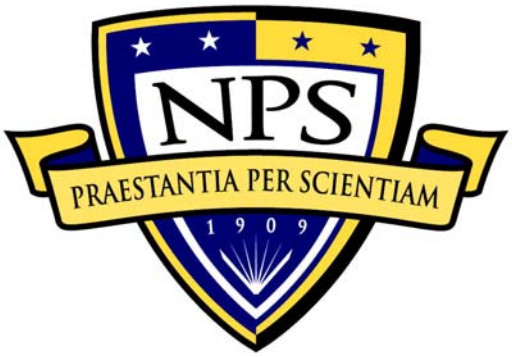

NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

THE EFFECTS OF COMBAT EXPOSURE ON REENLISTMENT AND ATTRITION

by

Nicholas R. Pergar

March 2011

Thesis Co-Advisors: Yu-Chu Shen
Elda Pema

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THE EFFECTS OF COMBAT EXPOSURE ON REENLISTMENT AND ATTRITION

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Submitted in partial fulfillment of the
requirements for the degree of

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LIST OF ACRONYMS AND ABBREVIATIONS

AFHSC	Armed Forces Health Surveillance Center
AFQT	Armed Forces Qualification Test
ASVAB	Armed Service Vocational Aptitude Battery
CONUS	Continental United States
DMDC	Defense Manpower Data Center
DoD	Department of Defense
EAS	End of Active Service
GED	General Equivalency Degree
GWOT	Global War on Terror
HFP	Hostile Fire Pay
IED	Improvised Explosive Device
IRB	Institutional Review Board
ISC	Interservice Separation Code
MHAT	Mental Health Advisory Team
MOS	Military Occupational Specialty
OCONUS	Outside the Continental United States
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
PDHA	Post-Deployment Health Assessment
PTSD	Post Traumatic Stress Disorder
TFDW	Total Force Data Warehouse

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I. INTRODUCTION

A. BACKGROUND

As the Global War on Terror (GWOT) reaches its 10th anniversary, an increasing number of service members have experienced common combat stressors while deployed, such as feeling their lives were in danger, seeing dead or seriously injured service members, enemies, and civilians, and the responsibility for the death of an enemy combatant,. However, there is little information on whether these experiences have an adverse effect on a service member's decision to reenlist and the extent to which combat stress results in a service member's early attrition before their military obligation is complete.

The current environment faced by today's service members is characterized by continued deployments to combat zones where large segments of the active duty population now experience stressful and repeated deployments over the length of their contracts. In this environment, service members have experienced more deployment stressors than in any other recent time, including the first Gulf War. Previous studies have examined how deployment duration and tempo have affected retention, with most finding a positive effect on retention. Prior studies have also linked deployment characteristics and combat exposures to a host of mental health conditions such as PTSD and depression (Hoge, Auchterlonie, & Milliken, 2006; U.S. Army MHAT Reports I-V, 2003–2009). However, no studies have examined which combat experiences may specifically cause a service member to attrite early or reenlist. Such information is critical for manpower planning.

B. PURPOSE

This thesis will examine how specific battlefield experiences encountered during recent deployments affect retention and non-EAS attrition behavior among first term enlisted personnel in the U.S. Army, Navy, Air Force, and Marine Corps. Specifically, this research explores the predictive effects of battlefield experiences on first-term retention while controlling for varying levels of combat exposure, deployment tempo,

and demographic characteristics. The objective is to determine whether battlefield experiences such as firing a weapon, witnessing the death or injury of individuals, and exposure to destroyed military vehicles have a significant impact on career decisions and if those who experience combat exposure during military deployments differ from those who do not in their reenlistment behaviors or early separation rates. Research will include a multivariate model to predict the probability of retention and non-EAS attrition given certain battlefield conditions experienced during service members' deployment. In order to successfully predict reenlistment decisions in the current era, the model must control for conditions that affect a service members' decision to reenlist or separate, none being more influential than deployments to Operation Iraqi/Enduring Freedom. Adding variables that capture the effects of combat experiences to the prediction model enables manpower planners to properly account for changing conditions in the "Long War."

C. RESEARCH QUESTIONS

1. Primary Research Questions

a. How do specific combat experiences affect first-term enlisted retention and attrition rates?

b. Is there a difference in retention or attrition rates between those who experience combat exposure in Iraq or Afghanistan and those who experience combat exposure elsewhere?

D. BENEFITS OF THE STUDY

This analysis can help planners better predict accession and recruitment goals in the GWOT environment as well as in the future. This study will provide insight on what specific combat deployment experiences and stressors contribute to service member's decision to attrite or reenlist.

E. SCOPE AND METHODOLOGY

The scope of the thesis will include a population of all first term enlisted service members who enlisted in calendar years 2002 and 2003. The sample consists of two

population types. The treatment group is those that have been deployed at least once during their initial enlistment contract and subsequently completed a Post-Deployment Health Assessment (PDHA). The study will compare this group's reenlistment and attrition rates to the control group, those that did not deploy. A number of demographic variables will be controlled for such as; race, age, gender, military occupational specialty, military rank, marital status.

Estimating the effects of battlefield experiences on reenlistment and non-EAS attrition behavior is complicated by the potential endogeneity of battlefield experiences. Those who remain in the service long enough to participate in a deployment are the only ones remaining in the sample to be analyzed. Those service members who experienced a deployment may be inherently predisposed to stay or leave their jobs irrespective of their battlefield experiences; especially those who complete multiple deployments during their initial contract. The model will account for deployment characteristics (such as location, length, and/or frequency) in addition to combat experiences.

F. ORGANIZATION OF THE STUDY

The rest of the thesis is organized as follows. Chapter II provides a review of existing literature on the effects of deployment on military personnel related to the thesis. Chapter III describes the data sources and a brief background of the Post-Deployment Health Assessment program. Chapter IV explains the dependent variables, key independent variables, and other control variables used in this thesis. Chapter V details the analytical method and multivariate probit regression models employed in the analysis. The dependent variables include whether a service member stays past their initial obligation (reenlistment) and a service member's Non-EAS separation (attrition). The key independent variables measure a service member's combat exposure during deployments and measure whether a service member fired their weapon during deployment, saw killed, dead, or wounded individuals, or was inside or entered destroyed military vehicles. Chapter VI provides the descriptive statistics of the data. Chapter VII

presents the results of the multivariate analysis. Chapter VIII provides conclusions and recommendations based on the results obtained in the analysis including areas for further research.

G. SUMMARY

This thesis will examine how specific battlefield experiences encountered during recent deployments affect retention and non-EAS attrition behavior amongst first-term enlisted personnel. The results of this study will be of value to manpower planners in determining the reenlistment and attrition probabilities of service members who served in Operations Iraqi Freedom and Enduring Freedom and, more specifically, who were exposed to combat experiences.

II. LITERATURE REVIEW

A. CHAPTER OVERVIEW

The current environment facing U.S. military members is characterized by lengthy and repeated deployments to combat locations with little time home between deployments. There have been several recent studies that examine the relationship between hostile deployment and retention using the receipt of Hostile Fire Pay as an indicator of a hostile deployment. However, no study has pinpointed what specific battlefield experiences may impact reenlistment behavior or attrition rates. Several studies have used focus groups and surveys along with administrative data to link subjective measures of deployment experiences to reenlistment intentions and actual reenlistment behavior. Studies have examined the relationship between specific responses on the PDHA and prevalence of mental health problems and military separation in the year following a combat deployment. However, there have been no studies that seek to link directly specific aspects of combat exposure to reenlistment and attrition rates.

B. DEPLOYMENT AND RETENTION PRE-9/11

James Hosek's and Mark Totten's analysis, "Does Perstempo hurt Reenlistment? The Effect of Long or Hostile Perstempo on Reenlistment" examined whether long separation or hostile duty affected the reenlistment of active duty enlisted personnel. Hosek and Totten used the Perstempo file covering fiscal years 1988–1996 provided by the Defense Manpower Data Center (DMDC). The authors contend that there are no commonly used measures of personnel tempo (perstempo); therefore, they used Family

Separation Allowance[1] (FSA) to measure long deployments and Hostile Fire Pay[2] (HFP) to identify hostile deployments (Hosek & Totten, 1998).

Hosek and Totten find large coefficients for the variable capturing long or hostile deployments, which indicates that there are major differences in reenlistment probabilities for those with and without hostile deployments, especially among first-term personnel (p. 42). When the authors analyzed whether long or hostile duty, measured in months during a 24-month timeframe, affected the service member's probability to reenlist, they found that members who had *some* months of long or hostile duty were more likely to reenlist than those who had not experienced hostile duty. Additionally, as the number of deployed months increased, the probability of reenlisting decreased and the decrease occurred more rapidly for hostile months than for non-hostile months (Hosek & Totten, 1998, p. xv).

When non-hostile months, hostile months, and number of deployment are measured, Hosek and Totten report that total deployed months generally have a negative effect on reenlistment, and hostile months tend to have an even greater negative effect (p. 43). Non-hostile months deployed have a statistically significant negative effect on reenlistment for Army, Air Force, and Navy personnel; whereas months deployed to a hostile environment are negative and statistically significant for all first-term personnel except those in the Air Force. For example, a first term Army soldier at his/her reenlistment point is .30 less likely to reenlist for each non-hostile month deployed and for each hostile month deployed is another .086 less likely to reenlist (Hosek & Totten, 1998, p. 43).

Hosek and Totten also examined whether specific deployment episodes affected reenlistment probabilities finding an increased probability of reenlistment for each of the services for a member with one or more non-hostile deployments compared to those with

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[1] According to *DoD Financial Management Regulation 7000.14-R*, Family Separation Allowance (FSA) is payable to service members when separated by their dependents for more than 30 consecutive days. Single service members with no dependents are not entitled to this special deployment pay.

[2] According to *DoD Financial Management Regulation 7000.14* a service member may be paid HFP for duty subject to hostile fire or imminent danger for any month when the member is subjected to hostile fire or explosions of hostile mines or is killed or wounded by hostile actions.

no deployments. Another feature of deployment episodes is that hostile episodes have a negative effect on reenlistment and the probability of reenlistment decreases as the number of hostile episodes increased, especially in the Army and Marine Corps (Hosek & Totten, 1998, p. 46).

Overall, Hosek, and Totten find that both the length of deployment and dangerous duty has a negative impact on reenlistment probabilities if the duration is long enough or there are too many hostile episodes. They find that having some long (greater than 30 days deployed) or some hostile months deployed (received HFP) have a positive impact on reenlistment, as compared with having no such perstempo; but as the months deployed increases or becomes hostile it can potentially reduce reenlistment. The authors cite survey findings that many are interested in military service for the adventure and travel or because of a sense of patriotism. Hosek and Totten hypothesize that non-hostile deployments fulfill the need for adventure and travel that many seek and therefore increase reenlistment probabilities (p. 57).

C. DEPLOYMENT AND RETENTION POST-9/11

James Hosek and Francisco Martorell in their study entitled, "How Have Deployments During the War on Terrorism Affected Reenlistment?" examined the context of hostile deployments during the "War on Terror" and reenlistment behavior. As in Hosek and Totten's 1998 study, the authors identified hostile deployments through the receipt of Hostile Fire Pay (HFP)[3], but covered the period 1996 through 2007. In addition to administrative files on personnel and pay, Hosek and Martorell used 10 Status of Forces Surveys of Active Duty Personnel administered over the internet from 2002 to 2005. The inclusion of these surveys allowed the authors to include data not found in the administrative files. The surveys provided measures of a member's well-being in the

[3] At the time of the study, areas eligible for HFP included Afghanistan, Algeria, areas of the Arabian Peninsula and adjoining sea areas, Azerbaijan, Bahrain, Burundi, Chad, Colombia, Cote d'Ivoire, Cuba, Democratic Republic of Congo, Djibouti, East Timor, Egypt, Eritrea, Ethiopia, areas of Greece, Haiti, Indonesia, Iran, Iraq, Israel, Jordon, Kenya, Kosovo, Kuwait, Kyrgyzstan, Lebanon, Liberia, Malaysia, Montenegro, Oman, Pakistan, Philippines, Qatar, Rwanda, Saudi Arabia, Serbia, Somalia, Sudan, Syria, Tajikistan, areas of Turkey, Uganda, United Arab Emirates, Uzbekistan, and Yemen (Hosek & Martorell, 2009).

military, such as work stress, personal stress, intention to stay in the military, number of days longer than usual work day, whether time away was less or more than expected, and individual and unit preparedness (Hosek & Martorell, 2009, p. xiv).

Hosek and Martorell (2009) contrasted their findings with Hosek and Totten (1998), since both studies compare the time period before 9/11 and hostile deployments are similarly measured by receipt of HFP. Hosek and Martorell find hostile deployments in the year prior to a service member's reenlistment decision had a positive effect on reenlistment before (and for a period after) 9/11 for first-term personnel in the Army, but had no significant effect on Navy, Marine Corps, or Air Force personnel (p. 44). Conversely, Hosek and Totten (1998) find a negative effect of hostile deployment episodes on reenlistment probabilities (p. 46). Both studies find that too many months deployed to an area eligible for HFP have a negative effect on reenlistment. Similar to Hosek and Totten (1998), Hosek and Martorell (2009) find that having *some*[4] months of hostile deployment has a positive effect for first-term Army personnel from 1996 through 2001 while having seven to eleven months of hostile deployments had a negative effect on Marine personnel reenlistment probabilities during that same time (p. 50).

Since the administrative data used by Hosek and Martorell covers a time period in which the nature and intensity of deployments and threats faced by service members varied, they can measure how the hostile deployment effect on reenlistment behavior changed from 1996 through 2007[5]. For service members who had a hostile deployment in the year prior to their reenlistment decision, Hosek and Martorell (2009) found that among first-term sailors, hostile deployments did not display any trends on reenlistment behavior (p. 43). Among Air Force personnel the results demonstrated a stable and positive effect over time (p. 45). For Army personnel hostile deployments had a positive effect on reenlistment through 2004, began decreasing, and in 2006 hostile deployments began to have a negative effect on first (and second) term reenlistment (Hosek &

[4] 'Some' is defined as having 1–6 months or 7–11 months of HFP in the 36 months preceding the reenlistment decision.

[5] Major ground operation in Iraq began in 2003 and continued throughout the time period studied with vary levels of intensity. Operations in Afghanistan also occurred during the period; while fewer troops served there as more began serving multiple tours in Iraq.

Martorell, 2009, p. 43). Marine personnel show deployment effects close to zero (for those in their first-term) and exhibit no trend though 2005; in 2006 and 2007 hostile deployments have an increasingly positive effect on reenlistment for Marines completing a hostile deployment in the year prior to their reenlistment decision (Hosek & Martorell, 2009, p. 45).

Narrowing their focus to the post-9/11 era (2002–2007), the authors examined deployment effects on reenlistment behavior using three specifications for Military Occupational Specialty (MOS) controls. Across all three MOS specifications and across all services, deployment to a non-hostile location had a positive and statistically significant estimated effect on reenlistment. When controlling for occupation, hostile deployments had a negative effect on reenlistment for Army and Navy personnel and a positive effect on Marine personnel. The authors also found that the magnitude of the hostile deployment estimate increased when controlling for occupation, which indicates that hostile deployments may be more likely in occupations that have lower reenlistment rates (Hosek & Martorell, 2009, p. 41).

Using responses from the Status of Forces Surveys, Hosek and Martorell found that among respondents[6], hostile deployments had a negative and statistically significant relationship with the likelihood of *intention* to reenlist for all first-term service members (p. 33). This result is different from Hosek et al (2006), who found that the intention to reenlist was not affected by hostile deployments except for Army Personnel. The divergence in these studies could be due to the increasing strain on the military over time, which was first experienced by Army personnel. The earlier study examined reenlistment intentions using surveys administered in July 2003, while the later study used survey and administrative data collected from 2002 to 2005.

The analysis of survey responses when compared to actual reenlistment behavior found that although hostile deployments decreased the *intention* to reenlist, hostile

[6] 35,000 individuals are sampled during each survey. Approximately 10, 000 completed the survey and non response was higher among junior and enlisted personnel. The survey administers (DMDC) produce weights that adjust for errors in sampling design and survey non-response (Hosek & Martorell, 2009).

deployments had a small and not statistically significant effect on actual reenlistment, except for Army personnel who were about six percentage points less likely to reenlist. The authors hypothesize that the difference between survey and personnel data could be due to the fact that survey respondents may have intended not to reenlist, but these intentions are measured long before the service member must actually make a reenlistment decision (Hosek & Martorell, 2009, p. 35).

Hosek and Martorell show that the effect of deployment on Army reenlistment rates changed from positive to negative from 1996 to 2007. This could be due to two reasons: first, more soldiers had an accumulation of a large number of months deployed to hostile areas and the estimated effect of deployment decreased from positive to negative for soldiers with many months of hostile deployments (p. 70). For both soldiers and Marines, a large total number of months deployed to areas eligible for HFP reduced reenlistment, especially in the later years of this study, and the effect was larger for soldiers (Hosek & Martorell, 2009, p. 70).

The study, "How Deployments Affect Service Members" by Hosek et al. is a multidisciplinary analysis based on responses to the Status of Forces Surveys of Active Duty Personnel from March and July 2003 and focus groups. The study examines the relationship between deployment-related stress and *intention* to stay in the military (Hosek, Kavanagh, & Miller, p. xviii).

The authors estimate linear probability models using the March and July 2003 Status of Forces Surveys of Active Duty Personnel where the explanatory variables are meant to represent situations outside a service member's control. The omitted group[7] is those with the following characteristics: worked a longer than normal duty-day from 0 to 20 times, not away, not in OIF/OEF combat operations, time away was neither more nor less than expected, you feel neither well nor poorly trained, your unit is neither well nor poorly trained, E1–E4, not married, male, white only (Hosek, Kavanagh, & Miller, 2006, p. 61).

[7] The omitted group is the group to which the reported results are referenced.

The authors' regression analysis found that frequently working longer than the usual work day increased the probability of higher-than-usual stress and also decreased the probability of intention to remain in the military (Hosek, Kavanagh, & Miller, 2006, p. xix). For the period covered by the survey, being in combat operations in OIF/OEF during the previous 12 months (mid-2002 to mid-2003) had no statistically significant effect on the intention to stay in the military, except for the Army. Soldiers were less inclined to stay in the military if they served in combat operations as part of OIF/OEF during the previous 12 months (Hosek, Kavanagh, & Miller, 2006, p. 107). It is important to consider here, that while these results seem to contradict previous literature, the reported results are *intentions* to stay in the military, not actual reenlistments. Also of note is that the combat question was worded, "Were you involved in combat operations?" with no direction given to the survey respondent how to define "involved" or "combat" (Hosek, Kavanagh, & Miller, 2006, p. 62). The authors further found that involvement in OIF or OEF combat operations did not affect the intention to remain in the military except for Army enlisted members (2006, p. 78).

David Barber's Naval Postgraduate School Master's thesis, "Predicting the Effects of Marine Corps Selective Reenlistment Bonuses in the Post-9/11 Era: Integrating the Effects of Deployment Tempo" examined the effects of deployment tempo on first-term enlisted Marine Corps personnel using data obtained from the Marine Corps' Total Force Data Warehouse[8] (TFDW) who made reenlistment decisions between fiscal years 2003 and 2007. Barber categorized a deployment as one in support of Operation Iraqi Freedom or Enduring Freedom and grouped deployments, in 100-day increments, according to the total number of days deployed from FY03 to FY07. Barber found that deployments in support of OIF or OEF had a negative and statistically significant effect on reenlistment; in particular, Marines deployed in support of OIF/OEF were between six and 29 percent less likely to reenlist than Marines who had never deployed in support of those two operations (p. 43). While Barber found that any number of episodes deployed reduced a Marine's reenlistment probability, Hosek and Martorell (2009) found that

[8] TFDW data included demographic information as well as military rank, occupational specialty, and End of Active Service (EAS) date, and deployment information.

hostile deployment only had a negative effect for Marines with greater than 7 months or two episodes in the three years preceding their reenlistment decision in 2004 and 2005.

These conflicting results could be partly due to how deployments were measured in each study. Hosek and Martorell (2009) measured a hostile deployment as one where the service member received Hostile Fire Pay, whereas Barber's measurement included only those who deployed in support of OIF/OEF. Consequently, a service member could have been on a hostile deployment[9] according to Hosek and Martorell's definition but not according to Barber's definition of a hostile deployment[10]. If many service member had positive experiences in areas deemed hostile, that could have biased Hosek and Martorell's hostile deployment effects results upwards. If Barber's definition of a hostile deployment (one in support of the Global War on Terror) is a more accurate measurement of hostility faced during deployment, then his results may be more accurate.

D. MENTAL HEALTH ADVISORY TEAM REPORTS

The U.S. Army Surgeon General chartered the Operation Iraqi Freedom (OIF) Mental Health Advisory Team (MHAT) in July 2003 in order to assess OIF-related mental health issues, and to provide recommendation to the OIF medical and line commands (U.S. Army, 2003, p. 5). The MHAT data collection effort involved small group interviews and surveys with 756 Soldiers—82% of which had engaged in combat. While the purpose of the MHAT was to assess the OIF behavioral healthcare system and other mental health issues among OIF soldiers, the Team's findings offer insight to the typical soldier's[11] experience in OIF.

About 77% of soldiers reported to the MHAT that they experienced no or mild stress, emotional, or family problems. Interestingly, 52% of soldiers report low or very low personal morale and 72% reported low or very low unit morale; unit cohesion was

[9] See footnote 4, for areas that are eligible for HFP.

[10] For instance, deployment to Cuba would be considered a hostile deployment according to Hosek and Martorell (2009) but not according to Barber (2009).

[11] MHAT I through MHAT II examined only U.S. Army Soldiers deployed to or in direct support of combat operations in Iraq. MHAT III and later studied U.S. Soldiers stationed in Kuwait and Qatar separately than those deployed to Iraq. U.S. Marine personnel were included only during MHAT IV.

also reported to be very low (U.S. Army, 2003, p. 12). These findings point to low utility according to Hosek, Kavanagh, and Miller's study (2006); if the soldiers updated their expected utility of future deployments based on these reported findings, OIF Soldiers could experience a lower reenlistment rate than other groups. The most reported combat stressors included seeing dead bodies and human remains, being attacked, and personally knowing someone who was seriously injured or killed (U.S. Army, 2003, p. 12).

The team comprising MHAT-III traveled to Iraq from October to November 2005 and was the third consecutive team to deploy in each of the previous three years; MHAT-II[12] having deployed to Kuwait and Iraq from August through October 2004. The purpose of MHAT-III was the same as the two previous teams and served to note the attitudes and experiences of soldiers deployed in support of OIF 04-06 during this time[13]. Data were collected using Soldier Surveys and soldier focus groups as well as behavioral health care provider surveys and focus groups (U.S. Army, 2006, p. 5).

