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**THESIS**

**THE IMPACT OF DEMOGRAPHICS AND MILITARY FACTORS  
AFFECTING RETENTION RATES OF FEMALE AND MALE  
OFFICERS IN THE SURFACE WARFARE AND RESTRICTED  
LINE COMMUNITIES**

by

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June 2005

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**THE IMPACT OF DEMOGRAPHICS AND MILITARY FACTORS AFFECTING  
RETENTION OF FEMALE AND MALE OFFICERS IN THE SURFACE  
WARFARE AND RESTRICTED LINE COMMUNITIES**

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## **ABSTRACT**

This study will analyze factors that affect retention of male and female officers with specific emphasis on the surface warfare and restricted line communities. The research will examine whether family influence, dependent status, accession source and undergraduate major are differentially related to retention by gender and community. This study will evaluate these officers from date of commissioning to the 10-year point in an effort to derive factors related to retention after reaching a major career milestone. A logistic regression model will be used as the analytic strategy for the study. Descriptive statistics on independent and dependent variables will be run, as appropriate, to show retention rates and outcomes from six Cohorts (1988-1993) while controlling for missing data, missing cases, personnel who died prior to the 10-year point, Marine Corps Officers, Aviators, Staff Corps and Submariners.. The findings of this study will evaluate whether retention of female and male officers is related to the same predictors. The results will provide data to policy makers and Navy personnel to better predict, control and maintain retention rates.

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# **I. INTRODUCTION**

## **A. BACKGROUND**

The United States Navy has evolved tremendously since its birth on 13 October 1775. One of the main evolutions is the inclusion of women not only in service but at sea. This study examines factors that affect women and their decisions to leave or stay in the Navy. This research compares the retention of male and female officers in the Surface Warfare community and the Restricted Line community controlling for demographic as well as military experience factors. Past research shows relatively high retention levels for minority officers; however, women tend to have somewhat lower retention rates than men (Stewart & Firestone, 1992). Past results also show that demographic factors like age, ethnicity, marital and dependent status are related to retention of officers within the Surface Warfare and Restricted Line communities (Parcell, Hodari, & Shuford, 2003). Other research shows that military factors such as accession source, year group and undergraduate programs also influence the divergence between male and female officer continuation rates (Gallagher & Wardynski, 2003). Although previous research has highlighted the importance of each of these factors for retention, the relative impact of these variables has yet to be examined simultaneously.

## **B. PURPOSE AND RESEARCH QUESTION**

The purpose of the proposed thesis is to compare the results of the Surface Warfare and Restricted Line communities controlling for demographics and military factors in relation to retention of male and female officers. The questions that will be addressed in this study are: to what extent do demographic and military factors impact retention rates in the Surface Warfare and Restricted Line communities? In addition, is gender directly related to increased or decreased retention rates among naval officers in the Surface Warfare and Restricted Line communities? And if so how?

This area of research is important to policy makers because it provides data that are valuable in tracking and explaining retention rates of its service members. It also can

provide information that can be used in formulating policies to increase retention rates within specific communities that will impact fleet readiness. It also aims to elucidate gender differences in retention.

In fact, this study examines the interplay between gender and job or work factors (i.e., the community) in the decision to stay in the Navy past the obligated service commitment period. Human capital investment is a vital concern to the Navy. This is extremely important to the Navy because the military does not hire senior and mid-level employees. All personnel within this organization are grown from the bottom up. Selecting officers who can be retained, and thus return the investment in recruitment and training, will help avoid personnel shortages and save money over time.

### **C. SCOPE AND LIMITATIONS**

The data set used in this study included officers who were commissioned in the military between 1988 and 1993. Only the Surface Warfare (nuclear and conventional), and Restricted Line (cryptology, intelligence, oceanography, and public affairs officer) officer communities were examined. The Marine Corps and Submarine communities were excluded because of limited female representation. Yet, the Aviation community was omitted because their minimum military service obligation after training is complete has them remain in service close to ten years of service. The Staff Corps (i.e., Medical Corps, Dental Corps, Supply Corps and Nurse Corps) was excluded because such officers typically enter into the Navy through alternatives to the three main accession sources (USNA, NROTC and OCS) that were also a focus of this research.

The analytic approach includes: (1) descriptive statistics and cross tabulations on key predictors (i.e., gender and other demographics; community and other military factors), and the criterion of retention; and (2) a logistic regression to predict female officer retention rates to the ten year point for the Surface Warfare and Restricted Line Communities.

#### **D. ORGANIZATION OF THESIS**

This study is divided into five chapters. Chapter I provides an introduction, background and gives a brief overview of the study, conveying previous research outcomes in the relevant research area. Chapter II reviews relevant studies. Chapter III discusses the methodology used to analyze the data and defines the independent and dependant variables in the model. Chapter IV presents descriptive statistics and the results of the logistic regression. Chapter V summarizes the findings and conclusions based on the results. In addition, recommendations for future research are presented.

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## **II. LITERATURE REVIEW**

### **A. INTRODUCTION**

This study looks at retention rates of female Naval officers at the 10-year point; within the Surface Warfare and Restricted Line communities, controlling for demographic as well as military experience factors. Little is known about retention rates of female officers between the two lines and the factors that affect their decisions to stay or leave the military. What is known is that there is a continuous concern regarding retention in the fleet for both men and women. This study seeks to provide policy makers with information that addresses the persistent retention problem.

Previous research has been extremely limited in the area of retention between the Surface Warfare and Restricted Line (RL) communities. Relevant studies on retention have focused mainly on individual communities (i.e., Surface Warfare, Submarine, and Aviation (URL) or oceanography, cryptology, public affairs, intelligence and fleet support (RL)). Additionally, retention has been studied in relation to attitudes and morale (Reed & Segal, 2000). Moreover, numerous studies of first term attrition and retention have been conducted on the enlisted ranks. Most of these studies have focused on demographic correlates of retention with education credential and gender shown to be among the main predictors. Few studies have examined the job or organizational characteristics that influence retention. Thus, most research findings can offer suggestions as to "who" is more likely to continue in service but there are few insights regarding why people continue to serve (Laurence, Naughton, & Harris, 1995).

Other research shows that military factors such as accession source, year group and undergraduate programs also influence the divergence between male and female officer continuations (Gallagher & Wardynski, 2003). Although previous research has highlighted the importance of each of these factors for retention, the relative impact of these variables has yet to be examined simultaneously. That is, to what extent do demographic and military factors impact retention of female and male officers in the Surface Warfare and Restricted Line communities? The purpose of this thesis is to examine retention of male and female officers within and across communities while controlling for demographics and military factors. This study uses methodologies of

prior retention studies to provide a logical starting point to examine retention by gender within the Surface Warfare and Restricted Line communities.

## **B. FEMALE REPRESENTATION**

...For the military, readiness, meaning the ability to perform at required levels in peace and war, is, or should be the sole test of whether women-or anyone else, for that matter-should wear the uniform.

William L. O'Neill, (2001; p.171)

In the early 1970s President Richard Nixon was faced with a major decision, one that was difficult and would change the way the United States military would operate forever if approved by Congress. The idea was to put an end to the draft and have an All Volunteer Force (AVF). To maintain force quantity and quality without the draft, women would be needed. "It soon became clear to civilian leaders in the Department of Defense (DOD) that the AVF could only meet its personnel requirements by recruiting women (Mitchell, 1998)".

Today our volunteer force is down to 1.4 million men and women from a peak of 2.4 million active duty members in 1988. As far as the Navy's contribution to this number, there are a total of 388,432 active duty personnel. Of those sailors 56,500 are Naval officers; 48,182 are male and 8,318 are female. "Currently women comprise approximately 19% of the navy's recruiting goal and the need to expand opportunities at sea is greater than ever before" (Women in the Navy, 2004). Table 1 shows the distribution of active duty female officers currently serving by community. The communities highlighted in the list below are those that are the focus of this study.

**Table 1. Total number and percentage of Women in the SWO and RL Communities**

<b>Community</b>	<b>Percent of Women by Community</b>	<b>Number of Women by Community</b>
<b>TOTAL UNRESTRICTED LINE</b>	<b>65.4</b>	2,215
<b>Surface Warfare</b>	35.5	(1,202)
<b>TOTAL RESTRICTED LINE</b>	<b>34.5</b>	1,169
<b>Restricted Line (Cryptology, Intelligence, Oceanography, Public Affairs)</b>	15.3	(519)
<b>Total</b>	<b>100</b>	<b>N=3,384</b>

\*EDO, HR, IP, AEDO not included due to missing data or small sample size.

Source: Women in the Navy: Active Duty Assignments (April, 2004)  
<http://www.chinfo.navy.mil/navpalib/people/women/winact1.html>.

As indicated in the table above, the Surface Warfare community has the largest total number (1,202) representing around 35.5 percent of women. On the other hand, approximately (519) 15.3 percent of women make up the total restricted line communities examined in the study.

