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Pre-deployment Year Mental Health Diagnoses and Treatment in Deployed Army Women

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Abstract

We estimated the prevalence of select mental health diagnoses (MHDX) and mental health treatment (MHT), and identified characteristics associated with MHT during the pre-deployment year (365 days before deployment) in active duty Army women (N = 14,633) who returned from Iraq or Afghanistan deployments in FY2010. Pre-deployment year prevalence estimates were: 26.2 % for any select MHDX and 18.1 % for any MHT. Army women who had physical injuries since FY2002 or any behavioral health treatment between FY2002 and the pre-deployment year had increased odds of pre-deployment year MHT. During the pre-deployment year, a substantial percentage of Army women had MHDX and at least one MHT encounter or stay. Future research should determine if pre-deployment MHDX among Army women reflect vulnerability to future MHDX, or if pre-deployment MHT results in protection from chronic symptoms.

Keywords

Army; Mental health treatment; Mental health diagnosis; Military deployment; Gelberg–Andersen behavioral model for vulnerable populations; Combat; Women veterans

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Compliance with Ethical Standards

Conflict of Interest Dr. Wooten is a lieutenant colonel in the U. S. Army Reserves with over 27 years of military service, but did not conduct this study as a part of her official military duties. Dr. Larson and Ms. Funk have several DoD contracts, but did not conduct this study as part of those contracts. Authors report no conflicts of interest.

Introduction

Women comprise 14.5 % of the United States Armed Forces and approximately 10 % of service members deployed in support of Operations Enduring Freedom, Iraqi Freedom, and New Dawn (OEF/OIF/OND; Armed Forces Health Surveillance Center 2011c; Murdoch et al. 2006). Between October 2001 and December 2010, over 154,500 women deployed to Iraq or Afghanistan at least once, 31 % of those at least twice, and 7.3 % at least three times (Armed Forces Health Surveillance Center 2012). Recent changes in women's military and deployment roles has raised concerns among military leadership and policy-makers about their increased risk of combat exposure, being prisoners of war, sexual assaults during captivity, severe physical injury, and gender discrimination (Kamarck 2015; Schaefer et al. 2015), which may increase mental health diagnoses (MHDX) and need for mental health treatment (MHT) among military women.

Given stressful, male-dominated military environments, military women have unique military and deployment experiences that may affect their risk for MHDX and need for MHT (Street et al. 2009). Military and civilian research show that women have higher rates of MHDX and MHT than men, which is associated with gender differences in interpersonal stressors, such as sexual harassment, sexual assault, intimate partner violence, gender-based discrimination, childhood sexual abuse, and low social support from military leadership and peers (Foynes et al. 2013; Haskell et al. 2010; Maguen et al. 2011; Maguen et al. 2010; Stoltenborgh et al. 2011; Street et al. 2013; Tjaden and Thoennes 2000; Vogt et al. 2005). Regardless of deployment status, military women have higher incidence of select MHDX (i.e., adjustment, post-traumatic stress disorder [PTSD], depression, anxiety) than military men (Armed Forces Health Surveillance Center 2010; Wells et al. 2010), which may increase their MHT needs.

Pre-deployment MHDX may indicate which military members are more susceptible to mental health problems associated with their deployment experiences, especially post-traumatic stress symptoms (Kline et al. 2013; Polusny et al. 2014). Deployed men and women with pre-deployment MHDX, may have a higher propensity for post-deployment MHDX due to differences in military experiences, such as military sexual trauma (MST), prior deployments, physical injuries, and multiple combat exposures (Castro and McGurk 2007; Seelig et al. 2012). Among recently deployed women, pre-deployment PTSD and mood disorders were associated with recurrence of these MHDX during post-deployment (Armed Forces Health Surveillance Center 2012).