The changing nature of deployments in Iraq was indicated in the soldiers' reports to the Team. While soldiers in OIF-I reported higher incidents of direct gunfire and soldiers in OIF-II reported receiving more enemy rocket or mortar attacks, soldiers in OIF 04-06 reported lower exposure to rocket or mortar attacks. Soldiers surveyed during MHAT-III were more likely than OIF-II soldier (interviewed during MHAT-II) to report knowing someone seriously injured or killed and having an IED or other ordinance explode near them (U.S. Army, 2006, p. 6). Both soldiers deployed for the first time and soldiers deployed to Iraq on multiple deployments mentioned during focus group interviews that they perceived the enemy as more lethal and unpredictable than during OIF-I or OIF-II phases of operations given the rise in the use of IEDs.

[12] MHAT-II used the "Soldier Survey" which was administered to 2,064 soldiers stationed at various bases throughout Kuwait and Iraq. The data from this survey were compared to results from the same survey administered during August-October 2003 during MHAT I report. MHAT-II supplemented their survey findings with focus groups.

[13] MHAT-III report did not include soldiers deployed exclusively to Kuwait.

The MHAT-IV report was conducted from August to October 2006 and included Marine Corps personnel for the first time[14]. The purpose of this MHAT was the same as the previous three, the survey methods, and focus group methodology were also similar to the three previous teams' work, though the survey included questions assessing battlefield ethics and combat leader behaviors for the first time (U.S. Army, 2006, p. 7). MHAT-IV focused assessment on soldiers serving in Brigade Combat Teams and Marines serving in Regimental Combat Teams but also included soldiers and Marines from support units as well. The demographics of the sample from the previous MHATs were similar to MHAT-IV (U.S. Army, 2006, p. 10).

The frequency of combat experiences was assessed by one of 30 different reported combat experiences using the Soldier and Marine Well-Being Survey. Fewer MHAT-III respondents and MAHT-IV participants report receiving small arms fire than those interviewed during MHAT-I and smaller portions of respondents reported knowing someone seriously injured or killed than during previous MHATs.

The fifth MHAT administered 2,279 anonymous surveys from September to October 2007 and conducted focus groups with soldiers in Iraq in October and November 2007. MHAT-V findings were published on February 14, 2008 and highlighted several central findings (U.S. Army, 2008, pp. 12–13):

- The percentage of soldiers who reported high or very high unit morale was significantly higher in 2007 than 2006[15].
- When the data is normalized for months deployed, soldiers reported a large decline in exposure to a variety of combat events when compared to 2006—particularly for soldiers who had been in Iraq for six months or less.
- Without adjustment, soldiers reported a high incidence of intense combat events; 72% of soldiers reported knowing someone seriously injured or killed.
- Soldiers on multiple deployments report low morale, more mental health problems, and more stress-related work problems.

[14] 1,320 Soldiers and 447 Marines administered anonymous surveys (U.S. Army, 2006, 3).

[15] 2006 values were gathered and reported in the MHAT-IV reports, the previous MHAT report completed immediately prior to this one.

Similar to MHAT-IV, MHAT-V authors assessed combat experience by measuring responses to 33 different combat experiences and creating a combat experience score ranging from zero to 33 by summing the results (U.S. Army, 2008, p. 34). Eleven of the 33 combat experiences measured by MHAT-V showed significant decline[16] and none of the 33 measured combat experiences increased. Of note, however, significant combat experiences still occurred to the soldier deployed during the time of this report; more than 78% of all respondents reported receiving enemy mortar or rocket fire and more respondents reported knowing someone seriously injured in killed in 2007 than in 2006 (72.1% versus 65.9%) (U.S. Army, 2008, p. 36–37).

E. PDHA SURVEYS AND REENLISTMENT/RETENTION BEHAVOIR

The objectives of the study titled, "Mental Health Problems, Use of Mental Health Service, and Attrition for Military Service After Returning for Deployment to Iraq and Afghanistan," were to examine: the relationship between combat deployments and the correlation between the screening results reported on the Post-Deployment Health Assessment (PDHA) (DD Form 2796)[17]; actual use of mental health services by the service member; and attrition from the military (p. 1023). The authors conducted a descriptive study and expressed their results as functions of total person-years of follow-up after deployment (p. 1024). The study population consisted of 303, 905 soldiers and Marines who completed a PDHA between May 1, 2003 and April 30, 2004.

One of the outcomes analyzed were attrition rates for members who completed a PDHA and who were considered a mental health risk compared with those who completed a deployment but were not considered a mental health risk. A soldier or Marine was defined as a mental health risk for the purposes of this study if they screened

[16] Those with a p-value equal to or less than .01; given the large sample size a p-value of .05 raises the possibility that some significant results would occur simply because of the high number of tests conducted.

[17] In April 2003, the U.S. Department of Defense (DOD) mandated that all service members complete a PDHA within 30 days of return from deployment using Department of Defense Form 2796. Department of Defense Instruction Number 6490.03 delineates Service roles and responsibilities for PDHA completion, storages, and other administrative actions.

positive for depression, Post Traumatic Stress Disorder (PTSD), or endorsed questions related to suicide, interpersonal relationship problems, or interest in receiving mental health care.

A positive response to feeling down, depressed, or hopeless, or expressing little interest or pleasure in doing things (DD Form 2796, Question 11), indicated that a service member was considered at risk for depression and subsequently a mental health risk. A positive endorsement of any two of the four questions which asks service members about their experiencing trauma, numbing, situation avoidance, or hyper-arousal categorized them as at risk for Post Traumatic Stress Disorder (PTSD) and consequently a mental health risk (Hoge, Auchterlonie, & Milliken, 2006, p. 1025). A service member was also considered to be at risk for developing mental health problems if they endorsed a response to suicide ideations (DD Form 2796, Question 11), or expressed "interest in receiving help for stress, emotional, alcohol, or family problems" (DD Form 2796, Question 10). A positive response to PDHA Question 13, "having thoughts or concerns you might have serious conflicts with your spouse, family members, or close friend or you might hurt or lose control with someone?" were the final criteria set for inclusion in to the mental health risk category (Hoge, Auchterlonie, & Milliken, 2006, p. 1025).

Overall, 19.1% of soldiers or Marines returning from Iraq were considered mental health concerns, 11.3% of those returning from Afghanistan screened positive for mental health concerns, and 8.5% of those deployed elsewhere met the risk criteria for mental health concerns (Hoge, Auchterlonie, & Milliken, 2006, p. 1025). Those deployed to OIF,[18] were more likely than those deployed elsewhere to report witnessing wounded or killed Americans, discharging their weapon, or feeling in great danger of being killed, while on their most recent deployment; 46 percent of soldiers or Marines returning from OEF reported any combat experience, while 65 percent of those returning from Iraq reported any combat experience (p. 1027).

The authors found that those service members who were categorized as mental health risks, were more likely to leave the military for any reason during the year

[18] Those deployed to Iraq, Kuwait, or Qatar.

immediately following their return from deployment, than those who were not categorized as mental health risks (p. 1028) and that soldiers and Marines deployed in support of Operation Iraqi Freedom were more likely to leave military service during the year long follow-up period than were those deployed to Afghanistan or other locations (p. 1029).

The authors do not directly analyze the relationship between combat exposure and attrition from military service, however, they do find that exposure to combat situations during the deployment for which the PDHA is completed is correlated with screening positive for PTSD (a metal health risk) among Operation Iraqi Freedom (OIF) veterans. 79.6% of OIF veterans who screened positive for PTSD reported witnessing seeing people wounded or killed or discharging their weapon in direct combat with the enemy (Hoge, Auchterlonie, & Milliken, 2006, p. 1028). Overall, those returning from Iraq were more likely to have experienced combat, were more likely to screen positive for mental health concerns and PTSD, and were more likely to leave the military for any reason during the yearlong follow-up period after their most recent deployment.

While this study showed that mental health concerns on the PDHA were correlated with attrition from the military in the year following deployment it did not directly study the direct effect of combat exposure on attrition. Additionally, while valid in other literature the authors point out that their measures of attrition include both voluntary separation, such as expiration of active service, and involuntary separation (p. 1031). Finally, there were demographic differences in deployment locals as more Marines and active duty units deployed to OIF than other locations and those who deployed but did not have a PDHA on record were more likely to be Marines (p. 1027).

F. CHAPTER SUMMARY

This chapter has provided a review of the current literature regarding the relationship between deployment and combat exposure to intended and actual reenlistment behavior. Several conclusions can be made from this review.

- Service members who had *some* months of hostile duty were more likely to reenlist than those without hostile duty. However, as the number of hostile months increased, the probability of reenlisting decreased and the decrease occurred more rapidly for hostile months than for non-hostile months.
- Status of Forces Surveys of Active Duty Personnel administered between 2002 and 2005 show that hostile deployments have a negative and statistically significant relationship with the likelihood of *intention* to reenlist.
- Service in OIF or OEF did not statistically affect member's intention to stay on active duty except for Army personnel where service in either of the two operations had a negative effect on intention to stay on active duty.
- According to Mental Health Advisory Team reports conducted annually since 2003. fewer OIF participants report receiving small arms fire in 2005 and 2006 than those involved in OIF-I during 2003. Later participants in OIF reported seeing dead or seriously injured American less often but more often reported exposure to Improvised Explosive Devices (IEDs) or booby traps.
- Soldiers and Marines deployed in support of Operation Iraqi Freedom were more likely to experience combat, screen positive for mental health concerns and PTSD, and to leave the military during the yearlong follow up period than were those deployed to other locations.
- Differing definitions of hostile deployments and the changing nature of violence and conditions faced by service members during deployments lead to seemingly contradictory deployment effects on reenlistment.

III. DATA DESCRIPTION

This chapter provides a detailed description of the various sources of the datasets used for this study. Section A identifies the different agencies and the data files they respectively provided as well as provides a brief description concerning how the two datasets where merged. Section B summarizes the highlights of the chapter.

A. DATA SOURCES

The data for this thesis comes from both DMDC (Defense Manpower Data Center) and the Armed Forces Health Surveillance Center (AFHSC[19]). The data from DMDC are quarterly personnel files for all service enlisted members between 1994 and 2007, regardless of their deployment status. The data from AFHSC contains responses to the post-deployment health assessment survey (PDHA) between 2002 and 2007. The AFHSC merged the active duty personnel file[20] using service members' social security numbers and their respective PDHAs responses contained in the AFSHC file. Both data files were cleansed of all personally identifiable data before the final analytic file was transferred from the AFHSC to the Naval Postgraduate School; unique study identification numbers were assigned to each observation in order to protect individual privacy and provide anonymity[21].

1. The Active Duty Personnel Extract File

The Active Duty Enlisted Master File, collected by the DMDC on a quarterly basis, contained information about service members from the third quarter of calendar year 1994 through the end of calendar year 2007. This enlisted master file provides demographic data such as age, race, gender, pay grade, marital status, months in service, and number of dependents, as well as military specific information such as contract

[19] The AFHSC is formerly known as Army Medical Surveillance Activity (AMSA).

[20] The active duty personnel extract file was originally provided to NPS from the DMDC in 2008 for another thesis. Since that time, the active duty file was stored by NPS on a secure server.

[21] The use of data and methodology for this study was approved by the NPS Institutional Review Board (IRB) and AFHSC prior to accessing or transmitting the Active Duty Personnel File to the AFHSC.

length, occupational specialty, and the service member's unit[22]. The enlisted master file was augmented with waiver data that included Armed Forces Qualification Test (AFQT) scores, education level, accession date, and home of record information. Finally, the enlisted master file was augmented with information from separation files, which included Interservice Separation Codes (ISC) that record the date and reason for separation or the occurrence of a reenlistment.

2. DD Form 2796 Post-Deployment Health Assessments

The purpose of the Post-Deployment Health Assessment (PDHA) (DD Form 2796) is to assess a returning service member's health after deployment and to assist healthcare providers[23] identify those in need of present or future medical care. First developed and distributed in April 2003, DD Form 2796 is required for all deployments outside the United States (OCONUS) that last more than 30 days. This form is recommended but at the discretion of the Component Commander, Service Component Commander, or commander exercising operation control during all deployments less than or equal to 30 days, deployments with a fixed military treatment facility (MTF) or for deployments within the Continental United States (CONUS) [24]. Those required to complete a PDHA must do so no sooner than 30 days before re-deployment to no later than 30 days after returning to their home station. Following the self-administered portion of the PDHA, a trained health care provider[25] conducts a one-on-one meeting with the member to discuss health related concerns and to screen the service member for physical or mental health concerns. Mental health is assessed using several questions: two questions widely used in primary care setting measure depression; a four-item screen for PTSD developed for the National Center of PTSD; finally four questions that relate to

[22] Service member's unit is recorded as a Unit Identification Code (UIC).

[23] *DoD Instruction 6490.03* defines a health care provider as a nurse, medical technician, corpsman, or medic.

[24] *DoD Instruction 6490.03* provides full instructive and administrative guidance for the administration and control of deployment health and administration of the PDHA.

[25] *DoD Instruction 6490.03* defines a trained health care provider as a physician, physician assistant, advanced nurse practitioner, nurse practitioner, independent duty corpsman, independent duty medical technician, or Special Forces medical sergeant.

suicide, interpersonal relations, and interest in receiving care (Hoge, Auchterlonie, & Milliken, 2006, pp. 1024–1025). Positive responses to particular PDHA questions require referrals for further medical evaluations. The health care providers document these referrals and discuss with the service member the resources available that best meet his/her needs. The PDHA also requires service members to annotate their branch and component of service, operation location, and occupational specialty while deployed.

Central to this study, the PDHA also asks service members about specific experiences during the deployment in question. In particular, the PDHA assesses the service member's battlefield experiences as it requires service members to respond to whether they felt in great danger of being killed, whether they witnessed injured or dead personnel, whether the fired their weapon at the enemy, and whether they were inside or closely inspected destroyed military vehicles during deployment. While these responses are not, and realistically cannot be verified, they do serve as a proxy for experiences that service members may have had during deployments that may influence future reenlistment and retention behavior. Details of the combat exposure information are described in Chapter IV.

3. Sample Criteria for the Study Population

The final dataset for this analysis represents pooled cross-sectional data of enlisted first-term service members in the United States Army, Navy, Marine Corps, and Air Force who began their first enlistment contract during calendar years 2002, 2003, or 2004. The sample was restricted to only those who initially enlisted utilizing four year contracts (three and four year contracts in Army). In order to ensure that only those members serving their first enlistment contract were included in the sample, the final dataset was further restricted to four year enlistees who served less than 52 months of service (40 months of service for three-year enlistees). Selecting 52 and 40 months of service prevented members who extended their enlistment contracts for short periods of time but had no intention of reenlisting from being dropped from the sample. Previous

literature[26] has found significantly different attrition rates between service members in their first term of service and service members in subsequent terms of service; this study focuses only on first-term enlisted service members. Restricting the final dataset to cohort years 2002–2004 allow the PDHA records to encompass the entirety of each service member's initial contract obligation thereby recording deployment history during the first term. The final data set includes 179,651 total observations; 74,833 Army personnel, 41,607 Marine personnel, 40,938 Navy personnel, and 22,775 Air Force personnel.

B. SUMMARY

In summary, the Active Duty Personnel Extract File constructed by the DMDC and the Post-deployment Health Assessment questionnaire (DD Form 2796) provided by the Armed Forces Health Surveillance Center were merged using a social security numbers. The linked data contains demographic information, service members' military service information, and responses to PDHA. The AFHSC merged the two datasets and removed personally identifiable information prior to the final datasets delivery to the NPS in accordance with the IRB approved for this study.

[26] Hosek and Martorell find that second term service members have consistently higher reenlistment rates than their first term counterparts (2009, 11).

IV. VARIABLE DESCRIPTION

Section A discusses the dependent variables and Section B discusses the key independent variables and control variables used in analyzing the separation and attrition behavior of those in the sample. Section C provides a summary of the control and dependent variables used in this study.

A. DEPENDENT VARIABLES

1. Staying Past Initial Obligation

The first dependent variable of interest is if an enlisted member stays past their initial obligation: a binary dummy variable takes on a value of one if the member does continue past initial obligation; and 0 otherwise. For the purposes of this study, whether a person stays past initial obligation is determined if either of the two conditions below is met. First, it occurs when a service member's month in service is greater than their initial enlistment term dictated. For example, those with a four year enlistment contract who have greater than 48 months in service are considered to have stayed past their initial obligation. Likewise, for three-year enlistees, having greater than 36 months in service is also categorized as staying past initial enlistment obligation. In the analysis, we assume most Army enlisted faced a three-year initial contract and other services faced a four-year initial contract. Second, Interservice Separation Codes[27] (ISC) are also used to identify whether a service member stays past their initial obligation. There are several instances in which service members signaled their willingness to continue their military service and is captured by an ISC even when their months in service was less than their contractual obligation. Service members are categorized as staying past their initial obligation if they have an ISC corresponding to "immediate reenlistment" or if they are assigned an ISC for participation in an officer commissioning program, assignment to a military service academy, or for a warrant officer program. Participation in an officer program signifies a

[27] These ISCs are standardized codes that the DMDC created using each service's Separation Program Designator (SPD).

member's willingness to remain in military service and entails additional years of obligated military service as a requisite for program participation.

2. Early Attrition (Non-EAS Separation)

A service member is considered to have non-EAS separation if the member did not complete their service contract for reasons other than accepting a commission, retirement, or death. Appendix A lists all the ISC codes that represent non-EAS attrition. A binary variable takes the value of one if a service member's ISC code falls into this category, and 0 otherwise.

B. KEY INDEPENDENT VARIABLES

1. Deployment Indicator

For those that were not deployed during the study period, they would not have a matching PDHA response from AFHSC. A deployment indicator takes the value of one if the service member has been deployed and consequently completed a PDHA form, and 0 otherwise. The inclusion of this indicator tests whether there is a difference in retention or attrition outcomes between those who deployed and those who did not.

2. Deployment Locations

The deployment variables are generated according to each service member's PDHA responses. Deployment locations are characterized as Iraq, Afghanistan, other locations, or none. The PDHA form allows the respondent to list up to five countries and time at each location where they were mainly deployed. If the service member includes Iraq in the areas they were mainly deployed, it is treated as deployment to Iraq. If the service member included Afghanistan as the area they were mainly deployed the deployment is treated as a deployment to Afghanistan. If the PDHA respondent did not list Iraq or Afghanistan as a deployment location, the deployment is categorized as a deployment to other location.

If the service member has not completed a PDHA survey, they are considered to have not deployed during their initial enlistment contract. Chapter III provides details concerning the requirements for PDHA completion, and *DoD Instruction 6490.03* provides detailed guidance concerning administrative requirements and responsibilities for PDHA completion and recording requirements. Those who deployed inside the Continental United States, were deployed less than 31 days, or were deployed OCONUS to locales with permanent medical treatment facilities may be erroneously categorized as not being deployed if the appropriate authority decided not to require the completion of the PDHA. Previous literature has found non-hostile deployments, which are most likely not to require PDHA, do not significantly influence reenlistment behavior (Hosek, Kavanagh, & Miller, 2006, p. xix).

3. Combat Exposure

The PDHA asks service members to respond to questions regarding their combat experiences during their deployment. These questions ask whether a respondent felt in great danger of being killed, whether they saw dead, wounded or seriously wounded coalition forces, enemy combatants, or civilian personnel during their deployment. The PDHA also prompts respondents to answer whether they fired their weapon[28] while in direct combat with the enemy or whether they were inside, entered, or closely inspected destroyed military vehicles. This study examines the following combat exposure:

a. Weapons Usage

- A binary indicator capturing whether a service member ever fired their weapon during their deployment (regardless of firing location)
- Three binary indicators capturing whether a service member fired the weapon from land, sea, or air. Firing a weapon from an aircraft, for example, might have a different psychological effect on the service member than if the weapon was fired while on foot or from a ground-based vehicle.

[28] If the respondent answered yes, then whether on land, sea, or air also needs to be selected.

b. Casualty Experience

- A binary indicator capturing whether a service member ever reported seeing an individual (regardless of whether the individual was a coalition member, enemy combatant, or civilian) killed, wounded, or dead during any deployment during their enlistment.
- Three binary indicators capturing whether a service member witness an individual being killed, wounded, or dead from the following sub population: coalition member, enemy combatant, or civilian. Witnessing death of an enemy combatant can very well have a different psychological effect on the service member (and his subsequent stay decision) than if the death is of a coalition member.
- In order to measure a service member's exposure to destroyed military vehicles a final combat exposure binary variable captures whether the service member reported being inside, enter, or closely inspect any destroyed military vehicles during any deployment. If the service member ever reported that occurrence during any deployment the variable takes on a value of one; otherwise it is assigned a value of 0.

C. CONTROL VARIABLES

1. Cohort Years

There are two dummy variables that account for the calendar year in which a service member entered the military. These dummy variables are used to control to unobservable characteristics of a calendar year which are experienced by all members of the cohort such as macro-economic trends and military policies that affect all members of the U.S. military during a given time period.

2. Military Occupational Specialties

The PDHA collects information pertaining to a service member's occupational specialty during the deployment and combat specialty. These responses are an accurate reflection of the duties performed by each service member during their deployment. However, these measures are wide-ranging and subjective since they are self-reported; service members may have different definitions of job titles and job descriptions than either their fellow service members or those at DMDC. Therefore, occupational specialties used for this study were obtained using the Enlisted Personnel File provided by the DMDC; these occupational specialties are far less subjective and reflect the duties

that each service member was trained to perform during their enlistment. Occupations are categorized according to a Department of Defense (DoD) Occupational Group[29] where similar specialties regardless of service branch are grouped together. For example, DoD Occupational Group 10 titled, "Infantry, Gun Crews, and Seamanship Specialists" contains those whose military specialty include infantrymen, engineers, air crewmen, seamen, and those who perform installation security. For this study, these DoD occupational groups were further categorized into five distinct categories according to the roles performed by the occupational group members. The five occupational groups are combat arms, medical service, combat service, service support, and other occupations. The omitted category is "other occupations," which includes those in recruit training or in a training status. If a member belongs to one of these groups, a value of one was assigned; otherwise, a value of 0 was assigned.

3. Race/Ethnicity

Binary variables created from the DMDC data categorized service members into the following mutually exclusive groups: white, black, Hispanic, other races, and unknown. If the service member belongs to one of these groups, a value of one is assigned; otherwise, a value of 0 is assigned. The omitted category is white.

4. Marital Status

Marital status is divided into five groups: never married, married with no dependents (no children), married with dependents (children), divorced, and single with dependents. A service member's marital status was measured at the end of their active duty service regardless of their separation cause. If the service member belongs to one of these groups, a value of one is assigned; otherwise a value of 0 is assigned. The omitted category is single with no dependents.

[29] *DoD Instruction 1312.1-1* Occupational Conversion Index provides the tables that convert similar occupations in different branch of Services in to a single group.

5. Education

Educational status is measured at the time of a service member's first enlistment and is categorized into five groups: less than high school degree, high school degree or GED, some college education but no bachelor degree (these include associate degrees), a bachelor degree, and lastly more than a bachelor degree. The reference group is those with less than high school education.