### **1. Need for Women**

In today's military the thought of doing without women is out of the question (O'Neill, 2001). DiSilverio (2003) conducted a study on retention among women officers in the Air Force. She concluded that there are benefits from employing women in the Air Force. First, the Air Force would not be able to fill billets and get its job done without women. Secondly, women present efficient leadership styles that increase retention rates. On average the interactive and transformational styles of leadership are used to encourage participation, boost others' sense of self worth and allow continuous dialogue within the organization. The research states that this style breeds loyalty and allows service members to listen and share information when required, to get the job complete. These types of styles used by women are beneficial for retention because it promotes a healthy work environment and aides in "retaining outstanding individuals longer in the organization" (Disilverio, 2003). Also, women promote a diverse climate

within the organization, this mixture of gender “is associated with increased productivity, improved quality of management and increased gain and retention of market share” (DisSilverio, 2003).

## **C. RETENTION**

### **1. Always a Concern**

Throughout the 1990s, military retention declined (Fricker, 2003). Much of the decline was a result of military reductions in response to the collapse of the Soviet Union and the end of the Cold War. However, because considerable time and money was spent training personnel, a loss of qualified personnel represented a lost investment (Bowen, 1986).

At present, the Navy has 324 ships compared to a Cold War high of 600 (Bock, 1999). Still, the cut backs of personnel from the post Cold War period have not negated concerns over retention (Bock, 1999). The Navy has attributed subsequent retention problems among officers to trends in the civilian economy (e.g., when the economy is doing well military retention declines), longer deployments (e.g., in excess of six months) and after effects of the drawdown. For example there are questions as whether the draw down left enough people in service for mission accomplishment?

After winning the Cold War and downsizing—our military finds itself busier than ever, protecting American interests around the world. This translates to longer and more frequent periods away from home for those fewer personnel remaining. Simply put, a higher operations tempo is wearing out the troops and in the aggregate, they are leaving with their feet (Skelton, 1999).

After reviewing these trends, the Navy found it had a retention problem that needed to be fixed. So the Navy looked into the matter and came up with two solutions: boost military pay and offer bonuses (e.g. to specific communities) (Fricker, 2003).

## **2. Bonuses Alone Won't Fix the Problem**

The military could be conditioning service members and prospective recruits to be just like car buyers, who have ended up being trained by car manufacturers to wait for deals such as cash back before buying, it is possible we might be creating a bonus mentality that might be difficult to escape. Stated by a member of the military personnel subcommittee. (Sanchez, 2005)

Military bonuses and special pay were sought out to fix recruiting and retention problems. However, these solutions “could cause long term problems, according to a key Democrat on the House Armed Services committee” (Maze, 2005). When recruiting and retention are poor, analysts favor offering bonuses to a specific group of people instead of using basic pay increases for everyone in the military. This method will allow for any adjustments of special (bonuses) pay to either be increased or decreased when necessary, having no affect of an individuals base pay. A major benefit for using this method for the Defense Department is bonuses don't have a short term or long term cost on a service member's retirement because retirement is calculated using base pay (Maze, 2005).

Special pay and bonuses have been incorporated to fix retention problems. Though recent studies say that money does not fix retention, it still remains one of the solutions for the problem. A study conducted in 2003 on factors affecting the retention decisions of female Surface Warfare officers found that “... the SWO bonus was a negative incentive and did not influence female's decisions to stay or leave at all” (Clifton, 2003). Previous research states that the retention problem still exists and money is not the answer. One must seek to understand retention, who is leaving, from which community and why.

Congress can help with military retention via pay and recognition, but only the military can build and maintain Esprit —that indescribable something—that makes them want to stay (Skelton, 1999).

## **D. DEMOGRAPHIC FACTORS INFLUENCING RETENTION OF NAVAL OFFICERS**

Previous studies indicate the “older an officer is at commissioning, the more likely he/she is to remain in the Surface community for a career” (Duffy, 2000). Officers who are commissioned at the average age of 23.6 years or below possibly have never

worked as a civilian and joined the navy with little knowledge of all the opportunities available to them. In contrast, those that receive a commission after that age are more likely to have had a job in the civilian sector and understand more about what life is like outside of the military.

Stewart and Firestone (1992) conducted a study on race/ethnicity, sex, retention and promotion of minority and women officers. They concluded that “the officer corps is still overrepresented by white men, and this pattern increases with higher rank cohorts. Therefore the characteristics associated with success as an officer may be stereotyped as white, male characteristics”. On the other hand, compared to the general officer population, minorities and women officers are underrepresented. Although, “all services currently support specific affirmative action programs to increase minority and female representation” they statistically still have significantly lower numbers than the general population. For example, blacks comprise of 6.6%, Hispanics comprise of 1.9% and women comprise of 11.4% of all Department of Defense (DOD) officers. To combat this problem the Navy on an annual basis is sought out to commission 7% black, 4% Hispanic officers.

In 1990, Dansby and Landis developed the Military Equal Opportunity Climate Survey (MEOCS). This survey was created to measure climate along three basic dimensions: Organizational factors (i.e., mission effectiveness and job satisfaction); Racial factors (i.e., discrimination against minorities, reverse discrimination and racial separatism); and gender issues. The survey can be conducted at the commander’s request and is given to him/her and they own the data; with the option to share the information with anyone or keep it.

MEOCS surveys give information on how various groups think about race and gender climate in the military. Results from the climate surveys are rated on a scale of most positive to least positive influences. Individuals that are in super ordinate groups (whites, men, and officers) perceive less discrimination than the subordinate groups (minorities, women, and enlisted). Of particular note is that minority female officers are the least positive group. This may be because they have fewer peers and a weaker support system (Moskos & Butler, 1996).

## **1. Climate, Job Factors and Family Influence**

Professional women, like professional men, spend large portions of their lives striving to achieve success in a professional career. Women who marry and bear children often are left to “find that their husbands will not take the equal share in the child rearing (Hersh & Stratton 1994; Morgan 1998). In addition to the woman’s situation at home she may find that her employer will not accommodate her with a flexible schedule conducive child day care or provide flexible workable hours to maintain her career after childbirth. These are some of the factors that influence women’s career decisions and professional goals.

Family influences impact women's decisions to stay in or leave the military. Research examining wartime stress demonstrated that female personnel were more symptomatic in the initial post deployment phase than men (Kelly, 2001). Women reported their reliance on husbands to care for their children to be a central concern (Berry, 1987). Men are still reluctant to take on the primary caretaker role in the family that is often expected when the mother is a military member (Sinclair, 2004). Most women experience separation anxiety when they leave their children in the care of others. This anxiety typically occurs when child care and socialization falls mainly on mothers and when mothers are particularly concerned about attachment issues. These issues may make separation especially stressful for mothers (Kelley, Herzog-Simmer & Harris, 1994).

Job-related separation is not only very much part of the military it is a part of many occupations. Navy families receive lots of practice with cycles of departure—absence—and return throughout a military members obligated service time. This experience may affect people in different ways especially if a woman is to leave her child in the care of others. However, “single mothers reported more separation anxiety, less family cohesiveness, and less family organization than did married mothers” (Kelley, Herzog-Simmer & Harris, 1994).

A study on retention of Air Force women officers serving during Desert Shield and Desert Storm found that the greatest attrition occurred among the women who had given birth from the start of the war to the time of the survey (Pierce, 1998). Because women in our society carry out traditional roles in their families and continue to bear an unequal burden of child care responsibilities this has been found to be a primary reason

for them to leave the service. Major concerns for military women include care of children in the mother's absence and welfare rather than the mobilization and deployment during war time.

A May 5th 2005, Navy Times article linked separation to family/work balance problems. A pentagon advisory panel found in an annual report that "the imbalance of work/family life, including the inflexibility of workload and schedule" was the main factor that influenced retention decisions of active duty, reserve and National Guard members to leave the military. The Defense Advisory Committee on Women (DACOWITS) conducted focus groups and found that 73 percent of married male officers with children and 68 percent of married female officers with children said they intended to remain in uniform. For single officers without children, 58 percent of men and 53 percent of women said they intended to remain in uniform (Crawley, 2005). In addition, defense Manpower Data Center (DMDC) conducted a study and found that 9.4 percent of female officers with dependents and 7.4 percent of male officers with dependents separated from the military. By contrast, male officers without dependents had the lowest separation rate, at 5.5 percent, while 7.5 percent of female's officers without dependents separated (Crawley, 2005). Lastly the report noted that "women with five to eight years of service are most likely to leave the military" (Crawley, 2005). The groups recommended in order to mitigate the retention problem create programs such as sabbaticals and extended leaves of absence for child rearing to help with the family concerns. Also increases in pay and benefits may help to retain experienced personnel.

#### **E. MILITARY FACTORS INFLUENCING RETENTION OF NAVAL OFFICERS**

CNA used their Longitudinal Officer File to retrieve the necessary information required to conduct the study. These files have information on officers from accession, throughout each career milestone, as far into an officer's career as possible or until separated from service. Variables used in the model included: demographics, accession source, ethnicity, college major, college grades, college characteristics, college attributes, college selectivity and promotion rates.

Upon completion of the analysis the results stated that accession source had an affect on an officer's early career success but not so much for the senior personnel

studied in the model. Of the accession sources USNA although the most expensive had the most positive effect of the probability of promotion and its personnel seem to attain career milestones on time and some even early. NROTC accessions recruit officers that meet career milestones but at a lesser rate than USNA. On the other hand, OCS ranks the least expensive and has the lowest probability of promotion.

