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STRESS DISORDER AMONG ACTIVE DUTY POPULATION

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The Effect of OEF/OIF Deployment Intensity on the Rate of Posttraumatic Stress Disorder
Among Active Duty Population

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ABSTRACT

This study estimates the effect of deployment location and length on the risk of developing PTSD, relative to what it would be from the normal military operations. We use a random sample of activity-duty enlisted personnel serving between 2001 and 2006. We identify PTSD cases from TRICARE medical records and link deployment information from Contingent Tracking System. Comparing to those in other duties around the world, deployment to Iraq/Afghanistan increases the odds of developing PTSD substantially, with the largest effect observed for the Navy (OR=9.06, $p<0.01$) and the smallest effect for the Air Force (OR=1.25, $p<0.01$). A deployment longer than 180 days increases the odds of PTSD by 1.11 times to 2.84 times, depending on the service, compared to a tour under 120 days. For Army and Navy, a deployment to Iraq/Afghanistan further exacerbates the adverse effect of tour length. Our research identifies the extent of PTSD across services and quantifies the risks associated with OEF/OIF deployment intensity. Further research is needed for effective monitoring and preventive measures of PTSD on the active duty population.

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Introduction

Recent research suggests that the wars in Afghanistan and Iraq, also known as Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), pose substantial mental health challenges to U.S. military service members and mental health systems (Hoge, Castro et al. 2004; Hoge, Auchterlonie et al. 2006; Erbes, Westermeyer et al. 2007; Rosenheck and Fontana 2007; Seal, Bertenthal et al. 2007; Tanielian and Jaycox 2008). Post-traumatic stress disorder (PTSD), in particular, has risen steadily, with heavy combat typically being cited as a leading cause of PTSD (Helzer, Robins et al. 1987; CDC 1988; The Iowa Persian Gulf Study Group 1997; Prigerson, Maciejewski et al. 2002; Kang, Natelson et al. 2003; Hoge, Castro et al. 2004). A recent comprehensive review of the literature by Rand found a wide range of PTSD rates among those serving in Iraq and Afghanistan, with estimates ranging from 4% to 45%, depending on the samples and how PTSD was measured (Tanielian and Jaycox 2008). Many studies used anonymous survey responses from convenience samples of Army soldiers who were deployed in either Iraq or Afghanistan from 2003 to 2005 (Helzer, Robins et al. 1987; Hoge, Castro et al. 2004; Grieger, Cozza et al. 2006; Vasterling, Proctor et al. 2006; Erbes, Westermeyer et al. 2007). Some analyzed the mental health issues using post-deployment health assessment surveys collected by the Mental Health Advisory Team (MHAT), which measured PTSD by primary-care PTSD screening questions (U.S. Army 2003; U.S. Army 2005; Hoge, Auchterlonie et al. 2006; U.S. Army 2006; U.S. Army 2006; Shen, Arkes et al. 2009), while a few used actual medical records from the VA health care system.

With the Global War on Terrorism (GWOT) going into its 8th year and with a planned surge of forces in Afghanistan, it is critical to evaluate the prevalence of PTSD among the active duty population and how the deployment intensity in OEF/OIF affect the mental health readiness of the Armed Forces. While previous studies have provided important information on PTSD in the current operations, they have several shortcomings. First, the previous studies have been descriptive

analyses except for a study analyzing UK soldiers and one focusing on the US Navy (Rona, Fear et al. 2007; Shen, Arkes et al. 2009). Second, most studies focus on just the Army and Marine Corps. Yet the rates of PTSD among those deployed in Iraq and Afghanistan could be different across services because of different types of assignments, and such differences are important to identify in evaluating total force readiness. Third, most studies used convenience samples on those returning from OEF/OIF, without a comparable control group of personnel who were not deployed under OEF/OIF. Thus, while these studies indicate the frequency of PTSD for those deployed under OEF/OIF, they cannot speak to the effect of being deployed under OEF/OIF relative to their risk of PTSD under other military operations. Fourth, studies using surveys often had to rely on screening questions (such as PCL-DSM IV), which are typically short and simple to administer but likely miss some cases of PTSD and misdiagnose PTSD in other cases (Kimerling, Ouimette et al. 2006; Ramchand, Karney et al. 2008). Finally, previous studies focus on the effect of the deployment location (i.e, Iraq or Afghanistan) with little attention paid to the duration of deployment or the cumulative effect of multiple deployments on the PTSD occurrence. However, deployment duration and frequency are equally important deployment dimensions to consider when designing the optimal deployment strategy.