Pre-deployment MHDX are significant contributors to psychiatric morbidity during deployment and post-deployment. G. Larson et al. (2011) found that 29 % of active duty military personnel receiving in-theater MHT had pre-existing MHDX. Among predominantly male Iraq veterans, the most common in-theater MHDX included anxiety, mood and adjustment disorders, with over 50 % being a recurrence of their pre-deployment MHDX (Larson et al. 2011). Recent evidence further suggest that pre-deployment MHDX have significant implications for post-deployment psychiatric morbidity. In a FY2010 cohort of predominantly male Army personnel ($n = 152,447$), 17.9 % ($n = 27,324$) had behavioral health diagnoses in the pre-deployment year, and they had 2.06 times the odds of receiving a

behavioral health referral within 90 days of return from deployment than those without pre-deployment diagnoses (M. Larson et al. 2012). Although evidence among military women is limited, diagnosis of PTSD or a mood disorder before deployment was the strongest predictor of a recurrence of the MHDX during post-deployment (Armed Forces Health Surveillance Center 2012) and military women's rates of mental health problems appear to be higher than military men (Armed Forces Health Surveillance Center 2010; Wells et al. 2010). Yet, relatively little is known about either in deployed women.

In a cohort of active duty Army women who returned from Iraq and Afghanistan deployments in FY2010, this study aims to: (1) estimate the prevalence of select MHDX and inpatient and outpatient MHT in the pre-deployment year, (2) determine sociodemographic, military, and deployment characteristics associated with receiving MHT in the pre-deployment year, and (3) among users of pre-deployment year MHT, identify characteristics associated with the number of outpatient MHT encounters. We hypothesized: (1) the majority of deployed Army women with pre-deployment MHDX would have received MHT in the pre-deployment year, and (2) Army women receiving pre-deployment MHT would differ significantly on military-related variables related to potential vulnerability.

The Gelberg–Andersen behavioral model for vulnerable populations (Andersen 1995, 2008; Gelberg et al. 2000) has utility in the examination of pre-deployment MHDX and MHT among recently deployed Army women. This model extends the Andersen model (Andersen 1995), which posits that predisposing, enabling, and need characteristics determine health behaviors and service utilization. Specifically, the Gelberg–Andersen model conceptualizes vulnerability factors within the predisposing, enabling, and need domains. In this study, predisposing, enabling, and need for MHT were conceptualized as vulnerability factors that may increase military women's need for MHT. Based on prior research, we hypothesized that military-related factors such as enlisted rank, prior deployments, short dwell time, and physical injury during post-September 11th military service (i.e., since FY2002) may increase vulnerability for MHDX and need for MHT (Armed Forces Health Surveillance Center 2011a).

Methods

This retrospective study received human subjects approval from Brandeis University, Boston University, and the Department of Defense (DoD) Human Research Protection Office. Data were obtained from the Defense Health Agency via a data sharing agreement to ensure compliance with DoD privacy and security regulations, and the Health Insurance Portability and Accountability Act.

Study Cohort

This study used a preliminary cohort from a larger study, the Substance Use and Psychological Injury Combat (SUPIC) study, a longitudinal study funded by the National Institute on Drug Abuse (Larson et al. 2013). Study analyses were cross-sectional and the cohort included all active duty Army women ($N = 14,633$) who returned from Iraq or Afghanistan deployments in FY2010 (October 1, 2009–September 30, 2010) out of the 152,447 active duty Army service members who returned from deployments in FY2010. The

women were identified from demographic data in the Defense Enrollment Eligibility Reporting System (DEERS) and FY2010 deployment end dates from deployment files in the Contingency Tracking System (CTS). For each Army woman, we selected an “index deployment” defined as the deployment ending in FY2010; the first one was selected if there was more than one ending in FY2010. The deployment begin and end dates varied for each cohort member, but the mean number of months deployed during the index deployment was 10.2 months. A detailed description of the Army cohort with deployments ending in FY2010 is described in Wooten et al. (2013).