In 1998, a study was conducted to compare prior enlisted service members to non-prior enlisted service members on measures of performance up to the rank of Lieutenant Commander. Two measures of performance was the focal point of this study; if the officer's promotion board to lieutenant commander fell between 1985 and 1995. The first was if the officer was recommended for accelerated promotion and second if the officer was promoted to lieutenant commander. In addition to the above-mentioned measures, gender and ethnicity were looked at as well. The results of the study were that prior enlisted service members were not recommended as often as non-prior enlisted personnel but they were promoted equally. The second finding was that officer corps does not match the make up of the navy as a whole. It lags behind in terms of its ratio of minority and female officers. This was significant because one third of the militaries minority and female officers come from the enlisted ranks (Astrella, 1998).

### **1. Community**

Job characteristics vary by community. The effects that deployment has on a sailor can be desirable and undesirable and the impact it has on an officer's decision to stay or leave the military is not obvious and is probably very complex (Fricker, 2003). The type and quantity of deployment, have a direct impact on whether or not one enjoys the deployment experience and, if not, whether the negative experience is enough to cause the individuals to leave the military (Fricker, 2003). Studies show that deployment adversely affects retention (Fricker, 2003). Frequent peacetime (non-hostile) missions do not carry the same operational stress as wartime (hostile) missions. Non-hostile deployments tend to have a positive effect on retention of mid grade officers (O-3s and O-4s with five and ten years of service) and hostile deployments have a negative effect on retention of mid grade officers (Fricker, 2003). Hostile deployments and occupational categories (i.e., intelligence, tactical) cause females separation rates to exceed those of male in pay grades O-1 through O-5 (DACOWITS, 2004). In the Navy, a sailor does not

have a choice to serve during peace or war when a crisis can occur at any time during an 18-24 month assignment. In addition to peace and war commitments, separation brings about stress. Deployment causes the member to be separated from family, which adds to the sailors' hardships. Studies have shown that these separations may be more complicated for women because women have traditionally borne the responsibility for child care and have strong normative commitments to their maternal roles (Kelly, 2001).

In May 2004, CNA conducted a study on officer accession cuts and ways to limit lateral transfers. A lateral transfer is when an officer applies for and accepts a different job within the same level or grade. The term "lateral" is not defined or found in Navy instructions or terminology even though it is referred to in MILPERSMAN Article 1212-010 and used in NAVADMIN Messages (Mooney & Cook, 2004). Transfers and redesignation shall be used for four specific reasons according to Secretary of the Navy Instructions (SECNAVINST) 1210.5A, dated 24 July 1985:

- For the career development of individual officers
- To assist the Navy in attaining the objective of an all Regular career force in the grades of Lieutenant Commander and above
- To the extent necessary to sustain authorized strength on the active-duty list, authorize Regular Officer strength and authorizes strength in the Training and Administration on of Reservist (TAR) program, within each corrective category and specialty
- To maintain promotion opportunity guidelines within each competitive category.

The unrestricted line officers in the SWO community consist of 31% as of September 2003 (Mooney & Cook, 2004). On average most of the personnel from the SWO community apply for redesignation and transfer to the RL community. On the other hand, the restricted line community receives a significant number of lateral transfers from the URL. The RL community consists of 16% Cryptology; 28% Intelligence; 4% Public Affairs Officer (PAO); 8% Oceanography respectively (Mooney & Cook, 2004). Forty to 50% of oceanography and public affairs personnel are warfare qualified compared to less than 20 percent of the cryptology and intelligence community (Mooney & Cook, 2004).

## **F. GENDER**

In both the professional and general literature, few issues receive more attention than that of women in the military. Scarcely a day goes by without some debate about the things women can and cannot do, on the job, in war and in combat. One of the ways the literature states we can give a better understanding to the ongoing integration of women is to have women train along side men. This will dispel any myths and allow men to see that women undergo and participate in the same demanding physical, emotional, and mental challenges. This builds cohesion and teamwork required for mission accomplishment in the fleet. In 2001, Partlow, Jr. wrote about national security implications of Women in the U.S. Army. He told his story from an Army's perspective with regard to women in the force and states that this is the way the Army views their units:

Although not always viewed as being directly related to combat readiness, the relationships between the men and women of a unit and the unit's cohesion is complex. Unit cohesion is directly affected by the way women are accepted and treated or mistreated, with sexual harassment only one method of mistreatment. To the degree that women are accepted by men and allowed and required to fulfill their role as soldiers, cohesion can and will flourish.

This study also states that within today's society we are moving in the forward direction if we continue to focus on three key elements when dealing with gender. First, as society changes the military must continue to change and accept that women will be an active part of the force and male peers and supervisors will welcome women, fully integrate and accept them into their units and commands. Second, constant training will be conducted on the integration of women and new levels of confidence and competence will be required at all levels regardless of the total number of females present so the Army can get it right and keep it right. Third, "women must not simply be allowed, but encouraged, and required to do the jobs for which they have been trained, regardless of whether they or the men for whom they work would rather they performed some more traditionally female function"(Partlow 2001).

## **G. CHAPTER SUMMARY**

This thesis examines gender and retention differences in relation to the Surface Warfare and Restricted Line communities. There is much evidence to support that there is a retention problem in the fleet. However, what data is not available is why we have the problem and what communities are affected the most.

This study will answer the primary question is gender directly related to increased or decreased retention rates among Naval Officers within the two communities? And if so how? Demographic and military factors will be used to show what influences men and women's decisions to stay or leave the service. This study will evaluate officers from date of commissioning to the 10-year point in an effort to derive what factors are significantly related to retention.

### **III. RESEARCH METHODOLOGY**

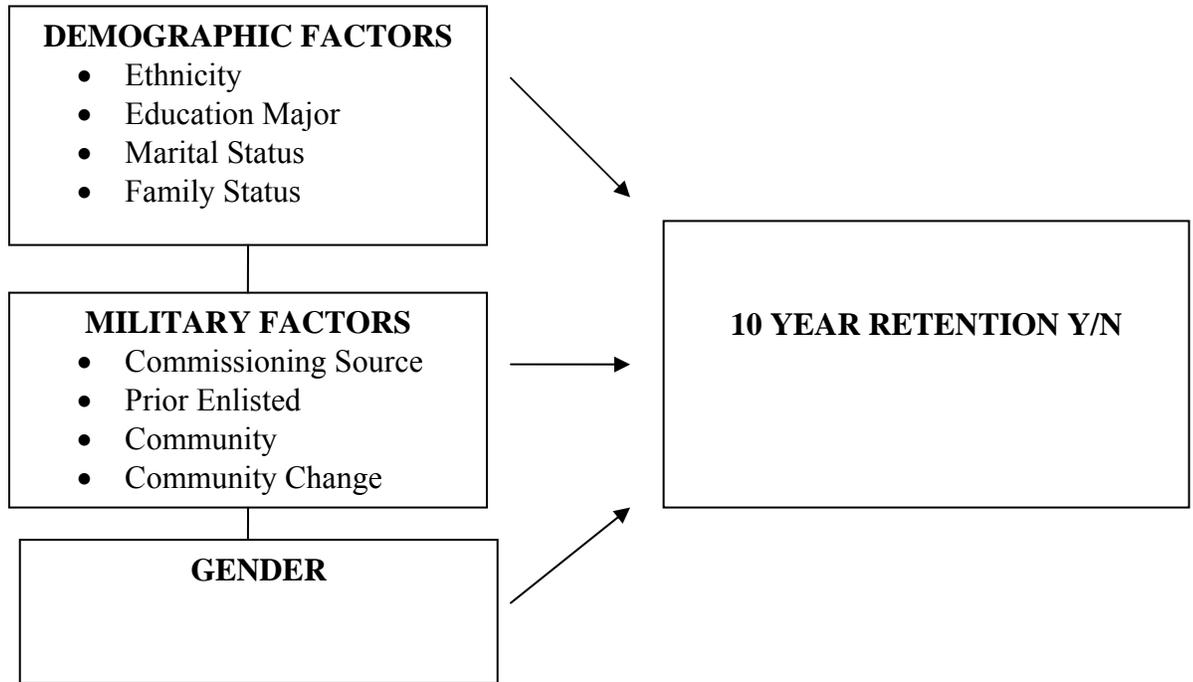
#### **A. DATA DESCRIPTION**

##### **1. Description of the Officer Sample**

The data set was obtained from the Center for Naval Analysis (CNA), a federally funded research and development center located in Alexandria, Virginia. The data file came from their Longitudinal Officer File, which is a robust file system that retains information on naval officers and their various career milestones from date of accession until separation from the Navy beginning from 1976 to present. For this analysis, information was provided from six cohorts on officers who were in year groups 1988 through 1993.

The original data set consisted of 84 variables and 9,867 cases; after controlling for missing cases, staff corps, submariners, aviators and variables that will not be used in this study; the data set was condensed to 4 categories of variables (i.e., demographics factors, military factors, gender and retention), comprising 10 major groups (i.e., age, ethnicity, education major, family status (married/children), commissioning source, prior enlisted, Community, Community Change (SWO lateral to RL), gender and 10 year retention y/n) yielding 24 variables and 5,411 cases.

Figure 1 displays the four major categories of variables used in this study. Each category is grouped and has associated variables that will be examined in the statistical analysis in the next chapter.