In this study, we address the shortcomings of the previous literature with a random sample based on all active duty enlisted personnel serving between 2001 and 2006. We merge data on PTSD diagnoses from the TRICARE medical records and deployment records from the Contingency Tracking System. We then examine the effects of OEF/OIF deployment intensity for enlisted personnel separately for the four services (Army, Marines, Navy, and Air Force). We analyze two dimensions of deployment intensity: location and duration. Specifically, we address the following research questions:

1. What are the rates of PTSD among all active duty enlisted personnel and how do the rates

differ by service and deployment location?

2. How do deployment location and length of deployment affect the probability of being diagnosed with PTSD?
3. Is there an interactive effect between a deployment's length and location? In particular, do longer deployments to Iraq or Afghanistan exacerbate the risk of PTSD?

Data and Methods

Methods Overview. Our sample is based on all individuals who were active duty enlisted service members of the US Armed Forces between 2001 and 2006. The outcome of interest is whether the individual was diagnosed with PTSD within the TRICARE system. We first use a descriptive analysis to compare the rate of PTSD among different branches of the Armed Services by deployment location. We then estimate two multivariate models using logistic regressions to assess the effect of deployment intensity (location, duration) under OEF/OIF on the rate of PTSD. These regression models address the policy question of how much an Iraq/Afghanistan (or other OEF/OIF) deployment increases the risk of developing PTSD relative to the risk military personnel would have had if they had not been deployed to OEF/OIF missions. We estimate our models separately for each service (Army, Air Force, Marines, and Navy). We provide more details on the model specifications below.

Data and Sample. We use a random sample of activity-duty enlisted personnel serving between 2001 and 2006 because the GWOT started in 2001 and 2006 is the year for which the latest data are available. We combine several data sources from TRICARE and the Defense Manpower Data Center (DMDC) to form the basis of our analysis. First, we identify the active duty personnel population and obtain demographic and service information (such as age, gender, race, rank) from

the Defense Enrollment Eligibility Reporting System (DEERS). Second, depending on where PTSD was diagnosed (military treatment facility or TRICARE civilian provider) and whether it was identified from inpatient or outpatient claims, we identify the date that PTSD was first diagnosed and related health information from the following sources: the Standard Inpatient Data Record, the Standard Ambulatory Data Record, and the TRICARE Encounter Data. Third, we obtain OEF/OIF deployment characteristics and military occupational specialty (MOS) codes between 2001 and 2006 from the Contingency Tracking System (CTS). The CTS Deployment Files were used to track personnel involved in contingency operations and report all personnel who have been deployed in support of the Global War on Terror (GWOT) since September 11, 2001. CTS data contain information on deployment location, start and end dates of the deployment. A person would have multiple sets of deployment records in CTS if he were deployed multiple times during the study period. The study received expedited IRB approval.

Each observation in our data represents unique enlisted personnel. Based on the TRICARE medical records and monthly DEERS records, we first identify all personnel who were diagnosed with PTSD and take their demographic and rank information from DEERS the month they were diagnosed. Next, for the remaining active duty population (those without PTSD), we randomly select a month from each individual's monthly DEERS records for their demographic and rank information. We then draw a 25 percent random sample of this population from each service (regardless of whether they used TRICARE services). At the end, our data consist of 678,227 unique enlisted personnel from all services. This represents a 25% random sample of the active population without PTSD and 100% of the PTSD population. We weight all of our comparisons and empirical models to reflect this sampling scheme so our estimated numbers are representative of all personnel from each service. For all personnel in our sample, we extract complete deployment information from CTS.

Outcome measures. The dependent variable in our analysis is whether an enlisted person was diagnosed with PTSD anytime between 2001 and 2006 (i.e., if the ICD-9 code of the principal diagnosis is 309.81)(American Psychiatric Association 2000).

