based on author calculations from Navy Enlisted Street-to-Fleet Accession File. Information on minimum ASVAB scores required to enter the AECF and NF ratings from Navy Cyberspace are from the Armed Forces Qualification Test Requirements – Navy website (https://www.navycs.com/asvab-test.html).

[5] Retention rates for women are lower in both the Navy's officer corps [3] and the Marine Corps [4].

Table 1. Cumulative continuation rates for selected Navy ratings, 2008–2012

Rating	Cumulative continuation rates YOS 0-7		
	Women	Men	Percentage difference
NF	15.7%	27.4%	75%
MMSW	15.9%	16.7%	5%
FC/FC Aegis	23.3%	34.6%	48%
ETSW	28.7%	38.7%	35%
ITSW	34.2%	39.6%	16%
STG	21.0%	27.0%	29%
LS	26.0%	34.3%	32%
CS	23.7%	32.0%	35%
YN	25.0%	36.3%	45%

Source: Parcell and Parvin (2014, p. 10) [5, p.10].

Table 1 shows that female continuation rates range between 5 and 75 percent lower than the comparable male rates, depending on the rating in question.

Gender differences in Navy training pipeline retention

The first four to six years of an enlisted Navy contract encompass (1) bootcamp (BC), (2) post-BC, pre-fleet training, and (3) a first fleet tour. Upon completion of the first contract, a Sailor decides to reenlist or not. Gender differences in the probability of reaching these early career milestones and of reenlisting exist. Specifically, there are differences in continuation rates between enlisted women and men before they reach the fleet. Table 2 provides data on enlisted training pipeline outcomes going back to the 1990s. We aggregate accession cohorts into five-year periods to smooth out year-to-year fluctuations and examine the following possible outcomes:

1. BC loss (dropped out during bootcamp)
2. Post-BC, pre-fleet loss (dropped out after completing bootcamp but before reaching the fleet)
3. Reached the fleet with promised rating
4. Reached the fleet, but with a rating other than that originally promised

Table 2. Enlisted training pipeline outcomes, all ratings, 1995–2014

Accession FY group	Outcome				Total accessions
	1. BC loss	2. Post-BC pre-fleet loss	3. Reached fleet in promised rating	4. Reached fleet in other rating	
Women					
1995–1999	16%	6%	64%	13%	**41,351**
2000–2004	14%	5%	67%	13%	**40,032**
2005–2009	14%	5%	70%	10%	**34,579**
2010–2014	13%	3%	77%	6%	**41,439**
Total	15%	5%	70%	11%	**157,404**
Men					
1995–1999	15%	7%	61%	16%	**197,045**
2000–2004	10%	6%	70%	14%	**185,969**
2005–2009	9%	5%	71%	15%	**148,984**
2010–2014	9%	3%	77%	11%	**138,411**
Total	11%	6%	69%	14%	**670,409**

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Table 2 shows that, overall, about 81 percent of women who enter the enlisted training pipeline eventually reach the fleet, compared with 83 percent for men. While this overall difference is fairly small, there are important gender differences in other training pipeline outcomes. A higher proportion of women drop out of bootcamp (15 percent) compared with men (11 percent) over the entire 1995–2014 period. Also, women who have difficulty in the initially promised rating are less likely to be reassigned to other training programs compared with men. The proportion of women who reach the fleet with a rating other than that originally promised (outcome 4) is about 25 percent lower than the corresponding fraction for men (11 percent and 14 percent, respectively).

More differences in training pipeline outcomes between men and women are revealed when we focus on highly technical ratings. As Table 3 shows, AECF-promised female losses during bootcamp (15 percent) are higher than male losses (10 percent), although the rates for both women and men are close to the all-Navy averages (14 and 11 percent, respectively, as shown in Table 2). These gender differences persist despite the fact that the Navy has clearly made gains in reducing training pipeline attrition in the last two decades (the AECF post-bootcamp, pre-fleet loss rate has fallen from 19 to 9 percent for women and from 16 to 5 percent for men). During the post-bootcamp,

pre-fleet period, however, the difference between female and male loss rates in AECF is noticeably greater than the Navy-wide averages (15 and 12 percent for women and men in AECF, respectively, compared with Navy-wide averages for women and men of 5 and 6 percent, respectively).

Table 3. Enlisted training pipeline outcomes, AECF promised, 1995–2014

Accession FY group	Outcome				Total accessions
	1. BC loss	2. Post-BC pre-fleet loss	3. Reached fleet in promised rating	4. Reached fleet in other rating	
Female AECF					
1995–1999	17%	21%	50%	12%	**2,245**
2000–2004	15%	17%	59%	8%	**1,329**
2005–2009	15%	14%	64%	7%	**1,579**
2010–2014	12%	9%	72%	7%	**2,063**
Total	15%	15%	61%	9%	**7,216**
Male AECF					
1995–1999	13%	17%	58%	12%	**13,343**
2000–2004	10%	13%	67%	10%	**8,384**
2005–2009	8%	9%	71%	12%	**7,208**
2010–2014	8%	6%	78%	8%	**7,071**
Total	10%	12%	67%	11%	**36,006**

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Table 4 shows loss differences by gender in the NF training pipeline. The NF-promised bootcamp loss rates are lower than the all-Navy rates for both women and men (11 and 7 percent, respectively, for NF-promised Sailors, as shown in Table 4). However, the difference between female and male loss rates during the post-bootcamp, pre-fleet period in the NF is striking (again, despite the decline in training pipeline attrition for both female and male NFs since the mid-1990s). In the NF pipeline, the post-bootcamp, pre-fleet losses for women and men are 24 and 13 percent, respectively, compared with all-Navy rates for women and men of 5 and 6 percent, respectively. In other words, the retention gender gap in these highly technical ratings emerges during bootcamp and is magnified during the post-bootcamp, pre-fleet training period.

Table 4. Enlisted training pipeline outcomes, NF promised, 1995–2014

Accession FY group	Outcome				Total accessions
	1. BC loss	2. Post-BC pre-fleet loss	3. Reached fleet w/ promised rating	4. Reached fleet w/ other rating	
Female NF					
1995–1999	11%	27%	36%	21%	**1,447**
2000–2004	8%	21%	56%	11%	**1,018**
2005–2009	12%	20%	50%	16%	**1,084**
2010–2014	11%	17%	56%	15%	**1,132**
Total	11%	22%	48%	16%	**4,681**
Male NF					
1995–1999	9%	13%	48%	26%	**15,111**
2000–2004	6%	8%	69%	14%	**11,650**
2005–2009	6%	9%	65%	18%	**10,734**
2010–2014	7%	9%	65%	18%	**13,311**
Total	7%	10%	61%	19%	**50,806**

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Table 5 shows loss differences by gender in the Cryptologic Technician (CT) training pipeline. Post-bootcamp, pre-fleet loss rates overall are about the same as for the Navy overall, but the loss rate for women is higher, and the loss rate for men is lower, especially after 2006.

Table 5. Enlisted training pipeline outcomes, CT promised, 1995–2014

Accession FY group	Outcome				Total accessions
	1	2	3	4	
	BC loss	Post-BC pre-fleet loss	Reached fleet w/ promised rating	Reached fleet w/ other rating	
Female CT					
1995–1999	13%	8%	57%	21%	**1,826**
2000–2004	13%	7%	59%	21%	**2,112**
2005–2009	11%	7%	63%	19%	**1,642**
2010–2014	10%	4%	70%	14%	**1,940**
Total	12%	6%	62%	19%	**7,520**

Accession FY group	Outcome				Total accessions
	1	2	3	4	
	BC loss	Post-BC pre-fleet loss	Reached fleet w/ promised rating	Reached fleet w/ other rating	
Male CT					
1995–1999	13%	7%	63%	16%	**3,881**
2000–2004	9%	6%	64%	21%	**4,123**
2005–2009	9%	5%	67%	20%	**4,234**
2010–2014	8%	3%	75%	13%	**4,929**
Total	10%	5%	68%	17%	**17,167**

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Organization of the report

The rest of this report focuses on the remaining female-male differences in post-bootcamp, pre-fleet loss rates in highly technical Navy ratings, including the AECF, the NF, and the CT fields. We then conduct an analysis of Navy loss codes and reenlistment quality codes (RQCs) assigned to accessions who leave the Navy before reaching the fleet to see if they provide any insight into differences in the experiences of women and men in the Navy training pipeline. We conclude by summarizing our findings and providing suggestions for further research.

Post-Bootcamp, Pre-Fleet Loss Rates

In this section, we consider post-bootcamp, pre-fleet loss rates for women and men in AECF, NF, and CT who have high qualification standards and where we observe higher loss rates for women than men. We also compare loss rates in these ratings with those of other training pipelines that have a high share of women (Hospital Corpsman (HM)) or are sea intensive (Machinist's Mate (MM) and Operations Specialist (OS)).

We use data from CNA's Navy Enlisted Street-to-Fleet Accession File merged with ASVAB test data and Navy Integrated Training and Resource Administration System (NITRAS) SSN Pre-Fleet Summary data from course transaction files (the Student History File). Because our goal is to examine the progression of Sailors from the completion of bootcamp to reaching the fleet, we must allow time for all Sailors in our sample to complete pre-fleet training. Therefore, we include Sailors who accessed from FY 1995 to FY 2014 in our analysis. We observe Sailors in the dataset through 2016.

For all but the most recent accession cohorts, we group the annual data into five-year periods to avoid calculating percentages based on too-small sample sizes. For the last period (2011–2013), we group only three years because of incomplete data for the last few years (most accessions are still in the training pipeline after 2013).

Ratings with male-female differences in post-bootcamp, pre-fleet losses

Advanced Electronics Computer Field

The AECF rating offers training in electronics, including computer systems, radars, communication systems, and weapon fire control systems, such as the Navy's advanced missile system and Aegis radar. The AECF rating includes two subfields: Electronics Technicians (ETs) and Fire Controlmen (FCs). Jobs performed by ETs include maintenance and repair of electronics (such as radar, communication, and navigation equipment), while FCs are responsible for operation, maintenance, and repair of fire control radars, mainframe computers, large screen displays, local area networks (LANs), weapon control consoles, automatic gun systems, and associated

electromechanical systems used in weapon systems. The post-bootcamp, pre-fleet training pipeline for AECFs is fairly long, averaging almost 16 months.[6, 7]

As displayed in Table 6, the female proportion of accessions promised AECF is close to the female share of all accessions over the period of 1995 to 2014.

Table 6. Female share of accessions, all ratings and AECF-promised, FY 1995–2014 accession groups

Accession FY group	All ratings		AECF	
	Accessions	Percentage female	Accessions	Percentage female
1995–1999	238,397	17%	15,393	14%
2000–2004	226,005	18%	9,713	14%
2005–2009	183,561	19%	8,787	18%
2010–2014	179,850	23%	9,134	23%

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Accessions promised AECF ratings are highly qualified, as indicated by Table 7, which shows average AFQT scores for those entering the AECF rating compared with all accessions. Average AFQT scores for those promised AECF are typically 20 to 25 points higher than the average for all accessions. Although among all accessions men score higher on average than women, female AECF accessions score a bit higher than male AECF accessions. Since female and male AECF accessions have similar qualifications, it seems unlikely that gender differences in quality of accessions can explain differences in attrition rates.

Figure 3 shows post-bootcamp, pre-fleet loss rates (conditional on having completed bootcamp) for women and men in the group promised AECF ratings between 1995 and 2014.[8] The figure shows that female loss rates exceed male loss rates in each period; female Navy loss rates are 20 to 50 percent higher than male loss rates.