**Figure 1. Factors, Demographic Military Factors, Gender and Retention**

**2. Definition of Dependent Variable**

The dependent variable, retention, is a dichotomous outcome indicating whether the case stayed in or left the military by the 10-year point (10 Year Retention Y/N). The retention variable, 10 Year Retention Y/N, was set to “1” if officers remained in the Navy for ten years of service and beyond, and ”0” if officers decided to leave prior to reaching ten years of active military duty.

**3. Description of the Independent Variables**

The independent or predictor variables for this data set are grouped into three categories: (1) demographic factors; (2) military factors; and (3) gender. The dependent and independent variables are listed, described, and coded in Table 1.

Table 2. Below shows the definitions of the 24 variables used in the statistical analysis.

**Table 2. Variable Descriptions**

VARIABLE	DESCRIPTION	CODE
<b>10 YEAR RETENTION YES/NO</b>	10 Year Retention Y/N was determined by filtering on Years of Service (yos) . if yos => 10, then 10 Year Retention Y/N set to Y, if yos =< 9, then 10 Year Retention Y/N set to N.	1= RETENTION “YES” 10 YEARS 0= RETENTION “NO” 10 YEARS
<b>DEMOGRAPHIC FACTORS</b>		
<b>ETHNICITY</b>	Ethnicity was determined by filtering on the race_code and ethnic_code columns	1=CAUCASIAN;2=AFRICAN AMERICAN;3=HISPANIC;4=OTHER
CAUCASIAN	if race_code = C, then Ethnicity set to Caucasian	ETHNIC1 1= CAUCASIAN;0= OTHERWISE
AFRICAN AMERICAN	if race_code = N then Ethnicity set to African American	ETHNIC2 1= AFRICAN AMERICAN;0= OTHERWISE
HISPANIC	if ethnic_code = 1, 4, 6, 9, or S, then Ethnicity set to Hispanic else	ETHNIC3 1= HISPANIC;0= OTHERWISE
OTHER	if Ethnicity is null then set to Other.	ETHNIC4 1= OTHER;0= OTHERWISE
<b>EDUCATION MAJOR</b>	Technical/ Non-Technical major was determined by filtering on the ba_maj column.	1= TECHNICAL MAJOR 0= NON-TECHNICAL MAJOR
TECHMAJ	if ba_maj = Technical Major, then set to Tech	
NON_TECHMAJ	if ba_maj =Non-Technical Major, then set to Non Tech	
<b>MARITAL STATUS/ FAMILY STATUS</b>	these columns were determined by using the last dependent change. to determine what the last change was the pdeps_ch_count column was used. if pdeps_ch_count = 0, then use the init_pde column to set final pdeps value if pdeps_ch_count = 1, then use the pdeps_c1 column to set final pdeps value if pdeps_ch_count = 2, then use the pdeps_c2 column to set final pdeps value if pdeps_ch_count = 3,	

**Table 2. Continued**

VARIABLE	DESCRIPTION	CODE
MARITAL STATUS		MARRIED Y/N 1= MARRIED 0= NOT MARRIED
FAMILY STATUS		CHILDREN Y/N 1= CHILDREN 0= NO CHILDREN
MILITARY FACTORS		
COMMISSIONING SOURCE	commission source was determined by filtering on the srce_org column.	1=USNA;2=NROTC;3= OCS
USNA	if srce_org = 010 or 011, then commission source set to usna.	COMMIS2 1= USNA;0= OTHERWISE
NROTC	if srce_org = 040, 041 or 051, then commission source set to nrotc	COMMIS3 1= NROTC;0= OTHERWISE
OCS	if srce_org = 060 or 061, then commission source set to ocs	COMMIS4 1=OCS;0= OTHERWISE
PRIOR ENLISTED	prior enlisted was determined by filtering on the pr_enl column	1= PRIOR ENLISTED; 0=NOT PRIOR ENLISTED
COMMUNITY	community was determined by filtering on the inti_des column.	1= SURFACE WARFARE 0= RESTRICTED LINE
SURFACE WARFARE OFFICERS	if inti_des = 1160 or 1165, then community set to s for swo trainee	
RESTRICTED LINE OFFICERS		
CRYPTOLOGY	if inti_des = 1610 or 1615, then community set to c for cryptology	
INTELLIGENCE	if inti_des = 1630 or 1635, then job specialty set to i for intelligence	
OCEANOGRAPHY	if inti_des = 1800 or 1805, then job specialty set to o for oceanography	
PUBLIC AFFAIRS	if inti_des = 1650 or 1655, then job specialty set to p for public affairs	
COMMUNITY CHANGE (SWO TO RL)	swo trainee lateral to rl was determined by filtering on the init_pde, desig_c1 and desig_c2 columns.	1= LATERAL TRANSFER 0= CONTINUOUS COMMUNITY
GENDER	gender was determined by filtering on the sex_code column	1= FEMALE 0= MALE
MALE	if sex_code is male, then gender set to m	
FEMALE	if sex_code is female, then gender set to f	

**B. DEFINITIONS OF TERMS**

The definitions and terms listed below will explain how the samples were selected from the two communities and give a brief description of what their job responsibilities are within the Navy.

**1. Surface Warfare Officer (SWO)**

Surface Warfare Officers are in the unrestricted line community (URL) and are Naval officers that command and manage daily ship operations and activities out at sea. This elite group of ship drivers and ship fighters are involved in virtually every aspect of Navy missions. For this thesis, officers with designators 116X (SWO trainees) and 111X (qualified SWO's) were selected. An X was used to indicate active duty or active duty reserve.

**2. Restricted Line Officers (RL)**

Restricted Line Officers carry out support roles in their everyday functions of Naval service. These personnel hold billets in highly specialized jobs that aide in the success of the Navy. However, they are not eligible for command at sea. There are eight primary designators in the RL community. However, four will be examined in this study: Cryptology (161X), Intelligence (163X), Oceanography (180X), and Public affairs Officers (165X). Four restricted line communities were excluded because of small sample sizes. Each community is listed along with the frequencies depicted below in table 2.

Table 3. Shows the name, designator and frequency of the four communities excluded from the analyses.

**Table 3. Frequencies of communities excluded from analyses**

Name	Designator	Frequency
Engineering Duty Officer (EDO)	1460	6
Aerospace Engineering Duty Officer (AEDO)	1510	0
Aerospace Maintenance duty Officer (AMDO)	1520	12
Fleet Support Officer (FSO)	1700	0

A brief description of the RL communities examined in the study is provided below to clarify what roles these personnel carry out in the fleet.

**Cryptologic Officers:** The cryptologic community is responsible for Information Warfare (IW) and Information Operations (IO). Information Warfare helps protect and minimize vulnerability of U.S. information, communication and weapons systems which are used by and large by the SWO community to carry out missions.

**Naval Intelligence Officers:** Intelligence Officers support the fleet directly and also aide in support of national operations. These personnel serve onboard aircraft carriers, aviation squadrons and overseas. The Intelligence community is unique in that one forth of its billets are joint oriented.

**Public Affairs Officers:** The public affairs community is the smallest of RL community. It has approximately 200 officers who are responsible for communicating the Navy's current events to the news media (externally), the Navy (internally) and their families.

**Naval Oceanographers:** Oceanographers serve in direct support role onboard ship to advice commanding officers of the effects of the environment. They also provide vital information required in the planning process to help guide decision makers on how the atmosphere and ocean will affect operations at sea.

## **C. ANALYTICAL APPROACH**

### **1. Logistic Regression**

A logistic regression will be used to predict the outcome category of each case used in this study. A logistic regression is used to predict discrete dependent variables (i.e., 10 year retention Y/N) from a group of independent variables that may be discrete, continuous, or a mix of both (e.g., demographic and military factors, gender). The goal of analysis using a logistic regression is to correctly predict the outcome category for each case.

Because a logistic regression is a nonlinear model, the equations used to describe the regression are complex. The dependent variable,  $Y$ , is the probability of having one outcome or another based on the best linear combination of independent variables, with two outcomes:

$$Y_i = e^u / (1 + e^u)$$

where  $Y_i$  is the estimated probability that the  $i$ th case ( $i = 1, \dots, n$ ) is in one of the categories and  $u$  is the usual linear regression equation:

$$u = A + B_1X_1 + B_2X_2 + \dots + B_kX_k$$

with constant  $A$ , coefficients  $B_j$ , and independent variables  $X_j$  for  $k$  independent variables ( $j = 1, 2, \dots, k$ ). This linear regression equation creates the logit, or log of the odds:

$$\ln(Y / (1 - Y)) = A + \sum B_j X_{ij}$$

or more simply the natural log ( $\log_e$ ) of the probability of being in one group divided by the probability of being in the other group. Coefficients are estimated by converging on values that maximize the likelihood of obtaining observed frequencies (Tabachnick & Fidell, 2001).

The goodness of fit for a logistic regression is determined by the chi-squared statistic ( $\chi^2$ ).  $\chi^2$  is normally used in judging the independence of two variables. In this context, it is limited by the sample size and the extent of the departure from independence. Also, it reveals nothing on how the two variables are related, just the extent to which they are or not. In order to use  $\chi^2$  to determine goodness of fit, it must be modified to avoid these limitations (Norusis, 2002). To accomplish this,  $\chi^2$  is calculated on the difference in the log-likelihoods between the model including independent variables and the model including only the constant ( $A$ ) (Tabachnick & Fidell, 2001).