Statistical Models. After an initial set of descriptive analyses for raw comparisons of PTSD rates for different types of deployments across services, we conduct regression models in order to control for relevant factors. Because our outcome is binary, we estimate logistic regression models. In the primary models, we focus on deployment characteristics of the last deployment. For example, if a person was included in the analytical sample on March 2004 and his/her most recent deployment prior to this date was July 2003, we would use deployment information from the July 2003 deployment in this set of models. Our key variables of interest in Model 1 are the deployment location and duration (details below). In Model 2, we estimate an interaction effect between deployment duration and deployment location (in particular, Iraq and Afghanistan) to test whether longer deployments as a result of OIF and OEF magnifies the effect of such a deployment on the probability of being diagnosed with PTSD.

As a sensitivity analysis on the location effect, we also estimate a model based on all past deployments' locations, since PTSD is not necessarily triggered by the last deployment and often emerges after a long delay. Specifically, if a person was included in the sample on March 2004, we identify the locations for all deployments between 2001 and March 2004. The key variable of interest in this sensitivity model is whether a person was ever deployed to a given location (details below). In all models, we control for service and demographic characteristics as explained below.

Explanatory variables. There are three categories of variables that we include in the models: deployment characteristics, service characteristics, and demographic information. Summary statistics of these measures are presented in Table 1. We describe here the different types of variables.

We classify three categories of deployment locations: not deployed under OEF or OIF (the reference group), deployed to Iraq/Afghanistan, deployed on other OEF/OIF missions (such as Kuwait, Qatar, Saudi Arabia, Turkey).¹ For the duration of the last deployment, we classify the deployment length into three categories: short if the length of the last deployment is less than 120 days (the reference group), medium if the length of last deployment is between 120 and 180 days, and long if the duration is greater than 180 days. In the sensitivity analysis, we define four mutually exclusive categories of all past deployment location indicators: ever deployed to Iraq or Afghanistan (but not other locations), ever deployed on other OEF/OIF missions, ever deployed to Iraq/Afghanistan as well as other OEF/OIF missions, and never deployed on any OEF/OIF mission (the reference group).

For service characteristics, we include rank and military occupation specialty (MOS) categories. Studies have shown that soldiers in combat divisions and those in medical service tend to have different rates of PTSD than non-combat specialties (Martin 2007; Tanielian and Jaycox 2008). We categorize military occupational specialty codes into the following categories: Combat arms (reference group), combat support, combat service support, aviation, medical, and other MOS.²

To control for demographic characteristics, we include the following demographic

¹ We do not define more detailed location categories because sample size would be too small for the finer categorization.

² The four service branches use different sets of military occupation codes. The Army and Marine Corps use a Military Occupational Specialty (MOS) code, while a system of Air Force Specialty Codes (AFSC) is used in the Air Force. The Navy uses a system of naval ratings and designators along with the Naval Enlisted Classification (NEC) system. For some service branches, some of the categories are merged due to small numbers of observations in the individual categories and some categories are missing (for example, Marines and Air Force do not have medical MOS)

information in the models: gender, race (with White as the reference group, African-American, Hispanic, Asian, and other races), marital status (single or married), and age. Lastly, we include year indicators to control for possible macro trends in PTSD rate in the general active duty population.

Results

Table 1 presents the descriptive statistics of the sample by service branches. We focus our discussion on the deployment characteristics. The majority of the active duty personnel were not deployed under OEF/OIF: the percentages range from 61.5% in Air Force to 78% in Army. However, while not shown, this rate did vary by year as increasing numbers of Army and Marine Corps personnel were deployed under OEF/OIF in later years. Not surprisingly, the service with the highest share of its enlisted members sent to Iraq/Afghanistan is the Army (11.3%), followed by the Marines (8.6%). The Navy and Air Force appear to serve a more supporting role, with 35% and 33%, respectively, of their enlisted population being sent on OEF/OIF missions other than Iraq/Afghanistan. Among those deployed, large proportions of Army and Marine Corps personnel had been deployed more than 180 days in their most recent deployment prior to being included in the sample (58% and 48%, respectively), whereas 65% of deployed Air Force personnel had a tour length under 120 days. The next set of summary statistics report the proportions of those ever deployed under OEF/OIF who were ever deployed to a given location since September 11, 2001. We categorize the past deployment location indicators into three mutually exclusive categories to allow for easier comparison (i.e., the three rows add up to 100%). With the Army, for example, 31% of soldiers ever deployed under OEF/OIF were sent to Iraq/Afghanistan (but not on other OEF/OIF missions), 45% were sent on other OEF/OIF missions, and the remaining 24% have been to Iraq/Afghanistan as well as other OEF/OIF missions. The rest of Table 1 provides summary statistics of service and demographic characteristics, which are representative of the US

Armed Forces active duty population.