[6] Over the FY 2014–2016 period, the 16-month average broke out into about 17.4 months for FCs, 19.7 months for FC-Aegis Sailors, and 13.2 months for ETs. Taken together with time in bootcamp, we calculate that the average time from accession to the fleet for these Sailors is about 18 months.

[7] In addition to high AFQT scores, the Navy requires AECF accessions to have either a high school diploma or GED certificate, which is a more restrictive education requirement compared with other Navy ratings. AECF accessions also have a relatively long six-year service obligation.

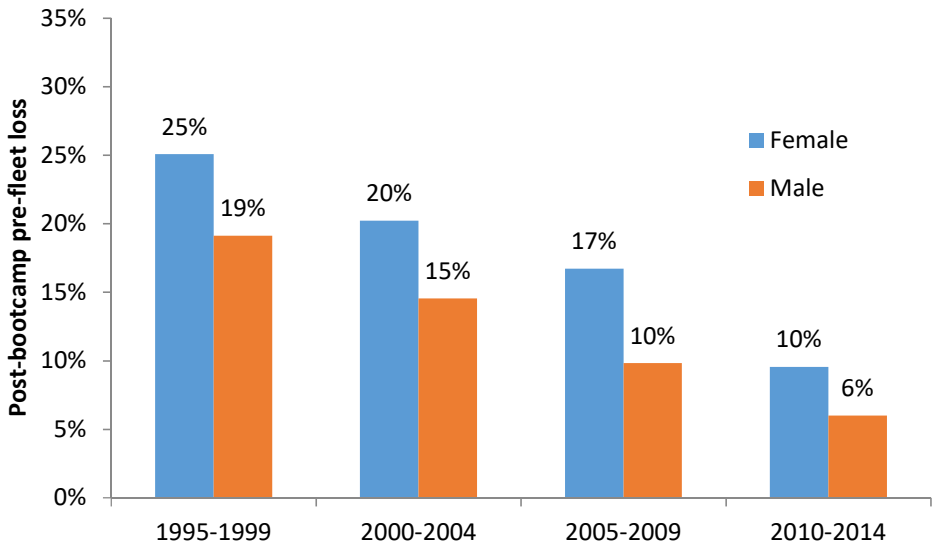
[8] These conditional loss rates (meaning conditional on the Sailor having completed bootcamp) are different from the unconditional loss rates presented in Table 3, columns 1 and 2.

Table 7. Average AFQT scores, all accessions and AECF accessions, FY 1995-2014

Accession FY group	All accessions				AECF			
	Female		Male		Female		Male	
	No.	Avg. score	No.	Avg. score	No.	Avg. score	No.	Avg. score
1995–1999	41,351	57.2	197,046	60.1	2,220	80.7	13,173	79.5
2000–2004	40,032	57.5	185,973	59.6	1,329	80.4	8,384	79.8
2005–2009	34,579	60.5	148,982	64.4	1,579	80.7	7,208	78.5
2010–2014	41,441	63.9	138,409	69.8	2,066	81.8	7,068	80.0

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

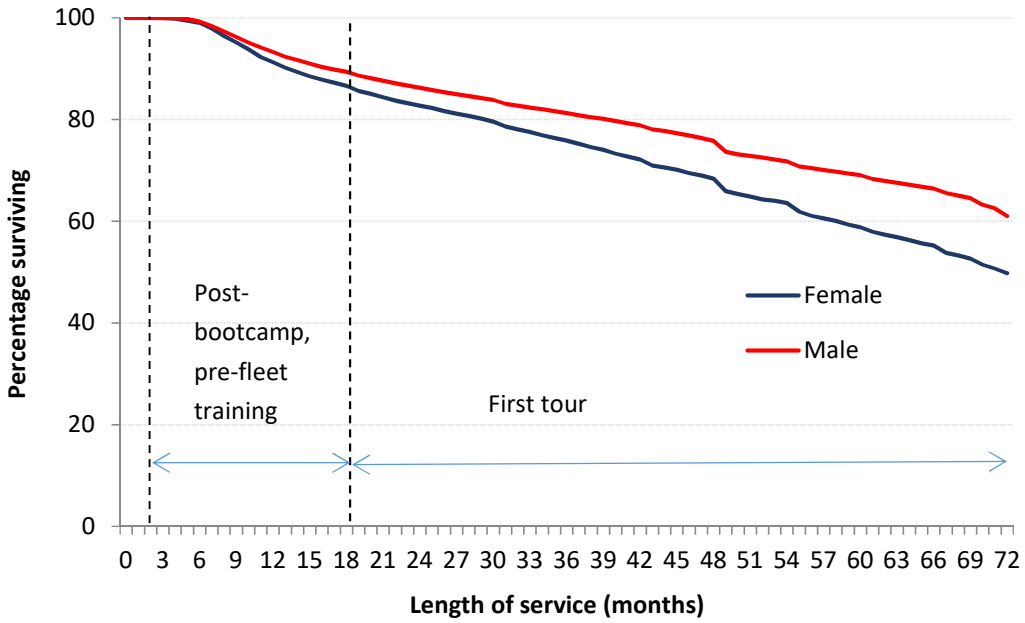
Figure 3. AECF post-bootcamp, pre-fleet Navy loss rates, FY 1995-2014 accessions



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

One potential explanation for higher-than-average post-bootcamp, pre-fleet loss rates in particular fields (such as AECF) could have to do with the length of the training pipeline. In fields with longer training pipelines, losses may occur during the pre-fleet stage that would have occurred after reaching the fleet had the Sailor entered a field with a shorter training pipeline. To investigate this possibility, we construct survival curves. A survival curve shows the percentage of Sailors who remain in the Navy—in the training pipeline, or in the first fleet tour—as a function of time since enlistment. Figure 4 shows the survival curve for female and male bootcamp completers in the AECF rating.

Figure 4. Male and female survival curves for AECF-promised accessions who completed bootcamp

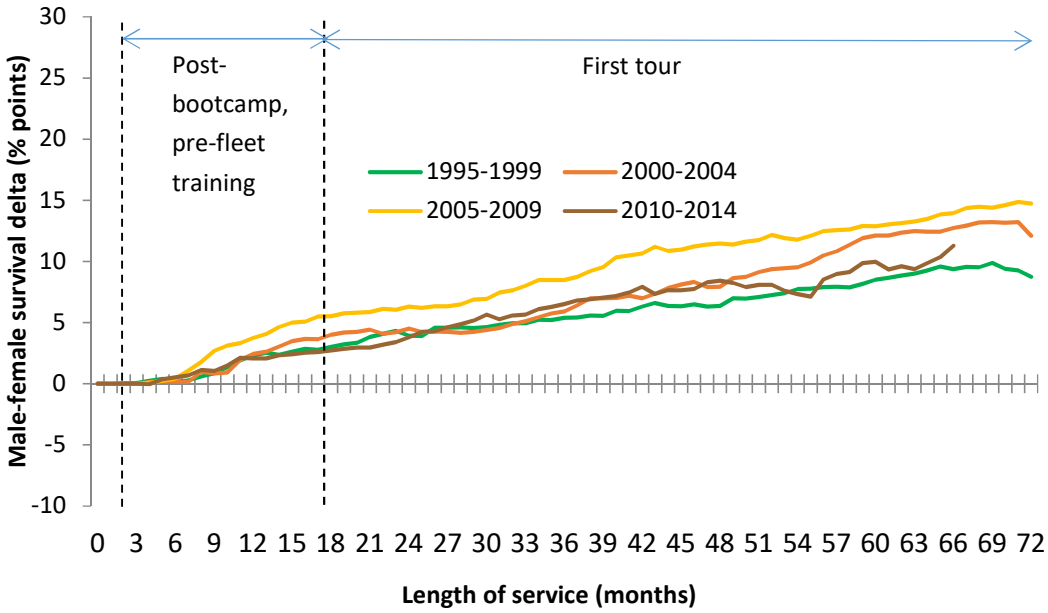


Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2014 AECF accessions who completed bootcamp.

Figure 4 confirms that female losses begin to exceed male losses during the post-bootcamp, pre-fleet period (about 2 to 18 months after enlistment in the case of AECF; the gap between men and women appears to open up at about 7 to 8 months of service). At the end of the pre-fleet training period, at about 18 months of service, 87 percent of women in the AECF rating who cleared bootcamp remain in the Navy, compared with 89 percent for men. This pattern continues into the first tour period (approximately 18 to 72 months), by the end of which 51 percent of enlisted women remain in the Navy compared with 61 percent of men. To take a closer look at differences in female and male survival rates over time during this part of the career, Figure 5 plots the difference (delta) in female-male survival percentages for four subperiods (1995–1999, 2000–2004, 2005–2009, and 2010–2014), derived from the survival curves graphed in Figure 4.[9]

[9] As before (see footnote 6), we include only the years 2010–2014 in the last period because many accessions in subsequent years are still in the pipeline, and their ultimate outcome was unknown at the time this report was prepared.

Figure 5. Male-female survival deltas for AECF-promised accessions who completed bootcamp, by accession FY group



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2014 AECF accessions who completed bootcamp.

Figure 5 shows that men have a higher survival rate (meaning a higher retention rate) than women in each of the individual subperiods. This gap between male and female survival rates at first increases across cohorts (for the first three cohorts), but then decreases for the last cohort. The gap increased from the 1995–1999 accession cohort to the 2000–2004 cohort, and again from the 2000–2004 cohort to the 2005–2009 cohort. For the 2010–2014 accession cohort, however, the male-female survival rate gap fell back closer to the levels observed for the 2000–2004 cohort. The figure also indicates that the gap begins to open in the post-bootcamp, pre-fleet training phase (again, at about 7 to 8 months of service) and increases through the first-term, first-tour phase of a Sailor's career.

Nuclear Field

The Navy's NF program trains accessions as nuclear propulsion plant operators and technicians. NFs perform operations and basic preventive maintenance of propulsion plant mechanical systems, support systems, turbines, pumps, valves, electrical distribution systems, motors and controllers, electrical generators, lighting systems,

alarm and indicating systems, machinery vibration analysis equipment, throttle control systems, electronic equipment used for reactor control, rod control, protection and alarm systems, primary plant instrumentation, nuclear instrumentation, primary plant control, steam generator water level control, and other electrical and electronic support equipment. The training pipeline for NFs is quite long. In recent fiscal years, the post-bootcamp average time to train for completers was about 24 months.[10, 11]

Unlike AECF, the female share of NF-promised accessions is substantially less than the female share of all accessions, as Table 8 shows.[12]

Table 8. Female share of accessions, all ratings and NF-promised, FY 1995–2014 accession groups

Accession FY group	All ratings		NF	
	Accessions	Percentage female	Accessions	Percentage female
1995–1999	238,397	17%	15,772	9%
2000–2004	226,005	18%	12,668	8%
2005–2009	183,561	19%	11,818	9%
2010–2014	179,850	23%	14,443	8%

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Accessions promised NF ratings are also highly qualified. Table 9 shows average AFQT scores for those entering NF compared with all accessions. Like AECF, test scores for those promised NF ratings are typically 30 points higher than the average for all accessions. Average scores for NF men and women are virtually identical.

[10] This varies slightly across nuclear subspecialties. For example, in FY 2014 to FY 2016, Sailors who completed Electrician's Mate, Nuclear (Surface) (EMNUCSW) training took an average of about 25 months, while Sailors who completed Machinist's Mate, Nuclear (Surface) (MMNUCSW) training took an average of about 23 months. Note also that total time from accession to reaching the fleet is about 26 months.

[11] NF accessions have very strict educational requirements (Sailors must have a high school degree) and have 6-year service obligations, as do AECFs.