6. AFQT Score

Armed Forces Qualification Test (AFQT) scores are used to determine an applicant's eligibility for military service and are derived from the Armed Services Vocational Aptitude Battery (ASVAB). An AFQT score is a combination of four subtests that measure general cognitive ability, and is composed of verbal and mathematic subtests. AFQT scores are reported as percentiles, which correspond to AFQT categories. An AFQT percentile score of 93–99 falls into category I, a percentile score between 65–92 falls into category II, percentile scores of 50–64 fall in category IIIA, 31–49 fall within category IIIB, percentile scores of 10–30 fall within category IV, and percentile scores lower than 9 fall within AFQT category V[30]. Binary variables for AFQT categories take on a value of one if the service member's percentile score dictates their inclusion in that category; otherwise, a value of 0 is assigned. The omitted category is AFQT category IIIA, those with a percentile score between 50 and 64.

D. SUMMARY

To summarize, this study will analyze three dependent variables: whether a service member stays past initial obligation, whether a service member completes his or her initial obligation and separated afterward (expiration of service obligation separation), and whether a person is subjected to attrition before their contract expires (early, Non-EAS attrition). The key variables for the models are the combat exposure information reported in the PDHA. There are two types of control variables in the model.

[30] Those in category V are ineligible to enlist and those in category IV may not exceed 20% of the total number of persons enlisted (*DoD Instruction* 1304.26, 2005).

The first type captures the general deployment characteristics (location, duration, frequency. The rest of the control variables include the following demographic and service information: rank, occupation, race, marital status, education. Chapter V will discuss the statistical models for the analysis.

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V. STATISTICAL MODEL

This chapter identifies the statistical model used in the study. Section A defines the analytical model. Section B describes the multivariate probit regression models used in this thesis.

A. ANALYTICAL METHOD

This study uses probit models. Probit models are nonlinear regression models designed for use with binary dependent variables that are bound between zero and one and require maximum likelihood estimation. The maximum likelihood estimation is based on the distribution of the dependent variables given the explanatory variables. Unlike linear models where the predicted probabilities can either exceed one or drop below zero, the conditional probabilities of probit models always fall between the bounds of zero and one. In this study, each dependent variable is binary and takes on a value of either one or zero. The theoretical model is:

$$Pr(Y=1|X) = \Phi (X'\beta)$$

where

Y = the probability that the dependent variable is one

Φ = Cumulative distribution function of the standard normal distribution

X = Vector explanatory variables which are assumed to influence the dependent variable

β = Coefficient of the regression estimated by maximum likelihood

B. MULTIVARIATE PROBIT REGRESSION MODELS

In this study, four sets of models are used to analyze the effect of combat exposure on first term enlisted service members' retention and attrition and a set of models are re-estimated for sensitivity analysis. Separate models are estimated for each of the two dependent variables and for each branch of service. The models that measure retention probability only examine service members who have completed all but one year

of their obligated service; this technique allows us to focus on those who are eligible to make a retention decision. Each of the models includes many of the same control variables that remain constant in each of the models such as: gender, race, military occupation, year of military entry, marital status, age, education, and AFQT score. Only the key explanatory variables change in each model specification. The general form of the model is:

Pr(stay past initial obligation or Non-EAS separation) = β_0 + β_1(key independent variables) + β_2(constant control variables)

Finally, the model that measures service member retention is re-estimated with pay grade and deployment tempo variables included in order conduct a sensitivity analysis of the models.

1. Model One

Model One focuses on the overall effect of three combat exposure measures on retention or early attrition, regardless of where the combat exposure took place. This Model takes the following general form:

Pr(stay past initial obligation or Non-EAS separation) = β_0 + β_1(saw any individual killed, wounded, or dead) + β_2(fired a weapon) + β_3(entered, inside, or inspected destroyed military vehicle) + β_4(deployed to other location) + β_5(deployed to Iraq or Afghanistan) + β_6(other explanatory variables)

The key coefficients of interest are β1– β3, as they capture the effect of the three major combat exposure measures on reenlistment or attrition. In addition, variables that control for deployment location (deployed to Iraq or Afghanistan, deployed to other locations) are included so the model can separate the effect of deployment location from the effect of combat exposure on retention and early attrition. The other explanatory variables that control for service members' demographic and service characteristics remain unchanged for all models. These explanatory variables are described in Section C of Chapter IV.

2. Model Two

Model Two expands from Model One by including finer details of combat exposure. In particular, there are seven key variables of interest: the first set of variables captures whether a service member discharged a weapon from the land, air, or sea during deployment; the second set of variables capture whether a service member saw coalition members, enemy, or civilians killed, wounded, or dead during deployment; lastly whether a service member was inside or inspected destroyed military vehicles. Like Model One, this model controls for deployments locations and the rest of the variables are identical to that of Model One.

3. Model Three

Model Three focuses on combat exposure that occurred only in Iraq or Afghanistan. The key variables of interest in this model are the following: seeing any individual killed in Iraq or Afghanistan, firing any weapon in Iraq or Afghanistan, and ever entering, being inside, or inspecting destroyed military vehicles in Iraq or Afghanistan. This model is useful for comparing the effects of combat exposure that occur only in Iraq or Afghanistan with the effects of combat exposure that occur during any deployment as examined in Model One.

4. Model Four

Model Four builds upon Model One by examining whether combat exposure that occurred in Iraq or Afghanistan has a differential effect on reenlistment and attrition rates than combat exposures that occur in other locations. In other words, this model examines whether combat exposure that occurred in Iraq or Afghanistan affects retention or attrition rates differently than the same type of combat exposure that occurred in other OIF/OEF locations. Model Four combines combat exposure occurring in Afghanistan and Iraq as one group, so it is easier to get more precise estimates of the effect (since sample size is particularly small for deployment to Afghanistan). In addition to the three combat exposure variables from Model One, this model adds three additional key variables: seeing any individual killed in Iraq or Afghanistan, firing any weapon in Iraq

or Afghanistan, and ever entering, being inside, or inspecting destroyed military vehicles in Iraq or Afghanistan. The rest of the model specification is identical to that of Model One. If the three additional combat exposure variables are statistically significant, then there is evidence that combat exposures occurring in Iraq or Afghanistan affect service members' reenlistment decision differently than combat exposures occurring elsewhere.

5. Sensitivity Analysis Models

Models One through Four are individually re-estimated with pay grade dummy variables and with variables that measure deployment tempo included in the set of constant explanatory variables in order to test the sensitivity of the models. Pay grade and deployment tempo variables are not included in the main analysis because such information is highly correlated with the dependent variable.

C. CHAPTER SUMMARY

Four separate models are used to examine the effects of combat exposure on retention and attrition of first-term enlisted service members. While the control variables remain unchanged, each of the models uses different key explanatory variables to measure the degrees to which the location or type of combat exposure affect retention and attrition amongst first-term enlisted service members. A comparison of these models allows one to examine the effect that combat exposure has on retention and attrition, while controlling for the effects of deployment tempo and deployment location. Finally, for the analysis that examines reenlistment decision, each of the models are re-estimated with pay grade dummy variables included in the model specification.

VI. DESCRIPTIVE STATISTICS

This chapter presents summary statistics used in providing the interpretation for reenlistment and Non-EAS separation analysis of the service members included in the sample. Section A compares the descriptive statistics of those who have been deployed and those who have not been deployed during their initial enlistment contract.

A. PRELIMINARY DATA ANALYSIS

1. Demographic and Service Characteristics

Table 1 provides the statistical sample for first-term enlisted service members who did and did not deploy during their initial enlistment contract.

Table 1. Service and Demographic Characteristics

	Army		Marine		Navy		Air Force	
Race/Ethnicity	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
White	0.258	0.249	0.298	0.322	0.254	0.246	0.303	0.355
	(0.438)	(0.432)	(0.457)	(0.467)	(0.436)	(0.431)	(0.460)	(0.479)
Black	0.064	0.073	0.031	0.044	0.106	0.076	0.051	0.083
	(0.244)	(0.261)	(0.173)	(0.205)	(0.308)	(0.265)	(0.220)	(0.275)
Other	0.037	0.028	0.027	0.023	0.043	0.037	0.024	0.025
	(0.188)	(0.166)	(0.161)	(0.151)	(0.203)	(0.188)	(0.153)	(0.155)
Unknown	0.542	0.561	0.539	0.524	0.523	0.594	0.590	0.501
	(0.498)	(0.496)	(0.499)	(0.499)	(0.500)	(0.491)	(0.492)	(0.500)
Hispanic	0.100	0.089	0.106	0.086	0.074	0.047	0.032	0.037
	(0.300)	(0.285)	(0.307)	(0.281)	(0.261)	(0.212)	(0.175)	(0.189)
Gender/Age								
Female	0.119	0.251	0.033	0.107	0.125	0.175	0.220	0.330
	(0.324)	(0.434)	(0.178)	(0.310)	(0.331)	(0.380)	(0.414)	(0.470)
Age	21.0	21.1	19.6	19.6	20.3	20.3	20.2	20.5
	(3.2)	(3.5)	(1.8)	(2.0)	(2.6)	(2.8)	(2.1)	(2.5)
Education Level								
Non High School Diploma	0.003	0.004	0.011	0.009	0.020	0.024	0.001	0.002
or GED Grad	(0.056)	(0.062)	(0.103)	(0.094)	(0.139)	(0.154)	(0.037)	(0.041)
High School Diploma or GED	0.906	0.864	0.962	0.960	0.921	0.902	0.873	0.815
	(0.292)	(0.343)	(0.192)	(0.196)	(0.270)	(0.297)	(0.333)	(0.389)

	Army		Marine		Navy		Air Force	
	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
Some college, no bachelor degree	0.040	0.043	0.012	0.013	0.039	0.048	0.015	0.014
	(0.195)	(0.202)	(0.106)	(0.113)	(0.194)	(0.213)	(0.120)	(0.115)
Bachelors degree	0.032	0.039	0.004	0.005	0.012	0.015	0.017	0.018
	(0.177)	(0.193)	(0.065)	(0.073)	(0.107)	(0.123)	(0.130)	(0.134)
Postgraduate degree	0.019	0.051	0.010	0.011	0.008	0.010	0.091	0.148
	(0.136)	(0.221)	(0.100)	(0.102)	(0.091)	(0.101)	(0.288)	(0.355)
AFQT Score								
AFQT score >=93	0.047	0.041	0.035	0.034	0.020	0.050	0.064	0.123
	(0.211)	(0.199)	(0.184)	(0.180)	(0.140)	(0.218)	(0.245)	(0.328)
AFQT score 65-92	0.316	0.288	0.319	0.326	0.242	0.330	0.403	0.380
	(0.465)	(0.453)	(0.466)	(0.469)	(0.428)	(0.470)	(0.491)	(0.485)
AFQT score 50-64	0.274	0.281	0.270	0.284	0.252	0.267	0.250	0.245
	(0.446)	(0.450)	(0.444)	(0.451)	(0.434)	(0.443)	(0.433)	(0.430)
AFQT score 31-49	0.339	0.368	0.356	0.331	0.476	0.345	0.280	0.212
	(0.473)	(0.482)	(0.479)	(0.471)	(0.499)	(0.475)	(0.449)	(0.409)
AFQT score 10-30	0.020	0.017	0.006	0.005	0.002	0.001	0.003	0.001
	(0.139)	(0.129)	(0.075)	(0.071)	(0.040)	(0.022)	(0.050)	(0.038)
Marital Status								
Single/Divorced	0.542	0.648	0.576	0.676	0.519	0.637	0.621	0.649
	(0.498)	(0.478)	(0.494)	(0.468)	(0.500)	(0.481)	(0.485)	(0.477)
Single with Dependents	0.136	0.090	0.028	0.029	0.065	0.055	0.049	0.039
	(0.342)	(0.286)	(0.163)	(0.167)	(0.246)	(0.227)	(0.215)	(0.193)

	Army		Marine		Navy		Air Force	
	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
Married	0.164	0.143	0.281	0.199	0.266	0.195	0.224	0.210
	(0.370)	(0.350)	(0.450)	(0.399)	(0.442)	(0.396)	(0.417)	(0.407)
Married with non-spousal dependents	0.159	0.120	0.115	0.097	0.150	0.114	0.106	0.103
	(0.365)	(0.325)	(0.319)	(0.295)	(0.357)	(0.317)	(0.308)	(0.304)
Entered military while single	0.868	0.823	0.978	0.971	0.916	0.916	0.944	0.914
	(0.339)	(0.382)	(0.147)	(0.168)	(0.278)	(0.277)	(0.230)	(0.280)
Entered military single with dependents	0.033	0.038	0.003	0.004	0.035	0.031	0.001	0.001
	(0.179)	(0.191)	(0.058)	(0.065)	(0.185)	(0.174)	(0.025)	(0.026)
Entered military while married	0.053	0.079	0.014	0.019	0.026	0.029	0.050	0.075
	(0.224)	(0.270)	(0.117)	(0.137)	(0.159)	(0.169)	(0.219)	(0.264)
Entered military married with dependents	0.047	0.060	0.005	0.006	0.023	0.023	0.005	0.010
	(0.211)	(0.238)	(0.071)	(0.076)	(0.150)	(0.150)	(0.069)	(0.098)
Service Information								
Pay grade E1-E2	0.066	0.295	0.047	0.255	0.101	0.235	0.029	0.192
	(0.248)	(0.456)	(0.212)	(0.436)	(0.301)	(0.424)	(0.167)	(0.394)
Pay grade E3	0.117	0.168	0.237	0.194	0.369	0.280	0.128	0.241
	(0.321)	(0.374)	(0.425)	(0.395)	(0.483)	(0.449)	(0.334)	(0.427)
Pay grade E4	0.659	0.225	0.579	0.322	0.433	0.277	0.833	0.402
	(0.474)	(0.418)	(0.494)	(0.467)	(0.496)	(0.448)	(0.373)	(0.490)
Pay grade E5 and higher	0.158	0.043	0.136	0.075	0.098	0.093	0.011	0.017
	(0.365)	(0.203)	(0.343)	(0.264)	(0.297)	(0.291)	(0.106)	(0.130)
Months of service	38.0	17.2	44.7	28.6	41.3	28.9	44.6	28.6
	(8.1)	(15.5)	(5.2)	(19.1)	(9.7)	(17.9)	(6.1)	(18.0)

	Army		Marine		Navy		Air Force	
	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
Year of Entry								
2002 Cohort	0.391	0.384	0.419	0.449	0.474	0.404	0.417	0.509
	(0.488)	(0.486)	(0.494)	(0.497)	(0.499)	(0.491)	(0.493)	(0.500)
2003 Cohort	0.386	0.387	0.581	0.551	0.526	0.596	0.583	0.491
	(0.487)	(0.487)	(0.494)	(0.497)	(0.499)	(0.491)	(0.493)	(0.500)
2004 Cohort	0.224	0.229	0.000	0.000	0.000	0.000	0.000	0.000
	(0.417)	(0.421)	0.000	0.000	0.000	0.000	0.000	0.000
MOS								
Combat Arms	0.374	0.216	0.480	0.173	0.155	0.098	0.183	0.070
	(0.484)	(0.412)	(0.500)	(0.378)	(0.362)	(0.298)	(0.387)	(0.255)
Medical Service	0.051	0.056	0.000	0.000	0.043	0.043	0.051	0.101
	(0.221)	(0.230)	0.000	0.000	(0.203)	(0.203)	(0.220)	(0.302)
Combat Service	0.247	0.162	0.194	0.140	0.462	0.324	0.282	0.229
	(0.431)	(0.369)	(0.396)	(0.347)	(0.499)	(0.468)	(0.450)	(0.420)
Service Support	0.298	0.254	0.307	0.339	0.275	0.252	0.367	0.261
	(0.457)	(0.435)	(0.461)	(0.473)	(0.447)	(0.434)	(0.482)	(0.439)
Other Occupation	0.003	0.014	0.006	0.174	0.059	0.163	0.003	0.113
	(0.050)	(0.116)	(0.076)	(0.379)	(0.235)	(0.369)	(0.051)	(0.317)
Observations	30577	44256	21303	20304	9486	31452	6486	16289
Standard deviations in parentheses								

Table 1 provides comparative summary characteristics of all service members in the sample according to their service affiliation and whether or not they have a deployment history (i.e., the control group are those that did not have any matching PDHA). Overall, whites comprised the largest known race regardless of service affiliation or deployment history. Across each of the services, female members make up a larger portion of those without deployment history than those with a deployment history. The Marine Corps has the lowest average age of new enlistees at less than 20 years of age for both Marines who have deployed and those who have not.

High school diploma graduates make up the largest educational category in each of the services while the Air Force has a much higher portion of its enlisted members holding a postgraduate degree than the other services; 14.8% of Air Force personnel who have not deployed posses a postgraduate degree and 9% of Air Force personnel who have deployed have a postgraduate degree. The Air force also has a larger portion of its force with an AFQT score of 65 or above than the other services.

Most members of the Marine Corps are single with no dependents upon military entry (97%) while the Army and Air Force has equally sized portion of their respective forces enter the military while married (5% who deployed and about 7% of those who did not deploy). While 97% of new entrants to the Marine Corps were single with no dependents, only 58% of Marines who had deployed and 68% of Marines who had not deployed were single at the time of their separation or reenlistment decision. Likewise, 62% of airmen who have deployed and 64.9% of airmen who have not deployed were single with no deployments at the end of their initial obligation compared to over 90% of airmen who were single when they began their service. Compared to the others, the Army has the largest percentage of its force that enters the military either married without non-spousal dependents or married with dependents. The Army also has the highest percentage of its personnel who end their service while married with dependents: at the end of initial obligation, 15.9% of Army personnel who have deployed and 11.9% of those who have not deployed were married with dependents.

The Army and Marine Corps have the highest number of service members in a combat arms occupation amongst the four services with 37.4% and 48% respectively. The Navy and Air Force has a larger portion of those in Combat Service and Service Support occupations who have deployed than the Army or Marine Corps.

2. Deployment and Combat Exposure Characteristics

Table 2 provides the portion of each service that has been deployed during their initial enlistment contract as well as provides summary statistics of deployment history and combat exposure characteristics for service members who have been deployed at least once during their first enlistment contract.

Table 2. Deployment and Combat Exposure Characteristics

	Army	Marine	Navy	Air Force
Has been deployed	0.409 (0.492)	0.512 (0.500)	0.232 (0.422)	0.285 (0.451)
Has NOT been deployed	0.591 (0.492)	0.488 (0.500)	0.768 (0.422)	0.715 (0.451)
Those who have deployed				
Deployed more than once	0.144 (0.351)	0.400 (0.490)	0.106 (0.308)	0.279 (0.449)
Deployed 181-365 days during enlistment	0.541 (0.498)	0.519 (0.500)	0.184 (0.388)	0.262 (0.440)
Deployed more than 365 days during enlistment	0.315 (0.465)	0.212 (0.409)	0.020 (0.140)	0.058 (0.235)
Total days deployed during enlistment	341.1 (190.5)	244.0 (166.0)	132.5 (86.9)	174.9 (502.4)
Has been deployed to Iraq	0.874 (0.332)	0.872 (0.334)	0.094 (0.292)	0.411 (0.492)
Has been deployed to Afghanistan	0.087 (0.281)	0.054 (0.226)	0.009 (0.093)	0.091 (0.287)
Has been deployed to Iraq or Afghanistan	0.942 (0.235)	0.903 (0.296)	0.101 (0.301)	0.486 (0.500)
Deployed to other location	0.070 (0.255)	0.188 (0.390)	0.878 (0.327)	0.607 (0.488)

Share of those deployed that experience the following combat exposure	Army	Marine	Navy	Air Force
Saw individual killed, wounded, dead during a deployment	0.560 (0.497)	0.556 (0.497)	0.093 (0.291)	0.146 (0.353)
Reported seeing individual killed, wounded, or dead in Iraq	0.511 (0.500)	0.528 (0.499)	0.034 (0.182)	0.108 (0.310)
Reported seeing individual killed, wounded, or dead in Afghanistan	0.043 (0.203)	0.024 (0.153)	0.002 (0.046)	0.014 (0.119)
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan	0.548 (0.498)	0.543 (0.498)	0.036 (0.187)	0.122 (0.327)
Fired their weapon during deployment	0.294 (0.455)	0.343 (0.475)	0.023 (0.150)	0.022 (0.146)
Reported firing any weapon in Iraq	0.270 (0.444)	0.329 (0.470)	0.011 (0.106)	0.015 (0.122)
Reported firing any weapon in Afghanistan	0.022 (0.146)	0.013 (0.112)	0.000 (0.021)	0.002 (0.045)
Reported firing any weapon in Iraq or Afghanistan	0.289 (0.454)	0.339 (0.473)	0.012 (0.108)	0.017 (0.130)
Inside, entered, or closely inspected any destroyed military vehicle	0.352 (0.478)	0.348 (0.476)	0.024 (0.152)	0.049 (0.215)
Reported being inside or inspected destroyed military vehicle in Iraq	0.325 (0.468)	0.333 (0.471)	0.015 (0.122)	0.038 (0.191)
Reported being inside or inspected destroyed military vehicle in Afghanistan	0.022 (0.145)	0.007 (0.085)	0.001 (0.027)	0.003 (0.057)
Reported being inside or inspected destroyed military vehicle in Iraq or Afghanistan	0.344 (0.475)	0.339 (0.474)	0.016 (0.125)	0.042 (0.199)
Observations	30577	21303	9486	6486
Standard deviations in parentheses				

The Army and Marine Corps, with 40.9% and 51% respectively deployed, have the largest portion of their total first-term enlistees deployed while the Navy or Air Force have had 23.2% and 28.5% deployed, respectively. The small portion of first term enlistees in the Navy who have a PDHA record could be due to the fact that PDHAs are

not mandatory for sailors serving exclusively on ship[31]. The low percentage of Air Force first-term enlistees who have been deployed, could be due to clustering of deployment amongst a small group of Air Force personnel. While the Air Force has 28.5% of its first-term enlistees deployed, the average number of deployments experienced by those who have deployed is 1.37 deployments; higher than both the Army and Navy with 1.15 and 1.11 average deployments respectively for those who have deployed. It seems that deployments in the Air Force are concentrated among a small sample of its first-term population; while many in the Air Force may not deploy, those who do deploy, deployed repeatedly.

While Army deployments are longer in duration, Marine personnel deploy more frequently. The Army averages the most days deployed during an enlistment (341 days) while the Marine Corps averages the most total deployments (1.46) among first-term personnel with a deployment history. Further evidence of shorter, but more frequent deployments experienced by Marines compared to Army personnel is that in both services 87% of members have deployed to Iraq, while the total average number of deployments to Iraq are .97 in the Army but 1.16 in the Marine Corps. However, when deployments to either Iraq or Afghanistan are considered 94% of Army personnel who have deployed have been deployed to either of those locations, while 90% Marines have been to either of those locales; 10% of sailors, and 48.6% of airmen have been to either of those two hostile locations.