Table 2 reports the proportion of the active duty population who were diagnosed with PTSD for each service. The first row presents the PTSD percentage for the entire active duty population, regardless of their deployment status, and ranges from 0.6% for Air Force to 1.4% for Army. The next set reports the PTSD rate by the last deployment location. People deployed to Iraq/Afghanistan had much higher rates of being diagnosed with PTSD compared to those not deployed under OEF or OIF (4.4% vs. 0.6% for the Army, 3.5% vs. 0.5% for the Marines, 6.5% vs. 0.5% for the Navy, and 1.3% vs. 0.6% for the Air Force; $p < 0.01$ for statistical tests of all of these differences). Army and Marine Corps personnel deployed to other OEF/OIF missions also have higher rates of PTSD compared to those not deployed under OEF/OIF (3.8% for Army, 2.3% for Marines), but the opposite is the case for the Navy and Air Force. Among those deployed under OEF/OIF, the PTSD rate increases as the tour length increases. With the Army, for example, the proportion of enlisted personnel who were later diagnosed with PTSD is 2.9% among those with a short tour length (1-120 days), and the rate increases to 3.5% in the medium length category (120-180 days) and to 4.8% for long tours (>180 days). We observe similar, but not as stark, patterns for the other three services.

The last set of statistics in Table 2 reports the PTSD rate by whether a person was ever deployed to a given location. With the Army, the proportion of people ever deployed to Iraq/Afghanistan (but not other OEF/OIF missions) who were diagnosed with PTSD is 3.5%. The number is slightly lower for those who were deployed elsewhere except for Iraq/Afghanistan (3.4%). The rate of PTSD is even higher (6.2%) for those who have been to Iraq/Afghanistan, as well as other OEF/OIF missions. We observe similar pattern for the other three branches.

The raw proportions of personnel being diagnosed with PTSD shown in Table 2 provide a good comparison across services of the prevalence of PTSD based on types of deployments. We

next report, in Table 3, the logistic regression results that compare, across services, the effect of the OEF/OIF deployment on the risk of developing PTSD relative to the risk enlisted personnel would have had in the more typical military missions around the world. We present the results in terms of odds ratios and focus only on the effect of deployment characteristics in Table 3 (the complete regression results for Model 1 are included in the Appendix). The top panel of Table 3 reports the main effect of the last deployment's location and duration. With the Army, the first row indicates that the odds of being diagnosed with PTSD is 3.96 times higher among those deployed to Iraq/Afghanistan compared to those not deployed under OEF/OIF ($p < 0.01$). Being deployed on other OEF/OIF missions also increases the odds of PTSD by the same magnitude (OR=3.97, $p < 0.01$).

The effects of being deployed to Iraq/Afghanistan and on other OEF/OIF missions are comparable for the Marines, as it increases the odds of developing PTSD by 4.57 and 3.51 times ($p < 0.01$ for both), respectively. For the Navy, being deployed to Iraq/Afghanistan also carries a very high risk of developing PTSD (OR=9.06, $p < 0.01$) compared to those not deployed under OEF/OIF. Iraq/Afghanistan missions appear to have the smallest impact for Air Force, as the odds of developing PTSD among those deployed to Iraq/Afghanistan is only 1.25 times higher than those not deployed ($p < 0.05$). For the Navy and Air Force, the risk of being deployed on other OEF/OIF missions is actually lower than for those not deployed on an OEF/OIF mission (OR=0.54 and 0.44, respectively, both $p < 0.01$).

Model 1 also shows that the tour length matters. Compared to those who have a short tour length (<120 days), Army soldiers whose last deployment was between 120-180 days are 1.18 times more likely to get PTSD ($p < 0.01$) and those whose last deployment was more than 180 days have an odds ratio of 1.62 ($p < 0.01$). Similar adverse effects of longer tours are observed for the Navy and Air Force. For the Marine Corps, the duration effect only shows up if they have been deployed

more than 180 days (OR=1.11, $p<0.10$). It is worth noting that the adverse effects of deployment location and length are present even after we control for MOS, and not surprisingly, those in combat arms specialty (the reference group) have the highest odds of developing PTSD (Appendix).