[12] One reason for the smaller fraction of women in the NF rating is that many NF billets are on submarines, unlike AECF in which the sea billets are all located on surface vessels.

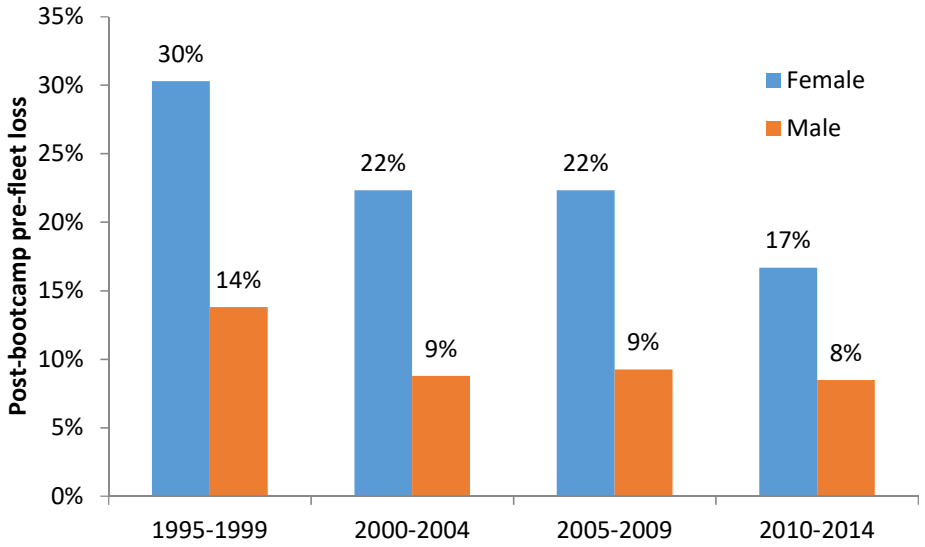
Table 9. Average AFQT scores, all accessions and NF-promised, FY 1995–2014 accession groups

Accession FY group	All accessions				NF			
	Female		Male		Female		Male	
	No.	Avg. score	No.	Avg. score	No.	Avg. score	No.	Avg. score
1995–1999	41,351	57.2	197,046	60.1	1,356	88.6	14,416	89.1
2000–2004	40,032	57.5	185,973	59.6	1,017	89.4	11,651	88.9
2005–2009	34,579	60.5	148,982	64.4	1,084	89.0	10,734	89.4
2010–2014	41,441	63.9	138,409	69.8	1,132	91.4	13,311	91.2

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Figure 6 shows post-bootcamp, pre-fleet loss rates for female and male accessions promised NF ratings between 1995 and 2014. The loss rate for women is about double that for men throughout the two-decade period.

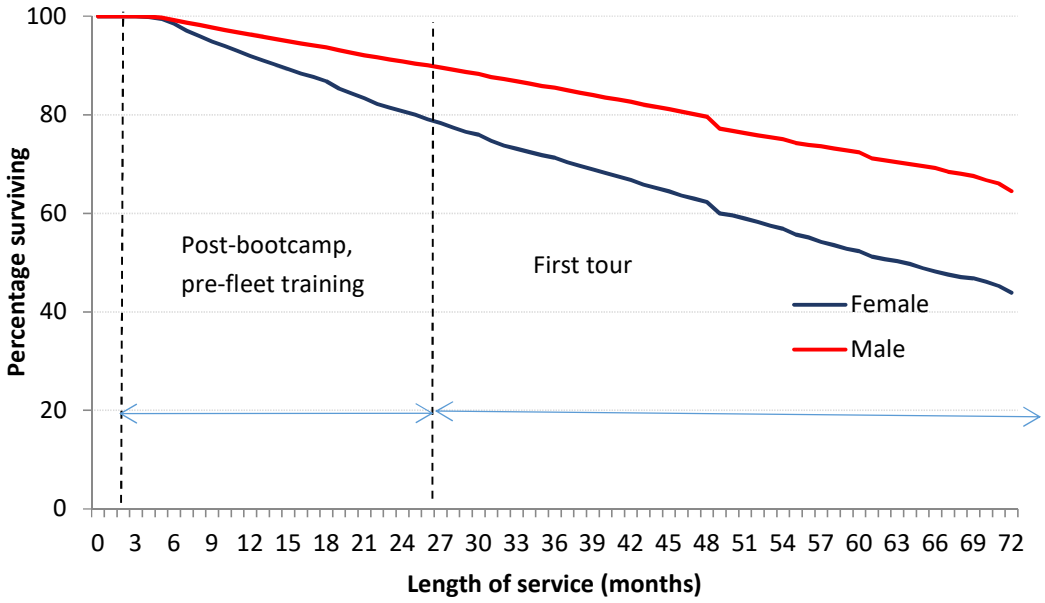
Figure 6. NF post-bootcamp, pre-fleet Navy loss rates, FY 1995–2014 accession groups



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

We estimate survival curves for men and women in the NF field (Figure 7).

Figure 7. Male and female survival curves for NF-promised accessions who completed bootcamp

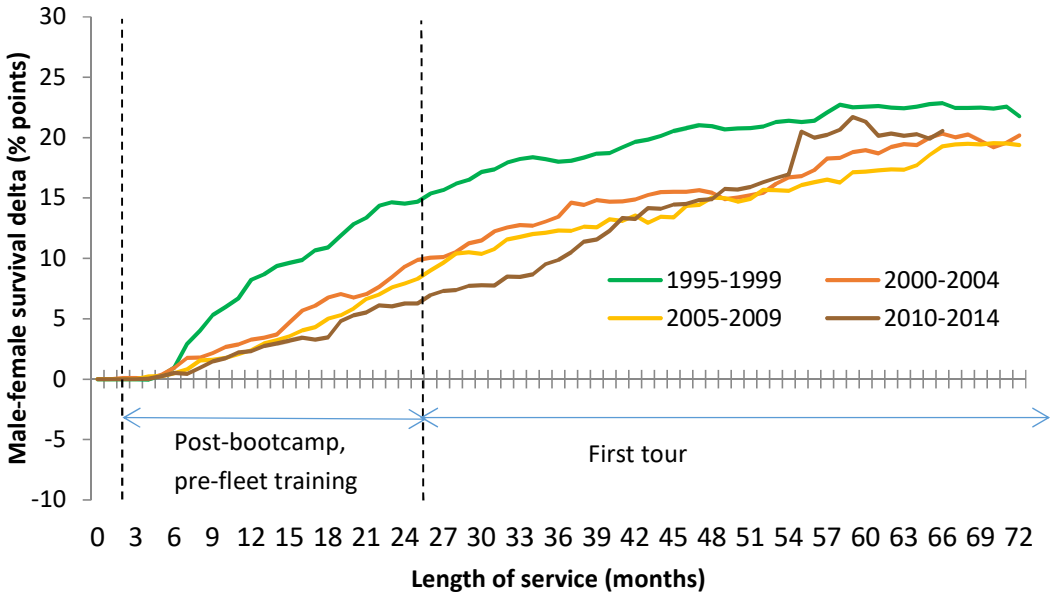


Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2016 NF accessions who completed bootcamp.

Figure 7 shows that a substantial gap between male and female survival rates begins to appear during the post-bootcamp, pre-fleet training period (about the 6th or 7th month of service). By the end of the pre-fleet training period (which occurs at about 26 months, approximately 8 months longer than the AECF pre-fleet training phase), the female survival rate (78.1 percent) is about 12 percentage points below the male rate (90 percent). The gap continues to grow after Sailors have reached the fleet; by 72 months of service, only 44 percent of female NFs who originally enlisted remain in the Navy compared with 64 percent for men.

Figure 8 shows differences in male-female survival rates for the NF rating, broken down by subperiod. The figure confirms that for all accession FY groups, the female NF survival rate begins to fall behind the male rate during the post-bootcamp, pre-fleet training period, at about 6 months of service, and falls further behind all throughout the first-term, first-tour phase. The gap between men's and women's survival rates is largest during the earliest subperiod, 1995–1999, and tends to fall in subsequent periods (except for the last period, 2010–2014, after about 40 to 50 months of service, where the gap increases above those of the previous periods).

Figure 8. Male–female survival deltas for NF-promised accessions who completed bootcamp, by accession FY group



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2014 NF accessions who completed bootcamp.

Cryptologic Technician

CTs perform a variety of duties, including collection, analysis, and reporting on communication signals using computers, video display terminals, and specialized computer-assisted communication equipment. Of the eight cryptology subspecialties, one in particular, Cryptologic Technician (Technical) (CTT), is associated with higher post-bootcamp, pre-fleet loss rates for women (see the appendix for details). Therefore, we focus on CTTs.

CTTs operate systems for electronic intelligence receiving and direction finding, digital recording devices, analysis terminals, and associated computer equipment. The average post-bootcamp time to train for CTTs is about 9.4 months, a shorter pipeline than those of AECF or NF.

Table 10 shows the percentage of accessions promised the CTT rating who are women. For CTT, the percentage of women is at or above the level for all accessions.

Table 10. Female share of accessions, all promised ratings and CTT-promised, 1995–2014

Accession FY group	All ratings		CTT	
	Accessions	Percentage female	Accessions	Percentage female
1995–1999	238,397	17%	583	18%
2000–2004	226,005	18%	711	24%
2005–2009	183,561	19%	1,667	26%
2010–2014	179,850	23%	1,615	22%

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

CTT-promised accessions have higher than average AFQT scores, as shown in Table 11. Men outscore women in the CTT rating, but these male-female differences in test scores have become smaller in recent years.

Table 11. Average AFQT scores, CTT rating, 1995–2014

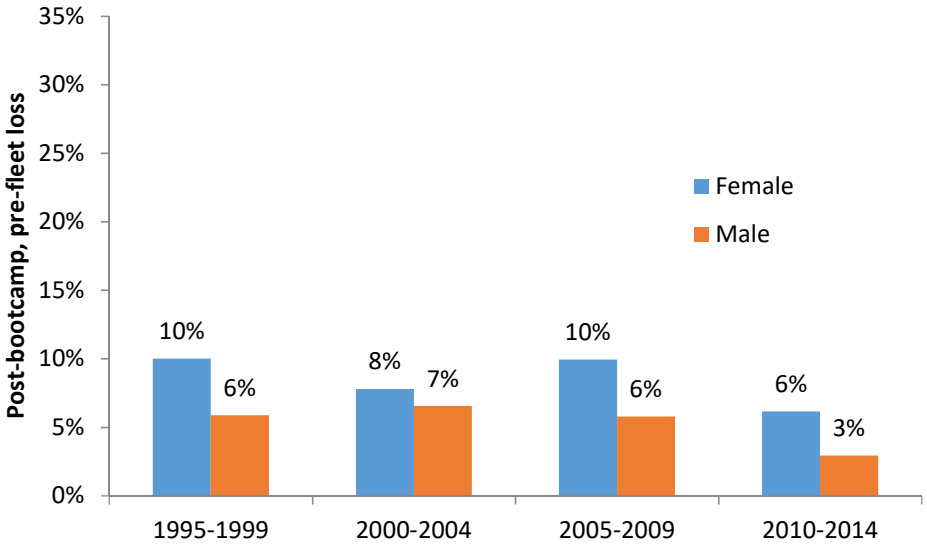
Period	All accessions				CTT			
	Female		Male		Female		Male	
	No.	Avg. score	No.	Avg. score	No.	Avg. score	No.	Avg. score
1995–1999	41,351	57.2	197,046	60.1	104	74.9	479	78.0
2000–2004	40,032	57.5	185,973	59.6	174	71.7	537	73.1
2005–2009	34,579	60.5	148,982	64.4	427	70.6	1,240	73.9
2010–2014	41,441	63.9	138,409	69.8	351	73.5	1,264	74.3

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Figure 9 shows the gap between post-bootcamp, pre-fleet loss rates for men and women who were promised the CTT rating between 1995 and 2014.