The Army and Marine Corps reported a higher portion of their first-term enlisted force with combat exposure. Army and Marine Corps personnel reported firing their weapons during deployments more than Navy or Air Force personnel; 29% of soldiers and 34% of Marines who have deployed reported firing their weapon during combat. Among Navy and Air Force personnel, only 2% reported firing their weapon during any deployment during their initial enlistment contract.

[31] DoD Instruction 6490.03 states, "Shipboard operations that are not anticipated to involve operations ashore are exempt from the requirements of this Instruction except for recording individual daily deployment locations or when potential health threats indicate actions necessary beyond the scope of shipboard occupational health programs or per the decision of the commander exercising operation control" (2).

Among soldiers who have been deployed, 35.2% reported being inside, entering, or inspecting destroyed military vehicles; 34.8% of Marines, 2.4% of sailors, and 4.9% of airmen reported that same experience if they had been deployed. Likewise, 56% of Army personnel and 55.6% of Marine personnel reported seeing an individual killed, wounded, or dead while on deployment, whereas 9.3% of Navy personnel and 14.6% of airmen reported that same experience.

3. Staying Past Initial Obligation Characteristics

Table 3 provides the portion of service members who have stayed past their initial contract obligation categorized by service affiliation regardless of deployment status. The table also provides summary statistics of deployment as well as combat exposure characteristics for service members who have stayed past their initial service obligation according to service affiliation.

Table 3. Retention Characteristics

	Army		Marine		Navy		Air Force	
	Did Reenlist	Did Not Reenlist	Did Reenlist	Did Not Reenlist	Did Reenlist	Did Not Reenlist	Did Reenlist	Did Not Reenlist
Has been deployed	60.83% (0.488)	35.97% (0.480)	60.57% (0.489)	48.47% (0.500)	25.97% (0.439)	22.45% (0.417)	36.46% (0.481)	26.28% (0.440)
Has not been deployed	39.17% (0.488)	64.03% (0.480)	39.43% (0.489)	51.53% (0.500)	74.03% (0.439)	77.55% (0.417)	63.54% (0.481)	73.72% (0.440)
Has been deployed to Iraq	54.28% (0.498)	31.17% (0.463)	53.53% (0.499)	42.07% (0.494)	4.54% (0.208)	1.57% (0.124)	16.08% (0.367)	10.50% (0.307)
Has been deployed to Afghanistan	5.27% (0.224)	3.11% (0.174)	1.16% (0.107)	3.22% (0.176)	0.39% (0.063)	0.15% (0.039)	4.21% (0.201)	2.14% (0.145)
Has been deployed to Iraq or Afghanistan	58.48% (0.493)	33.57% (0.472)	54.02% (0.498)	43.98% (0.496)	4.88% (0.216)	1.67% (0.128)	19.49% (0.396)	12.28% (0.328)
Deployed to other location	3.27% (0.178)	2.76% (0.164)	12.82% (0.334)	8.67% (0.281)	21.21% (0.409)	20.13% (0.401)	21.93% (0.414)	16.02% (0.367)
Total days deployed during enlistment	232.5 (254.1)	116.6 (187.1)	157.9 (173.5)	115.3 (168.1)	37.5 (80.5)	29.0 (66.7)	77.1 (427.6)	42.3 (221.3)
Saw individual killed, wounded, dead during ANY deployment	34.37% (0.475)	20.05% (0.400)	30.65% (0.461)	27.83% (0.448)	3.97% (0.195)	1.69% (0.129)	6.12% (0.240)	3.62% (0.187)
Reported seeing individual killed, wounded, or dead in Iraq	31.37% (0.464)	18.30% (0.387)	30.08% (0.459)	26.12% (0.439)	2.51% (0.156)	0.35% (0.059)	4.41% (0.205)	2.70% (0.162)
Reported seeing individual killed, wounded, or dead in Afghanistan	2.56% (0.158)	1.57% (0.124)	0.39% (0.063)	1.46% (0.120)	0.12% (0.034)	0.03% (0.018)	0.61% (0.078)	0.35% (0.059)

	Army		Marine		Navy		Air Force	
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan	33.61% (0.386)	19.63% (0.303)	30.33% (0.346)	27.09% (0.333)	2.61% (0.122)	0.38% (0.043)	5.00% (0.157)	3.04% (0.114)
Fired their weapon during a deployment	18.51% (0.388)	10.40% (0.305)	18.34% (0.387)	17.32% (0.378)	0.87% (0.093)	0.45% (0.067)	1.36% (0.116)	0.42% (0.065)
Reported firing any weapon in Iraq	16.79% (0.374)	9.60% (0.295)	18.09% (0.385)	16.51% (0.371)	0.77% (0.088)	0.13% (0.036)	0.91% (0.095)	0.30% (0.054)
Reported firing any weapon in Afghanistan	1.39% (0.117)	0.77% (0.087)	0.28% (0.053)	0.75% (0.086)	0.04% (0.019)	0.00% (0.006)	0.16% (0.040)	0.03% (0.017)
Reported firing any weapon in Iraq or Afghanistan	18.11% (0.017)	10.29% (0.015)	18.26% (0.018)	17.10% (0.020)	0.80% 0.000	0.14% (0.010)	1.10% 0.000	0.32% (0.008)
Inside, entered, or closely inspected destroyed military vehicles	24.08% (0.428)	11.99% (0.325)	20.26% (0.402)	17.11% (0.377)	1.59% (0.125)	0.28% (0.053)	2.03% (0.141)	1.21% (0.109)
Reported being inside or inspected destroyed military vehicle in Iraq	22.30% (0.416)	11.05% (0.314)	19.70% (0.398)	16.27% (0.369)	1.28% (0.113)	0.11% (0.033)	1.42% (0.118)	0.99% (0.099)
Reported being inside or inspected destroyed military vehicle in Afghanistan	1.33% (0.114)	0.77% (0.088)	0.15% (0.039)	0.44% (0.066)	0.07% (0.027)	0.00% (0.006)	0.20% (0.045)	0.06% (0.025)
Reported being inside or inspected destroyed military vehicle in Iraq or Afghanistan	23.54% (0.424)	11.75% (0.322)	19.80% (0.399)	16.66% (0.373)	1.35% (0.116)	0.11% (0.033)	1.63% (0.127)	1.06% (0.102)
Overall Reenlistment	.197 (.397)		.226 (.418)		.206 (.404)		.216 (.412)	
Observations	14714	60119	9388	32219	8422	32516	4920	17855
Standard deviations in parentheses								

When considering every member regardless of actual service length or reenlistment eligibility each of the Services have similar portions of their first-term enlisted members stay past their initial service obligation; Army (19.7%), Marine Corps (22.6%), Navy (20.6%), and Air Force (21.6%). When only considering service members who have completed all but the last year of their enlistment contracts the Service have different portions of their first-term enlisted members stay past initial service obligation; Army (30.3%), Marine Corps (28.4%), Navy (36%), and Air Force (28.6%). Among all of the Services, the Army (60.8%) has the largest portion of those who deployed and subsequently stayed past their initial obligation while the Navy has the largest portion that have stayed past their initial obligation and not deployed (74%). The Army has the highest rate of those who stay past their initial obligation and have been deployed to Iraq or Afghanistan (58.5%) while only 4.8% of sailors who stayed past their initial obligation have been deployed to either of those hostile locations. Among soldiers who stay in the Army past their initial obligation, the average days deployed is 232 days and is much more than any of the other services; the average Marine who stays past initial obligation has been deployed 158 total days during his or her initial enlistment.

Army personnel (34.4%) and Marine personnel (30.7%) report similar portions of those who saw an individual killed during a deployment and subsequently stayed past their initial obligation; 4% of sailors and 6.1% of airmen fall in to that category. Likewise, both Army and Marine personnel report 18.5% and 18.3% respectively who have fired their weapon during deployment and later stayed past their initial obligation; less than 1% of sailors and 1.4% of airmen belong in this category. About one-quarter (24.1%) of army personnel and 20.3% of Marine Corps personnel report being inside, entering, or inspecting destroyed military vehicles and also staying past their initial obligation; 1.6% of sailors and 2% of airmen also belong in this category.

4. Non-EAS Separation Characteristics

Table 4 provides the portion of service members who separated before completion of their first enlistment contract categorized by service affiliation. The table also provides summary statistics of deployment and combat exposure characteristics for service members who are characterized with Non-EAS separation.

Table 4. Attrition Characteristics

	Army		Marine		Navy		Air Force	
	Did Attrite	Did not Attrite	Did Attrite	Did not Attrite	Did Attrite	Did not Attrite	Did Attrite	Did not Attrite
Has been deployed	19.55% (0.397)	66.31% (0.473)	18.66% (0.390)	64.91% (0.477)	16.80% (0.374)	32.59% (0.469)	11.16% (0.315)	41.50% (0.493)
Has NOT been deployed	80.45% (0.397)	33.69% (0.473)	81.34% (0.390)	35.09% (0.477)	83.20% (0.374)	67.41% (0.469)	88.84% (0.315)	58.50% (0.493)
Has been deployed to Iraq	16.44% (0.371)	58.75% (0.492)	15.03% (0.357)	57.13% (0.495)	1.36% (0.116)	3.39% (0.181)	4.00% (0.196)	17.49% (0.380)
Has been deployed to Afghanistan	1.50% (0.121)	5.98% (0.237)	1.31% (0.114)	3.36% (0.180)	0.12% (0.034)	0.32% (0.057)	0.64% (0.080)	4.05% (0.197)
Has been deployed to Iraq or Afghanistan	17.77% (0.382)	63.19% (0.482)	16.08% (0.367)	58.95% (0.492)	1.44% (0.119)	3.65% (0.188)	4.57% (0.209)	20.80% (0.406)
Deployed to other location	1.75% (0.131)	4.19% (0.200)	2.79% (0.165)	12.48% (0.331)	14.80% (0.355)	28.55% (0.452)	6.76% (0.251)	25.21% (0.434)
Total days deployed during enlistment	52.5 (134.8)	243.2 (229.7)	34.0 (90.6)	163.2 (181.1)	20.8 (57.2)	45.3 (82.9)	14.4 (48.6)	76.4 (365.2)
Saw individual killed, wounded, dead during ANY deployment	10.41% (0.305)	37.74% (0.485)	11.08% (0.314)	35.79% (0.479)	1.43% (0.119)	3.25% (0.177)	1.29% (0.113)	6.31% (0.243)
Reported seeing individual killed, wounded, or dead in Iraq	9.35% (0.291)	34.63% (0.476)	10.04% (0.301)	34.17% (0.474)	0.38% (0.062)	1.40% (0.117)	0.92% (0.096)	4.68% (0.211)

	Army		Marine		Navy		Air Force	
	Did Attrite	Did not Attrite	Did Attrite	Did not Attrite	Did Attrite	Did not Attrite	Did Attrite	Did not Attrite
Reported seeing individual killed, wounded, or dead in Afghanistan	0.81% (0.090)	2.90% (0.168)	0.62% (0.079)	1.47% (0.120)	0.02% (0.016)	0.08% (0.029)	0.13% (0.036)	0.62% (0.078)
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan	10.12% (0.302)	37.03% (0.483)	10.56% (0.307)	35.09% (0.477)	0.41% (0.064)	1.48% (0.121)	1.06% (0.103)	5.27% (0.223)
Fired their weapon during a deployment	5.08% (0.220)	20.24% (0.402)	7.02% (0.256)	21.98% (0.414)	0.41% (0.064)	0.73% (0.085)	0.16% (0.040)	0.97% (0.098)
Reported firing any weapon in Iraq	4.67% (0.211)	18.58% (0.389)	6.66% (0.249)	21.16% (0.409)	0.14% (0.037)	0.45% (0.067)	0.11% (0.034)	0.67% (0.082)
Reported firing any weapon in Afghanistan	0.36% (0.060)	1.53% (0.123)	0.26% (0.051)	0.81% (0.089)	0.00% (0.006)	0.02% (0.014)	0.00% 0.000	0.10% (0.032)
Reported firing any weapon in Iraq or Afghanistan	5.02% (0.218)	19.95% (0.400)	6.88% (0.253)	21.78% (0.413)	0.14% (0.038)	0.47% (0.068)	0.11% (0.034)	0.78% (0.088)
Inside, entered, or closely inspected destroyed military vehicle	5.73% (0.233)	24.67% (0.431)	6.07% (0.239)	22.77% (0.419)	0.26% (0.051)	0.98% (0.099)	0.64% (0.080)	1.95% (0.138)
Reported being inside or inspected destroyed military vehicle in Iraq	5.22% (0.223)	22.85% (0.420)	5.69% (0.232)	21.82% (0.413)	0.11% (0.034)	0.70% (0.083)	0.52% (0.072)	1.51% (0.122)

	Army		Marine		Navy		Air Force	
Reported being inside or inspected destroyed military vehicle in Afghanistan	0.38% (0.061)	1.48% (0.121)	0.18% (0.042)	0.46% (0.068)	0.00% (0.006)	0.04% (0.019)	0.03% (0.018)	0.14% (0.037)
Reported being inside or inspected destroyed military vehicle in Iraq or Afghanistan	5.60% (0.230)	24.19% (0.428)	5.85% (0.235)	22.22% (0.416)	0.12% (0.034)	0.73% (0.085)	0.55% (0.074)	1.65% (0.128)
Overall Non-EAS Separation	.544 (.498)		.296 (.457)		.596 (.491)		.429 (.495)	
Observations	40730	34103	12332	29275	24415	16523	9774	13001
Standard deviations in parentheses								

Regardless of deployment history, the Navy has the highest portion of first-term service members separate before the end of their service contract (59.6%), while the smallest portion of first term service members who separate before the end of EAS reside in the Marine Corps (29.6%). The unexpectedly large percentage of sailors who separate before the end of their service contract is due to the fact that the attrition rate for sailors in the 2002 year cohort was 73%. In each of the Services the vast majority of those who separate before the end of their service contract have never deployed; 80.5% in the Army, 81.3% in the Marine Corps, 83.2% in the Navy, and 88.8% in the Air Force. The Army has the highest portion of members who attrite and have been deployed (19.6%) and the Air Force has the smallest portion of members who prematurely separate and have been deployed (11.2%).

Army personnel (10.4%) and Marine Corps personnel (11.1%) report similar portions of their respective forces who have witnessed an individual killed, wounded, or dead during deployment and have non-EAS separation; 1.4% of sailors and 1.3% of airmen fall in to this category. Likewise, 5.1% of soldiers and 7.1% of Marines reported discharging their weapons during deployment and subsequently are characterized with non-EAS separation; less than 1% of sailors and airmen belong in this category. There are similar portions of those who reported being inside, entering, or closely inspecting military vehicles and have non-EAS separation according to service affiliation; 5.7% in the Army, 6.1% in the Marine Corps, and less than 1% in the Navy and Air Force have reported experience with destroyed military vehicles and subsequent non-EAS separation.

VII. MULTIVARIATE ANALYSIS AND RESULTS

This chapter presents the marginal effects of the four probit models used in this study. Section A compares various models using likelihood ratio tests. Section B presents the marginal results for the early attrition outcome; each of the Services is presented separately. Section C presents the marginal effects for the reenlistment outcome. Section D and Section E presents the sensitivity analysis of the models. Section F provides a summary of the regression results. Each tables depict only the key explanatory variables, full regression tables with the remaining explanatory variables are found in Appendix C through Appendix F.

A. MULTIVARIATE REGRESSION RESULTS FOR ATTRITION

1. Marine Corps Personnel

Table 5 presents the results of the regression for U.S. Marine Corps personnel. Marginal effects of the key independent variables are presented for ease in interpretation; full regression tables are found in Appendix C.

Table 5. Marine Corps Personnel Regression Results for Attrition

Marine Corps Personnel	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	0.031*** (0.010)			0.118*** (0.035)
Fired their weapon during a deployment	0.005 (0.010)			-0.046 (0.058)
Inside, entered, or closely inspected any destroyed military vehicle	-0.025*** (0.008)	-0.022*** (0.009)		-0.001 (0.040)
Discharged weapon from the LAND during deployment		0.013 (0.011)		
Discharged weapon from the AIR during deployment		-0.089 (0.091)		
Discharged weapon from the SEA during deployment		-0.008 (0.137)		

Marine Corps Personnel	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw a COALITION member killed, wounded, or dead		-0.022** (0.009)		
Saw an ENEMY killed, wounded, or dead		0.033*** (0.011)		
Saw a CIVILIAN killed, wounded, or dead		0.012 (0.010)		
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			0.023** (0.010)	-0.085*** (0.031)
Reported firing any weapon in Iraq or Afghanistan			0.008 (0.010)	0.058 (0.067)
Reported exposure to destroyed military vehicle in Iraq or Afghanistan			-0.025*** (0.009)	-0.024 (0.040)
Has been deployed to Iraq or Afghanistan	-0.261*** (0.007)	-0.254*** (0.006)	-0.258*** (0.007)	-0.257*** (0.007)
Deployed to other location	-0.158*** (0.006)	-0.158*** (0.007)	-0.158*** (0.007)	-0.163*** (0.007)
LR Chi2 (For joint significance of combat exposure variables)	16.74	28.11	12.31	24.58
Prob>Chi2	.0008	.0002	.0064	.0004
Observations	41607	41607	41607	41607
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Model One

The non-EAS separation (henceforth attrition) rate is very different between those that were deployed and those who were not. Specifically, deployment to either Iraq or Afghanistan decreases the likelihood a first-term enlisted Marine will attrite by 26.1 percentage points, while deployment to other locations reduces the likelihood of attrition by 15.8 percentage points compared to a Marine who has not deployed, holding all other factors constant. Since I control for whether a service member was deployed (and the

deployment location), all subsequent discussion on combat exposure effect is comparing service members who have been deployed to the same location categories (Iraq or Afghanistan or other locations).

Among those deployed to the same location categories, witnessing death or injury results in a 3.1 percentage point increase in the likelihood of attrition ($p<.01$) while exposure to a destroyed military vehicle leads to a 2.5 percentage point decrease ($p<0.01$) in the attrition rate of a first-term enlisted Marine compared to a deployed Marine who did not have such exposure. To put the magnitude in perspective, the average rate of attrition for Marine Corps personnel who have deployed is about 10.8%. This would imply that witnessing death increases attrition rate by 28.7% and exposure to a destroyed vehicle reduces attrition rate by 23.2%. While it's not surprising that witnessing death might increase attrition rate; exposure to destroyed military vehicles could provide some sense of the adventure that service members cited in the survey findings and referenced by Hosek and Totten (1998).

Model Two

There are seven key variables of interest in Model Two that measure finer details of combat exposure; of those seven variables, three are statistically significant. Witnessing the death of a coalition member results in a 2.2 percentage point decrease ($p<0.05$) in the attrition rate compared to a Marine who deployed with no such combat experience. However, witnessing death or injury of enemy combatants results in a 3.3 percentage point increase ($p<0.01$) in attrition rate compared to a Marine who has been deployed to a comparable location. The attrition effects of exposure to destroyed military vehicles and deployments remain relatively unchanged from Model One.

Model Three

Model Three focuses on the effects of combat exposure that occurs only in Iraq or Afghanistan. A Marine who witnesses death or injury while in Iraq or Afghanistan is 2.3 percentage points ($p<.05$) more likely to attrite than a Marine deployed to Iraq or Afghanistan with no such combat experience. Exposure to destroyed military vehicles in Iraq or Afghanistan decreases the probability of attrition by 2.5 percentage points ($p<.01$) compared to a Marine deployed to Iraq or Afghanistan with no such exposure.

Model Four

Model Four examines whether combat exposure that occurs in Iraq or Afghanistan has a differential effect on attrition rate than combat exposure that occurs in other locations. The last column of Table 5 shows that a Marine who witnesses injury or death while deployed outside Iraq or Afghanistan is 11.8 percentage points ($p<.01$) more likely to attrite than a Marine deployed to the same location but with no such experience. A Marine who witnesses death or injury while deployed to Iraq or Afghanistan is 3.3 percentage points (11.8-8.5=3.3) more likely to attrite compared to a Marine deployed to Iraq or Afghanistan with no such experience. The 8.5 percentage point difference is statistically significant at the 0.01 level, indicating that there is indeed differential effect on attrition rates between this type of combat exposure that occur in the two different location categories.

As discussed in the previous chapter, all models group Afghanistan and Iraq into the same location categories due to the small sample size in Afghanistan. In a sensitivity analysis Model Four is further refined by separating out combat exposures that occur in Iraq from those that occurred in Afghanistan. Not surprisingly, the estimated effects have large standard errors and the results observed in Model Four are largely driven by the combat exposures in Iraq.

Summary

Being deployed (regardless of location) has a negative effect on the attrition rate and remains relatively unchanged across each model specification. The average rate of attrition for Marine Corps personnel that were deployed is 10.8%; one can therefore assess the magnitude of the effect (in terms of percent change in attrition rate) by dividing the coefficients reported in the previous models by this average attrition rate. The combat exposure that appears to have the most adverse effect on attrition rate for the Marine Corps enlisted members is witnessing a person's death or injury while deployed to locations outside Iraq or Afghanistan.

2. Navy Personnel

Table 6 presents the results of the regression for U.S. Navy personnel. Marginal effects of the key independent variables are presented for ease in interpretation; full regression tables are found in Appendix D.

Table 6. Navy Personnel Regression Results for Attrition

Navy Personnel	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	-0.012 (0.019)			0.001 (0.022)
Fired their weapon during a deployment	0.017 (0.035)			0.051 (0.045)
Inside, entered, or closely inspected any destroyed military vehicle	-0.086** (0.040)	-0.060 (0.041)		0.028 (0.053)
Discharged weapon from the LAND during deployment		0.033 (0.058)		
Discharged weapon from the AIR during deployment		-0.146 (0.194)		
Discharged weapon from the SEA during deployment		0.043 (0.076)		
Saw a COALITION member killed, wounded, or dead		0.001 (0.025)		
Saw an ENEMY killed, wounded, or dead		-0.102** (0.047)		
Saw a CIVILIAN killed, wounded, or dead		-0.012 (0.027)		
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			-0.029 (0.042)	-0.030 (0.048)
Reported firing any weapon in Iraq or Afghanistan			0.012 (0.058)	-0.041 (0.078)
Reported exposure to destroyed military vehicle in Iraq or Afghanistan			-0.166*** (0.060)	-0.196** (0.084)
Has been deployed to Iraq or Afghanistan	-0.167*** (0.020)	-0.153*** (0.020)	-0.150*** (0.022)	-0.150*** (0.022)

Navy Personnel	Model 1	Model 2	Model 3	Model 4
Deployed to other location	-0.144***	-0.144***	-0.145***	-0.146***
	(0.007)	(0.007)	(0.007)	(0.007)
LR Chi2 (For joint significance of combat exposure variables)	6.10	12.82	13.28	14.79
Prob>Chi2	.1079	.0766	.0041	.0219
Observations	40938	40938	40938	40938
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Model One

Similar to Marine Corps personnel, the attrition rate of first-term sailors is very different between sailors that were deployed, and those who were not. Specifically, deployment to either Iraq or Afghanistan decreases the likelihood a first-term enlisted sailor will attrite by 16.7 percentage points while deployment to other locations reduces the likelihood of attrition by 14.4 percentage points compared to a sailor who has not deployed, while holding all other factors constant.