For Model 2, presented in the lower panel of Table 3, we add an interaction effect between the Iraq/Afghanistan location and the tour duration variables to test whether long tour exacerbate the effects of deployments to these two countries. For the Army, the 1.53 odds ratio on the long duration variable itself now indicates that those whose OEF/OIF deployment to locations other than Iraq/Afghanistan lasted more than 180 days are 1.53 times more likely to be diagnosed with PTSD than those whose last tour to those locations were under 120 days. The odds ratio on the Iraq/Afghanistan indicator now essentially compares the rate of PTSD between those deployed to Iraq/Afghanistan under 120 days and those not deployed to OEF/OIF missions. Even with a short tour, deployment to Iraq still results in an odds ratio of 3.70 ($p<0.01$). The same applies to the Marine Corps and Navy, but the Air Force still has a smaller effect of an Iraq/Afghanistan deployment. The key variables are the last two rows. Among soldiers whose last deployment was to Iraq/Afghanistan, those that lasted more than 180 days had a 1.15 times higher risk of developing PTSD ($p<0.10$) compared to those with a short (less than 120-day) deployment, which is in addition to the main Iraq/Afghanistan effect of 3.96). For the Army, a medium-length deployment had no additional effect on the risk of developing PTSD. We observe additive effects for the Navy (OR for the interactive terms on medium and long duration are 2.50 and 2.47, respectively, $p<0.01$), but not for Marines or Air Force.

As a sensitivity analysis, we estimate Model 3, which captures whether the individual was ever deployed to a given location. The results in Table 4 are similar to Model 1 (where we only capture the location of last deployment). The odds ratio of developing PTSD for those deployed to Iraq/Afghanistan (but not other OEF/OIF locations) compared to those never deployed under

OEF/OIF ranges from 1.85 times for the Air Force to 10.34 times for the Navy ($p < 0.01$ for all services). The highest odds belong to those who were deployed to Iraq/Afghanistan as well as other OEF/OIF locations (essentially, deployed at least twice): the odds ratio of developing PTSD ranges from 1.92 for the Air Force to 9.65 for the Navy ($p < 0.01$ for all services) compared to those never sent on an OEF/OIF missions.

In another sensitivity analysis, we address the empirical issue that the year variables could be highly correlated with the -OEF/OIF missions, thus causing multicollinearity and perhaps leading to an underestimation of the deployment effect on the risk of developing PTSD. Thus we estimated models that excluded the year dummies, and the estimated effects of an Iraq/Afghanistan deployment on the risk of developing PTSD were about 10-15 percent higher than our main models.

Comments

In this study, we link deployment information and TRICARE health records to examine the relationship between deployment intensity and PTSD. We find that the percentage of PTSD diagnoses among the active duty population varies by service, but are all below one percent among those not deployed on OEF/OIF missions. But, those deployed to Iraq/Afghanistan have a much higher probability of developing PTSD, with the percentages ranging from 1.3% for the Air Force to 6.5% for the Navy. Those deployed on other OEF/OIF missions, on the other hand, have higher PTSD rates relative to those not deployed on such missions only for the Army and Marines.

While those comparisons describe the actual rates of PTSD across the services for different types of deployments, our regression models further explore how the deployment location and duration affect the risk of developing PTSD, relative to what it would have been in other typical world-wide missions of the U.S. military. A deployment to Iraq/Afghanistan increases the odds of

developing PTSD substantially, with the largest effect observed for the Navy (OR=9.06) and the smallest effect for the Air Force (OR=1.25). The tour length also matters, as a deployment lasting longer than 180 days increases the odds of PTSD by 1.11 times to 2.84 times, depending on the service, compared to a short tour. Furthermore, for the Army and Navy, a deployment to Iraq/Afghanistan further exacerbates the adverse effect of tour length. The sizable adverse effect of deployment location persists when we considered all past deployments, not just the previous deployment.

Our overall rates of PTSD are much lower than previously reported based on surveys or on VA data (Ramchand, Karney et al. 2008). There are several important factors that contribute to the differences. First, our sample is active duty personnel who are still deemed fit to serve in the military, whereas people who show up in the VA health care system are those who had left the military because they have serious physical or mental health problems that prevent them from continuing to serve. Second, compared to PTSD rates reported in anonymous surveys, which lack clinical details in the screening questions, our PTSD rates are based on clinical diagnoses. The enlisted person may be more willing to admit to PTSD symptoms, even if they were mild, on an anonymous survey than they would to military health officials. Third, for people who have the desire to continue serving (and thus stay within the TRICARE system), the stigma of PTSD often prevents them from seeking care when needed since this information would then go on the service person's record.