There are many types of logistic regressions, including direct, hierarchical, and stepwise. In a direct logistic regression, all independent variables are entered into the regression at the same time. This method is useful if no hypothesis exists for the outcome of the regression, and takes into account the unique contribution of each independent variable. A hierarchical logistic regression allows the user to specify the order of entry of independent variables into the regression, and is useful for controlling

for factors that prior research has shown will affect the dependent variable. This method takes into account the unique contribution of each independent variable, as well as the overlapping contribution of independent variables, in each step. When a hierarchical logistic regression is used, it is important to enter the independent variable of concern in the last step of the regression. In a stepwise logistic regression, inclusion and exclusion of independent variables are based on statistical tests. The user has no input as to which independent variables are included, and in what order they are included (Tabachnick & Fidell, 2001).

A hierarchical logistic regression analysis will be used to test the hypothesized model depicted in Figure 1. As noted in the previous section, a hierarchical logistic regression allows the user to input independent variables in the regression in a priority order. This approach enables you to assess the unique contribution of each independent variable on the dependent variable. The independent variables will be entered into the regression hierarchically, into three different steps. The order in which the independent variables will be input into the regression is depicted in Table 3. For each step, the new variables entered are displayed in bold. The first step will enter demographic factors including age at commissioning, ethnicity, education major and family status. The second step will enter military factors including commissioning source, prior enlisted service, year group, community/designator and SWO lateral to RL. The third step will enter gender, the main variable of interest. This approach will allow for a determination of the unique effect by each group of independent variables on the variance in the dependent variable, taking into consideration the variance accounted for by the previously entered groups of independent variables. The final result will also include the shared variance between the groups of independent variables. Table X shows how the variables will be entered into the model. The new variables entered for each of the steps are displayed in bold.

**Table 4. Order of Independent Variable Entry for Regressions**

<b>STEP 1 DEMOGRAPHIC FACTORS</b>	<b>STEP 2 MILITARY FACTORS</b>	<b>STEP 3 GENDER</b>
<b>Age At Commissioning</b>	Age At Commissioning	Age At Commissioning
<b>Ethnicity</b>	Ethnicity	Ethnicity
<b>Education Major</b>	Education Major	Education Major
<b>Family Status</b>	Family Status	Family Status
	<b>Commissioning Source</b>	Commissioning Source
	<b>Prior Enlisted</b>	Prior Enlisted
	<b>Year Group</b>	Year Group
	<b>Community/Designator</b>	Community/Designator
	<b>SWO Lateral to RL</b>	SWO Lateral to RL
		<b>Gender</b>

The results of each logistic regression will be looked at overall and then by individual variable. Overall, the significance (p) will be checked first to see if the variables entered were significant. Next, the chi-squared value ( $\chi^2$ ) and the Nagelkerke  $R^2$  value will be examined to determine goodness-of-fit. For individual variables, the significance (p) will be checked first to see if the individual variable was significant within the step. Wald statistics ( $\underline{z}$ ) and odds ratios will then be compared to determine the weight of the variable.

The statistical package used to perform the logistic regressions in this study is SPSS version 11.5. The specific regression used from SPSS is binary logistic, which can be found under the analyze->regression menu. A binary logistic regression is used because all four of the discrete dependent variables have only two possible values.

#### **D. SUMMARY**

This chapter described the methodology for this study. A description of the data set used in this study was provided including an in-depth description of the independent and dependent variables included in the study. In addition, the chapter presented the theory for the regression analyses that will be used to test they hypothesized model depicted in Figure 1. Chapter IV reports the results of the regression analyses.

## **IV. DATA ANALYSIS**

### **A. INTRODUCTION**

This chapter presents the results of analysis performed to examine gender differences in retention rates among officers in the surface warfare and restricted line communities. The chapter is divided into three major sections. The first section presents descriptive statistics of the officer sample. Distributional properties of the data for the entire sample and by gender are presented. The section also includes the results of correlational analysis of variables included in the study. The second section presents the results of regression analyses examining the impact of demographics, military factors, and gender on retention. This section begins by presenting the results of hierarchical logistic regression analyses that examine the impact of gender on retention after controlling for both demographic and military factors. It also includes results of simultaneous logistic regression analyses that examine the impact of demographic and military factors by gender and community. The third section provides a summary of the results and highlights differences across gender and community.

### **B. DESCRIPTIVE STATISTICS**

Examination of data included analyses of the demographic characteristics of the officer sample. Descriptive statistics were computed for each of the variables included in the study. Data were analyzed using the entire officer sample and men and women separately. Pearson correlation coefficients were computed to examine the intercorrelation among variables included in the study.

#### **1. Demographic Characteristics of Officer Sample**

Distributional properties of the demographic characteristics of the officer sample are presented in Table 5. A total of 5,411 cases were available for analyses. As can be seen in Table 5, the sample included a total of 264 women (4.9%) and 5,147 men (95.1%). The ethnic composition of the sample was 82.4% Caucasian, 6.9% African American, 5.5% Hispanic and 5.1% other. Forty-five percent of the sample had earned a non-technical degree and 55.4% of the sample had earned technical degree. Approximately 60% of the sample was married and 40.3% of the sample was single.

About 33% of the sample had children and 67.1% had no children. The majority of the sample was commissioned through the NROTC program (50.6%), 33.9% was commissioned through USNA and 15.5% was commissioned through OCS. The majority of the sample did not have prior enlisted service experience (90.9%); only 9.1% of the sample had prior enlisted service experience. With regard to warfare community, 88.8% of the sample was from the surface warfare community and 11.2% of the sample was from the restricted line community. Practically all (97%) sample members had remained in their respective service community and 2.9% changed community (i.e., laterally transferred from the SWO to RL). Overall retention rate for the sample was 29.5%.

**Table 5. Descriptive Statistics of Study Variables (N=5411)**

<b>Variable</b>	<b>Number</b>	<b>Percentage</b>
<b>Gender</b>		
Female	264	4.90%
Male	5147	95.10%
<b>Ethnicity</b>		
Caucasian	4460	82.40%
African American	374	6.90%
Hispanic	299	5.50%
Other	278	5.10%
<b>Education Major</b>		
Non-Technical	2415	44.60%
Technical	2996	55.40%
<b>Marital Status</b>		
Married	3233	59.70%
Not Married	2178	40.30%
<b>Family Status</b>		
Children	1781	32.90%
No Children	3630	67.10%
<b>Commissioning Source</b>		
USNA	1836	33.90%
NROTC	2739	50.60%
OCS	836	15.50%
<b>Prior Enlisted Service</b>		
Prior Service	491	9.10%
No Prior Service	4920	90.90%
<b>Warfare Community</b>		
Surface Warfare Officer (SWO)	4806	88.80%
Restricted Line (RL)	605	11.20%
<b>Community Change</b>		
No Change	5266	97.10%
Change (SWO to RL)	145	2.90%
<b>Retention</b>		
Retained	1596	29.50%
Not Retained	3815	70.50%

***a. Distributional Characteristics for the Officer Sample by Gender***

To further examine these data, descriptive statistics of the demographic characteristics of the sample were computed separately for men and women. Table 6 presents descriptive statistics of the study variables by gender. As can be seen in Table 6, similar pattern of distributions were observed for ethnicity, family status, commissioning source, prior enlisted service, warfare community, and community change. A different pattern of results was observed for education and marital status. Results of Chi-Square tests reveal significant gender differences in education major ( $\chi^2 [1] = 17.733, p = .001$ ), marital status ( $\chi^2 [1] = 15.643, p = .001$ ), family status ( $\chi^2 [1] = 16.117, p = .001$ ), commissioning source ( $\chi^2 [2] = 13.328, p = .001$ ), warfare community ( $\chi^2 [1] = 222.455, p = .001$ ) and community change ( $\chi^2 [1] = 5.361, p = .021$ ).

***b. Correlational Analysis of Study Variables***

Pearson correlation coefficients were computed to examine relationships among variables in the data. Table 7 presents correlation coefficients among variables included in the study. Significant correlations were observed between retention and ethnicity group 1 (Caucasian); ethnicity group 2 (African-American), family status, commissioning source 1 (USNA), commissioning source 2 (NROTC), prior service, warfare community (SWO), and community change. The bivariate relationship between gender and retention was not significant.