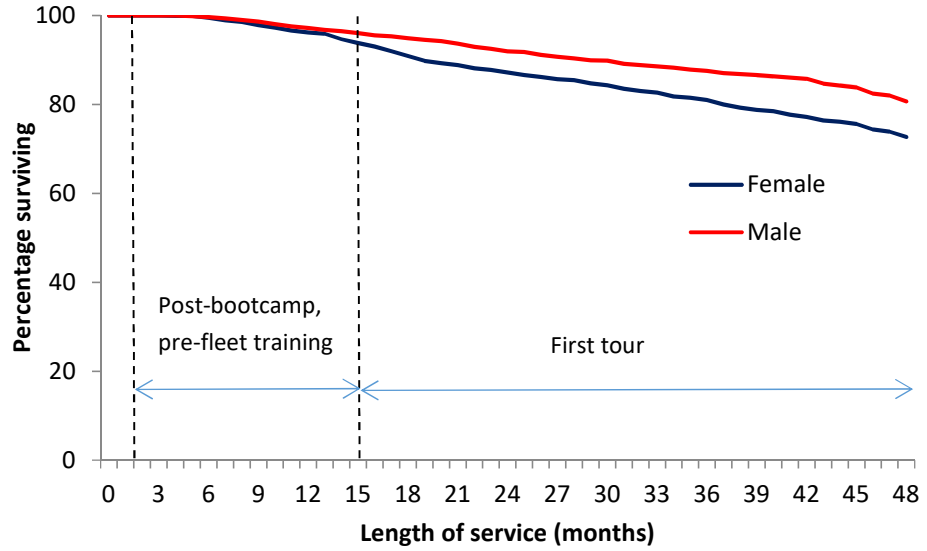
Figure 10 and Figure 11 show survival curves and male-female survival deltas for the CTT rating. For CTT, a small gap between male and female survival rates begins to open up after 6 months or so of service. A more substantial gap appears after about 13 months of service and continues to grow into the first-tour period after Sailors have reached the fleet.

Figure 9. CTT post-bootcamp, pre-fleet Navy loss rates, aggregated periods 1995–2014



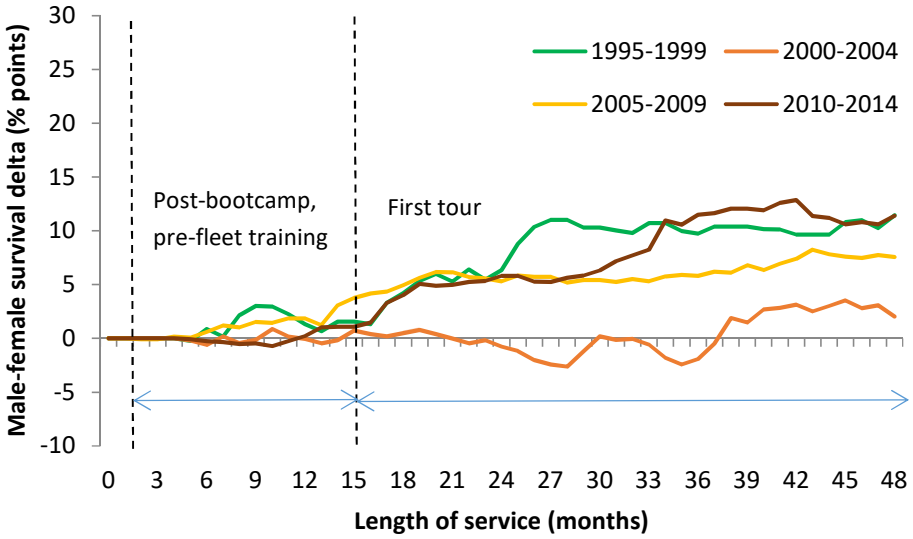
Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Figure 10. Male and female survival curves for CTT-promised accessions who completed bootcamp



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2016 CTT accessions who completed bootcamp.

Figure 11. Male–female survival deltas for CTT-promised accessions who completed bootcamp, by accession FY group



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2016 CTT accessions who completed bootcamp.

Male–female loss rate differences in other ratings

For purposes of comparison, we also consider post-bootcamp, pre-fleet loss rates for other ratings. We look at Hospital Corpsman (HM) as an example of a female-intensive (and also shore-intensive) rating and at Machinist's Mate (MM) and Operations Specialist (OS) as examples.

Female-intensive rating: HM

HMs assist health care professionals in providing medical care to naval personnel and their families. They may serve as clinical or specialty technicians, medical administrative personnel, and health care providers at medical treatment facilities. They also serve as battlefield corpsmen with the Marine Corps, providing emergency medical treatment, including treatment in combat environments. The average length of the post-bootcamp, pre-fleet training pipeline across all HM subspecialties is about 8.5 months.

Historically, the female share in the HM rating has been higher than the Navy average. In the last decade or so, however, the proportion of women accessions promised the HM rating is about the same as the Navy average, as shown in Table 12. With the rising female share of accessions, more women are joining other ratings that have historically attracted lower shares of female accessions.

Table 12. Female share of accessions, all ratings promised and HM-promised, FY 1995–2014 accession groups

Accession FY group	All ratings		HM	
	Accessions	Percentage female	Accessions	Percentage female
1995–1999	238,397	17%	13,718	26%
2000–2004	226,005	18%	15,109	29%
2005–2009	183,561	19%	16,160	16%
2010–2014	179,850	23%	18,258	22%

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

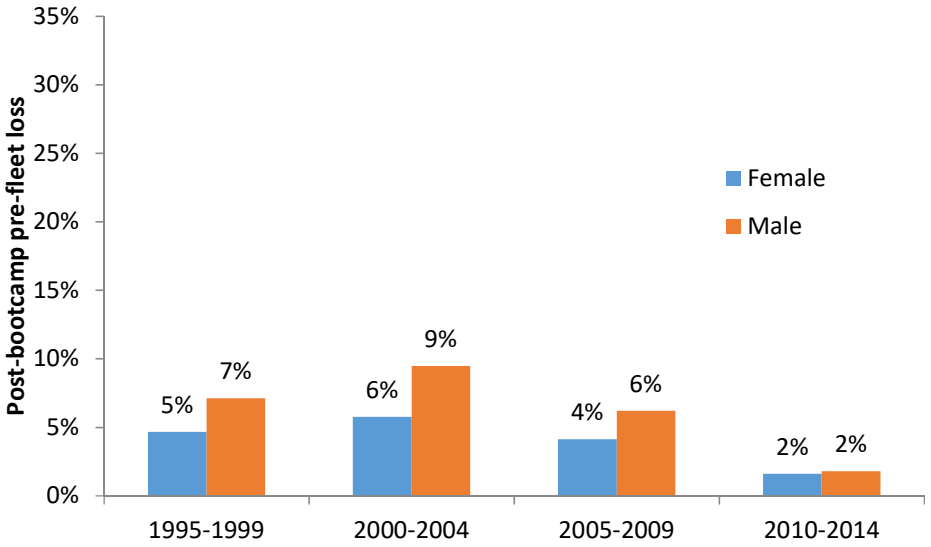
Table 13. Average AFQT scores, HM rating promised, 1995–2014

Period	All accessions				HM			
	Female		Male		Female		Male	
	No.	Avg. score	No.	Avg. score	No.	Avg. score	No.	Avg. score
1995–1999	41,351	57.2	197,046	60.1	3,610	60.5	10,108	60.6
2001–2005	40,032	57.5	185,973	59.6	4,332	58.9	10,777	59.9
2005–2009	34,579	60.5	148,982	64.4	2,650	57.7	13,510	60.7
2010–2014	41,441	63.9	138,409	69.8	4,008	66.7	14,250	69.6

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Figure 12 shows post-bootcamp, pre-fleet loss rates for men and women promised the HM rating between 1995 and 2014. There is no pattern of a higher loss rate for women. If anything, men promised this rating have tended to experience higher loss rates than have women.

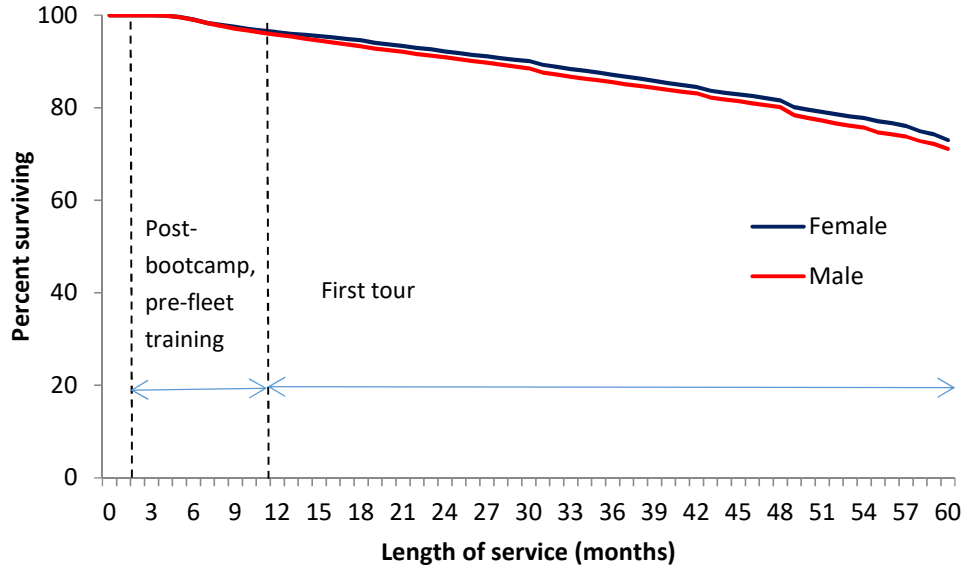
Figure 12. HM post-bootcamp, pre-fleet Navy loss rates, FY 1995-2014 accession groups



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

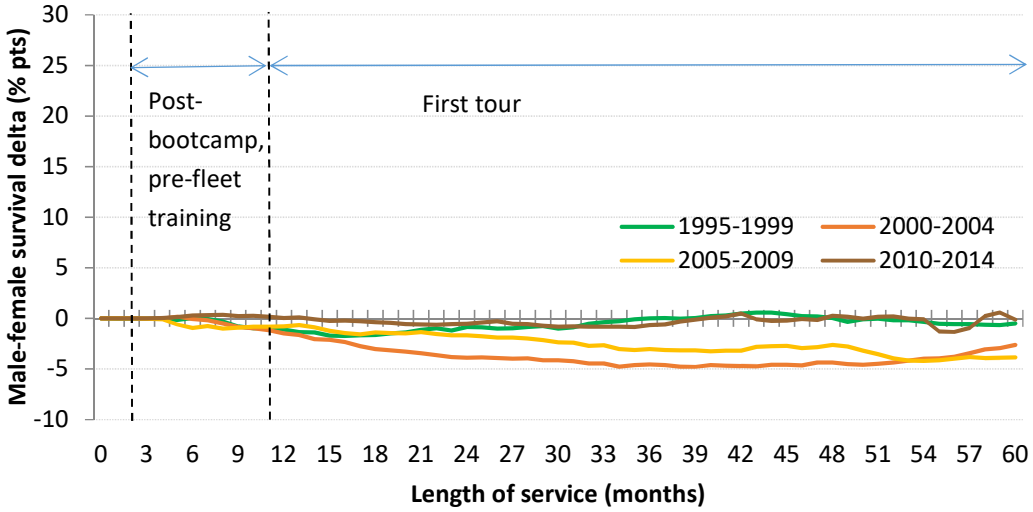
Figure 13 shows overall survival curves, and Figure 14 shows differences in male and female survival rates for HM-promised accessions who completed bootcamp as a function of length of service. The pattern of male-female survival rate differences is very different for HM compared with AECF, NF, CTT, and Cryptologic Technician (Maintenance) (CTM). For the HM rating, gender differences in the survival rate are relatively small, especially during the earliest subperiod (1995–1999) and the most recent one (2010–2014). Also, to the extent there are differences, women tend to have higher survival rates in the HM rating (the delta curves mostly fall below the y-axis), in contrast to AECF, NF, and CTT/CTM.