Among those deployed to the same location categories, exposure to a destroyed military vehicle leads to an 8.6 percentage point decrease ($p<0.05$) in the attrition rate of a first-term enlisted sailor compared to a deployed sailor who did not have such exposure. To put the magnitude in perspective, since the average rate of attrition for U.S. Navy personnel who have deployed is about 43.2% this would imply that exposure to a destroyed vehicle reduces attrition rate by 19.9%. Contrary to the Marine Corps, witnessing death has no effect on attrition rate among Navy enlisted.

Model Two

There are seven key variables of interest in Model Two that measure finer details of combat exposure; of those seven variables, one is statistically significant. Witnessing the death or injury of enemy combatants results in a 10.2 percentage point decrease ($p<0.05$) in attrition rate compared to a sailor who has been deployed to a comparable

location. While the attrition effects of exposure to destroyed military vehicles become statistically insignificant, the attrition effects of deployments remain relatively unchanged from Model One.

Model Three

Model Three focuses on the effects of combat exposure that occurs only in Iraq or Afghanistan. Exposure to destroyed military vehicles in Iraq or Afghanistan decreases the probability of attrition by 16.6 percentage points ($p<.01$) compared to a sailor deployed to Iraq or Afghanistan with no such exposure.

Model Four

Model Four examines whether combat exposure that occurs in Iraq or Afghanistan has a differential effect on attrition rate than combat exposure that occurs in other locations. The last column of Table 6 shows that exposure to destroyed military vehicles outside Iraq or Afghanistan has a statistically insignificant effect on the attrition rate. A sailor who is exposed to destroyed military vehicles while deployed to Iraq or Afghanistan is 16.8 percentage points (2.8-19.6=-16.8) less likely to attrite compared to a sailor deployed to Iraq or Afghanistan with no such experience. The 19.6 percentage point difference is statistically significant at the 0.05 level, indicating that there is indeed differential effect on attrition rates between this type of combat exposure that occur in the two different location categories.

In a sensitivity analysis, Model Four is further refined by separating out combat exposures that occur in Iraq from those that occurred in Afghanistan; the estimated effects have large standard errors and the results observed in Model Four are largely driven by the combat exposures in Iraq.

Summary

Being deployed (regardless of location) has a negative effect on the attrition rate and remains relatively unchanged across each model specification. The average rate of attrition for U.S. Navy personnel that were deployed is 43.2%. One can therefore assess the magnitude of the effect (in terms of percent change in attrition rate) by dividing the coefficients reported in the previous models by this average attrition rate. The combat

exposure that appears to have the most adverse effect on attrition rate for enlisted sailors is exposure to destroyed military vehicles in Iraq or Afghanistan.

3. Air Force Personnel

Table 7 presents the results of the regression for U.S. Air Force personnel. Marginal effects of the key independent variables are presented for ease in interpretation; full regression tables are found in Appendix E.

Table 7. Air Force Personnel Regression Results for Attrition

Air Force Personnel	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	-0.049** (0.024)			-0.059 (0.049)
Fired their weapon during a deployment	0.013 (0.058)			0.067 (0.111)
Inside, entered, or closely inspected any destroyed military vehicle	0.124*** (0.036)	0.117*** (0.037)		0.129 (0.087)
Discharged weapon from the LAND during deployment		0.084 (0.073)		
Discharged weapon from the AIR during deployment		-0.066 (0.231)		
Saw a COALITION member killed, wounded, or dead		-0.027 (0.030)		
Saw an ENEMY killed, wounded, or dead		-0.093** (0.039)		
Saw a CIVILIAN killed, wounded, or dead		0.032 (0.040)		
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			-0.045* (0.027)	0.013 (0.058)
Reported firing any weapon in Iraq or Afghanistan			-0.008 (0.068)	-0.071 (0.121)
Reported exposure to destroyed military vehicle in Iraq or Afghanistan			0.123*** (0.040)	-0.005 (0.093)

Air Force Personnel	Model 1	Model 2	Model 3	Model 4
Has been deployed to Iraq or Afghanistan	-0.305***	-0.306***	-0.305***	-0.305***
	(0.009)	(0.009)	(0.009)	(0.009)
Deployed to other location	-0.292***	-0.293***	-0.293***	-0.292***
	(0.008)	(0.008)	(0.008)	(0.008)
LR Chi2 (For joint significance of combat exposure variables)	13.53	18.68	10.27	13.89
Prob>Chi2	.0036	.0047	.0164	.0309
Observations	22775	22773	22775	22775
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Model One

Similar to the other services, the attrition rate in the U.S. Air Force is very different between those that were deployed and those who were not. The previous chapter shows that the average attrition rate for those who have never been deployed is 53.3%. The multivariate analysis reported here shows deployment to either Iraq or Afghanistan decreases the likelihood a first-term enlisted airman will later attrite by 30.5 percentage points ($p<.01$) while deployment to other locations reduces the likelihood of attrition by 29.2 percentage points ($p<.01$) compared to an airman who has not deployed, while holding all other factors constant.

Among those deployed to the same location categories, witnessing death or injury results in a 4.9 percentage point decrease in the likelihood of attrition ($p<.05$) while exposure to a destroyed military vehicle leads to a 12.4 percentage point increase ($p<0.01$) in the attrition rate of a first-term enlisted airman compared to a deployed airman who did not have such exposure. To put the magnitude in perspective, since the average rate of attrition for U.S. Air Force personnel who have deployed is 16.8% this would imply that witnessing death decreases attrition rate by 29.1% and exposure to a destroyed vehicle increases attrition rate by 73.7%.

Model Two

There are seven key variables of interest in Model Two that measure finer details of combat exposure; of those seven variables, two are statistically significant. Witnessing the death or injury of enemy combatants results in a 9.3 percentage point decrease ($p<0.05$) in attrition rate compared to an airman who has been deployed to a comparable location but had no such experience. The attrition effects of exposure to destroyed military vehicles and deployments remain relatively unchanged from Model One.

Model Three

Model Three focuses on the effects of combat exposure that occurs only in Iraq or Afghanistan. An airman who witnesses death or injury while in Iraq or Afghanistan is 4.5 percentage points ($p<.10$) less likely to attrite than an airman deployed to Iraq or Afghanistan with no such combat experience. Exposure to destroyed military vehicles in Iraq or Afghanistan increases the probability of attrition by 12.3 percentage points ($p<.01$) compared to an airman deployed to Iraq or Afghanistan with no such exposure.

Model Four

Model Four examines whether combat exposure that occurs in Iraq or Afghanistan has a differential effect on attrition rate than combat exposure that occurs in other locations. None of the three variables that measure combat exposure that occurs in Iraq or Afghanistan is statistically significant indicating that there is no differential effect on attrition rates between combat exposure that occurs in Iraq or Afghanistan and combat exposure that occurs elsewhere.

In a sensitivity analysis, Model Four is further refined by separating out combat exposures that occur in Iraq from that which occurred in Afghanistan. Not surprisingly, the estimated effects have large standard errors and the results observed in Model Four are largely driven by the combat exposures in Iraq.

Summary

Being deployed (regardless of location) has a negative effect on the attrition rate and remains relatively unchanged across each model specification. The average rate of attrition for U.S. Air Force personnel that were deployed is 16.8%; one can therefore assess the magnitude of the effect (in terms of percent change in attrition rate) by

dividing the coefficients reported in the previous models by this average attrition rate. The combat exposure that appears to have the most adverse effect on attrition rate for the Air Force enlisted members is exposure to destroyed military vehicles while deployed.

4. Army Personnel

Table 8 presents the results of the regression for U.S. Army personnel. Marginal effects of the key independent variables are presented for ease in interpretation; full regression tables are found in Appendix F.

Table 8. Army Personnel Regression Results for Attrition

Army Personnel	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	0.022*** (0.007)			-0.015 (0.034)
Fired their weapon during a deployment	-0.014* (0.008)			-0.116* (0.061)
Inside, entered, or closely inspected any destroyed military vehicle	-0.052*** (0.007)	-0.050*** (0.007)		-0.101** (0.042)
Discharged weapon from the LAND during deployment		-0.023*** (0.009)		
Discharged weapon from the AIR during deployment		0.034 (0.068)		
Discharged weapon from the SEA during deployment		0.102 (0.117)		
Saw a COALITION member killed, wounded, or dead		-0.009 (0.008)		
Saw an ENEMY killed, wounded, or dead		0.045*** (0.008)		
Saw a CIVILIAN killed, wounded, or dead		-0.010 (0.008)		
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			0.025*** (0.008)	0.040 (0.034)
Reported firing any weapon in Iraq or Afghanistan			-0.013 (0.008)	0.099* (0.058)

Army Personnel	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Reported exposure to destroyed military vehicle in Iraq or Afghanistan			-0.051*** (0.007)	0.049 (0.042)
Has been deployed to Iraq or Afghanistan	-0.412*** (0.005)	-0.408*** (0.005)	-0.414*** (0.005)	-0.414*** (0.005)
Deployed to other location	-0.278*** (0.010)	-0.277*** (0.010)	-0.280*** (0.010)	-0.268*** (0.011)
LR Chi2 (For joint significance of combat exposure variables)	61.50	84.03	55.51	73.67
Prob>Chi2	.0000	.0000	.0000	.0000
Observations	74828	74828	74828	74828
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Model One

The attrition rate is very different between soldiers that were deployed and those who were not; the attrition rate for soldiers who have been deployed is 26% and the attrition rate for soldiers who have never been deployed is 74%. Specifically, deployment to either Iraq or Afghanistan decreases the likelihood of a first-term enlisted soldier's attrition by 41.2 percentage points ($p<.01$) while deployment to other locations reduces the likelihood of attrition by 27.8 percentage points ($p<.01$) compared to a soldier who has not deployed, while holding all other factors constant. Hosek and Martorell (2009) did find a large increase in reenlistment rates for first-term soldiers with two or more hostile deployments in 2005 (p. 53). It is hypothesized that the large decrease in attrition rate found among soldiers deployed to Iraq or Afghanistan is the inverse of large reenlistment probability found by Hosek and Martorell for soldier with two or more deployments in 2005.

Among those deployed to the same location categories, witnessing death or injury results in a 2.2 percentage point increase in the likelihood of attrition ($p<.01$) while firing a weapon leads to a 1.4 percentage point decrease in the attrition rate ($p<.10$) of soldiers. Exposure to a destroyed military vehicle leads to a 5.2 percentage point decrease

($p<0.01$) in the attrition rate of a first-term enlisted soldier compared to a deployed soldier who did not have such exposure. To put the magnitude in perspective, the average rate of attrition for U.S. Army personnel who have deployed is about 26%. This would imply that witnessing death increases attrition rate by 8.4%, firing a weapon decreases attrition rate by 5.4%, and exposure to a destroyed vehicle reduces attrition rate by 20%.

Model Two

There are seven key variables of interest in Model Two that measure finer details of combat exposure; of those seven variables, two are statistically significant. Witnessing the death or serious injury of an enemy combatant leads to a 4.5 percentage point increase ($p<0.01$) in the attrition rate compared to a deployed soldier with no such exposure. However, firing a weapon from the land during deployment results in a 2.3 percentage point decrease ($p<.01$) in the attrition rate compared to a deployed soldier with no such exposure. The attrition effects of exposure to destroyed military vehicles and deployments remain relatively unchanged from Model One.

Model Three

Model Three focuses on the effects of combat exposure that occurs only in Iraq or Afghanistan. A soldier who witnesses death or injury while in Iraq or Afghanistan is 2.5 percentage points ($p<.01$) more likely to attrite than a soldier deployed to Iraq or Afghanistan with no such combat experience. Exposure to destroyed military vehicles in Iraq or Afghanistan decreases the probability of attrition by 5.1 percentage points ($p<.01$) compared to a soldier deployed to Iraq or Afghanistan with no such exposure. The attrition effects of deployments remain relatively unchanged from Models One and Two.

Model Four

Model Four examines whether combat exposure that occurs in Iraq or Afghanistan has a differential effect on attrition rate than combat exposure that occurs in other locations. The last column of Table 8 shows that a soldier who fired a weapon while deployed outside Iraq or Afghanistan is 11.6 percentage points ($p<.010$) less likely to attrite than a soldier deployed to the same location category but with no such experience. A soldier who fired a weapon while deployed to Iraq or Afghanistan is 1.7

percentage points (9.9-11.6=1.7) less likely to attrite compared to a soldier deployed to Iraq or Afghanistan with no such experience. The 9.9 percentage point difference is statistically significant at the 0.10 level, indicating that there is indeed differential effect on attrition rates between this type of combat exposure that occur in the two different location categories.

Exposure to destroyed military vehicles while deployed outside Iraq or Afghanistan results in a 10.1 percentage point decrease in the attrition rate ($p<.05$) compared to soldiers deployed to the same locations category but with no such experience. The attrition effect of exposure to destroyed military vehicles in Iraq or Afghanistan is not statistical significant, indicated there is no differential effect on the attrition rate between soldiers who were exposed to destroyed military vehicles in Iraq or Afghanistan and soldiers with the same exposure elsewhere.

In a sensitivity analysis Model Four is further refined by separating out combat exposures that occur in Iraq from those that occurred in Afghanistan; the estimated effects have large standard errors and the results observed in Model Four are largely driven by the combat exposures in Iraq.

Summary

Deployment has a negative effect on the attrition rate and remains relatively unchanged across each model specification. The average rate of attrition for U.S. Army personnel that were deployed is 26%; one can therefore assess the magnitude of the effect (in terms of percent change in attrition rate) by dividing the coefficients reported in the previous models by this average attrition rate. Exposure to destroyed military vehicles is the combat exposure that appears to most decrease the attrition rate for first-term enlisted soldiers.

B. MULTIVARIATE REGRESSION RESULTS FOR REENLISTMENT

1. Marine Corps Personnel

Table 9. Marine Corps Personnel Regression Results for Reenlistment

Marine Corps Personnel	Model 1	Model 2	Model 3	Model 4
Saw individual killed, wounded, or dead during ANY deployment	-0.036*** (0.007)			-0.139*** (0.031)
Fired their weapon during a deployment	-0.026*** (0.007)			-0.094* (0.055)
Inside, entered, or closely inspected any destroyed military vehicle	-0.000 (0.007)	-0.002 (0.007)		0.030 (0.036)
Discharged weapon from the LAND during deployment		-0.018** (0.008)		
Discharged weapon from the AIR during deployment		-0.091* (0.050)		
Discharged weapon from the SEA during deployment		-0.025 (0.103)		
Saw a COALITION member killed, wounded, or dead		-0.013* (0.007)		
Saw an ENEMY killed, wounded, or dead		-0.033*** (0.008)		
Saw a CIVILIAN killed, wounded, or dead		0.005 (0.008)		
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			-0.030*** (0.007)	0.125*** (0.040)
Reported firing any weapon in Iraq or Afghanistan			-0.027*** (0.007)	0.081 (0.079)
Reported exposure to destroyed military vehicle in Iraq or Afghanistan			-0.003 (0.007)	-0.030 (0.032)
Has been deployed to Iraq or Afghanistan	0.007 (0.006)	0.002 (0.006)	0.005 (0.006)	0.004 (0.006)
Deployed to other location	0.026*** (0.008)	0.026*** (0.008)	0.024*** (0.008)	0.029*** (0.008)

Marine Corps Personnel	Model 1	Model 2	Model 3	Model 4
LR Chi2 (For joint significance of combat exposure variables)	67.73	65.33	56.19	83.48
Prob>Chi2	.0000	.000	.0000	.0000
Observations	30654	30654	30654	30654
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Model One

The continuation (henceforth reenlistment) rate of Marine Corps personnel is not very different between those that were deployed and those who were not; the reenlistment rate for Marines who have deployed is 27.7% and 29.7% for Marines that have not deployed, based on descriptive statistics in the previous chapter (Table 3). Specifically, deployment to either Iraq or Afghanistan does not significantly affect the likelihood that a first-term enlisted Marine will reenlist. However, deployment to other locations increases the likelihood of reenlistment by 2.6 percentage points ($p<.01$) compared to a Marine who has not deployed, while holding all other factors constant. As in the attrition models I control for whether a service member was deployed (and the deployed location) all subsequent discussion on combat exposure effect is comparing service members who have been deployed to the same location categories (Iraq or Afghanistan or other locations).

Among Marines deployed to the same location categories, witnessing death or injury results in a 3.6 percentage point decrease in the likelihood of reenlistment ($p<.01$) while firing a weapon leads to a 2.6 percentage point decrease ($p<0.01$) in the reenlistment rate of a first-term enlisted Marine compared to a deployed Marine who did not have such experience. To put the magnitude in perspective, the average rate of reenlistment for Marine Corps personnel who have deployed is about 27.7%. This would imply that witnessing an individual's death decreases the reenlistment rate by 13% and firing a weapon decreases the reenlistment rate by 9.4%.

Model Two

There are seven key variables of interest in Model Two that measure finer details of combat exposure; of those seven variables, four are statistically significant. Exposure to the death or serious injury of a coalition member results in a 1.3 percentage point decrease ($p<0.10$) in reenlistment rate while witnessing the death of enemy combatants results in a 3.3 percentage point decrease ($p<0.01$) in the reenlistment rate compared to a deployed Marine with no such combat experience. Firing a weapon from the land decreases reenlistment rate by 1.8 percentage points ($p<.05$) while firing a weapon from the air has a more pronounced affect; decreasing reenlistment rate 9.1 percentage points ($p<.10$) compared to a Marine without those same experiences. The reenlistment effect of exposure to destroyed military vehicles and deployments remain relatively unchanged from Model One.

Model Three

Model Three focuses on the effects of combat exposure that occurs only in Iraq or Afghanistan. A Marine who witnesses death or injury while in Iraq or Afghanistan is 3 percentage points ($p<.01$) less likely to reenlist than a Marine deployed to Iraq or Afghanistan with no such combat experience. A Marine who fires a weapon in Iraq or Afghanistan is 2.7 percentage points ($p<.01$) less likely to reenlist than one deployed to the same location category with no such combat exposure. Similar to Models One and Two, exposure to destroyed military vehicles and deployment to Iraq or Afghanistan remain statistically insignificant and deployments to other locations maintain the same affect on Marine reenlistment rates.

Model Four

Model Four examines whether combat exposure that occurs in Iraq or Afghanistan has a differential effect on reenlistment rate than combat exposure that occurs in other locations. The last column of Table 9 shows that a Marine who witnesses injury or death while deployed outside Iraq or Afghanistan is 13.9 percentage points ($p<.01$) less likely to reenlist than a Marine deployed to the same location but with no such experience. A Marine who witnesses death or injury while deployed to Iraq or Afghanistan is 1.4 percentage points (12.5-13.9=1.4) less likely to reenlist compared to a

Marine deployed to Iraq or Afghanistan with no such experience. The 12.5 percentage point difference is statistically significant at the 0.01 level, indicating that there is indeed differential effect on reenlistment rates between this type of combat exposure that occur in the two different location categories. A Marine who fires a weapon while deployed outside Iraq or Afghanistan is 9.4 percentage points ($p<.10$) less likely to reenlist than a Marine deployed to the same location but lacking that experience. Firing a weapon while deployed to Iraq or Afghanistan is not statistically significant which indicates there is no differential effect on reenlistment rates between firing a weapon in Iraq or Afghanistan and firing a weapon elsewhere.

As discussed in the previous chapter, all models group Afghanistan and Iraq into the same location categories due to the small sample size deployed in Afghanistan. In a sensitivity analysis, Model Four is further refined by separating out combat exposures that occur in Iraq from those that occurred in Afghanistan. The estimated effects have large standard errors and the results observed in Model Four are largely driven by the combat exposures in Iraq.

Summary

Being deployed to other locations has a positive effect on the reenlistment rate and remains relatively unchanged across each model specification. Deployment to Iraq or Afghanistan has a positive but statistically insignificant effect on Marine reenlistment rate and remains relatively unchanged across each model specification. The average rate of reenlistment for Marine Corps personnel that were deployed is 27.7%; one can therefore assess the magnitude of the effect (in terms of percent change in reenlistment rate) by dividing the coefficients reported in the previous models by this average reenlistment rate. Neither exposure to destroyed military vehicles nor deployments to Iraq or Afghanistan have a statistically significant effect on first-term enlisted Marines reenlistment rates. The combat exposure that appears to have the most adverse effect on reenlistment rate for the Marine Corps members is witnessing a person's death or injury while deployed to locations outside Iraq or Afghanistan.

2. Navy Personnel

Table 10. Navy Personnel Regression Results for Reenlistment

Navy Personnel	Model 1	Model 2	Model 3	Model 4
Saw individual killed, wounded, or dead during ANY deployment	-0.003 (0.023)			-0.017 (0.026)
Fired their weapon during a deployment	-0.091** (0.042)			-0.105 (0.078)
Inside, entered, or closely inspected any destroyed military vehicle	0.171*** (0.050)	0.167*** (0.050)		0.079 (0.073)
Discharged weapon from the LAND during deployment		-0.027 (0.065)		
Discharged weapon from the AIR during deployment		-0.167 (0.111)		
Discharged weapon from the SEA during deployment		-0.205** (0.084)		
Saw a COALITION member killed, wounded, or dead		-0.002 (0.031)		
Saw an ENEMY killed, wounded, or dead		-0.041 (0.045)		
Saw a CIVILIAN killed, wounded, or dead		0.006 (0.031)		
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			0.026 (0.048)	0.045 (0.057)
Reported firing any weapon in Iraq or Afghanistan			-0.109** (0.049)	-0.006 (0.121)
Reported exposure to destroyed military vehicle in Iraq or Afghanistan			0.226*** (0.070)	0.136 (0.103)
Has been deployed to Iraq or Afghanistan	0.100*** (0.024)	0.101*** (0.025)	0.084*** (0.027)	0.084*** (0.027)
Deployed to other location	-0.036*** (0.008)	-0.037*** (0.008)	-0.036*** (0.007)	-0.035*** (0.008)
LR Chi2 (For joint significance of combat exposure variables)	15.07	16.08	15.54	18.49

Navy Personnel	Model 1	Model 2	Model 3	Model 4
Prob>Chi2	.0018	.0244	.0014	.0051
Observations	22106	22106	22106	22106
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Model One

The reenlistment rate is very different between sailors that were deployed and those who were not; the reenlistment rate for sailors who have deployed is 28.9% and 39.6% for sailors that have not deployed. Specifically, deployment to either Iraq or Afghanistan increases the likelihood a first-term enlisted sailor's reenlistment by 10 percentage points ($p<.01$) while deployment to other locations decreases the likelihood of reenlistment by 3.6 percentage points ($p<.01$) compared to a sailor who has not deployed, while holding all other factors constant.