It is also important to keep in mind the following limitations of this study. First, even though we were able to include military occupational specialty categories, we do not have details on the specific assignments. The lack of details on assignments might contribute to the lower odds ratios we observe among Navy and Air Force personnel who were deployed to OEF/OIF locations

that are not in Iraq or Afghanistan.³ Second, since our intention is to look at the prevalence of PTSD among the population of personnel who are still in service, we most likely miss severe cases of PTSD since those would show up in the VA system unless they were first diagnosed inside the TRICARE system.

With these caveats in mind, there are several important policy implications from our findings. While the adverse effects of Iraq/Afghanistan deployments across all services is expected, it might be surprising that such deployments cause the highest PTSD rates for the Navy. This might be due to many sailors deployed to Iraq or Afghanistan being what the military calls Individual Augmentees (IA), who are those deployed individually or in a small group to assist Army and Marines. The IAs are subject to additional stress as they are thrust into an unfamiliar environment away from their parent command. It may be important to train these personnel for not just the additional physical skills but also mental health readiness for such assignments. In addition, the adverse effect of tour length is observed across all services—and for the Air Force, longer durations are more likely to lead to PTSD than being deployed in Afghanistan/Iraq. While a recommendation of the optimal tour length for each branch is beyond the scope of this study, our findings do suggest that efforts to keep OEF/OIF deployments to reasonable lengths could help reduce PTSD rates.

Given the continuing nature of the Global War on Terror, it is unavoidable that many enlisted personnel will be subjected to multiple deployments to OEF/OIF locations. We can expect thousands of new cases of PTSD, and it is imperative to monitor these soldiers' mental health. The DoD has begun to address this issue by introducing the Post-Deployment Health Reassessment (PDHRA, DD2900) in March 2005, and mandates the completion of this re-assessment at 90-180 days after a deployment (US Department of Defense 2008). However, our data show that almost 75

³ For example, in the Navy the reference group is mostly people on routine shipboard operation (although they might also be on their shore rotation). Personal communications with the sailors reveal that the living condition on ship is usually horrendous, and a ground OIF assignment in places like Qatar or Kuwait might actually be better compared to life on ship.

percent of the PTSD population in our sample did not get diagnosed with PTSD until 200 days after their last deployment—the average lapse between the last deployment and the first diagnosis of PTSD is 291 days. Further research effort should look into the extent of the effect due to repeated deployments and explore how effective PDHRA is in identifying PTSD cases, as well as more effective monitoring methods beyond the 180 day mandated surveys.

PTSD leads to a host of long-term family and workplace problems and is often comorbid with other psychiatric and physical disorders. Our research identifies the extent of the PTSD problem within the active duty population and highlights how certain enlisted personnel, based on their deployment characteristics, are at higher risks of developing this disorder. Further research into preventive measures and effective treatments of PTSD on the active duty population, especially the higher risk groups, needs to remain a focus within the Department of Defense. In addition, while PTSD remains the focus of media attention, other mental health illness such as depression and substance abuse have higher prevalence in the active duty population, and are just as costly to the individuals, military health system, and the society. A comprehensive analysis of other mental health illness would help the evaluation of total force readiness.