Figure 13. Male and female survival curves for HM-promised accessions who completed bootcamp



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2016 HM accessions who completed bootcamp.

Figure 14. Male–female survival deltas for HM-promised accessions who completed bootcamp



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2014 HM accessions who completed bootcamp.

Other sea-intensive ratings: MM and OS

Machinist's Mates operate and maintain steam turbines and reduction gears used for ship propulsion and auxiliary machinery, such as turbo generators, pumps, and oil purifiers. They also maintain auxiliary machinery outside main machinery spaces, such as electrohydraulic steering engines and elevators, refrigeration plants, air-conditioning systems, and desalinization plants. They may also operate and maintain compressed-gas-producing plants. The training pipeline for MMs is relatively short, about 5.5 months. Over a 20-year career, MMs typically spend about 70 percent of their time assigned to fleet units.

Operations Specialists serve as plotters, radio-telephone and Command and Control sound-powered telephone talkers; they maintain Combat Information Center (CIC) displays of strategic and tactical information, operate surveillance and altitude radars, and perform Air Traffic Control duties for helicopters and fixed-wing supersonic jet aircraft. The OS training pipeline is about 4 months long, and OSs typically spend about 60 percent of their time at sea.

Table 14. Female share of accessions, all ratings promised and MM and OS ratings promised, FY 1995–2014 accession groups

Accession FY group	All ratings		MM		OS	
	Accessions	% female	Accessions	% female	Accessions	% female
1995-1999	238,397	17%	3,823	9%	5,805	15%
2000-2004	226,005	18%	3,500	7%	4,078	19%
2005-2009	183,561	19%	4,119	19%	4,456	27%
2010-2014	179,850	23%	3,524	32%	3,194	32%

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Table 15. Average AFQT scores, MM and OS ratings promised, 1995–2014

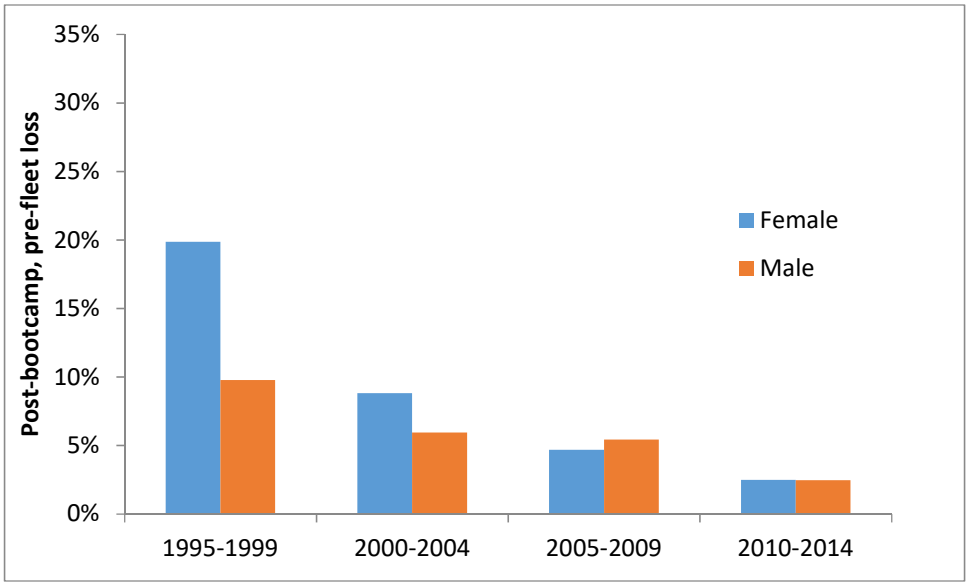
Period	Female		Male	
	No.	Avg. score	No.	Avg. score
All accessions				
1995–1999	41,351	57.2	197,046	60.1
2000–2004	40,032	57.5	185,973	59.6
2005–2009	34,579	60.5	148,982	64.4
2010–2014	41,441	63.9	138,409	69.8
MMs				
1995–1999	358	63.4	3,465	56.0
2000–2004	243	51.3	3,257	49.9
2005–2009	765	51.4	3,354	54.8

Period	Female		Male	
	No.	Avg. score	No.	Avg. score
2010–2014	1,119	54.2	2,405	60.0
OSs				
1995–1999	872	53.0	4,933	56.7
2000–2004	783	55.6	3,295	59.5
2005–2009	1,211	54.9	3,245	58.9
2010–2014	1,038	56.1	2,156	60.9

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Figure 15 shows post-bootcamp, pre-fleet loss rates for the MM rating. For this rating, female post-bootcamp, pre-fleet loss rates were somewhat higher than male loss rates during the 1990s. Since then, loss rates have decreased for both women and men, and the gap between the rates has disappeared.

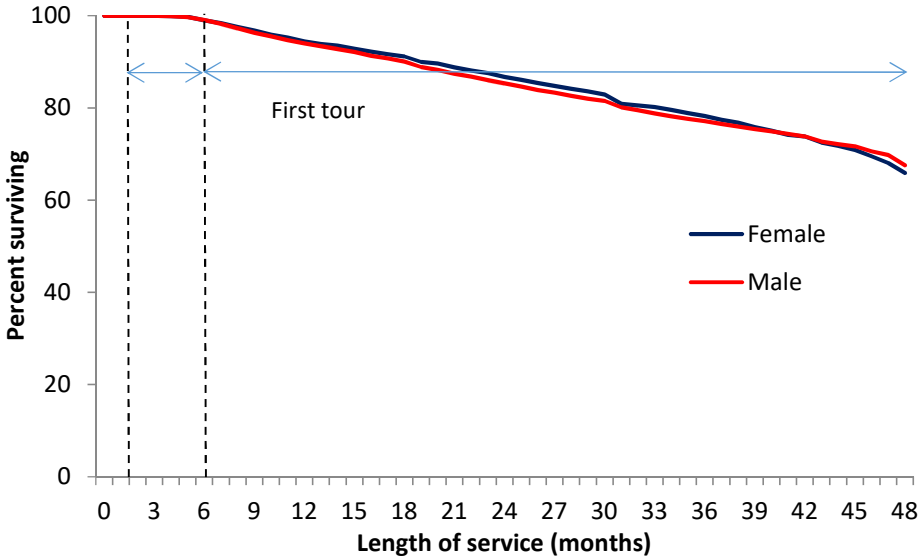
Figure 15. MM post-bootcamp, pre-fleet Navy loss rates, aggregated periods 1995-2014



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

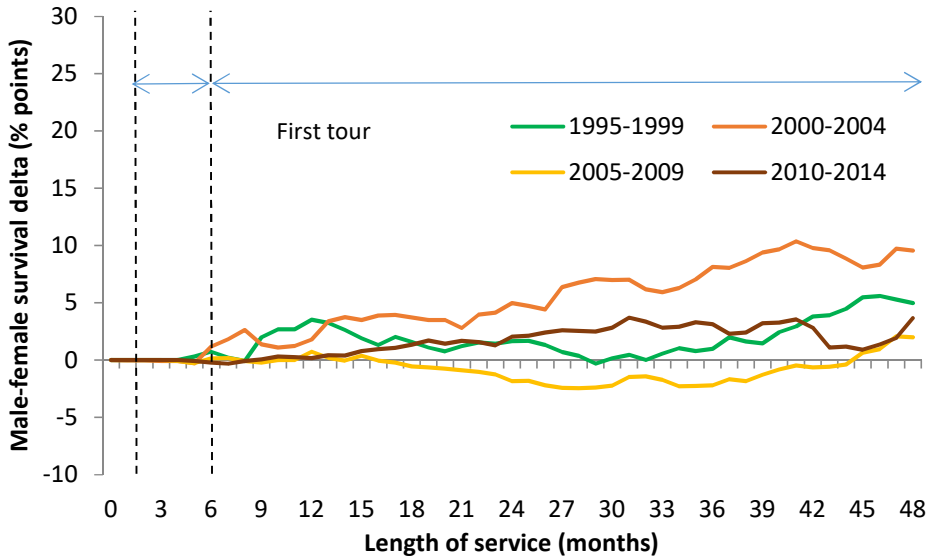
Figure 16 shows overall survival curves, and Figure 17 shows differences in male and survival rates for the MM rating, as a function of service length. For the MM rating, these differences are relatively small, although the female survival rate after reaching the fleet was somewhat lower than the male rate during the 2000–2004 subperiod.

Figure 16. Male and female survival curves for MM-promised accessions who completed bootcamp



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2014 MM accessions who completed bootcamp.

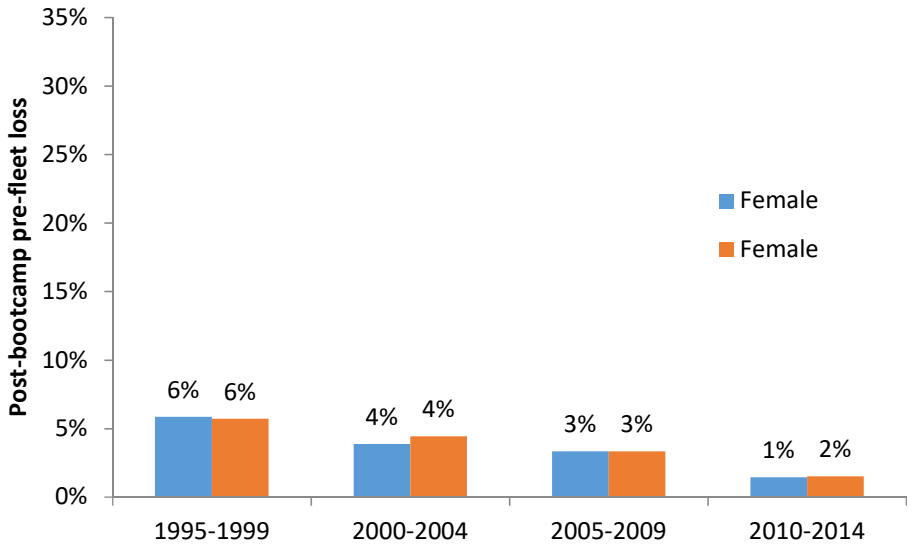
Figure 17. Male–female survival deltas for MM-promised accessions who completed bootcamp



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2014 MM accessions who completed bootcamp.

Figure 18 shows post-bootcamp, pre-fleet loss rates for the OS rating. For OSs, loss rates are low, and there is not much of a gender gap throughout the 1995–2014 period.