Data Sources

MHDX and MHT data were obtained from a DoD Military Health System (MHS) file containing person-level data and all claims/encounters comprising a mental health research file from the DoD Military Health System Data Repository (MDR), which contains all health care utilization paid for by the MHS (i.e., direct and purchased care). Demographic and military characteristics were obtained from DEERS and deployment files from the CTS. Person-level records were analyzed for this study. Detailed information about the MDR is described in *A Guide for DoD Researchers on Using MHS Data* (Office of the Secretary of Defense for Health Affairs 2012).

Time Periods

Two observation periods, the “pre-deployment year” and “post-September 11th military service”, were constructed relative to the start date of the deployment ending in FY2010 for each cohort member. The “pre-deployment year” was defined as the 365 days prior to the index deployment start date. In this study, “post-September 11th military service” was defined as the military service period starting with FY2002 (i.e., October 1, 2001) and ending the day before the beginning of the “pre-deployment year”. The post-September 11th military service period was conceptualized as a period during which an Army woman may acquire characteristics or engage in behaviors predisposing them to use or need MHT. Physical injuries and behavioral health treatment were measured during “post-September 11th military service” period.

Dependent Variables

The primary dependent variable was receipt of any MHT in the pre-deployment year. To qualify as MHT, the principal MHDX on the inpatient record or outpatient claim/encounter had to meet the definition of the Major Diagnostic Category (MDC) 19 (mental diseases and disorders). We required either one inpatient record or two outpatient claims/encounters with MHT. We further examined the number of outpatient MHT encounters in the pre-deployment year.

Independent Variables

Informed by the Gelberg–Anderson behavioral model for vulnerable populations (Gelberg et al. 2000), predisposing, enabling, need, and vulnerability factors were identified and defined. Unless stated otherwise, all variables were measured at the start of the index deployment.

Predisposing—Some sociodemographics were potential indicators of a predisposition to use MHT. They included: age (in years), marital status (married, divorced/widowed, single), race/ ethnicity (white, black, Asian, other), number of child military dependents (i.e., sponsored by the service member for benefits), and single parent status (defined as single/ divorced/widowed marital status and one or more child military dependents). Any behavioral health treatment during post-September 11th military service, defined as any inpatient or outpatient claim/encounter assigned MDC 19 or MDC 20 (alcohol/other drug use or alcohol/ drug induced mental disorders) since FY2002, was also a predisposing characteristic.

Enabling—Other sociodemographics were potential facilitators or barriers to MHT. Military rank (enlisted, commissioned officer, warrant officer) was considered an *enabling* characteristic, as enlisted members may be ordered to seek treatment by their commander, and alternatively, officers may be in leadership roles and less likely to be ordered to seek treatment. Length of military service, measured as the number of months between first eligibility date for TRICARE or MHS benefits and the end of the pre-deployment year, was also an enabling variable.

Need—Any select MHDX in the pre-deployment year was an indicator of need for MHT. Select MHDX were defined by examining all diagnoses on all claims and encounters in the pre-deployment year, regardless of position. To qualify as a MHDX, a diagnosis had to occur on one inpatient or two outpatient claims and meet Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS) definitions for mood, adjustment, or anxiety disorders (excluding PTSD) or the Ill, Injured, and Wounded (IIW; Funk 2012) definition of PTSD. Based on previous research (Armed Forces Health Surveillance Center 2012), low frequency MHDX or those not specifically associated with military deployments, such as bipolar disorder and schizophrenia were not included in the MHDX definition. Any physical injury during post-September 11th military service (i.e., since FY2002) using IIW definitions (i.e., lower body amputations, burns, fractures, concussion, spinal cord injury, shrapnel, or blindness; Funk 2012) was measured as need.

Vulnerability—Military-specific measures of potential vulnerability included any deployment prior to the index deployment (*yes/no*) and short dwell time (i.e., <365 between deployments; *yes/no*).