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Table 1.Descriptive Statistics of Enlisted Personnel Characteristics				
	Army	Marines	Navy	Air Force
Deployment Characteristics				
Location of Last OEF/OIF Deployment				
Not deployed under OEF/OIF	77.9%	75.3%	64.3%	61.5%
Afghanistan or Iraq	11.3%	8.6%	1.0%	5.4%
Other countries under OEF/OIF	10.8%	16.0%	34.7%	33.1%
Duration of Last Deployment For Those Deployed under OEF/OIF				
Short (1-120 days)	28.0%	25.6%	31.4%	64.5%
Medium (120-180 days)	14.2%	26.0%	23.2%	24.7%
Long (more than 180 days)	57.7%	48.4%	45.4%	10.8%
Deployment History For Those Ever Deployed Under OEF/OIF				
Ever deployed to Afghanistan or Iraq only	31.4%	22.2%	2.0%	9.4%
Ever deployed to other OEF/OIF countries except Afghanistan or Iraq	45.0%	64.2%	97.0%	84.9%
Ever deployed to Afghanistan or Iraq, and other OEF/OIF countries	23.6%	13.6%	1.0%	5.7%
Service Characteristics				
Military Occupational Specialty*				
Combat Arms	28.9%	38.4%	4.9%	10.6%
Combat Support	10.9%	16.8%	10.0%	0.2%
Combat Service Support	26.7%	28.0%	5.6%	79.0%
Aviation	-	15.0%	3.4%	-
Medical	10.1%	-	3.0%	-
Other MOS	23.0%	1.3%	72.8%	9.8%
Rank				
E1-E3	33.6%	61.4%	38.2%	32.4%
E4	28.0%	17.0%	19.9%	18.7%
E5	17.4%	11.0%	20.4%	23.0%
E6	11.1%	5.6%	13.7%	14.5%
E7-E9	8.0%	4.4%	7.3%	11.5%
Demographic Characteristics				
Gender				
Male	88.7%	96.3%	87.4%	84.1%
Female	11.3%	3.7%	12.6%	15.9%
Marital Status				
Single	53.0%	69.0%	55.0%	48.2%
Married	47.0%	31.0%	45.0%	51.8%
Race				
White	63.9%	71.2%	57.2%	74.0%
Black	19.5%	10.3%	21.7%	15.3%
Hispanic	6.8%	8.2%	7.2%	3.4%
Asian	3.9%	2.8%	6.0%	2.2%
Other races	5.9%	7.6%	8.0%	5.0%
Age				
	27.7	23.4	27.0	28.5
Sample Size	332970	98695	134095	112467

Table 2. Rate of PTSD Diagnoses By Deployment Location				
	Army	Marines	Navy	Air Force
Overall	1.40%	1.06%	0.77%	0.56%
Based on Location of Last OEF/OIF Deployment				
Not deployed under OEF/OIF	0.63	0.52	0.83	0.62
Afghanistan or Iraq	4.41	3.51	6.46	1.34
Other countries under OEF/OIF	3.77	2.28	0.49	0.31
Based on Duration of Last OEF/OIF Deployment				
Short (1-120 days)	2.90	2.31	0.50	0.31
Medium (120-180 days)	3.49	2.22	0.66	0.62
Long (more than 180 days)	4.83	3.19	0.77	0.99
Based on Deployment History				
Not deployed under OEF/OIF	0.63	0.52	0.83	0.62
Ever deployed under OEF/OIF	4.10	2.71	0.66	0.46
Ever deployed to Afghanistan or Iraq only	3.48	2.76	6.32	1.27
Ever deployed to other OEF/OIF countries except Afghanistan or Iraq	3.43	2.19	0.49	0.31
Ever deployed to Afghanistan or Iraq, and other OEF/OIF countries	6.20	5.14	6.06	1.36
Sample Size	332970	98695	134095	112467

Table 3. Effect of Last Deployment's Location and Duration on the Rate of PTSD Diagnosed

	Army	Marines	Navy	Air Force
Model 1: Main Effect				
Location of Last Deployment (reference group is not deployed under OEF/OIF)				
Deployed to Afghanistan or Iraq	3.96** (0.12)	4.57** (0.32)	9.06** (1.10)	1.25* (0.11)
Deployed to other countries under OEF/OIF	3.97** (0.11)	3.51** (0.21)	0.54** (0.04)	0.36** (0.02)
Duration of Last Deployment (reference group is short, <120 days)				
Medium (120-180 days)	1.18** (0.04)	0.95 (0.06)	1.19+ (0.12)	1.72** (0.14)
Long (longer than 180 days)	1.62** (0.04)	1.11+ (0.06)	1.21* (0.11)	2.84** (0.28)
Model 2: Interactive Effect				
Location of Last Deployment (reference group is not deployed under OEF/OIF)				
Deployed to Afghanistan or Iraq	3.70** (0.17)	5.37** (0.51)	4.53** (1.38)	1.25+ (0.14)
Deployed to other countries under OEF/OIF	4.07** (0.12)	3.32** (0.22)	0.59** (0.04)	0.36** (0.02)
Duration of Last Deployment (reference group is short, <120 days)				
Medium (120-180 days)	1.21** (0.06)	0.97 (0.07)	1.07 (0.11)	1.70** (0.17)
Long (longer than 180 days)	1.53** (0.05)	1.28** (0.09)	1.07 (0.10)	2.89** (0.34)
Interaction Between Deployment Duration and Iraq/Afghanistan Location				
Medium duration X Iraq or Afghanistan	0.97 (0.08)	0.99 (0.15)	2.50* (0.96)	1.02 (0.18)
Long duration X Iraq or Afghanistan	1.15* (0.07)	0.71** (0.08)	2.47** (0.82)	0.96 (0.20)
Sample size	332970	98695	134095	112467
Note: Full regression results for Model 1 is in the Appendix. ** p<0.01, * p<0.05,+ p<0.10				