Among those deployed to the same location categories, firing a weapon leads to a 9.1 percentage point decrease ($p<0.05$) in the reenlistment rate of a first-term enlisted sailor compared to a deployed sailor who did not have such exposure. Exposure to destroyed military vehicles leads to a 17.1 percentage point ($p<.01$) increase in reenlistment rate compared to a deployed sailor who did not have exposure to destroyed vehicles while deployed. To put the magnitude in perspective, the average rate of reenlistment for sailors who have deployed is 28.9% implying that firing a weapon decreases the U.S. Navy personnel's reenlistment rate by 31.5% and exposure to destroyed military vehicles increase reenlistment rate by 59.1%.

Model Two

There are seven key variables of interest in Model Two that measure finer details of combat exposure; of those seven variables, two are statistically significant. Discharging a weapon from the sea results in a 20.5 percentage point decrease ($p<0.05$) in the reenlistment rate compared to a deployed sailor with no such experience. The reenlistment effect of exposure to destroyed military vehicles and deployments remain relatively unchanged from Model One.

Model Three

Model Three focuses on the effects of combat exposure that occurs only in Iraq or Afghanistan. A sailor who fires a weapon in Iraq or Afghanistan is 10.9 percentage points ($p<.05$) less likely to reenlist than a sailor deployed to the same location category with no such combat experience. A sailor exposed to destroyed vehicles in Iraq or Afghanistan is 22.6 percentage points ($p<.01$) more likely to reenlist than a sailor deployed to Iraq or Afghanistan without exposure to destroyed vehicles. The reenlistment effects of deployments remain relatively unchanged from Models One and Two.

Model Four

Model Four examines whether combat exposure that occurs in Iraq or Afghanistan has a differential effect on attrition rate than combat exposure that occurs in other locations. None of the three variables that measure combat exposure that occurs in Iraq or Afghanistan is statistically significant and indicates that there is no differential effect on attrition rates between combat exposure that occurs in Iraq or Afghanistan and combat exposure that occurs elsewhere.

In a sensitivity analysis, Model Four is further refined by separating out combat exposures that occur in Iraq from those that occurred in Afghanistan; the estimated effects have large standard errors and the results observed in Model Four are largely driven by the combat exposures in Iraq.

Summary

Being deployed to other locations has a negative effect on the reenlistment rate and remains relatively unchanged across each model specification. Deployment to Iraq or Afghanistan has a positive effect on sailor reenlistment rates and remains relatively unchanged across each model specification. The average rate of reenlistment for U.S. Navy personnel that were deployed is 28.9%; one can therefore assess the magnitude of the effect (in terms of percent change in reenlistment rate) by dividing the coefficients reported in the previous models by this average reenlistment rate. The combat exposure that appears to have the most adverse effect on reenlistment rate for sailors is firing a

weapon in Iraq or Afghanistan. Exposure to destroyed military vehicles while deployed to Iraq or Afghanistan has the largest positive effect on a sailor's reenlistment rate.

3. Air Force Personnel

Table 11. Air Force Personnel Regression Results for Reenlistment

Air Force Personnel	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	0.009 (0.016)			0.088** (0.042)
Fired their weapon during a deployment	0.141*** (0.047)			0.161 (0.106)
Inside, entered, or closely inspected any destroyed military vehicle	0.001 (0.025)	0.008 (0.025)		0.155* (0.084)
Discharged weapon from the LAND during deployment		0.024 (0.049)		
Discharged weapon from the AIR during deployment		-0.148*** (0.038)		
Saw a COALITION member killed, wounded, or dead		-0.001 (0.020)		
Saw an ENEMY killed, wounded, or dead		0.039 (0.028)		
Saw a CIVILIAN killed, wounded, or dead		0.013 (0.026)		
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			-0.008 (0.017)	-0.074*** (0.027)
Reported firing any weapon in Iraq or Afghanistan			0.149*** (0.053)	-0.008 (0.081)
Reported exposure to destroyed military vehicle in Iraq or Afghanistan			-0.020 (0.025)	-0.110*** (0.033)
Has been deployed to Iraq or Afghanistan	0.016 (0.010)	0.016 (0.009)	0.022** (0.010)	0.022** (0.010)
Deployed to other location	0.018** (0.008)	0.020** (0.008)	0.020** (0.008)	0.014 (0.008)

Air Force Personnel	Model 1	Model 2	Model 3	Model 4
LR Chi2 (For joint significance of combat exposure variables)	13.66	8.40	10.66	25.69
Prob>Chi2	.0034	.2099	.0137	.0003
Observations	13266	13265	13266	13266
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Model One

The reenlistment rate is very different between airmen that were deployed and those who were not; the reenlistment rate for airmen who have deployed is 30.3% and 27.3% for airmen that have not deployed. Specifically, deployment to either Iraq or Afghanistan does not significantly affect the likelihood a first-term enlisted airman will reenlist. However, deployment to other locations increases the likelihood of reenlistment by 1.8 percentage points ($p<.05$) compared to an airman who has not deployed, while holding all other factors constant.

Among those deployed to the same location categories, firing a weapon leads to a 14.1 percentage point increase ($p<0.01$) in the reenlistment rate of a first-term enlisted airman compared to a deployed airman who did not have such experience. To put the magnitude in perspective, the average rate of reenlistment for airmen who have deployed is 30.3% implying that firing a weapon increases the U.S. Air Force personnel's reenlistment rate by 46.6%.

Model Two

There are seven key variables of interest in Model Two that measure finer details of combat exposure; of those seven variables, only one is statistically significant. Discharging a weapon from the air results in a 14.8 percentage point decrease ($p<0.01$) in the reenlistment rate compared to a deployed airman with no such exposure. The reenlistment effect of deployments remain relatively unchanged from Model One.

Model Three

Model Three focuses on the effects of combat exposure that occurs only in Iraq or

Afghanistan. An airman who fires a weapon in Iraq or Afghanistan is 14.9 percentage points ($p<.01$) more likely to reenlist than an airman deployed to the same location category with no such combat exposure. The reenlistment effects of deployments to Iraq or Afghanistan become statistically significant and result in a 2.2 percentage point ($p<.05$) increase in the likelihood to reenlist. The reenlistment effects of deployments to other locations remain relatively unchanged from Models One and Two.

Model Four

Model Four examines whether combat exposure that occurs in Iraq or Afghanistan has a differential effect on reenlistment rate than combat exposure that occurs in other locations. The last column of Table 11 shows that an airman who witnesses injury or death while deployed outside Iraq or Afghanistan is 8.8 percentage points ($p<.05$) more likely to reenlist than an airman deployed to the same location but with no such experience. An airman who witnesses death or injury while deployed to Iraq or Afghanistan is 1.4 percentage points (8.8-7.4=1.4) more likely to reenlist compared to an airman deployed to Iraq or Afghanistan with no such experience. The 1.4 percentage point difference is statistically significant at the 0.01 level, indicating that there is indeed differential effect on reenlistment rates between this type of combat exposure that occur in the two different location categories. An airman who is exposed to destroyed military vehicles while deployed outside Iraq or Afghanistan is 15.5 percentage points ($p<.10$) more likely to reenlist than an airman deployed to the same location category but with no such experience. An airman exposed to destroyed military vehicles while deployed to Iraq or Afghanistan is 4.5 percentage points (15.5-11=4.5) more likely to reenlist compared to an airman deployed to Iraq or Afghanistan with no such experience. The 4.5 percentage point difference is statistically significant at the 0.01 level indicating that there is also a differential effect on reenlistment rates between this type of combat exposure that occur in the two location categories. The reenlistment effects of deployments to Iraq or Afghanistan remain relatively unchanged from Model Three while the reenlistment effects of deployments to other locations become statistically insignificant when compared to the previous models.

In a sensitivity analysis Model Four is further refined by separating out combat exposures that occur in Iraq from those that occurred in Afghanistan; the estimated effects have large standard errors and the results observed in Model Four are largely driven by the combat exposures in Iraq.

Summary

Being deployed to other locations has a positive effect on the reenlistment rate and remains relatively unchanged across Models One, Two, and Three. Deployment to Iraq or Afghanistan has a positive effect on airman reenlistment rates and remains unchanged in Models Three and Four. The average rate of reenlistment for U.S. Air Force personnel that were deployed is 30.3%; one can therefore assess the magnitude of the effect (in terms of percent change in reenlistment rate) by dividing the coefficients reported in the previous models by this average reenlistment rate. Across each model specification, combat exposure has a positive effect on airmen reenlistment rates and the combat exposure that appears to have the largest effect on reenlistment rate for airmen is firing a weapon in Iraq or Afghanistan.

4. Army Personnel

Table 12. Army Personnel Regression Results for Reenlistment

Army Personnel	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	-0.002 (0.007)			-0.031 (0.033)
Fired their weapon during a deployment	0.017** (0.007)			0.184*** (0.061)
Inside, entered, or closely inspected any destroyed military vehicle	0.020*** (0.007)	0.018*** (0.007)		0.073* (0.042)
Discharged weapon from the LAND during deployment		0.015* (0.008)		
Discharged weapon from the AIR during deployment		0.066 (0.071)		
Discharged weapon from the SEA during deployment		-0.043 (0.115)		

Army Personnel	Model 1	Model 2	Model 3	Model 4
Saw a COALITION member killed, wounded, or dead		0.002 (0.007)		
Saw an ENEMY killed, wounded, or dead		0.006 (0.008)		
Saw a CIVILIAN killed, wounded, or dead		0.000 (0.007)		
Reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			-0.001 (0.007)	0.030 (0.035)
Reported firing any weapon in Iraq or Afghanistan			0.014* (0.008)	-0.139*** (0.042)
Reported exposure to destroyed military vehicle in Iraq or Afghanistan			0.018*** (0.007)	-0.051 (0.037)
Has been deployed to Iraq or Afghanistan	0.041*** (0.006)	0.039*** (0.006)	0.042*** (0.006)	0.042*** (0.006)
Deployed to other location	0.034*** (0.013)	0.033*** (0.013)	0.036*** (0.013)	0.026** (0.013)
LR Chi2 (For joint significance of combat exposure variables)	21.37	24.10	15.91	35.71
Prob>Chi2	.0001	.0011	.0012	.0000
Observations	39541	39541	39541	39541
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Model One

Soldiers have different reenlistment rates depending on their deployment history; the reenlistment rate for soldiers who have deployed is 31.8% and 27.2% for soldiers that have not deployed. Specifically, deployment to either Iraq or Afghanistan increases the likelihood of reenlistment by 4.1 percentage points ($p<.01$) and deployment to other locations increases the likelihood of reenlistment by 3.4 percentage points ($p<.01$) compared to a soldier who has not deployed, while holding all other factors constant.

Among those deployed to the same location categories, firing a weapon leads to a 1.7 percentage point increase ($p<0.05$) in the reenlistment rate of a first-term enlisted soldier compared to a deployed soldier who did not have such exposure. Exposure to destroyed military vehicles leads to a two percentage point ($p<.01$) increase in the reenlistment rate of a soldier. To put the magnitude in perspective, the average rate of reenlistment for soldiers who have deployed is 31.8% implying that firing a weapon increases a soldier's reenlistment rate by 5.3% and exposure to destroyed military vehicles increases reenlistment rates by 6.3%.

Model Two

There are seven key variables of interest in Model Two that measure finer details of combat exposure; of those seven variables, two are statistically significant. Discharging a weapon from the land results in a 1.5 percentage point increase ($p<0.10$) in reenlistment rate compared to a deployed soldier with no such exposure. Exposure to destroyed vehicles while deployed results in a 1.8 percentage point ($p<.01$) increase in the reenlistment rate compared to a deployed soldier who was never exposed to destroyed military vehicles while deployed. The reenlistment effect of deployments remain relatively unchanged from Model One.

Model Three

Model Three focuses on the effects of combat exposure that occurs only in Iraq or Afghanistan. A soldier who fires a weapon in Iraq or Afghanistan is 1.4 percentage points ($p<.10$) more likely to reenlist than a soldier deployed to the same location category with no such combat exposure. A soldier exposed to destroyed vehicles in Iraq or Afghanistan is 1.8 percentage points ($p<.01$) more likely to reenlist than a soldier deployed to Iraq or Afghanistan with no such exposure to destroyed military vehicles. The reenlistment effects of deployments remain relatively unchanged from Models One and Two.

Model Four

Model Four examines whether combat exposure that occurs in Iraq or Afghanistan has a differential effect on reenlistment rate than combat exposure that occurs in other locations. The last column of Table 12 shows that a soldier who fires a

weapon while deployed outside Iraq or Afghanistan is 18.4 percentage points ($p<.01$) more likely to reenlist than a soldier deployed to the same location category but with no such experience. A soldier who fires a weapon while deployed to Iraq or Afghanistan is 4.5 percentage points (18.4-13.9=4.5) more likely to reenlist compared to a soldier deployed to Iraq or Afghanistan with no such experience. The 4.5 percentage point difference is statistically significant at the 0.01 level, indicating that there is indeed differential effect on reenlistment rates between this type of combat exposure that occur in the two different location categories. A soldier exposed to destroyed military vehicles while deployed outside Iraq or Afghanistan is 7.3 percentage points ($p<.10$) more likely to reenlist than a soldier deployed to the same location category but with no such experience. The effects of exposure to destroyed vehicles in Iraq or Afghanistan is not statistically significant indicating there is no differential effect on reenlistment rates between soldiers who are exposed to destroyed vehicle outside Iraq or Afghanistan and soldiers exposed to destroyed vehicles while deployed to Iraq or Afghanistan. The reenlistment effects of deployments remain relatively unchanged from the previous models.

In a sensitivity analysis Model Four is further refined by separating out combat exposures that occur in Iraq from those that occurred in Afghanistan; the estimated effects have large standard errors and the results observed in Model Four are largely driven by the combat exposures in Iraq.

Summary

Deployments have a positive effect on the reenlistment rate and remain relatively unchanged across each model specification. The average rate of reenlistment for U.S. Army personnel that were deployed is 31.8%; one can therefore assess the magnitude of the effect (in terms of percent change in reenlistment rate) by dividing the coefficients reported in the previous models by this average reenlistment rate. Across each model specification, combat exposure has a positive effect on soldiers reenlistment rates if the effect is statistically significant and the combat exposure that appears to have the largest effect on reenlistment rate for soldiers is firing a weapon while deployed outside Iraq or Afghanistan.

C. LIKELIHOOD RATIO TEST

A likelihood ratio test is used to evaluate the difference between nested models and compares the log-likelihood function of restricted and unrestricted models. For this study, the unrestricted model is the fully specified model described in Chapter V and the restricted model omits the combat exposure variables. While removing the combat exposure variables from each model will almost always make the model fit less well, the likelihood ratio test compares the log likelihood of the restricted and unrestricted models and tests whether any difference between the two is statistically significant. If the difference is statistically significant, then the unrestricted model (combat exposure variables included) is considered to fit the data significantly better than the restricted model (combat exposure variables omitted) and therefore the combat exposure variables belong in the model specification. Likelihood ratio test p-values are displayed in each table; a p-value less than .05 is interpreted to mean that the inclusion of the combat exposure variables results in a statistically significant improvement in the fit of the model. After completing a likelihood ratio test for each model and for each of the two outcomes, the inclusion of combat exposure variables results in a statistically significant improvement in the fit of the model at the 5% significant level, except in the following three cases:

- Reenlistment Model Two for U.S. Air Force personnel.
- Attrition Models One and Two for U.S. Navy personnel.
- It is not unexpected that the combat exposure variables are insignificant for members of the U.S. Navy since most are confined to their ship and only a few have an opportunity for the combat exposure measured by the PDHA.

D. SENSITIVITY ANALYSIS WITH PAY GRADE CONTROLS

Sensitivity analysis was conducted to examine the stability of each model's key variables where the outcome is reenlistment. Specifically, the analysis examines if the coefficients of the key variables change when pay grade variables were added to each of the models. Pay grade is a significant predictor of a service member staying past his or her initial service obligation; higher pay grades may be indicative of a service member's

propensity for and skill in military service. At the same time, pay grade may be a proxy for the complexity of the duties and stress during a deployment in a hostile area.

For Marines and Air Force, none of the combat exposure variables significantly changed with the inclusion on pay grade variables in to the model thus concluding that the models are stable for Marine Corps and Air Force personnel. For the Navy, including pay grade makes coefficients of the two variables that account for a sailor who fired a weapon from the air and witnessing the death or injury of an enemy combatant during deployment became statistically significant in the reenlistment model:

- Fired a weapon during a deployment (Model One)
- Fired a weapon from the land (Model Two)
- Fired a weapon in Iraq or Afghanistan (Model Three)
- Exposure to destroyed military vehicles in Iraq or Afghanistan (Model Four).

E. SENSITIVITY ANALYSIS WITH DEPLOYMENT CONTROLS

Sensitivity analysis was also conducted to examine the stability of each model's key variables when controlling for deployment tempo and duration. Variables that account for deployment duration and tempo were not included in the original specification because they are highly correlated with combat exposure; the more times a service member deploys the more likely that member is to be exposed to combat situations. Specifically, the analysis examines if the coefficients of the key variables change when variables that measure days deployed during first enlistment period and being deployed more than once where included in each model specification.

1. Sensitivity Analysis for Marine Corps Personnel

None of the combat exposure variables significantly changed with the inclusion of deployment variables into the reenlistment model thus concluding that the reenlistment models are stable for Marine Corps personnel. However, when deployment variables

were included in the attrition models the combat exposure variables showed less stability. Instability was most pronounced in attrition Models Two and Three, and is detailed below:

- Model Two: Firing a weapon from land and witnessing the death of a civilian became statistically significant and increased the attrition rate by 2.9 and 2.2 percentage points respectively ($p<.05$). Witnessing the death of a coalition member, while negative and statistically significant without deployment controls, became statistically insignificant and positive after inclusion of deployment controls.
- Model Three: Firing a weapon in Iraq or Afghanistan became statistically significant and resulted in a 3.1 percentage point increase in attrition rate ($p<.01$). However, effect of exposure to destroyed military vehicles in Iraq or Afghanistan became statistically insignificant.

2. Sensitivity Analysis for Navy Personnel

The combat exposure variables in both the reenlistment and attrition models for Navy personnel demonstrated stability when deployment variables were included in model specification. The only combat exposure variable that changed significance level was firing a weapon from the air as it became statistically significant in the reenlistment model.

3. Sensitivity Analysis for Air Force Personnel

The combat exposure variables in both the reenlistment and attrition models for Air Force personnel demonstrated stability when deployment variables were included in model specification. Exposure to destroyed military vehicles while deployed to locations outside Iraq or Afghanistan lost statistical significance when deployment variables where added to the reenlistment Model Four specification.

4. Sensitivity Analysis for Army Personnel

Combat exposure variables that were once significant became statistically insignificant when deployment variables were included in the model specification. The variables that became insignificant in the attrition models include:

- Fired a weapon from the land
- Exposure to destroyed military vehicles outside Iraq or Afghanistan
- Fired a weapon outside Iraq or Afghanistan.

The reenlistment models for service members in the U.S. Army showed more stability. Although some variables lost statistical significance, the magnitude of the coefficients look similar to those in the original model (changing less than one percentage point). Therefore, one can conclude that because the deployment control variables included in this sensitivity analysis are highly collinear with the combat exposure variables the result was larger standard errors and decreased statistical significance in some variables. The combat exposure variables that lost statistical significance include:

- Fired a weapon during deployment
- Fired a weapon in Iraq or Afghanistan
- Fired a weapon from the land.

F. SUMMARY

Witnessing death or injury during deployment increases the attrition rates of a soldiers and Marines, has no significant effect on sailors, and has a negative effect on Air Force personnel attrition rates. Witnessing the death or injury of enemy combatants increases the attrition rate for soldiers while it decreases the attrition rate for sailors and airmen. Witnessing the death or injury of coalition members only has an effect on Marine Corps personnel and lowers the attrition rate for Marines who were deployed and saw the death of coalition members compared to deployed Marines who did not witness such an event. For combat exposure that occurs specifically in Iraq or Afghanistan witnessing death increases soldiers and Marines attrition rates and decreases the attrition

rates of airmen. Exposure to destroyed vehicles in Iraq or Afghanistan decreases attrition rates for all Services except the Air Force where it increases the attrition rate. Soldiers and Marines experience differential effects of combat exposure on attrition rates between combat exposure that occurs in Iraq or Afghanistan and combat exposure that occurs elsewhere. Members of the U.S. Army experience differential effects between those who fire their weapon in Iraq or Afghanistan, and those that fire their weapons while deployed elsewhere while in the Marine Corps. The differential effect on attrition rates occur between those who saw a person killed or injured in Iraq or Afghanistan and those that witnessed death while deployed to other locations.

Across each of the Services, deployments reduce the rate of attrition. Deployment to Iraq or Afghanistan and deployments to other locations all decrease attrition rates that range from 41.2 percentage points (soldiers with deployment to Iraq or Afghanistan) to 12.6 percentage points (Marines with deployments to Afghanistan). A careful interpretation is needed for the deployment effects on attrition rates; deployments alone do not reduce attrition rates. Those who are able to deploy have completed the entry-level training (when attrition rates are highest) specific to their MOS and other deployment-specific training requirements and have progressed past a point in their careers where much early attrition occurs. The attrition results for deployment are spurious and the models show that deployment reduces attrition but only because individuals who separated early have not had the opportunity to deploy.

Combat exposure has a uniformly positive impact on reenlistment rates for service members in the U.S. Army and includes a differential effect on reenlistment rates between those who fire their weapon in Iraq or Afghanistan and those who fire their weapons while deployed elsewhere. Conversely, combat exposure has a negative impact on reenlistment rates for service members in the Marine Corps. Marines also experience a differential effect on reenlistment rates between those who witnessed death or injury in Iraq or Afghanistan and those who witnessed death or injury while deployed elsewhere. Combat exposure has both positive and negative impacts on the reenlistment rates for service members in the U.S. Navy. Discharging a weapon while deployed (regardless of location) and discharging a weapon while deployed to Iraq or Afghanistan each decrease

reenlistment rates for sailors who report those instances compared to sailors who were deployed to the same locations and did not have such experiences. Exposure to destroyed military vehicles while deployed (regardless of location) and while deployed to Iraq or Afghanistan result in an increase in the reenlistment rate for sailors who report such exposure compared to sailors who were deployed and did not report such exposure. Combat exposure generally increases the reenlistment rate for service members in the U.S. Air Force and airmen experience a differential effect on reenlistment rates between those who witness death and are exposed to destroyed military vehicles in Iraq or Afghanistan and those who experience those two situations elsewhere.

Across each of the Service, deployments to Iraq or Afghanistan increase the reenlistment rate for service members that range from a 10 percent point ($p<.01$) increase in the reenlistment rate of sailors to a 2.2 percentage point ($p<.05$) increase in the reenlistment rate of airmen. Deployment to other locations also has a positive impact on the reenlistment of all service members except those in the Navy. Service members in the Army enjoy the largest increase in reenlistment rates due to deployment to other locations with approximately a 3.3 percentage point ($p<.01$) increase in the reenlistment rate. Conversely, service members in the Navy who have been deployed to other locations experience a decrease reenlistment rates of approximately 3.6 percentage points ($p<.01$). As demonstrated in other studies and confirmed here service members without a traditional high school diploma are less likely to reenlist and service members who are married with non-spousal dependents are more likely to reenlist.