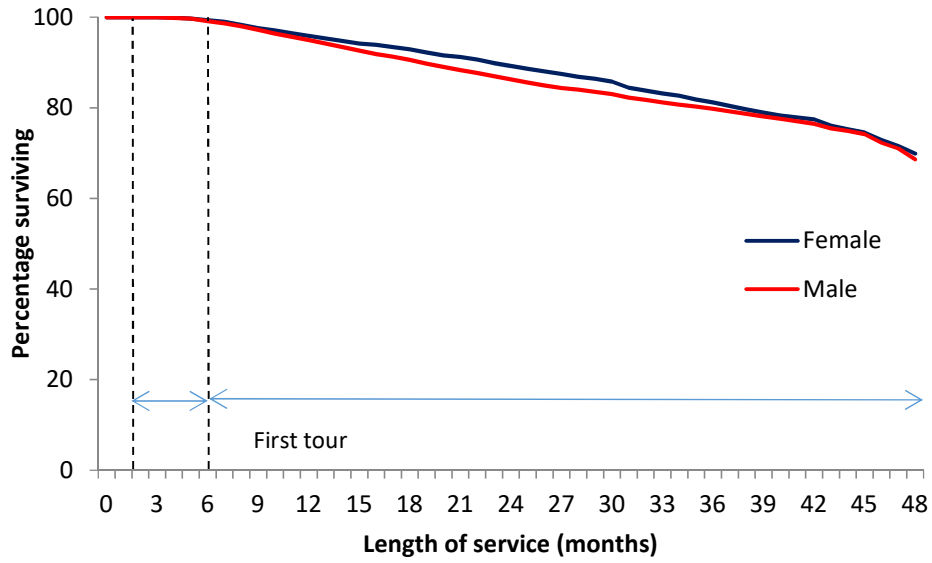
Figure 18. OS post-bootcamp, pre-fleet Navy loss rates, aggregated periods 1995-2014



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

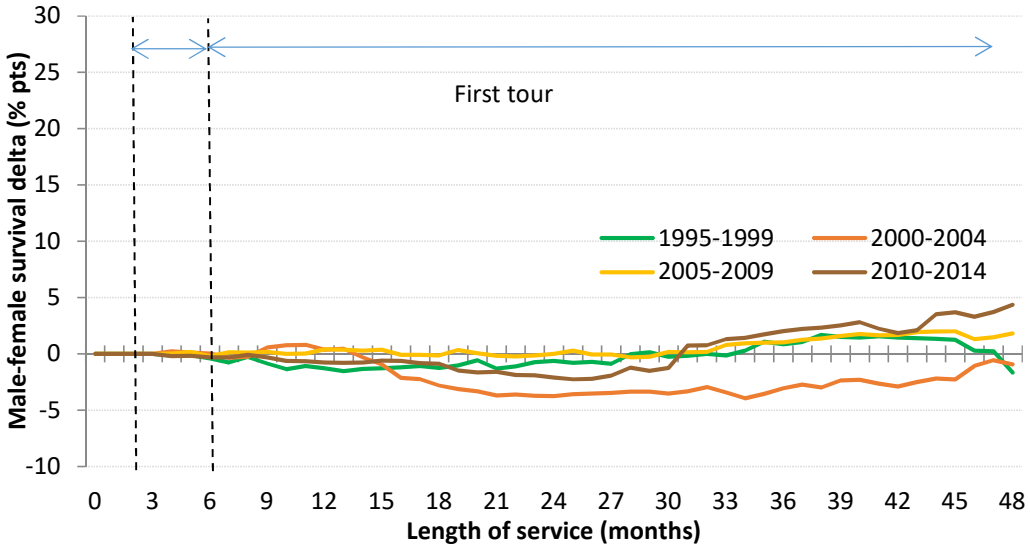
Figure 19 shows overall survival curves, and Figure 20 shows differences in male and survival rates for the OS rating, as a function of service length. For the OS rating, these differences are relatively small and are not consistently positive or negative. In other words, female survival rates in OS are not consistently lower than those of men, unlike fields such as AECF or NF.

Figure 19. Male and female survival curves for OS-promised accessions (post-BC)



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2014 OS accessions who completed bootcamp.

Figure 20. Male–female survival deltas for OS-promised accessions (post-BC)



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
Note: Population is 1995–2014 OS accessions who completed bootcamp.

Summary

In this section, we examined post-bootcamp, pre-fleet loss rates and survival rates for highly technical Navy ratings—AECF, NF, CTT, and CTM—and displayed results for the HM, MM, and OS ratings for comparison. The analysis shows that the gap between female and male post-bootcamp, pre-fleet loss rates is not a general problem occurring in all ratings. Instead, the problem appears to be concentrated in the highly technical, high qualification ratings, including AECF, NF, CTM, and CTT, and it appears to begin during the post-bootcamp, pre-fleet training phase of a Sailor's career, after about 6 months of service. Although in some ratings (e.g. AECF) this gap between female and male attrition has closed over time, in others (including NF and CTM) the gap has persisted.

Factors Associated with Post-Bootcamp, Pre-Fleet Losses

To understand the gender differences in the loss rates outlined in the previous sections, we examine the relationship between entrance test scores and post-bootcamp, pre-fleet loss rates. We also examine the relationship among test scores, rating assignments, demographic and other factors, and post-bootcamp, pre-fleet loss rates. We then examine gender differences in the discharge category among the post-bootcamp, pre-fleet losses.

Test scores, rating reassignments, and demographic factors

We might expect that such factors as entrance test scores, rating reassignment patterns, type of discharge assigned, and demographic characteristics could be related to higher female post-bootcamp, pre-fleet loss rates. None of these factors, however, appears to be correlated with the probability of leaving the Navy in the post-bootcamp, pre-fleet period. For example:

- **Test score differentials.** ASVAB scores may be correlated with attriting from the training pipeline to which a Sailor is initially assigned.[13] However, we find that, among those who attrite from the Navy after bootcamp but before reaching the fleet, there does not appear to be a relationship between test scores and the estimated probability of leaving the Navy. See the appendix for details.

- **Rating reassignment patterns**. In these high test score ratings, a smaller share of women were reassigned to other training pipelines (versus leaving the Navy entirely). Of those accessions who do reach the fleet in ratings other than the one they are originally promised, the reassignment pattern does not appear to differ significantly between women and men.

[13] Table 2, Table 4 and Table 7 show that average AFQT scores are very similar for men and women in the high-qualification ratings that we examined. However, we do see gender differences in the effect of certain subtest scores on the probability of post-BC, pre-fleet attrition—particularly mathematical knowledge (MK) and arithmetic reasoning (AR) (see the appendix, Table 22).

- **Other than honorable discharges**. Women are not other than honorably discharged at higher rates than men (in fact, men have this outcome more often than women).
- **Other characteristics** of accessions, such as age, racial/ethnic background, and education level, do not appear to be associated with higher loss rates for women. See the appendix for more details.

Loss types

We then turned our attention to loss information about the post-bootcamp, pre-fleet attrites that could help us understand their reasons for leaving the Navy. We looked at loss codes assigned to attrites. Because of inconsistencies in the way these codes are assigned, however, caution should be used in drawing conclusions from them. Still, examining code assignment patterns may provide some insight into differences in the way the Navy uses these codes for women and men who leave the Navy.

We also looked at reenlistment quality codes (RQCs) associated with the post-bootcamp, pre-fleet losses. RQCs indicate whether a separating Sailor will be eligible to reenlist in the Navy or another military service in the future. For instance, separating Sailors may be ineligible to reenlist due to a medical condition or misbehavior. As an additional behavioral measure, RQCs also indicate the type of discharge earned by the separating Sailor: honorable, general, or less than honorable. By examining the RQCs, we approximate the share of post-bootcamp, pre-fleet losses due to poor behavior. RQCs may be more carefully and consistently assigned than the Navy loss codes because RQCs can have real consequences in the civilian sector. For example, potential employers may ask about the type of service discharge earned by the former servicemember on an employment application.

Navy loss codes

We proceed with calculating the percentage of those who did not reach the fleet, among those who completed bootcamp. By gender, we examine the distribution of loss codes over time to uncover which loss codes appear to be driving female–male differences in loss rates. We present findings for AECF, NF, CTT, and CTM ratings.

Table 16 shows the most important loss codes in terms of accounting for AECF female–male differences in who left the Navy after bootcamp but before going to the fleet between 1995 and 2014. Exploring the 1995–1999 results, for example, we see that there were a total of 2,653 accessions promised the AECF rating who left after bootcamp but before reaching the fleet: 460 women and 2,193 men. A total of 1,834 women and 11,463 men made it out of bootcamp during this period, so the overall

post-bootcamp, pre-fleet loss rate for the period was 25.1 percent for women and 19.1 percent for men, for a difference of 6.0 percentage points. "Medical" loss code accounts for 3.5 percentage points, or 57 percent of the 6.0-percentage-point difference between the female and male post-bootcamp, pre-fleet loss rate in the AECF rating. "Personality disorder" accounts for 2.9 percentage points, or 47 percent of the gap. "Parenthood" accounts for 1.3 percentage points, or 21 percent of the gap. "Pregnancy" accounts for 1.2 percentage points, or 20 percent of the gap. No other loss code accounts for more than half of a percentage point of the female–male gap. Notice that the proportion of the female-male loss rate gap accounted for by these four codes adds up to more than 100 percent. This is because there are other codes more likely to be assigned to men than women, including "Drugs," "Alcohol," "In lieu of court-martial (CM)," and "Other misconduct."

Across all years in Table 16, we find that, for the AECF rating:

- "Medical" losses contribute most to relatively high female loss ratios in each period.
- "Personality disorder" and "Pregnancy" are more important contributors to high female loss ratios in the earlier periods, but they become less important in the later ones.
- "Erroneous/defective entry" is a more important contributor at the later periods.[14]

[14] Erroneous/defective entry refers to (a) an accession who has been erroneously enlisted, reenlisted, extended, or inducted into a service component or to (b) nonfulfillment of member's service contract by the service component (commitments made at time of enlistment, extension, call-up, or recall to active duty) [6].

Table 16. Loss codes by gender, AECF rating

Loss code	Female		Male		Pct.-point differ-ence
	Post-BC, pre-fleet losses	Pct. of those who com-pleted BC	Post-BC, pre-fleet losses	Pct. of those who com-pleted BC	
	(1)	(2)	(3)	(4)	(2) - (4)
1995–1999					
Medical	118	6.4%	331	2.9%	3.5
Personality disorder	117	6.4%	395	3.4%	3.0
Parenthood	25	1.4%	---	0.0% [a]	1.4
Pregnancy	22	1.2%	0	0.0%	1.2
Total post-BC, pre-fleet losses	**460**	**25.1%**	**2,193**	**19.1%**	**6.0**
Total completed BC	**1,834**		**11,463**		
2000–2004					
Medical	77	6.8%	193	2.9%	4.0
Personality disorder	46	4.1%	184	2.7%	1.4
Pregnancy	9	0.8%	0	0.0%	0.8
Parenthood	6	0.5%	---	0.0% [a]	0.5
Total post-BC, pre-fleet losses	**228**	**20.2%**	**1,096**	**16.1%**	**4.1**
Total completed BC	**1,128**		**6,822**		
2005–2009					
Medical	74	5.5%	98	1.5%	4.0
Erroneous/defective entry	74	5.5%	150	2.3%	3.2
Personality disorder	33	2.5%	51	0.8%	1.7
Total post-BC, pre-fleet losses	**225**	**16.7%**	**650**	**9.8%**	**6.9**
Total completed BC	**1,346**		**6,619**		
2010–2014					
Medical	74	4.1%	96	1.5%	2.6
Erroneous/defective entry	51	2.8%	78	1.2%	1.6
Total post-BC, pre-fleet losses	**186**	**10.3%**	**398**	**6.1%**	**4.2**
Total completed BC	**1,811**		**6,501**		

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

[a.] Sample size is too small to report, and the percentage of the losses is non-zero but smaller than 0.0 percent.