**Table 6. Descriptive Statistics of Study Variables by Gender (N = 5411)**

Variable	Men		Women	
	N	Percentage	N	Percentage
<b>Ethnicity</b>				
Caucasian	4231	82.20%	229	86.70%
African American	364	7.10%	10	3.80%
Hispanic	287	5.60%	12	4.50%
Other	265	5.10%	13	4.90%
<b>Education Major</b>				
Non-Technical	2264	44%	151	57.20%
Technical	2883	56%	113	42.80%
<b>Marital Status</b>				
Married	3106	60.30%	127	48.10%
Not Married	2041	39.70%	137	51.90%
<b>Family Status</b>				
Children	1724	33.50%	57	21.60%
No Children	3423	66.50%	207	78.40%
<b>Commissioning Source</b>				
USNA	1733	33.70%	103	39%
NROTC	2633	51.20%	106	40.20%
OCS	781	15.20%	55	20.80%
<b>Prior Enlisted Service</b>				
Prior Service	466	9.10%	25	9.50%
No Prior Service	4681	90.90%	239	90.50%
<b>Warfare Community</b>				
Surface Warfare Officer (SWO)	4646	90.30%	160	60.60%
Restricted Line (RL)	501	9.70%	104	39.40%
<b>Community Change</b>				
No Change	5015	97.40%	251	95.10%
Change (SWO to RL)	132	2.60%	13	4.90%
<b>Retention</b>				
Retained	1513	29.40%	83	31.40%
Not Retained	3634	70.60%	181	68.60%

**Table 7. Person Correlation Coefficients of Study Variables**

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Ethnicity 1 (Caucasian)												
2. Ethnicity 2 (African American)	-.590**											
3. Ethnicity 3 (Hispanic)	-.524**	-.066**										
4. Education Major (Technical)	-.036**	0.003	0.001									
5. Marital Status (Married)	0.007	0.005	0.024	.050**								
6. Family Status (Children)	-.051**	.067**	0.006	.036**	.530**							
7. Commissioning Source 1 (USNA)	-0.017	-0.02	0.009	.088**	.067**	.065**						
8. Commissioning Source 2 (NROTC)	.110**	-.066**	-.056**	-.105**	-.051**	-.076**	-.726**					
9. Prior Enlisted Service	-.160**	.140**	.084**	-0.002	.061**	.095**	.054**	-.104**				
10. Warfare Community (SWO)	-.042**	0.016	0.014	.101**	-.041**	-.082**	.071**	.035**	-.049**			
11. Community Change	0.016	-0.005	.000	0.004	.083**	.125**	.065**	-.035**	.031*	-.468**		
12. Gender (Female)	0.026	-.028*	-0.01	-.057**	-.054**	-.055**	0.024	-.047**	.003*	-.203**	.031*	
13. Retention	-.043**	.052**	0.019	0.017	0.329	.500**	.057**	-.038**	.106**	-.138**	-.159**	0.01

Note. N = 5411. \*p < .05; \*\*p < .01. Ethnicity 1 is dummy coded such that 1 = Caucasian and 0 = All Other Groups; Ethnicity 2 is dummy coded such that 1 = African American and 0 = All Other Groups; Ethnicity 3 is dummy coded such that 1 = Hispanic and 0 = All Other Groups; Education Major is dummy coded such that 1 = Technical major and 0 = Non-Technical major; Married YN is dummy coded such that 1 = Married and 0 = Not Married; Children YN is dummy coded such that 1 = Children and 0 = No Children; Commissioning Source 1 is dummy coded such that 1 = USNA and 0 = All Other Groups ; Commissioning Source 2 is dummy coded such that 1 = NROTC and 0 = All Other Groups; Prior Enlisted Service is dummy coded such that 1 = Prior service and 0 = No prior service; Warfare Community is dummy coded such that 1 = Surface warfare and 0 = Restricted Line; Community Change is dummy coded such that 1 = Lateral and 0 = Continuous service; Gender is dummy coded such that 1 = Female and 0 = Male; Retention is dummy coded such that 1 = Retained and 0 = Not Retained.

## C. REGRESSION ANALYSES

A series of hierarchical and sequential logistic regression analyses were performed to test the proposed hypotheses. Specifically, it was hypothesized that gender would be predictive of retention after controlling for the effects of both demographic and military factors known to impact retention among surface warfare and restricted line communities. These analyses employed a hierarchical approach where demographic variables were entered in the first step of the equation, military variables were entered in the second step of the equation, and gender was entered in the last step of the equation. Demographic variables included ethnicity, education, marital status and family status. Military variables included commissioning source, prior service, warfare community, and community change. The section below presents the results of the analyses for the sample; for men and women separately; and for surface warfare officers and restricted line officers separately.

### 1. Hierarchical Logistic Regression Analysis for Predictors of Retention

Table 8 presents the results of hierarchical logistic analysis of demographic and military factors and gender on retention for the entire sample. Results indicate that a test of the full model with all hierarchically ordered predictors against a constant-only model was statistically significant  $\chi^2(9) = 292.486, p = .001$ , indicating that demographic and military factors and gender were predictive of retention. Collectively these variables accounted for 34.4% of the variance in retention (Nagelkerke  $R^2 = .344, p < .05$ ). Table 8 shows regression coefficients (B), with corresponding standard errors (SE B), Wald statistics, and associated Odds Ratios for each of variables in the three steps in the equation. As shown in Table 8, among the demographic variables entered in the first step, only marital status and family status were predictive of retention, with beta coefficients of .665 (Odds Ratio = 1.945) and 2.033 (Odds Ratio = 7.485), respectively. Examination of military variables included in the second step reveal that all military variables were predictive of retention, with beta coefficients of .430 for Commissioning Source 1 (Odds Ratio = 1.5437), .372 for Commissioning Source 2 (Odds Ratio = 1.450), .491 for Prior Enlisted Service (Odds Ratio = 1.634), -.69 for Community (Odds Ratio = .502), and .836 for Community Change (Odds Ratio = 2.307). Finally, the addition of gender in the third step indicated that gender was predictive of retention with beta coefficient of .355 (Odds Ratio = 1.427).

These results indicate that married officers were 1.9 times more likely to complete 10 years of service as compared with non-married individuals. Officers with children were 7.3 times more likely to reach this tenure point as compared with those without children. Officers commissioned through USNA were 1.5 times more likely to remain in service as compared with other commissioning sources. Officers commissioned through NROTC were 1.4 times more likely to stay as compared with other commissioning sources. Officers with prior enlisted service experience were 1.6 times more likely to remain than those without such experience. Officers from the SWO community were .532 times less likely to complete 10 years as compared with officers from the restricted line community. Officers who change into SWO community (i.e., lateral transfers) were 2.3 times more likely to stay as compared with officers whose community was continuous. More importantly, these results showed that after controlling for the effects of both demographic and military variables, gender remains a significant predictor of retention—women officers were 1.4 times more likely to complete 10 years than male officers.

## **2. Simultaneous Logistic Regression Analysis of Predictors of Retention by Gender**

Simultaneous logistic regression analyses were performed to examine the impact of demographic and military variables for men and women separately. Table 9 and Table 10 present the results of simultaneous logistic analyses of demographic and military factors on retention for men and women respectively. These results indicate that a test of the full model with all predictors against a constant-only model was statistically significant for men  $\chi^2(11) = 1454.712$ ,  $p = .001$ , and for women  $\chi^2(11) = 54.653$ ,  $p = .001$ . Collectively these variables accounted for 35.1% of the variance in retention among men (Nagelkerke  $R^2 = .351$ ,  $p < .05$ ) and 26.3% of the variance in retention among women (Nagelkerke  $R^2 = .263$ ,  $p < .05$ ).

**Table 8. Hierarchical Logistic Regression Analysis for Predictors of Retention (N = 5411)**

Variable	B	SE B	Wald	p	Odds Ratio
<b>Step 1 Demographic Variables</b>					
Ethnicity1 (Caucasian)	0.02	0.161	0.015	0.901	1.02
Ethnicity2 (African American)	0.279	0.199	1.962	0.161	1.322
Ethnicity3 (Hispanic)	0.221	0.211	1.091	0.296	1.247
Education Major (Technical)	-0.019	0.07	0.074	0.786	0.981
Marital Status (Married)	0.665	0.093	51.75	.000	<b>1.945***</b>
Family Status (Children)	2.013	0.08	632.227	.000	<b>7.485***</b>
Nagelkerke $R^2$ =.320					
<b>Step 2 Military Variables</b>					
Ethnicity1 (Caucasian)	-0.015	0.162	0.008	0.927	0.985
Ethnicity2 (African American)	0.266	0.201	1.748	0.186	1.304
Ethnicity3 (Hispanic)	0.191	0.213	0.808	0.396	1.211
Education Major (Technical)	0.027	0.072	0.146	0.702	1.028
Marital Status (Married)	0.653	0.094	48.774	.000	<b>1.922***</b>
Family Status (Children)	1.982	0.081	593.769	.000	<b>7.258***</b>
Commissioning Source 1—USNA	0.43	0.112	14.721	.000	<b>1.537***</b>
Commissioning Source 2—NROTC	0.372	0.108	11.917	0.001	<b>1.450**</b>
Prior Enlisted Service	0.491	0.115	18.327	.000	<b>1.634***</b>
Warfare Community	-0.69	0.123	31.694	.000	<b>.502***</b>
Community Change	0.836	0.245	11.693	0.001	<b>2.307**</b>
Nagelkerke $R^2$ =.343					
<b>Step 3 Gender</b>					
Ethnicity1 (Caucasian)	-0.11	0.162	0.004	0.948	0.989
Ethnicity2 (African American)	0.277	0.201	1.893	0.169	1.319
Ethnicity3 (Hispanic)	0.197	0.213	0.853	0.356	1.218
Education Major (Technical)	0.032	0.072	0.198	0.656	1.032
Marital Status (Married)	0.662	0.094	49.899	.000	<b>1.939***</b>
Family Status (Children)	1.991	0.082	596.322	.000	<b>7.325***</b>
Commissioning Source 1—USNA	0.424	0.112	14.295	.000	<b>1.528***</b>
Commissioning Source 2—NROTC	0.376	0.108	12.151	.000	<b>1.456***</b>
Prior Enlisted Service	0.493	0.115	18.411	.000	<b>1.637***</b>
Warfare Community	-0.631	0.125	25.335	.000	<b>.532***</b>
Community Change	0.866	0.244	12.601	.000	<b>2.378***</b>
Gender	0.355	0.165	4.65	0.031	<b>1.427*</b>
Nagelkerke $R^2$ =.344					

Note. \*  $p \leq .05$ . \*\*  $p \leq .01$ . \*\*\*  $p \leq .001$ .