Statistical Analyses

Prevalence of Pre-deployment Mental Health Diagnosis and Treatment

We calculated the prevalence of MHDX and MHT in the pre-deployment year. For a small percentage of the sample (6 %), the pre-deployment year was shorter than one year because the index deployment began fewer than 365 days after the deployment immediately preceding it. We were unable to correct for this because the index deployment start date was unavailable. The distributions of the independent variables were compared by any MHT using the χ^2 test for independence (categorical variables) or the Wilcoxon rank-sum test (continuous variables).

Factors Associated with Pre-deployment Mental Health Treatment

Multivariate logistic regression was used to determine associations between sociodemographics, military and prior deployment characteristics, physical injury and behavioral health treatment during post-September 11th military service, and the dependent variable, any MHT in the pre-deployment year. Results were reported as adjusted odds ratios (AORs) and 95 % confidence intervals (CIs). To identify characteristics associated with the number of outpatient MHT encounters among users of MHT, we restricted the sample to Army women with at least one outpatient MHT encounter in the pre-deployment year. Due to the truncation of the number of encounters at 0, data were modeled using zero-truncated negative binomial regression. Results were reported as adjusted rate ratios (RR) and 95 % CIs or the percent change in the expected number of MHT encounters for each one unit difference in the independent variable (percent change was calculated as $RR-1$ and expressed as a percent; e.g., RR of 1.27 = 27 % increase). All statistical analyses were performed using SAS/STAT software[®] 9.2 (SAS Institute Incorporated 2008) except for the truncated negative binomial model which was performed using Stata 14.0 (StataCorp. 2015).

Results

The study population of Army women returning from deployments in FY2010 ($N = 14,633$) was previously described in Wooten et al. (2013). The average age was 27.7 years, with the largest age group consisting of 18–24 year old Army women (42.5 %). Most women were white (39.2 %), with a slightly smaller representation of black women (35.7 %). Almost half were married (46.9 %), 40 % were single, and 15.3 % were single parents. The majority of the Army women were enlisted (81.5 %) compared to officer rank. Approximately half of the women (49.7 %) had a deployment prior to the index deployment, and overall 12.5 % reported a short dwell time (defined as <365 days between deployments). Almost 5 % had a diagnosis of a physical injury during post-September 11th military service (i.e., since FY2002).

Prevalence of Pre-deployment Mental Health Diagnosis and Treatment

Table 1 shows the prevalence of select MHDX and MHT in the pre-deployment year. Over a quarter (26.2 %, $n = 3835$) of the Army women had select MHDX in the pre-deployment year, the most common being mood disorders (20.2 %) and the least common PTSD (1.9 %). The majority of those with MHDX had only one diagnosis (68.8 %), while 20.9 % had two diagnoses and the remaining 10.3 % had three or more diagnoses in the pre-deployment year. Just over 18 % received MHT in the pre-deployment year, with the majority being outpatient treatment; 2.9 % of those who had any MHT had inpatient treatment. Of those receiving MHT in the pre-deployment year ($n = 2647$), 66.3 % ($n = 1755$) had two or more MHT encounters. Before the pre-deployment year, 27.8 % ($n = 4069$) of the military women had at least one inpatient or outpatient encounter for mental health or substance abuse treatment. The number of outpatient MHT encounters in the pre-deployment year among those with any MHT ranged from 1 to 58 encounters, with an average of 5 encounters ($SD = 6.4$) and a median of 3 encounters.

Sociodemographic Characteristics by Mental Health Treatment

Table 2 shows study population characteristics grouped by Army women who received MHT in the pre-deployment year compared to those who did not. Women who received MHT in the pre-deployment year were more likely to be younger, White (42.7 vs. 38.4 %), and enlisted rank (89.6 vs. 10.4 % officers/warrant officers). Women with behavioral health treatment (including mental health and alcohol/drug disorders) during post-September 11th military service were much more likely to have MHT in the pre-deployment year compared to those without behavioral treatment (51.3 vs. 22.6 %) during post-September 11th military service. Army women with a physical injury during post-September 11th military service (i.e., since FY2002) were also more likely to receive MHT in the pre-deployment year than those without a previous physical injury (6.9 vs. 4.2 %). Women with any select MHDX in the pre-deployment year were more likely to receive MHT compared to those without select MHDX (83.2 vs. 13.6 %).