Table 17 shows the important drivers of post-bootcamp, pre-fleet loss rates for women promised an NF rating. They remain fairly consistent over time and overlap with the AECF loss drivers:

- "Medical" is an important contributor in each period; it becomes the most important contributor in the two later periods.
- "Pregnancy" and "Parenthood" are also important contributors in each of the periods.
- "Personality disorder" is important in the earlier periods, but becomes less so in later periods.

Table 17. Loss codes by gender, NF rating

Loss code	Female		Male		Pct.-point differ-ence
	Post-BC, pre-fleet losses	Pct. of those who com-pleted BC	Post-BC, pre-fleet losses	Pct. of those who com-pleted BC	
	(1)	(2)	(3)	(4)	(2) - (4)
1995–1999					
Personality disorder	138	11.5%	501	3.8%	7.7
Pregnancy	66	5.5%	0	0.0%	5.5
Medical	57	4.7%	248	1.9%	2.8
Parenthood	28	2.3%	---	0.0%[a]	2.3
Total post-BC, pre-fleet losses	**365**	**30.3%**	**1,819**	**13.8%**	**16.5**
Total completed BC	**1,205**		**13,186**		
2000–2004					
Personality disorder	58	6.2%	239	2.2%	4.0
Medical	51	5.4%	176	1.6%	3.8
Pregnancy	33	3.5%	0	0.0%	3.5
Parenthood	28	3.0%	---	0.0%[a]	2.9
Total post-BC, pre-fleet losses	**209**	**22.3%**	**967**	**8.8%**	**13.5**
Total completed BC	**936**		**11,007**		
2005–2009					
Medical	77	8.1%	215	2.1%	6.0
Parenthood	27	2.8%	---	0.0%[a]	2.8
Pregnancy	25	2.6%	0	0.0%	2.6
Personality disorder	36	3.8%	217	2.2%	1.6
Total post-BC, pre-fleet losses	**212**	**22.3%**	**931**	**9.3%**	**13.0**

Loss code	Female		Male		Pct.-point differ-ence
	Post-BC, pre-fleet losses	Pct. of those who com-pleted BC	Post-BC, pre-fleet losses	Pct. of those who com-pleted BC	
	(1)	(2)	(3)	(4)	(2) - (4)
Total completed BC	**950**		**10,058**		
2010–2014					
Medical	105	10.4%	569	4.6%	5.8
Pregnancy	16	1.6%	0	0.0%	1.6
Parenthood	10	1.0%	---	0.0% [a]	1.0
Total post-BC, pre-fleet losses	**185**	**18.4%**	**1,143**	**9.2%**	**9.2**
Total completed BC	**1,007**		**12,415**		

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

[a.] Sample size is too small to report, and the percentage of the losses is non-zero but smaller than 0.0 percent.

Table 18 shows the loss codes contributing most to female post-bootcamp, pre-fleet loss rates for accessions promised the CTT rating. Because sample sizes are small, we present data for the entire accession FY period of 1995 to 2014 without breaking it into subperiods.

Table 18. Loss codes by gender, CTT rating, 1995 to 2014

Loss code	Females		Males		Pct.-point differ-ence
	Post-BC, pre-fleet losses	Pct. of those who com-pleted BC	Post-BC, pre-fleet losses	Pct. of those who com-pleted BC	
	(1)	(2)	(3)	(4)	(2) - (4)
Medical	58	4.1%	67	1.3%	2.8
Personality disorder	37	2.6%	88	1.7%	0.9
Total post-BC pre-fleet losses	**157**	**11.2%**	**397**	**7.7%**	**3.5**
Total completed BC	**1,407**		**5,164**		

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

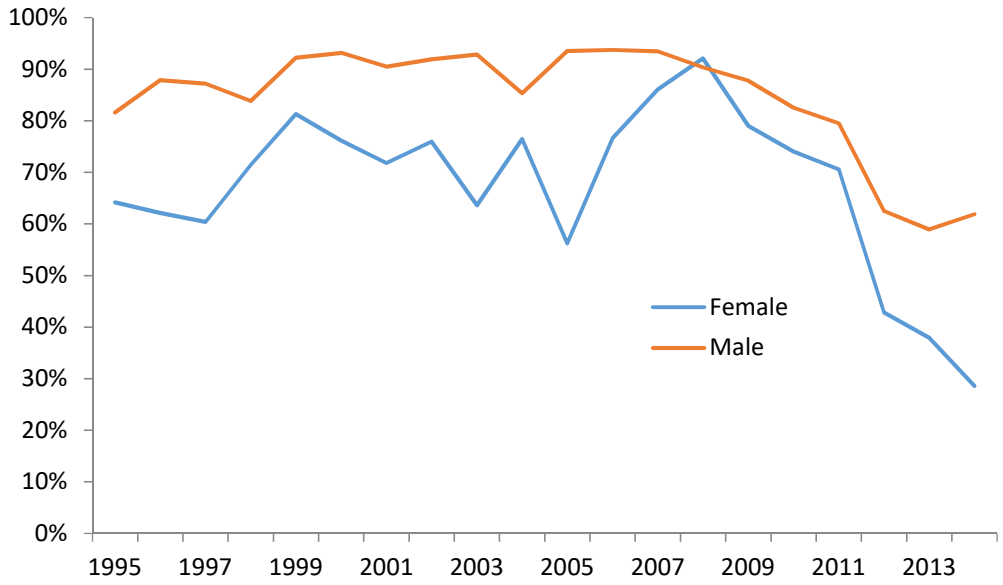
Again, the loss codes accounting for higher female loss ratios in this rating are "Medical" and "Personality disorder." Other loss codes appear infrequently for women (typically fewer than 10 over the 19-year period) and are more likely assigned to men.

Overall, then, in the AECF, NF, and CTT ratings, the "Medical" loss code is the biggest driver of higher female post-bootcamp, pre-fleet loss rates. "Personality disorder," "Pregnancy," and "Parenthood" codes also appear to be important contributors to female loss rates.

Reenlistment quality codes

To assess the degree to which specific behavioral issues may be associated with female-male gaps in initial training pipeline loss rates, we also examined the RQCs assigned to the post-bootcamp, pre-fleet losses. Of particular interest is the "Ineligible" code, which serves as a signal to other services not to allow the person assigned the code to reenlist. In general, individuals can be assigned the "Ineligible" code for medical or behavioral reasons, and those who have this code in their file may not reenlist in any service. Figure 21, Figure 22, and Figure 23 show the percentage of post-bootcamp, pre-fleet losses assigned the Ineligible RQC between 1995 and 2014 for the AECF, NF, and HM ratings.[15]

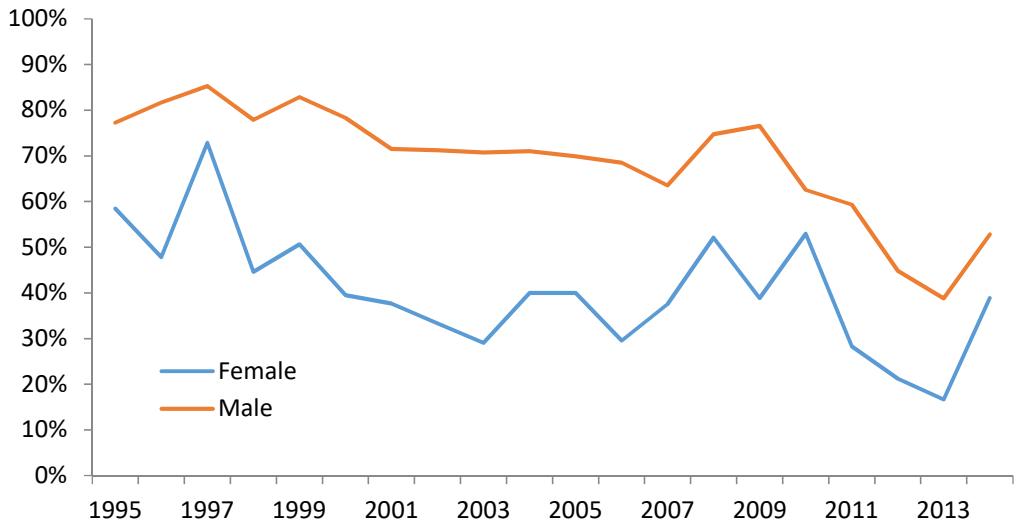
Figure 21. Percentage of post-bootcamp, pre-fleet losses assigned "ineligible" RQC, AECF rating, 1995–2014



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

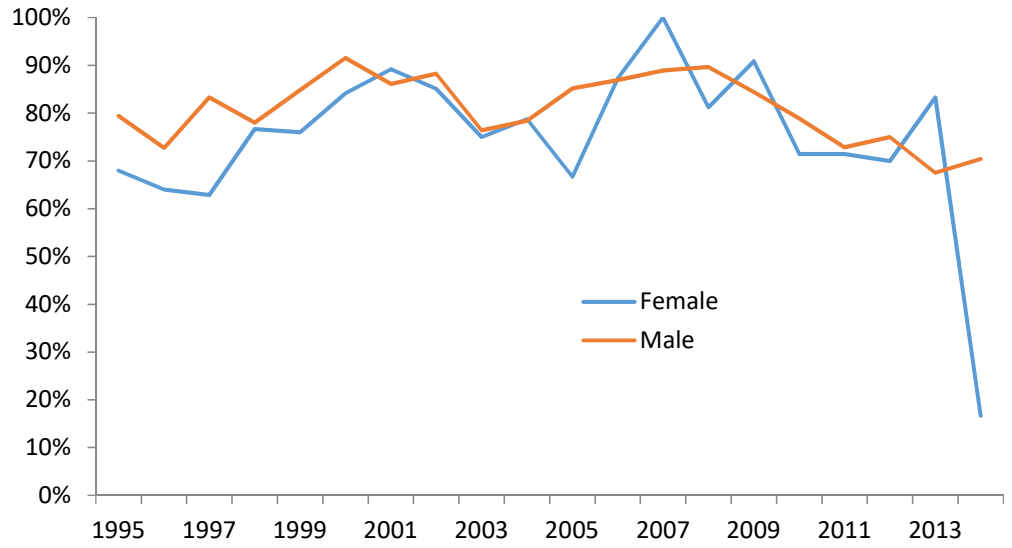
[15] We omit figures for CTT, CTM, and OS because of small sample sizes.

Figure 22. Percentage of post-bootcamp, pre-fleet losses assigned "ineligible" RQC, NF rating, 1995–2014



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

Figure 23. Percentage of post-bootcamp, pre-fleet losses assigned "ineligible" RQC, HM rating, 1995–2014



Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

The figures show that there is no tendency for women to be declared ineligible for reenlistment in other services at higher rates than men in the AECF and NF fields. In fact, men who leave the service after bootcamp but before reaching the fleet are more likely than women to receive this RQC in AECF and NF ratings. In contrast, ineligibility rates between men and women in the HM rating are fairly similar throughout the period. This suggests that higher loss rates for women in the AECF and NF ratings are not being driven by the kind of serious infractions that would result in an ineligibility determination.

Table 19 shows RQCs assigned to post-bootcamp, pre-fleet attrites promised the AECF rating during 1995 through 2014. The percentage of men assigned the "Ineligible" code exceeds that of women. In addition, Table 19 shows the percentage of post-bootcamp, pre-fleet attrites assigned three other RQCs: "Parent," "Condition," and "Physical disability." These codes indicate that the attrite is eligible for reenlistment except for the following disqualifying factors: parenthood/pregnancy/childbirth, condition (other than a physical disability) interfering with performance of duties, or physical disability, respectively.[16] In other words, there are no disqualifying factors for reenlistment other than the one stated. Women are more likely than men to be assigned these three codes.