Table 4. Effect of Deployment History on the Rate of PTSD Diagnosed

	Army	Marines	Navy	Air Force
Based on all past deployments (reference group is never deployed under OEF/OIF)				
Ever deployed to Afghanistan or Iraq only	4.61** (0.12)	4.09** (0.23)	10.34** (1.20)	1.85** (0.15)
Ever deployed to other OEF/OIF countries except Afghanistan or Iraq	4.64** (0.10)	3.48** (0.16)	0.61** (0.03)	0.47** (0.03)
Ever deployed to Iraq/Afghanistan as well as other countries under OEF/OIF	8.34** (0.20)	7.10** (0.42)	9.65** (1.74)	1.92** (0.19)
Sample size	332970	98695	134095	112467
Full results are available upon request				
** p<0.01, * p<0.05,+ p<0.10				

Appendix. Effect of Deployment Location and Duration on the Rate of PTSD Diagnosed				
	Army	Marines	Navy	Air Force
Location of Last Deployment (reference group is not deployed under OEF/OIF)				
Deployed to Afghanistan or Iraq	3.96** (0.12)	4.57** (0.32)	9.06** (1.10)	1.25* (0.11)
Deployed to other countries under OEF/OIF	3.97** (0.11)	3.51** (0.21)	0.54** (0.04)	0.36** (0.02)
Duration of Last Deployment (reference group is short, <120 days)				
Medium (120-180 days)	1.18** (0.04)	0.95 (0.06)	1.19+ (0.12)	1.72** (0.14)
Long (longer than 180 days)	1.62** (0.04)	1.11+ (0.06)	1.21* (0.11)	2.84** (0.28)
Military Occupational Specialty (reference group is Combat Arms)				
Combat Support	0.29** (0.01)	0.35** (0.02)	0.02** (0.00)	
Combat Service Support	0.33** (0.01)	0.37** (0.02)	0.03** (0.00)	0.09** (0.00)
Aviation	-	0.22** (0.02)	0.02** (0.00)	-
Medical	0.31** (0.01)	-	0.16** (0.01)	-
Other MOS	0.34** (0.01)	0.47** (0.07)	0.03** (0.00)	0.11** (0.01)
Rank (reference group is E1-E3)				
E4	1.22** (0.03)	0.93 (0.04)	0.72** (0.04)	1.07 (0.06)
E5	1.00 (0.03)	0.88* (0.05)	0.41** (0.03)	1.00 (0.07)
E6	0.73** (0.03)	0.46** (0.04)	0.23** (0.02)	0.68** (0.06)
E7-E9	0.57** (0.02)	0.26** (0.03)	0.16** (0.02)	0.70** (0.08)
Demographics				
race (reference group is White)				
African-American	0.88** (0.02)	0.95 (0.06)	0.73** (0.04)	0.92 (0.05)
Hispanic	0.81** (0.03)	0.84** (0.05)	1.06 (0.07)	1.16 (0.11)
Asian	0.57** (0.03)	0.75* (0.09)	0.69** (0.06)	0.64** (0.10)
Other races	0.98 (0.03)	0.97 (0.06)	1.18* (0.07)	1.13 (0.09)
Gender (reference group is male)				
Female	2.96** (0.08)	6.34** (0.41)	4.90** (0.19)	5.20** (0.20)
Marital status (reference group is married)				
Single	0.64** (0.01)	0.56** (0.02)	0.75** (0.03)	0.76** (0.03)
Age	1.04** (0.00)	1.07** (0.01)	1.06** (0.00)	1.03** (0.00)
Sample size	332970	98695	134095	112467
Note: Year dummies are included.				
** p<0.01, * p<0.05,+ p<0.10				