**Table 9 Simultaneous Logistic Regression Analysis for Predictors of Retention Among Male Officers (N = 5147)**

Variable	B	SE B	Wald	<i>p</i>	Odds Ratio
Ethnicity1 (Caucasian)	-0.021	0.167	0.016	0.899	0.979
Ethnicity2 (African American)	0.326	0.206	2.495	0.114	1.385
Ethnicity3 (Hispanic)	0.179	0.22	0.663	0.415	1.196
Major Category (Technical)	0.052	0.074	0.5	0.48	1.054
Marital Status (Married)	0.68	0.098	48.196	.000	<b>1.975***</b>
Family Status (Children)	2.006	0.084	573.773	.000	<b>7.432***</b>
Commissioning Source 1—USNA	0.456	0.117	15.276	.000	<b>1.578***</b>
Commissioning Source 2—NROTC	0.423	0.112	14.279	.000	<b>1.527***</b>
Prior Enlisted Service	0.469	0.118	15.793	.000	<b>1.599***</b>
Warfare Community	-0.679	0.136	24.861	.000	<b>.507***</b>
Community Change	0.862	0.264	10.645	0.001	<b>2.367**</b>
Nagelkerke $R^2$ = .351					

Note. \*  $p \leq .05$ . \*\*  $p \leq .01$ . \*\*\*  $p \leq .001$

Table 9 shows regression coefficients (B), with corresponding standard errors (SE B), Wald statistics, and associated Odds Ratio for each variable included in the equation for men. As can be seen in Table 9, a similar pattern of results was observed with regard to the men’s data—Marital Status (B = .680; Odds Ratio = 1.975), Family Status (B = 2.00; Odds Ratio = 7.432), Commissioning Source 1 (B = .456; Odds Ratio = 1.578), Commissioning Source 2 (B = .423; Odds Ratio = 1.527), Prior Enlisted Service (B = .469; Odds Ratio = 1.599), Community (B = -.679; Odds Ratio = .507) and Community Change (B = .862; Odds Ratio = 2.367) emerged as significant predictors of retention among men.

These results indicate that among men, married officers were 1.9 times more likely to stay in the Navy as compared with non-married individuals. Officers with children were 7.4 times more likely to remain as compared with those without children. Officers commissioned through USNA were 1.5 times more likely to complete 10 years as compared with other commissioning sources. Officers commissioned through

NROTC were 1.5 times more likely to stay as compared with other commissioning sources. Officers with prior enlisted service experience were 1.5 times more likely to remain than those without such experience. Officers from the SWO community were .507 times less likely to complete 10 years as compared with officers from the restricted line community. Officers who changed into SWO community (i.e., lateral transfers) were 2.3 times more likely to remain as compared with officers whose community was continuous.

Table 10 shows regression coefficients (B), with corresponding standard errors (SE B), Wald statistics, and associated Odds Ratios for each variable included in the equation for women. As can be seen in Table 10, a different pattern of results was observed with regard to the women’s data. In contrast to the results involving men, only Family Status (B = 1.625; Odds Ratio = 5.07) and Prior Enlisted Service (B = 1.143; Odds Ratio = 3.135) emerged as significant predictors of retention among women. These results indicate that among women, officers with children were 5 times more likely to stay to the 10-year point as compared with those without children and officers with prior enlisted service experience were 3.1 times more likely to stay than those without such experience.

**Table 10. Hierarchical Logistic Regression Analysis for Predictors of Retention Among Female Officers (N=264)**

Variable	B	SE B	Wald	<i>p</i>	Odds Ratio
Ethnicity1 (Caucasian)	0.212	0.682	0.097	0.756	1.236
Ethnicity2 (African American)	-1.852	1.315	1.985	0.159	0.157
Ethnicity3 (Hispanic)	0.828	0.931	0.792	0.373	2.29
Major Category (Technical)	-0.098	0.325	0.091	0.763	0.907
Marital Status (Married)	0.542	0.338	2.573	0.109	1.72
Family Status (Children)	1.625	0.389	17.451	.000	<b>5.078***</b>
Commissioning Source 1—USNA	0.311	0.442	0.495	0.482	1.365
Commissioning Source 2—NROTC	-0.028	0.44	0.004	0.949	0.972
Prior Enlisted Service	1.143	0.545	4.392	0.036	3.135
Warfare Community	-0.232	0.323	0.516	0.473	0.793
Community Change	0.54	0.689	0.616	0.433	1.717
Nagelkerke $R^2=.263$					

Note. \*  $p \leq .05$ . \*\*  $p \leq .01$ . \*\*\*  $p \leq .001$

### **3. Simultaneous Logistic Regression Analysis of Predictors of Retention by Warfare Community**

Simultaneous logistic regression analyses were performed to examine the impact of demographic and military variables for surface warfare officers and restricted line officers separately. Table 11 and Table 12 present the results of simultaneous logistic regression analyses of demographic and military factors on retention for surface warfare officers and restricted line officers respectively. These results indicate that a test of the full model with all predictors against a constant-only model was statistically significant for surface warfare officers  $\chi^2 (10) = 1210.898$ ,  $p = .001$ , and for restrictive line officers  $\chi^2 (10) = 185.520$ ,  $p = .001$ . Collectively these variables accounted for 32.3% of the variance in retention among surface warfare officers (Nagelkerke  $R^2 = .323$ ,  $p < .05$ ) and 35.2% of the variance in retention among women (Nagelkerke  $R^2 = .352$ ,  $p < .05$ ).

Table 11 shows regression coefficients (B), with corresponding standard errors (SE B), Wald statistics, and associated Odds Ratio for each variable included in the equation for surface warfare officers. As can be seen in Table 11, a similar pattern of results was observed with regard to the surface warfare officer's data as with the main analyses—Marital Status (B = .594; Odds Ratio = 1.811), Family Status (B = 2.06; Odds Ratio = 7.897), Commissioning Source 1 (B = .514; Odds Ratio = 1.672), Commissioning Source 2 (B = .409; Odds Ratio = 1.506), Prior Enlisted Service (B = .443; Odds Ratio = 1.558) and gender (B = .483; Odds Ratio = 1.620) emerged as significant predictors of retention among surface warfare officers.

**Table 11. Hierarchical Logistic Regression Analysis for Predictors of Retention Among Surface Warfare Officers (N=4806)**

Variable	B	SE B	Wald	<i>p</i>	Odds Ratio
Ethnicity1 (Caucasian)	0.3	0.169	0.032	0.858	1.031
Ethnicity2 (African American)	0.316	0.211	2.247	0.134	1.372
Ethnicity3 (Hispanic)	0.244	0.224	1.19	0.275	1.276
Education Major (Technical)	0.057	0.077	0.554	0.457	1.059
Marital Status (Married)	0.594	0.101	34.345	.000	<b>1.811***</b>
Family Status (Children)	2.067	0.088	550.486	.000	<b>7.897***</b>
Commissioning Source 1—USNA	0.514	0.124	17.228	.000	<b>1.672***</b>
Commissioning Source 2—NROTC	0.409	0.122	11.282	0.001	<b>1.506**</b>
Prior Enlisted Service	0.443	0.126	12.472	.000	<b>1.558***</b>
Gender	0.483	0.208	5.366	0.021	<b>1.620*</b>
Nagelkerke $R^2=.323$					

Note. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

These results indicate that among surface warfare officers, married officers were 1.8 times more likely to complete 10 years as compared with non-married individuals. Officers with children were 7.8 times more likely to remain as compared with those without children. Officers commissioned through USNA were 1.6 times more likely to stay as compared with other commissioning sources. Officers commissioned through NROTC were 1.5 times more likely to stay as compared with other commissioning sources. Officers with prior enlisted service experience were 1.5 times more likely to reach the 10-year point than those without such experience. Female officers were 1.6 times more likely to remain as compared with male officers from the surface warfare community.