VIII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This thesis developed four alternate probit model specifications to predict reenlistment and attrition probabilities of first-term enlisted service members in the U.S. Army, Navy, Air Force, and Marine Corps. The goal was to determine the effect that combat exposure has on service member's propensity to reenlist or separate before the end of their obligated service.

Answers to the primary research question, whether combat experiences affect first-term enlisted retention and attrition rates, vary depending on the Service. The results of the multivariate models show that witnessing the death or serious injury of enemy combatants while deployed increases attrition rates among soldiers and Marines by 4.5 and 3.3 percentage points, respectively, compared to soldiers and Marines deployed to the same location category without such an experience. The same exposure lead to a decrease in attrition rates for sailors and airmen that range from 10.2 to 9.3 percentage points respectively compared to those deployed to the same location category without that experience. Only Marine Corps personnel are significantly affected by the death of coalition members; Marines who witnessed a coalition member's death or injury have a 2.2 percentage point decrease in their attrition rates compared to a Marine who was deployed to a similar location but had no such exposure. Exposure to destroyed military vehicles leads to decreases in attrition rate among soldiers, sailors, and Marines that range from 8.6 percentage points ($p<.05$) for sailors to 2.5 percentage points ($p<.01$) for Marines. Airmen who are exposed to destroyed military vehicles experience a 12.4 percentage point increase ($p<.01$) increased attrition rate compared to airmen who are deployed to similar locations but lack that experience.

Among service members who have completed at least 36 months of active duty service (24 months for Army three year contracts) combat exposure that is statistically significant generally increases retention rate among service members in the Army and Air Force but decreases retention rate for service members in the Navy and Marine Corps.

Witnessing a person's death while deployed decreases Marine retention rates by 3.6 percentage points ($p<.01$) compared to a Marine who was deployed to a similar location and had no such experience; witnessing the death of an enemy combatant had a larger effect on Marine attrition rates than witnessing a coalition member's death. Firing a weapon increases Army and Air Force retention rates by 1.7 and 14.1 percentage points respectively. Conversely, firing a weapon decreases Navy and Marine Corps retention rates by 9.1 and 2.6 percentage points respectively. Exposure to destroyed military vehicles increases retention rates among service members in the Army and Navy that range from 2 to 17.1 percentage points; members of the Marine Corps and Air Force who experience destroyed military vehicles do not experience a statistically significant change in their retention rates.

The study further explores whether combat exposures that occurred in Iraq or Afghanistan have a differential effect on retention and attrition compared to combat exposure that occurred in other locations. The differential effect is only observed in Marines and solders. Specifically, retention and attrition rates differ significantly between Marines who have witnessed an individual's death while deployed to Iraq or Afghanistan and those who have witnessed an individual's death or serious injury while deployed elsewhere. Likewise, retention and attrition rates differ significantly between soldiers who have fired their weapons in Iraq or Afghanistan and those who have fired their weapons while deployed elsewhere. These differentials in attrition and retention rates could be indicative of deployment preparedness; it is hypothesized that service members being deployed to Iraq or Afghanistan were more prepared for combat exposure than those preparing to be deployed elsewhere.

B. STUDY LIMITATIONS

The study has the following limitations. First, this study focused on only two cohort years (2002 and 2003) and used the PDHA DD Form 2796 that was used from April 2003 through December 2007. The DD Form 2796 used from January 2008 to the

present asks more specific questions regarding combat experiences[32] and could provide more detailed analysis of the experiences that might affect retention and attrition. Since the study focuses only on first term enlisted, the combat exposure might have a differential effect on those beyond the first term. Thus, the results from this study might not be applicable to the general active duty population.

Second, due to privacy concerns, I only obtain individual's enlistment date and separate date in a more aggregated level: those information are recorded in year quarter. Such aggregation introduces measurement errors in the dependent variables, and might cause attenuation bias in the estimated effects. Third, the PHDA questions on combat experience, while capture the experience in a rather objective language, do not capture the severity of each event. Finally, the PDHA doesn't track the number of times the same combat related experience occurs during the same deployment. For instance, a service member who fired his or her weapon one time during deployment and another service member who fired a weapon dozens of times during the same deployment would each simply check "yes" to the PDHA question that asks if a service member fired a weapon and thus would have identical responses to that particular question on the PDHA. Some of the variations in the combat exposure effects on retention and attrition across Services might be due to the fact that each Service encounters different levels of severity for any given type of combat exposure. Fourth, the occupational categories used in the analysis are based on the person's trained MOS, and might not reflect the actual job assignment for his particular deployment. It is possible that the estimated effects of combat exposure might be confounded with the job assignment, but the amount of bias should be minimal given that most people would stay within their trained specialty.

C. RECOMMENDATIONS

It would be important for the DoD to continue monitor how the current deployment tempo and combat exposures affect retention and attrition in the military,

[32] The DD Form 2796 dated Jan 2008 asks specifically if a respondent was involved in a blast or explosion or vehicular accident/crash. The DD Form 2796 also asks specifically about physical symptoms associated with those events.

given the ongoing conflicts in Afghanistan and other parts of Africa and Middle East. Future research utilizing the new PDHA data (i.e., those administered after January 2008) could provide more detailed analysis of the combat experiences that might affect retention and attrition. For instance, the new PDHA forms administered after January 2008 directly ask service members if they were exposed to explosions during deployment, not simply their exposure to destroyed military vehicles. Since some findings do show that combat exposure predicts manpower losses utilization of pre-deployment training that focuses specifically on the physical or psychological reactions to the combat exposure events measured by the PDHA should be examined to better prepare service members for combat deployments. Early attrition and negative retention effects was more pronounced among some service members who had combat exposure outside Iraq or Afghanistan than by members who had the same exposure inside Iraq or Afghanistan; Marines who witnessed injury or death outside Iraq or Afghanistan were 11.8 percentage points more likely to attrite while Marines with the same experience in Iraq or Afghanistan were only 3.3 percentage points more likely to attrite. It would be useful to examine which specific training or deployment preparation, if any, received by the Iraq or Afghanistan group can be provided to members deploying outside Iraq or Afghanistan. This training could help offset the disproportionately larger negative attrition effects associated with combat exposure in those locales. Finally, a renewed emphasis on post-deployment health concerns could address a service member's problems or issues as they arise before they become grounds for early separation. While combat exposure among service members during deployment is an unavoidable but at times necessary duty, understanding how such experiences affect retention and attrition behavior will allow manpower planners to better predict recruitment and retention goals during times of military conflict.

APPENDIX A. POST-DEPLOYMENT HEALTH ASSESSMENT QUESTIONNAIRE (DD FORM 2796)

DD Form 2796 is required for all deployments outside the United States (OCONUS) greater than 30 days, and is recommended; however, at the discretion of the Component Commander, Service Component Commander, or commander exercising operation control during all deployments less than or equal to 30 days, deployments with a fixed military treatment facility (MTF), or for deployments within the Continental United States (CONUS) [33] . Those required to complete a PDHA must do so no sooner than 30 days before re-deployment to no later than 30 days after return to their home station.

[33] *DoD Instruction 6490.03* provides full instructive and administrative guidance for the administration and control of deployment health and administration of the PDHA.

POST-DEPLOYMENT Health Assessment

33348

Authority: 10 U.S.C. 136 Chapter 55. 1074f, 3013, 5013, 8013 and E.O. 9397

Principal Purpose: To assess your state of health after deployment outside the United States in support of military operations and to assist military healthcare providers in identifying and providing present and future medical care to you.

Routine Use: To other Federal and State agencies and civilian healthcare providers, as necessary, in order to provide necessary medical care and treatment.

Disclosure: (Military personnal and DoD civilian Employees Only) Voluntary. If not provided, healthcare WILL BE furnished, but comprehensive care may not be possible.

INSTRUCTIONS: Please read each question completely and carefully before marking your selections. Provide a response for each question. If you do not understand a question, ask the administrator.

Demographics

Last Name

First Name **MI**

Name of Your Unit or Ship during this Deployment

Today's Date (dd/mm/yyyy)

Social Security Number

DOB (dd/mm/yyyy)

Date of arrival in theater (dd/mm/yyyy)

Date of departure from theater (dd/mm/yyyy)

Gender
- O Male
- O Female

Service Branch
- O Air Force
- O Army
- O Coast Guard
- O Marine Corps
- O Navy
- O Other

Component
- O Active Duty
- O National Guard
- O Reserves
- O Civilian Government Employee

Pay Grade

O E1	O 001	O W1
O E2	O 002	O W2
O E3	O 003	O W3
O E4	O 004	O W4
O E5	O 005	O W5
O E6	O 006	
O E7	O 007	O Other
O E8	O 008	
O E9	O 009	
	O 010	

Location of Operation
- O Europe
- O SW Asia
- O SE Asia
- O Asia (Other)
- O Australia
- O Africa
- O Central America
- O Unknown
- O South America
- O North America
- O Other _____

To what areas were you mainly deployed: (mark all that apply - list where/date arrived)
- O Kuwait _____
- O Qatar _____
- O Afghanistan _____
- O Bosnia _____
- O On a ship _____
- O Iraq _____
- O Turkey _____
- O Uzbekistan _____
- O Kosovo _____
- O CONUS _____
- O Other _____

Name of Operation:

Occupational specialty during this deployment (MOS, NEC or AFSC)

Combat specialty: _____

Administrator Use Only

Indicate the status of each of the following:

Yes	No	N/A	
O	O	O	Medical threat debriefing completed
O	O	O	Medical information sheet distributed
O	O	O	Post Deployment serum specimen collected

Reset

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DD FORM 2796, APR 2003 PREVIOUS EDITION IS OBSOLETE. ASD(HA) APPROVED

Please answer all questions in relation to THIS deployment

1. **Did your health change during this deployment?**
   - ○ Health stayed about the same or got better
   - ○ Health got worse

2. **How many times were you seen in sick call during this deployment?** ☐☐ No. of times

3. **Did you have to spend one or more nights in a hospital as a patient during this deployment?**
   - ○ No
   - ○ Yes, reason/dates: _____

4. **Did you receive any vaccinations just before or during this deployment?**
   - ○ Smallpox (leaves a scar on the arm)
   - ○ Anthrax
   - ○ Botulism
   - ○ Typhoid
   - ○ Meningococcal
   - ○ Other, list: _____
   - ○ Don't know
   - ○ None

5. **Did you take any of the following medications during this deployment?** *(mark all that apply)*
   - ○ PB (pyridostigmine bromide) nerve agent pill
   - ○ Mark-1 antidote kit
   - ○ Anti-malaria pills
   - ○ Pills to stay awake, such as dexedrine
   - ○ Other, please list _____
   - ○ Don't know

6. **Do you have any of these symptoms now or did you develop them anytime during this deployment?**

No	Yes During	Yes Now		No	Yes During	Yes Now	
○	○	○	Chronic cough	○	○	○	Chest pain or pressure
○	○	○	Runny nose	○	○	○	Dizziness, fainting, light headedness
○	○	○	Fever	○	○	○	Difficulty breathing
○	○	○	Weakness	○	○	○	Still feeling tired after sleeping
○	○	○	Headaches	○	○	○	Difficulty remembering
○	○	○	Swollen, stiff or painful joints	○	○	○	Diarrhea
○	○	○	Back pain	○	○	○	Frequent indigestion
○	○	○	Muscle aches	○	○	○	Vomiting
○	○	○	Numbness or tingling in hands or feet	○	○	○	Ringing of the ears
○	○	○	Skin diseases or rashes				
○	○	○	Redness of eyes with tearing				
○	○	○	Dimming of vision, like the lights were going out				

7. **Did you see anyone wounded, killed or dead during this deployment?** *(mark all that apply)*
   ○ No ○ Yes - coalition ○ Yes - enemy ○ Yes - civilian

8. **Were you engaged in direct combat where you discharged your weapon?**
   ○ No ○ Yes (○ land ○ sea ○ air)

9. **During this deployment, did you ever feel that you were in great danger of being killed?**
   ○ No ○ Yes

10. **Are you currently interested in receiving help for a stress, emotional, alcohol or family problem?**
    ○ No ○ Yes

11. **Over the LAST 2 WEEKS, how often have you been bothered by any of the following problems?**

None	Some	A Lot	
○	○	○	Little interest or pleasure in doing things
○	○	○	Feeling down, depressed, or hopeless
○	○	○	Thoughts that you would be better off dead or hurting yourself in some way

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Reset

DD FORM 2796, APR 2003

12. **Have you ever had any experience that was so frightening, horrible, or upsetting that, IN THE PAST MONTH, you ....**

No	Yes	
○	○	Have had any nightmares about it or thought about it when you did not want to?
○	○	Tried hard not to think about it or went out of your way to avoid situations that remind you of it?
○	○	Were constantly on guard, watchful, or easily startled?
○	○	Felt numb or detached from others, activities, or your surroundings?

13. **Are you having thoughts or concerns that ...**

No	Yes	Unsure	
○	○	○	You may have serious conflicts with your spouse, family members, or close friends?
○	○	○	You might hurt or lose control with someone?

14. **While you were deployed, were you exposed to:** *(mark all that apply)*

No	Sometimes	Often	
○	○	○	DEET insect repellent applied to skin
○	○	○	Pesticide-treated uniforms
○	○	○	Environmental pesticides (like area fogging)
○	○	○	Flea or tick collars
○	○	○	Pesticide strips
○	○	○	Smoke from oil fire
○	○	○	Smoke from burning trash or feces
○	○	○	Vehicle or truck exhaust fumes
○	○	○	Tent heater smoke
○	○	○	JP8 or other fuels
○	○	○	Fog oils (smoke screen)
○	○	○	Solvents
○	○	○	Paints
○	○	○	Ionizing radiation
○	○	○	Radar/microwaves
○	○	○	Lasers
○	○	○	Loud noises
○	○	○	Excessive vibration
○	○	○	Industrial pollution
○	○	○	Sand/dust
○	○	○	Depleted Uranium (If yes, explain) _____
○	○	○	Other exposures _____

15. **On how many days did you wear your MOPP over garments?** ☐☐ No. of days

16. **How many times did you put on your gas mask because of alerts and NOT because of exercises?** ☐☐ No. of times

17. **Were you in or did you enter or closely inspect any destroyed military vehicles?**

○ No ○ Yes

18. **Do you think you were exposed to any chemical, biological, or radiological warfare agents during this deployment?**

○ No ○ Don't know
○ Yes, explain with date and location

_____
_____
_____

Reset

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DD FORM 2796, APR 2003

Health Care Provider Only

SERVICE MEMBER'S SOCIAL SECURITY # ☐☐☐ — ☐☐ — ☐☐☐☐

Post-Deployment Health Care Provider Review, Interview, and Assessment

Interview

1. Would you say your health in general is: ○ Excellent ○ Very Good ○ Good ○ Fair ○ Poor
2. Do you have any medical or dental problems that developed during this deployment? ○ Yes ○ No
3. Are you currently on a profile or light duty? ○ Yes ○ No
4. During this deployment have you sought, or do you now intend to seek, counseling or care for your mental health? ○ Yes ○ No
5. Do you have concerns about possible exposures or events during this deployment that you feel may affect your health? ○ Yes ○ No
   Please list concerns: _____
   _____
6. Do you currently have any questions or concerns about your health? ○ Yes ○ No
   Please list concerns: _____
   _____

Health Assessment

After my interview/exam of the service member and review of this form, there is a need for further evaluation as indicated below. (More than one may be noted for patients with multiple problems. Further documentation of the problem evaluation to be placed in the service member's medical record.)

REFERRAL INDICATED FOR:

- ○ None
- ○ Cardiac
- ○ Combat/Operational Stress Reaction
- ○ Dental
- ○ Dermatologic
- ○ ENT
- ○ Eye
- ○ Family Problems
- ○ Fatigue, Malaise, Multisystem complaint
- ○ Audiology
- ○ GI
- ○ GU
- ○ GYN
- ○ Mental Health
- ○ Neurologic
- ○ Orthopedic
- ○ Pregnancy
- ○ Pulmonary
- ○ Other _____

EXPOSURE CONCERNS (During deployment):

- ○ Environmental
- ○ Occupational
- ○ Combat or mission related
- ○ None

Comments: _____
_____
_____

I certify that this review process has been completed.
Provider's signature and stamp:

This visit is coded by V70.5 _ _ 6

Date (dd/mm/yyyy) ☐☐ / ☐☐ / ☐☐☐☐

End of Health Review

DD FORM 2796, APR 2003 ASD(HA) APPROVED Reset 33348

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APPENDIX B. INTERSERVICE SEPARATION CODES FOR NON-EAS SEPARATION

Code	Description
1002	Early release, insufficient retainability
1003	Early release, to attend school
1004	Early release, police duty
1005	Early release, in the national interest
1006	Early release, seasonal employment
1007	Early release, to teach
1008	Early release, other, including RIF, VSI, and SSB
1010	Condition existing prior to service
1011	Disability, severance pay
1012	Permanent disability retirement
1013	Temporary disability retirement
1014	Disability, no condtn existng prior to srvce, no sev pay
1015	Disability, Title 10 USC retirement
1016	Unqualified for active duty, other
1017	Failure to meet weight or body fat standards
1022	Dependency or hardship
1060	Character or behavior disorder
1061	Motivational problems (apathy)
1062	Enuresis
1063	Inaptitude
1064	Alcoholism
1065	Discreditable incidents, civilian or military
1066	Shirking
1067	Drugs
1068	Financial Irresponsibility
1069	Lack of dependent support
1070	Unsanitary habits
1071	Civil court conviction
1072	Security
1073	Court-martial
1074	Fraudulent entry
1075	AWOL or desertion
1076	Homosexuality
1077	Sexual perversion
1078	Good of the service (discharge in lieu of court-martial)
1079	Juvenile offender
1080	Misconduct, reason unknown
1081	Unfitness, reason unknown
1082	Unsuitability, reason unknown
1083	Pattern of minor disciplinary infractions
1084	Commission of a serious offense
1085	Failure to meet minimum qualifications for retention
1086	Unsat performance (former Expeditious Discharge Program)
1087	Entry lev perform and conduct (former Trainee Dschrge Progm)
1088	Unsatisfactory performance of Ready Reserve obligation
1090	Secretarial authority
1091	Erroneous enlistment or induction
1092	Sole surviving family member
1093	Marriage
1094	Pregnancy
1095	Minority (underage)
1096	Conscientious objector
1097	Parenthood
1098	Breach of contract
1099	Other
1101	Dropped from strength, desertion
1102	Dropped from strength, imprisonment
1103	Record correction
1104	Dropped from strength, MIA or POW

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APPENDIX C. PROBIT REGRESSIONS FOR MARINE CORPS PERSONNEL

	Reenlistment				Attrition			
Combat Exposure	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead	-0.036***			-0.139***	0.031***			0.118***
during ANY deployment	(0.007)			(0.031)	(0.010)			(0.035)
Fired their weapon during a deployment	-0.026***			-0.094*	0.005			-0.046
	(0.007)			(0.055)	(0.010)			(0.058)
Inside, entered, or closely inspected	-0.000	-0.002		0.030	-0.025***	-0.022***		-0.001
any destroyed military vehicle	(0.007)	(0.007)		(0.036)	(0.008)	(0.009)		(0.040)
Has been deployed to Iraq or Afghanistan	0.007	0.002	0.005	0.004	-0.261***	-0.254***	-0.258***	-0.257***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
Deployed to other location	0.026***	0.026***	0.024***	0.029***	-0.158***	-0.158***	-0.158***	-0.163***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.006)	(0.007)	(0.007)	(0.007)
Discharged weapon from the LAND		-0.018**				0.013		
during deployment		(0.008)				(0.011)		
Discharged weapon from the AIR		-0.091*				-0.089		
during deployment		(0.050)				(0.091)		
Discharged weapon from the SEA		-0.025				-0.008		
during deployment		(0.103)				(0.137)		
Ever saw a COALITION member		-0.013*				-0.022**		
killed, wounded, or dead		(0.007)				(0.009)		

	Reenlistment				Attrition			
Combat Exposure	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Ever saw an ENEMY killed, wounded, or dead		-0.033*** (0.008)				0.033*** (0.011)		
Ever saw a CIVILIAN killed, wounded, or dead		0.005 (0.008)				0.012 (0.010)		
Ever reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			-0.030*** (0.007)	0.125*** (0.040)			0.023** (0.010)	-0.085*** (0.031)
Ever reported firing any weapon in Iraq or Afghanistan			-0.027*** (0.007)	0.081 (0.079)			0.008 (0.010)	0.058 (0.067)
Ever reported being inside or inspected destroyed military vehicle in Iraq or Afghanistan			-0.003 (0.007)	-0.030 (0.032)			-0.025*** (0.009)	-0.024 (0.040)
Race/Ethnicity								
Black	0.029 (0.026)	0.029 (0.026)	0.029 (0.026)	0.029 (0.026)	0.082*** (0.014)	0.082*** (0.014)	0.082*** (0.014)	0.082*** (0.014)
Hispanic	-0.017 (0.016)	-0.017 (0.016)	-0.017 (0.016)	-0.017 (0.016)	-0.037*** (0.010)	-0.037*** (0.010)	-0.037*** (0.010)	-0.037*** (0.010)
Other	0.030 (0.024)	0.030 (0.024)	0.030 (0.024)	0.030 (0.024)	-0.028* (0.016)	-0.028* (0.016)	-0.028* (0.016)	-0.028* (0.016)
Unknown	0.153*** (0.016)	0.153*** (0.016)	0.153*** (0.016)	0.153*** (0.016)	-0.027** (0.013)	-0.027** (0.013)	-0.027** (0.013)	-0.027** (0.013)

	Reenlistment				Attrition			
Gender	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Female	0.035***	0.035***	0.035***	0.035***	0.020*	0.019*	0.019*	0.020*
	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Age								
Age	-0.013***	-0.013***	-0.013***	-0.013***	0.008***	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Education Level								
Non High School Diploma or GED Grad	-0.156***	-0.156***	-0.156***	-0.156***	0.026	0.027	0.026	0.026
	(0.007)	(0.007)	(0.007)	(0.007)	(0.026)	(0.026)	(0.026)	(0.026)
Some college, no bachelor degree	-0.006	-0.006	-0.007	-0.006	0.014	0.013	0.014	0.013
	(0.022)	(0.022)	(0.022)	(0.022)	(0.023)	(0.023)	(0.023)	(0.023)
Bachelors degree	0.092**	0.093**	0.092**	0.091**	-0.081***	-0.082***	-0.082***	-0.081***
	(0.043)	(0.043)	(0.043)	(0.042)	(0.031)	(0.031)	(0.031)	(0.031)
Postgraduate degree	0.442***	0.443***	0.443***	0.442***	-0.068***	-0.067***	-0.068***	-0.068***
	(0.036)	(0.036)	(0.036)	(0.036)	(0.022)	(0.022)	(0.022)	(0.022)
Year of Entry								
2002 Cohort	-0.345***	-0.345***	-0.345***	-0.344***				
	(0.012)	(0.012)	(0.012)	(0.012)				
2003 Cohort					-0.020*	-0.019	-0.020*	-0.020
					(0.012)	(0.012)	(0.012)	(0.012)