Table 19. RQCs assigned to post-bootcamp, pre-fleet losses, AECF rating, 1995–2014[a]

Years	Post-BC, pre-fleet losses		RQC							
			Ineligible (total)		Parent		Condition		Physical disability	
	F	M	F	M	F	M	F	M	F	M
1995–1999	469	2,219	70%	89%	8%	0%	8%	3%	13%	8%
2000–2004	228	1,096	76%	92%	---[b]	0%	8%	3%	12%	4%
2005–2009	225	650	80%	92%	0%	0%	---[b]	---[b]	13%	4%
2010–2014	186	398	53%	72%	---[b]	0%	14%	8%	14%	5%

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.

a. We use "F" and "M" to designate "female" and "male," respectively.

b. Sample sizes (expressed as a percentage) are greater than zero but are too small to report.

[16] The official descriptions of these codes follow. *Parent:* "Eligible for reenlistment except for disqualifying factor: Parenthood/Pregnancy/Childbirth"; *Condition:* "Eligible for reenlistment except for disqualifying factor: Condition (not physical disability) interfering with performance of duty." *Physical disability:* "Eligible for reenlistment except for disqualifying factor: Physical disability." Enlistees are assigned the 3G "Condition" code for one of two sets of reasons: (1) A "condition, not a physical or mental disability which interferes with performance of duty (enuresis, motion sickness, allergy, fear of flying, etc.)"; or, (2) A "personality disorder…not amounting to a disability, which significantly impairs the member's ability to function effectively in the military environment"[6].

Table 20 displays the RQCs assigned to accessions promised the NF rating who leave the Navy after bootcamp but before reaching the fleet.

Table 20. RQCs assigned to post-bootcamp, pre-fleet losses, NF rating, 1995-2014[a]

Years	Post-BC, pre-fleet losses		RQC							
			Ineligible (total)		Parent		Condition		Physical disability	
	F	M	F	M	F	M	F	M	F	M
1995–1999	400	1,938	63%	82%	23%	0%	16%	12%	13%	10%
2000–2004	209	967	44%	75%	27%	---[b]	26%	20%	18%	11%
2005–2009	212	931	43%	71%	24%	0%	17%	16%	22%	11%
2010–2014	185	1,143	35%	61%	13%	0%	27%	31%	19%	10%

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
[a.] We use "F" and "M" to designate "female" and "male," respectively.
[b.] Sample sizes (expressed as a percentage) are greater than zero but are too small to report.

The pattern here is similar to that for AECF; a smaller share of women than men are assigned an "Ineligible" code, but a relatively larger proportion of women are assigned to the "Parent" and "Physical disability" categories. Between 1995 and 2004, more women than men are also assigned to the "Condition" category, but after 2005 the proportion of men and women assigned this code is about the same.

Table 21 shows the same information for the HM rating. Recall we find that HM had little to no female–male differences in post-bootcamp, pre-fleet loss rates and thus provides a possibly informative comparison to the other ratings.

Table 21. RQCs assigned to post-bootcamp, pre-fleet losses, HM rating, 1995-2014[a]

Years	Post-BC, pre-fleet losses		RQC							
			Ineligible (total)		Parent		Condition		Physical disability	
	F	M	F	M	F	M	F	M	F	M
1995–1999	165	662	70%	81%	---[b]	0%	14%	8%	15%	9%
2000–2004	238	957	84%	85%	---[b]	0%	6%	9%	5%	4%
2005–2009	96	766	85%	88%	0%	0%	7%	7%	7%	3%
2010–2014	56	233	61%	74%	0%	0%	21%	15%	11%	6%

Source: Authors' calculations from Navy Enlisted Street-to-Fleet Accession File.
[a.] We use "F" and "M" to designate "female" and "male," respectively.
[b.] Sample sizes (expressed as a percentage) are greater than zero but are too small to report.

For HMs, the pattern of RQC code assignments differs somewhat from the pattern for AECFs and NFs. The female–male gap between the proportion of attriters who are assigned the "Ineligible" RQC is smaller for HMs. Few female attriters are assigned to the "Parent" category, unlike the AECF and NF ratings. More women than men are assigned the "Physical disability" code.

In summary, analysis of RQC codes assigned to accessions in AECF and NF who leave the Navy after bootcamp but before reaching the fleet suggests that higher female attrition is associated with the "Parent" code, and the "Physical disability" code for AECFs and NFs, and also the "Condition" code for AECFs. This is not as true of the female HM-promised post-bootcamp, pre-fleet losses, who tend to be assigned RQCs in a pattern more similar to that of men.

Conclusions and Recommendations

Examination of Navy accession outcome data suggests that post-bootcamp, pre-fleet loss rates are higher for women than men in certain technical ratings. These ratings include AECF, NF, CTT, and CTM. Other ratings (e.g., HM, MM, and OS) do not display such a pattern of higher loss rates for women.

We found that differences in test scores, career, and demographic factors for women and men do not explain the gender differences in post-bootcamp, pre-fleet losses. Investigation of loss codes associated with these attriters shows that primarily the "Medical" loss code—and to a lesser extent the "Personality disorder," "Pregnancy," and "Parenthood" loss codes—appear to be assigned to women leaving AECF and NF at a higher rate than they are assigned to men. Moreover, RQC assignments in the AECF and NF ratings show substantial differences between men and women; women are less likely to be assigned the "Ineligible" code and more likely to be assigned the "Parent," "Physical disability," or "Condition" codes.

The relatively greater use of loss codes related to medical and physical disability for female attriters who successfully completed the physically rigorous bootcamp is puzzling. Similarly, the relatively greater use of the personality disorder loss code for women also raises questions. Based on these conclusions, we offer the following recommendations:

- **Review the code assignment process.** The Navy should take a closer look at how loss codes and RQCs are assigned. Do differences in the patterns of codes assigned to women and men reflect inconsistencies in the assignment process, or do they reflect real differences in the experiences of men and women as they try to navigate the training pipeline and reach the fleet? Talking to subject matter experts who assign the codes may reveal insights into how codes are assigned and whether there have been any changes over time in the assignment process that may not appear in formal program documentation.

- **Take steps to better understand differences in women's versus men's experiences in the training pipeline.** If loss code differences do reflect real differences between men's and women's experiences in the pipeline, then our results suggest that health-related (both physical and mental) and family-related issues may be important avenues for further investigation. Relevant questions could include the following: Is there a higher incidence of health or family-related issues among women than men? Or, are women who do face such issues treated differently from men who face the same issues? If so, why?

- **Review the decision-making processes for identifying problems in the training pipeline and reassignment.** Women are less likely than men to reach the fleet in a rating other than that originally promised. The Navy could take a closer look at the decision-making process that determines whether a person who has problems in a training pipeline is reassigned to another pipeline. How is the reassignment versus exit outcome determined, and are there differences in the way that these processes unfold for women compared with men?

Related literature on organizations outside the military might also provide some direction for further analysis and policy remedies.

- Pleskac et al. (2011) found that certain critical events influenced college students (both male and female) to drop out. These events included being recruited for a job, an unexpected bad grade, roommate conflicts, an adverse financial shock (such as lost financial aid or a sudden increase in living or tuition costs), or becoming clinically depressed [7]. Other studies, such as Lewin (2009), have cited the stress associated with college students having to balance education with work and family commitments [8].

- Hewlett et al. (2008) studied career trajectories of women with science, engineering, and technology credentials in the private sector. Some of the factors they cited as to why women drop out of these career paths include organizational cultures that are hostile to or isolate women, systems of risk and reward that tend to disadvantage women (who tend to be risk averse), extreme work pressures due to time-intensive jobs, and family pressures [9]. According to Barnett and Rivers (2017), women may also face harsher penalties than men when they face an adverse situation on the job [10].

The Navy also might try to find out more about accessions' experiences directly. If there are existing exit interviews or exit surveys taken from men and women who leave the Navy during the training pipeline, these could be examined to see if they provide any information about their reasons for leaving, differences in their experiences during training, and so forth. If such interviews and/or surveys do not exist, the Navy might consider establishing them. The Navy may also want to collect similar information from women and men who make it through the training process and to the fleet, to assess any differences in their training pipeline experiences that could be contributing to differential loss rates.

A detailed investigation in these areas will produce a better understanding of what drives female–male differences in post-bootcamp, pre-fleet losses and how to mitigate those differences.

Appendix: Regression Results

To support our investigation, we conduct regression analysis using a dataset of more than 400,000 accessions who completed bootcamp to identify factors that appear to be associated with post-bootcamp, pre-fleet losses among women. We used a linear probability model with a categorical variable (equal to 1 if the person left the Navy before reaching the fleet and 0 otherwise) as the dependent variable. Explanatory variables included age, gender, racial/ethnic background (black or Hispanic), educational background (years of education and highest degree attained), AFQT and ASVAB test scores, whether a person faced an academic or a nonacademic training setback, promised rating, and year dummy variables. We also included a set of gender interaction terms with the other explanatory variables so that we could identify variables that statistically significantly affect female loss rates. Note that we also checked our results by estimating an alternative specification—a logit model—and the results were substantively similar to the original linear probability model.

Table 22 summarizes the important results with respect to female–male differences. Very few of the explanatory variables exhibit any statistically significant differences between women and men in terms of post-bootcamp, pre-fleet loss rates. The exceptions are:

- **Ratings.** Results for the AECF, NF, CTT, and CTM ratings have already been discussed in the main body of this report. In addition, women in the Gas Turbine Systems Technician – Electrical (GSE) and Sonar Technician – Surface (STG) ratings are statistically significantly more likely to leave the Navy than are men in these ratings.

- **Test scores.** A small number of the test scores have effects that are statistically significantly different for men than for women. These include the Armed Forces Qualifications Test score, where a higher score is correlated with a higher loss rate, and the effect is larger for women. Also, the Armed Services Vocational Aptitude Battery scores for Mathematical Knowledge and Arithmetic Reasoning have differential effects for women and men.

- **Racial/ethnic background.** Blacks have lower loss rates overall compared with individuals from other ethnic groups, and the effect is larger for black women.

Table 22. Explanatory variables with statistically significant coefficient differences between women and men—linear probability model

Variable	Coefficient		Interpretation
	Male	Female	
Ratings			
NF - Nuclear Field	0.07	0.21	All of these ratings are associated with higher loss rates relative to comparison group (AC - Air Traffic Controlman), and the effect is larger for women in each case
GSE - Gas Turbine Systems Technician - Electrical	0.02	0.07	
AECF [ET, FC, DS] - Advanced Electronic Computer Field	0.09	0.14	
STG - Sonar Technician - Surface	0.07	0.12	
CTM - Cryptologic Technician - Maintenance	0.01	0.06	
CTT [EW] - Cryptologic Technician - Technical	0.03	0.08	
CM - Construction Mechanic	0.00	0.03	
GM [TM] - Gunner's Mate	0.04	0.07	
EM - Electrician's Mate	0.01	0.04	
AO - Aviation Ordnanceman	0.00	0.02	
CE - Construction Electrician	-0.02	0.02	
SH - Ship's Serviceman	-0.02	0.00	
Test scores			
AFQT score	0.0001	0.0016	Higher AFQT score is correlated with higher loss rate, and the effect is larger for women
ASVAB - Mathematical Knowledge	-0.0012	-0.0024	Higher ASVAB MK score is correlated with lower loss rate, and effect is larger for women
ASVAB - Arithmetic Reasoning	0.0008	-0.0010	Higher ASVAB AR score is correlated with higher loss rate for men, but lower loss rate for women
Black	-0.01	-0.02	Blacks have lower loss rates, and the effect is larger for black women

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