**Table 12. Hierarchical Logistic Regression Analysis for Predictors of Retention Among Restricted Line Officers (N=605)**

Variable	B	SE B	Wald	<i>p</i>	Odds Ratio
Ethnicity1 (Caucasian)	-0.259	0.589	0.194	0.660	0.772
Ethnicity2 (African American)	0.032	0.697	0.002	0.963	1.033
Ethnicity3 (Hispanic)	-0.084	0.729	0.013	0.908	0.919
Major Category (Technical)	0.072	0.206	0.122	0.727	1.074
Marital Status (Married)	1.086	0.25	18.812	.000	<b>2.962***</b>
Family Status (Children)	1.625	0.224	52.416	.000	<b>5.076***</b>
Commissioning Source 1—USNA	0.25	0.281	0.791	0.374	1.284
Commissioning Source 2—NROTC	0.441	0.24	3.386	0.066	1.555
Prior Enlisted Service	0.791	0.295	7.21	0.007	<b>2.206*</b>
Gender	0.130	0.269	0.235	0.628	1.139
Nagelkerke $R^2=.352$					

Note. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 12 shows regression coefficients (B), with corresponding standard errors (SE B), Wald statistics, and associated Odds Ratio for each variable included in the equation for restricted line officers. As can be seen in Table 12, a different pattern of results was observed with regard to restricted line officer's data. In contrast to the results involving surface warfare officers, only Marital Status (B = 1.086; Odds Ratio = 2.962), Family Status (B = 1.625; Odds Ratio = 5.076) and Prior Enlisted Service (B = .791; Odds Ratio = 2.206) emerged as significant predictors of retention among restricted line officers. These results indicate that among restricted line community, officers who are married are 2.9 times more likely to stay for at least 10 years as compared with single officers; officers with children are 5.0 times more likely to stay than those without children; and officers with prior enlisted service experience are 2.2 times more likely to complete 10 years than those without such experience.

#### **D. SUMMARY**

This chapter presented the results of hierarchical and simultaneous logistic regression analyses performed to examine the impact of demographic and military factors and gender on retention among officers in the surface warfare and restricted line community. Results indicate that gender was a significant predictor of retention. Women were more likely to remain in service to the 10-year point after controlling for the statistical effects of demographic and military factors known to impact retention. Follow up analyses examining the relationship among demographic and military factors for men and women separately indicate that the relationship between demographic and military factors varies according to gender.

Examination of these data by warfare community reveals that gender influences retention among surface warfare officers but not restricted line officers. The implications of these findings are discussed in the next chapter.

## **V. CONCLUSIONS AND RECOMMENDATIONS**

### **A. INTRODUCTION**

This thesis examined gender differences on retention of naval officers from the surface warfare and restricted line communities. Data from six officer-cohorts were analyzed to identify factors related to retention to the 10-year career milestone. This research examined the extent to which demographics and military factors impact retention rates of the Surface Warfare and Restricted Line communities. In addition, the research also examined the impact of gender on retention rates of naval officers in the surface warfare and restricted line communities. This chapter provides a summary of the main findings of this study. The chapter also discusses the implications of these findings for understanding retention within the surface warfare and restricted line communities.

### **B. SUMMARY OF MAJOR FINDINGS AND CONCLUSIONS**

Major findings of the study are summarized in Table 13. Table 13 includes odds ratios and model statistics for each of three regression models examining the impact of demographic and military factors, and gender on retention. Examination of these results reveals that demographics, military factors, and gender appear to be differentially related to officer retention. Among the demographic variables included in the models, marital status and family status were consistently associated with increased retention. One exception to this trend involved the model examining data for women officers. Marital status was not significantly associated with retention among women officers. Additionally, ethnicity was not significantly related to officer retention in any of the models examined. With regard to the military variables included in the models, they were predictive of retention for men but not women; and for surface warfare officers but not for restricted line community. Prior enlisted service was the only significant predictor of retention for the restricted line community. Finally, gender was predictive of retention in the overall sample and for the surface warfare community but not the restricted line community. Table 13 presents odds ratios and model statistics for each of the regression models tested in this study.

**Table 13. Odds Ratios for Predictors of Retention for the Sample and by Gender and Warfare Community**

VARIABLE	Model I	MODEL II		MODEL III	
	Sample	Men	Women	SWO	RL
<b>DEMOGRAPHICS</b>					
Ethnicity1 (Caucasian)	0.989	0.979	1.236	1.031	0.772
Ethnicity2 (African American)	1.319	1.385	0.157	1.372	1.033
Ethnicity3 (Hispanic)	1.218	1.196	2.29	1.276	0.919
Education Major (Technical)	1.032	1.054	0.907	1.059	1.074
Marital Status (Married)	<b>1.939***</b>	<b>1.975***</b>	1.72	<b>1.811***</b>	<b>2.962***</b>
Family Status (Children)	<b>7.325***</b>	<b>7.432***</b>	<b>5.078***</b>	<b>7.897***</b>	<b>5.076***</b>
<b>Military</b>					
Commissioning Source 1—USNA	<b>1.528***</b>	<b>1.578***</b>	1.365	<b>1.672***</b>	1.284
Commissioning Source 2—NROTC	<b>1.456***</b>	<b>1.527***</b>	0.972	<b>1.506**</b>	1.555
Prior Enlisted Service	<b>1.637***</b>	<b>1.599***</b>	3.135	<b>1.558***</b>	<b>2.206*</b>
Warfare Community	<b>.532***</b>	<b>.507***</b>	0.793	N/A	N/A
Community Change	<b>2.378***</b>	<b>2.367**</b>	1.717	N/A	N/A
<b>Gender</b>	<b>1.427*</b>	N/A	N/A	<b>1.620*</b>	1.139
<b>MODEL STATISTICS</b>					
Nagelkerke R <sup>2</sup>	0.344	0.351	0.263	0.323	0.352
Model $\chi^2$	292.486	1454.712	54.653	1210.898	185.52
Degrees of Freedom	9	11	11	10	10
Significance	0.001	0.001	0.001	0.001	0.001
N	5411	5147	264	4806	605

Note.N/A=Not Applicable

These findings have important implications for understanding retention among male and female officers within these warfare communities. The results highlight the importance of considering both marital and family status characteristics of the force. Many service members entering the military may be married with children and/or will eventually marry and have children. Accordingly, marital and family factors will eventually factor into service member's considerations for remaining in the service beyond the 10-year point. Acknowledging the impact of both of these factors (i.e., having children and being married) on retention will allow policy makers to consider these issues in force planning and help to ensure the readiness of the fleet. The Navy is well served by policies that address the needs of service member's spouses and their children.

These findings also highlight the importance of military characteristics for understanding retention. The importance of commissioning source (i.e., USNA and NROTC) did not hold for the models restricted to women or the restricted line community. That is, the odds ratios associated with commissioning source were not significant for these particular models. This finding may suggest that the benefits associated with commissioning source may be more salient for the “warrior” communities and/or may stem from the relatively small samples of women and restricted line community members. It is also possible that commission source effects may not be realized until well beyond the 10-year point. Interestingly, prior enlisted service was consistently associated with increased retention across all models except for that of women. Though limitations in these data preclude any conclusive statements concerning this finding, it may be that prior enlisted service may be differentially predictive. Clearly, this finding is worthy of further study. With regard to warfare community and community change, the findings suggest that among male officers, warfare specialty and community changes (i.e., lateral transfers) may be predictive of retention.

Finally, the results indicate that even after controlling for both demographics and military characteristics, gender remains a significant predictor of retention. Furthermore, after controlling for the other factors in the model, gender was positively related to retention. This appears to be the case for surface warfare officers but not for restricted line officers. Though interesting it is important to underscore the importance of replicating this finding before making any firm conclusions based on these data. The next section addresses limitation of the data and provides recommendations for future research.

### **C. LIMITATIONS AND RECOMMENDATIONS**

Though the results of these analyses contribute to the understanding of retention of male and female officers in these warfare communities, there are several limitations that are important to consider when interpreting these results. The data available for analyses represents a sampling of the officer database. The database was obtained from the Center of Naval Analysis and included six-officer cohorts from 1988-1993 from the officer master files. These limitations warrant the need for additional analyses and

replication of these findings. Replication is particularly important given the limitation in the data. It was possible only to examine two communities (i.e., SWO and RL). It would be valuable to study other warfare communities to examine whether the present finding generalize across warfare specialties. Further, the RL community was restricted to: 1) cryptology, intelligence, oceanography, and public affairs. Four other RL communities were excluded (engineering, aerospace, aerospace maintenance, and fleet support). An analysis should be conducted with all the communities in the restricted line. This study used data from 1988-1993. Since that time there have been other restricted line communities that have been created in response to the Navy's needs. Human Resources and Information Professionals are the newest communities that have emerged. A replication with later cohorts is needed.

In addition, further exploration of retention intentions among married officers and officers with children are needed. Understanding why service members with children are five to seven times more likely to remain in service is an important finding to explore further. It may be that members are staying because of the medical benefits the military offers to its members and their dependants. Further, an examination of interactions between gender and family factors might prove to be informative. Focus groups studies should be conducted to determine why service members with children stay in the military.

Further examination of the importance of prior service on retention is also worthy of further study. A study exploring why prior enlisted service members are one to three times more likely to remain in service would be worthwhile. Similarly, a study to examine the characteristics and experiences of prior enlisted officers would enhance our understanding of the benefits of enlisted commissioning programs for long-term retention. Among the questions are whether number of years in enlisted service and whether enlisted time in service counts towards retirement affect officer retention.

An analysis should be conducted with a much larger sample size of women. This study had relatively few women but this may increase if all of the restricted line communities are included in a future study. Such studies will find out why certain variables are significant to service members and contribute to how policy makers think about recruiting, bonuses and quality of life issues.

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