	Reenlistment				Attrition			
AFQT Score	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
AFQT score >=93	0.095***	0.096***	0.095***	0.094***	-0.113***	-0.114***	-0.113***	-0.112***
	(0.030)	(0.031)	(0.030)	(0.030)	(0.015)	(0.015)	(0.015)	(0.015)
AFQT score 65-92	0.079***	0.080***	0.080***	0.079***	-0.082***	-0.082***	-0.082***	-0.082***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.015)	(0.015)	(0.015)	(0.015)
AFQT score 50-64	0.089***	0.089***	0.089***	0.088***	-0.043***	-0.043***	-0.043***	-0.042***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.016)	(0.016)	(0.016)	(0.016)
AFQT score 31-49	0.099***	0.099***	0.099***	0.099***	-0.003	-0.003	-0.003	-0.003
	(0.024)	(0.024)	(0.024)	(0.024)	(0.016)	(0.016)	(0.016)	(0.016)
MOS								
Combat Arms	-0.027*	-0.029**	-0.028**	-0.027*	-0.354***	-0.354***	-0.353***	-0.353***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.006)	(0.006)	(0.006)	(0.006)
Combat Service	-0.049***	-0.049***	-0.049***	-0.049***	-0.334***	-0.334***	-0.334***	-0.334***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.004)	(0.004)	(0.004)	(0.004)
Service Support	-0.050***	-0.051***	-0.050***	-0.050***	-0.413***	-0.413***	-0.413***	-0.413***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.005)	(0.005)	(0.005)	(0.005)
Marital Status								
Single with Dependents	0.047***	0.048***	0.047***	0.047***	-0.086***	-0.085***	-0.086***	-0.086***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.012)	(0.012)	(0.012)	(0.012)
Married	0.020***	0.021***	0.021***	0.020***	-0.092***	-0.092***	-0.092***	-0.092***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)

	Reenlistment				Attrition			
Marital Status	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Married with non-spousal dependents	0.044***	0.045***	0.044***	0.043***	-0.107***	-0.107***	-0.107***	-0.107***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
LR Chi2	67.73	65.33	56.19	83.48	16.74	28.11	12.31	24.58
Prob>Chi2	.0000	.000	.0000	.0000	.0008	.0002	.0064	.0004
Observations	30654	30654	30654	30654	41607	41607	41607	41607
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%								

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APPENDIX D. PROBIT REGRESSIONS FOR NAVY PERSONNEL

	Reenlistment				Attrition			
Combat Exposure	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	-0.003 (0.023)			-0.017 (0.026)	-0.012 (0.019)			0.001 (0.022)
Fired their weapon during a deployment	-0.091** (0.042)			-0.105 (0.078)	0.017 (0.035)			0.051 (0.045)
Inside, entered, or closely inspected any destroyed military vehicle	0.171*** (0.050)	0.167*** (0.050)		0.079 (0.073)	-0.086** (0.040)	-0.060 (0.041)		0.028 (0.053)
Has been deployed to Iraq or Afghanistan	0.100*** (0.024)	0.101*** (0.025)	0.084*** (0.027)	0.084*** (0.027)	-0.167*** (0.020)	-0.153*** (0.020)	-0.150*** (0.022)	-0.150*** (0.022)
Deployed to other location	-0.036*** (0.008)	-0.037*** (0.008)	-0.036*** (0.007)	-0.035*** (0.008)	-0.144*** (0.007)	-0.144*** (0.007)	-0.145*** (0.007)	-0.146*** (0.007)
Discharged weapon from the LAND during deployment		-0.027 (0.065)				0.033 (0.058)		
Discharged weapon from the AIR during deployment		-0.167 (0.111)				-0.146 (0.194)		
Discharged weapon from the SEA during deployment		-0.205** (0.084)				0.043 (0.076)		
Ever saw a COALITION member killed, wounded, or dead		-0.002 (0.031)				0.001 (0.025)		

	Reenlistment				Attrition			
Combat Exposure	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Ever saw an ENEMY killed, wounded, or dead		-0.041 (0.045)				-0.102** (0.047)		
Ever saw a CIVILIAN killed, wounded, or dead		0.006 (0.031)				-0.012 (0.027)		
Ever reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			0.026 (0.048)	0.045 (0.057)			-0.029 (0.042)	-0.030 (0.048)
Ever reported firing any weapon in Iraq or Afghanistan			-0.109** (0.049)	-0.006 (0.121)			0.012 (0.058)	-0.041 (0.078)
Ever reported being inside or inspected destroyed military vehicle in Iraq or Afghanistan			0.226*** (0.070)	0.136 (0.103)			-0.166*** (0.060)	-0.196** (0.084)
Race/Ethnicity								
Black	0.028 (0.026)	0.028 (0.026)	0.028 (0.026)	0.028 (0.026)	0.000 (0.011)	-0.000 (0.011)	0.000 (0.011)	-0.000 (0.011)
Hispanic	-0.061** (0.028)	-0.062** (0.028)	-0.061** (0.028)	-0.061** (0.028)	-0.075*** (0.013)	-0.075*** (0.013)	-0.075*** (0.013)	-0.075*** (0.013)
Other	-0.033 (0.035)	-0.033 (0.035)	-0.033 (0.035)	-0.033 (0.035)	-0.054*** (0.016)	-0.054*** (0.016)	-0.053*** (0.016)	-0.053*** (0.016)
Unknown	-0.085* (0.048)	-0.084* (0.048)	-0.084* (0.048)	-0.085* (0.048)	-0.008 (0.026)	-0.008 (0.026)	-0.008 (0.026)	-0.008 (0.026)

	Reenlistment				Attrition			
Gender	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Female	-0.027***	-0.027***	-0.027***	-0.027***	0.039***	0.039***	0.039***	0.039***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)
Age								
Age	0.001	0.001	0.001	0.001	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Education Level								
Non High School Diploma or GED Grad	-0.080***	-0.080***	-0.080***	-0.080***	0.085***	0.085***	0.085***	0.085***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.016)	(0.016)	(0.016)	(0.016)
Some college, no bachelor degree	-0.020	-0.020	-0.020	-0.020	0.104***	0.104***	0.104***	0.104***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.012)	(0.012)	(0.012)	(0.012)
Bachelors degree	0.122***	0.121***	0.121***	0.122***	-0.148***	-0.148***	-0.147***	-0.147***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.023)	(0.023)	(0.023)	(0.023)
Postgraduate degree	0.015	0.015	0.015	0.015	0.057**	0.056**	0.057**	0.057**
	(0.042)	(0.042)	(0.042)	(0.042)	(0.026)	(0.026)	(0.026)	(0.026)
Year of Entry								
2002 Cohort	-0.526***	-0.525***	-0.526***	-0.526***	0.247***	0.247***	0.247***	0.247***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
2003 Cohort								

	Reenlistment				Attrition			
AFQT Score	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
AFQT score >=93	0.123*	0.123*	0.122*	0.122*	-0.013	-0.012	-0.012	-0.012
	(0.066)	(0.066)	(0.066)	(0.066)	(0.031)	(0.031)	(0.031)	(0.031)
AFQT score 65-92	0.007	0.007	0.005	0.006	0.013	0.014	0.014	0.014
	(0.056)	(0.056)	(0.056)	(0.056)	(0.028)	(0.028)	(0.028)	(0.028)
AFQT score 50-64	-0.081	-0.081	-0.082	-0.082	0.041	0.041	0.041	0.041
	(0.051)	(0.051)	(0.051)	(0.051)	(0.028)	(0.028)	(0.028)	(0.028)
AFQT score 31-49	-0.125**	-0.125**	-0.126**	-0.126**	0.019	0.020	0.020	0.020
	(0.052)	(0.052)	(0.052)	(0.052)	(0.028)	(0.028)	(0.028)	(0.028)
MOS								
Combat Arms	-0.138***	-0.138***	-0.137***	-0.137***	-0.471***	-0.471***	-0.471***	-0.471***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.009)	(0.009)	(0.009)	(0.009)
Combat Service	-0.094***	-0.094***	-0.094***	-0.094***	-0.572***	-0.572***	-0.572***	-0.572***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.007)	(0.007)	(0.007)	(0.007)
Service Support	-0.094***	-0.095***	-0.094***	-0.094***	-0.546***	-0.546***	-0.546***	-0.546***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.008)	(0.008)	(0.008)	(0.008)
Marital Status								
Single with Dependents	0.047***	0.048***	0.048***	0.048***	-0.043***	-0.043***	-0.043***	-0.043***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.012)	(0.012)	(0.012)	(0.012)
Married	0.016**	0.016**	0.017**	0.016**	-0.091***	-0.091***	-0.091***	-0.091***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)

	Reenlistment				Attrition			
Marital Status	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Married with non-spousal dependents	0.074***	0.074***	0.074***	0.074***	-0.106***	-0.106***	-0.106***	-0.106***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.008)	(0.008)	(0.008)	(0.008)
LR Chi2	15.07	16.08	15.54	18.49	6.10	12.82	13.28	14.79
Prob>Chi2	.0018	.0244	.0014	.0051	.1079	.0766	.0041	.0219
Observations	22106	22106	22106	22106	40938	40938	40938	40938
Standard errors in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

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APPENDIX E. PROBIT REGRESSIONS FOR AIR FORCE PERSONNEL

	Reenlistment				Attrition			
Combat Exposure	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	0.009 (0.016)			0.088** (0.042)	-0.049** (0.024)			-0.059 (0.049)
Fired their weapon during a deployment	0.141*** (0.047)			0.161 (0.106)	0.013 (0.058)			0.067 (0.111)
Inside, entered, or closely inspected any destroyed military vehicle	0.001 (0.025)	0.008 (0.025)		0.155* (0.084)	0.124*** (0.036)	0.117*** (0.037)		0.129 (0.087)
Has been deployed to Iraq or Afghanistan	0.016 (0.010)	0.016 (0.009)	0.022** (0.010)	0.022** (0.010)	-0.305*** (0.009)	-0.306*** (0.009)	-0.305*** (0.009)	-0.305*** (0.009)
Deployed to other location	0.018** (0.008)	0.020** (0.008)	0.020** (0.008)	0.014 (0.008)	-0.292*** (0.008)	-0.293*** (0.008)	-0.293*** (0.008)	-0.292*** (0.008)
Discharged weapon from the LAND during deployment		0.024 (0.049)				0.084 (0.073)		
Discharged weapon from the AIR during deployment		-0.148*** (0.038)				-0.066 (0.231)		
Discharged weapon from the SEA during deployment								
Ever saw a COALITION member killed, wounded, or dead		-0.001 (0.020)				-0.027 (0.030)		

	Reenlistment				Attrition			
Combat Exposure	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Ever saw an ENEMY killed, wounded, or dead		0.039 (0.028)				-0.093** (0.039)		
Ever saw a CIVILIAN killed, wounded, or dead		0.013 (0.026)				0.032 (0.040)		
Ever reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			-0.008 (0.017)	-0.074*** (0.027)			-0.045* (0.027)	0.013 (0.058)
Ever reported firing any weapon in Iraq or Afghanistan			0.149*** (0.053)	-0.008 (0.081)			-0.008 (0.068)	-0.071 (0.121)
Ever reported being inside or inspected destroyed military vehicle in Iraq or Afghanistan			-0.020 (0.025)	-0.110*** (0.033)			0.123*** (0.040)	-0.005 (0.093)
Race/Ethnicity								
Black	-0.055* (0.031)	-0.054* (0.031)	-0.055* (0.031)	-0.054* (0.031)	0.050*** (0.015)	0.050*** (0.015)	0.050*** (0.015)	0.050*** (0.015)
Hispanic	-0.058 (0.038)	-0.058 (0.038)	-0.058 (0.038)	-0.057 (0.038)	-0.034* (0.019)	-0.035* (0.019)	-0.034* (0.019)	-0.034* (0.019)
Other	0.022 (0.047)	0.023 (0.047)	0.022 (0.047)	0.020 (0.047)	-0.038* (0.022)	-0.039* (0.022)	-0.038* (0.022)	-0.038* (0.022)
Unknown	-0.089 (0.103)	-0.090 (0.103)	-0.088 (0.102)	-0.088 (0.102)	-0.010 (0.035)	-0.009 (0.035)	-0.010 (0.035)	-0.010 (0.035)

	Reenlistment				Attrition			
Gender	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Female	-0.024***	-0.023***	-0.024***	-0.024***	0.101***	0.102***	0.101***	0.101***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Age								
Age	0.000	-0.000	-0.000	-0.000	-0.005***	-0.005***	-0.005***	-0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Education Level								
Non High School Diploma or GED Grad					0.014	0.016	0.014	0.013
					(0.089)	(0.089)	(0.089)	(0.089)
Some college, no bachelor degree	-0.003	-0.002	-0.003	-0.002	-0.043	-0.042	-0.043	-0.043
	(0.025)	(0.025)	(0.025)	(0.025)	(0.030)	(0.030)	(0.030)	(0.030)
Bachelors degree	-0.001	-0.002	-0.001	0.000	-0.033	-0.033	-0.033	-0.033
	(0.024)	(0.024)	(0.024)	(0.024)	(0.028)	(0.028)	(0.028)	(0.028)
Postgraduate degree	-0.027	-0.027	-0.027	-0.027	-0.027**	-0.027**	-0.027**	-0.027**
	(0.017)	(0.017)	(0.017)	(0.017)	(0.012)	(0.012)	(0.012)	(0.012)
Year of Entry								
2002 Cohort	-0.507***	-0.509***	-0.507***	-0.507***	0.130***	0.131***	0.130***	0.130***
	(0.067)	(0.067)	(0.067)	(0.067)	(0.034)	(0.034)	(0.034)	(0.034)
2003 Cohort								

	Reenlistment				Attrition			
AFQT Score	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
AFQT score >=93	-0.191***	-0.191***	-0.191***	-0.191***	0.349***	0.350***	0.349***	0.349***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.022)	(0.022)	(0.022)	(0.022)
AFQT score 65-92	-0.356***	-0.356***	-0.355***	-0.356***	0.394***	0.394***	0.394***	0.394***
	(0.043)	(0.043)	(0.043)	(0.043)	(0.023)	(0.023)	(0.023)	(0.023)
AFQT score 50-64	-0.255***	-0.255***	-0.255***	-0.255***	0.469***	0.469***	0.469***	0.469***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.021)	(0.021)	(0.021)	(0.021)
AFQT score 31-49	-0.257***	-0.258***	-0.257***	-0.257***	0.462***	0.462***	0.462***	0.462***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.021)	(0.021)	(0.021)	(0.021)
MOS								
Combat Arms	0.029*	0.031*	0.030*	0.027*	-0.277***	-0.277***	-0.277***	-0.277***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.010)	(0.010)	(0.010)	(0.010)
Combat Service	0.039***	0.041***	0.039***	0.039***	-0.300***	-0.299***	-0.299***	-0.300***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.008)	(0.008)	(0.008)	(0.008)
Service Support	0.054***	0.055***	0.053***	0.053***	-0.247***	-0.246***	-0.246***	-0.246***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.009)	(0.009)	(0.009)	(0.009)
Marital Status								
Single with Dependents	0.088***	0.088***	0.088***	0.088***	-0.143***	-0.144***	-0.143***	-0.143***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.016)	(0.016)	(0.016)	(0.016)
Married	0.036***	0.036***	0.036***	0.036***	-0.049***	-0.049***	-0.049***	-0.049***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)

	Reenlistment				Attrition			
Marital Status	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Married with non-spousal dependents	0.096***	0.096***	0.096***	0.096***	-0.135***	-0.135***	-0.135***	-0.135***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)	(0.011)
LR Chi2	13.66	8.40	10.66	25.69	13.53	18.68	10.27	13.89
Prob>Chi2	.0034	.2099	.0137	.0003	.0036	.0047	.0164	.0309
Observations	13266	13265	13266	13266	22775	22773	22775	22775
Standard errors in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

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APPENDIX F. PROBIT REGRESSIONS FOR ARMY PERSONNEL

	Reenlistment				Attrition			
Combat Exposure	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Saw individual killed, wounded, or dead during ANY deployment	-0.002 (0.007)			-0.031 (0.033)	0.022*** (0.007)			-0.015 (0.034)
Fired their weapon during a deployment	0.017** (0.007)			0.184*** (0.061)	-0.014* (0.008)			-0.116* (0.061)
Inside, entered, or closely inspected any destroyed military vehicle	0.020*** (0.007)	0.018*** (0.007)		0.073* (0.042)	-0.052*** (0.007)	-0.050*** (0.007)		-0.101** (0.042)
Has been deployed to Iraq or Afghanistan	0.041*** (0.006)	0.039*** (0.006)	0.042*** (0.006)	0.042*** (0.006)	-0.412*** (0.005)	-0.408*** (0.005)	-0.414*** (0.005)	-0.414*** (0.005)
Deployed to other location	0.034*** (0.013)	0.033*** (0.013)	0.036*** (0.013)	0.026** (0.013)	-0.278*** (0.010)	-0.277*** (0.010)	-0.280*** (0.010)	-0.268*** (0.011)
Discharged weapon from the LAND during deployment		0.015* (0.008)				-0.023*** (0.009)		
Discharged weapon from the AIR during deployment		0.066 (0.071)				0.034 (0.068)		
Discharged weapon from the SEA during deployment		-0.043 (0.115)				0.102 (0.117)		
Ever saw a COALITION member killed, wounded, or dead		0.002 (0.007)				-0.009 (0.008)		

	Reenlistment				Attrition			
Combat Exposure	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Ever saw an ENEMY killed, wounded, or dead		0.006 (0.008)				0.045*** (0.008)		
Ever saw a CIVILIAN killed, wounded, or dead		0.000 (0.007)				-0.010 (0.008)		
Ever reported seeing individual killed, wounded, or dead in Iraq or Afghanistan			-0.001 (0.007)	0.030 (0.035)			0.025*** (0.008)	0.040 (0.034)
Ever reported firing any weapon in Iraq or Afghanistan			0.014* (0.008)	-0.139*** (0.042)			-0.013 (0.008)	0.099* (0.058)
Ever reported being inside or inspected destroyed military vehicle in Iraq or Afghanistan			0.018*** (0.007)	-0.051 (0.037)			-0.051*** (0.007)	0.049 (0.042)
Race/Ethnicity								
Black	0.022 (0.015)	0.022 (0.015)	0.022 (0.015)	0.022 (0.015)	0.020** (0.009)	0.020** (0.009)	0.020** (0.009)	0.020** (0.009)
Hispanic	-0.027* (0.014)	-0.026* (0.014)	-0.027* (0.014)	-0.027* (0.014)	-0.090*** (0.010)	-0.090*** (0.010)	-0.090*** (0.010)	-0.090*** (0.010)
Other	-0.004 (0.018)	-0.004 (0.018)	-0.004 (0.018)	-0.004 (0.018)	-0.136*** (0.013)	-0.136*** (0.013)	-0.136*** (0.013)	-0.136*** (0.013)
Unknown	-0.007 (0.017)	-0.006 (0.017)	-0.007 (0.017)	-0.007 (0.017)	-0.005 (0.012)	-0.005 (0.012)	-0.005 (0.012)	-0.005 (0.012)

	Reenlistment				Attrition			
Gender	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Female	-0.044***	-0.043***	-0.044***	-0.044***	0.127***	0.126***	0.127***	0.127***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)	(0.005)
Age								
Age	-0.002***	-0.002***	-0.002***	-0.002***	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Education Level								
Non High School Diploma or GED Grad	-0.032	-0.032	-0.032	-0.033	0.082**	0.084***	0.082**	0.083**
	(0.039)	(0.039)	(0.039)	(0.039)	(0.032)	(0.032)	(0.032)	(0.032)
Some college, no bachelor degree	0.038***	0.038***	0.038***	0.037***	0.032***	0.032***	0.032***	0.032***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.010)	(0.010)	(0.010)	(0.010)
Bachelors degree	0.028**	0.028**	0.028**	0.028**	-0.255***	-0.255***	-0.255***	-0.254***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.011)	(0.011)	(0.011)	(0.011)
Postgraduate degree	-0.104***	-0.104***	-0.104***	-0.104***	0.103***	0.104***	0.103***	0.103***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.011)	(0.011)	(0.011)	(0.011)
Year of Entry								
2002 Cohort	-0.488***	-0.488***	-0.488***	-0.488***	0.128***	0.127***	0.128***	0.128***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.012)	(0.012)	(0.012)	(0.012)
2003 Cohort	-0.250***	-0.250***	-0.250***	-0.250***	0.046***	0.046***	0.046***	0.046***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)

	Reenlistment				Attrition			
AFQT Score	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
AFQT score >=93	-0.116***	-0.117***	-0.116***	-0.117***	-0.106***	-0.105***	-0.106***	-0.106***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.017)	(0.017)	(0.017)	(0.017)
AFQT score 65-92	-0.136***	-0.136***	-0.136***	-0.136***	0.007	0.007	0.007	0.007
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
AFQT score 50-64	-0.151***	-0.151***	-0.151***	-0.151***	0.077***	0.077***	0.077***	0.077***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)
AFQT score 31-49	-0.169***	-0.169***	-0.169***	-0.170***	0.075***	0.075***	0.074***	0.075***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
MOS								
Combat Arms	-0.025*	-0.026*	-0.024*	-0.026*	-0.251***	-0.250***	-0.251***	-0.250***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.007)	(0.007)	(0.007)	(0.007)
Combat Service	-0.004	-0.004	-0.004	-0.005	-0.290***	-0.290***	-0.290***	-0.290***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.007)	(0.007)	(0.007)	(0.007)
Service Support	0.048***	0.049***	0.048***	0.048***	-0.232***	-0.232***	-0.231***	-0.231***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.007)	(0.007)	(0.007)	(0.007)
Marital Status								
Single with Dependents	0.066***	0.066***	0.066***	0.066***	-0.055***	-0.055***	-0.055***	-0.055***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Married	0.099***	0.099***	0.099***	0.099***	-0.065***	-0.064***	-0.065***	-0.065***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)

	Reenlistment				Attrition			
Marital Status	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Married with non-spousal dependents	0.138***	0.138***	0.138***	0.138***	-0.064***	-0.064***	-0.064***	-0.064***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)
LR Chi2	21.37	24.10	15.91	35.71	61.50	84.03	55.51	73.67
Prob>Chi2	.0001	.0011	.0012	.0000	.0000	.0000	.0000	.0000
Observations	39541	39541	39541	39541	74828	74828	74828	74828
Standard errors in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

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