Factors Associated with Pre-deployment Mental Health Treatment

Table 3 presents adjusted associations of sociodemographic, deployment, and behavioral health treatment during post-September 11th military service with MHT in the pre-deployment year. Model 1 displays the factors associated with any MHT in the pre-deployment year. Black women had reduced odds of receiving MHT in the pre-deployment year compared to white women (AOR 0.76, 95 % CI 0.68–0.84), and results were similar for those from an ‘other’ racial/ethnic group compared to Whites (AOR 0.74, 95 % CI 0.62–0.88). Officers and warrant officers had reduced odds of receiving MHT in the pre-deployment year compared to enlisted women (AOR 0.49, 95 % CI 0.43–0.57). Those with a physical injury since FY2002 had increased odds of receiving MHT compared to those without an injury (AOR 1.58, 95 % CI 1.32–1.90). Women with any behavioral health treatment during post-September 11th military service had the strongest odds of receiving MHT in the pre-deployment year, compared to those without any behavioral health treatment during post-September 11th military service (AOR 3.78, 95 % CI 3.45–4.15).

Model 2 (see Table 3) reports characteristics associated with the number of outpatient MHT encounters among Army women with any MHT in the pre-deployment year ($n = 2647$). The model revealed two characteristics that were significantly associated with the number of outpatient MHT encounters. Officers/warrant officers had 35 % fewer expected number of MHT encounters, compared to enlisted women (RR 0.65, 95 % CI 0.50–0.84). Army women with any behavioral health treatment during their post-September 11th military service had 61 % higher expected number of MHT encounters compared to those without prior behavioral health treatment (RR 1.61, 95 % CI 1.38–1.88).

Discussion and Conclusions

This study examined select pre-deployment MHDX and MHT among Army women deployed to OEF/OIF/OND and found that a substantial proportion (26.2 %; $n = 3835$) had diagnoses of PTSD, mood, adjustment, or other anxiety disorders in the 365 days before the start of their military deployments ending in FY2010. An overwhelming majority (83.2 %) of Army women with pre-deployment MHDX received pre-deployment MHT, and those

who had received any behavioral health treatment during their post-September 11th military service had 61 % more pre-deployment outpatient mental health encounters than those without any prior behavioral health treatment. Our findings emphasize the importance of determining if Army women with MHDX and/or receiving MHT before deployment need behavioral health care in-theater.

The prevalence (26.2 %) of select MHDX among active duty Army women in this study is nearly identical to the pre-deployment prevalence (26.9 %) of self-reported post-traumatic stress symptoms among Army National Guard women prior to deployment to Iraq in 2008 (Kline et al. 2013). This study found a PTSD prevalence of 1.9 % among Army women, perhaps as a consequence of overlapping symptoms between PTSD and mood or other disorders (Biehn et al. 2013; Contractor et al. 2014). The pre-deployment PTSD prevalence among women during baseline assessments of the Millennium Cohort Study was 3.2 % (Riddle et al. 2007). However, factor analysis found that the survey used in the Millennium Cohort Study does not have distinct PTSD or mood disorder constructs (Kelton et al. 2010), again suggesting considerable overlap or concurrence of MHDX with symptoms characteristic of mood, anxiety, adjustment, and PTSD. Overall, the current study had higher MHDX rates compared to the Millennium Cohort Study, which found a 15 % prevalence of self-reported and provider-assessed MHDX among Army women diagnosed with mood disorders, stress, or serious, persistent MHDX (Seelig et al. 2012). This discrepancy may be a result of sample bias (e.g., self-reported vs. medical claims data) and how MHDX was operationalized. Military women in the Millennium Cohort were volunteers for survey research whereas this Army cohort included all active duty women who returned from OEF/OIF/OND deployments in FY2010 and MHDX were based on claims data. Pre-deployment MHDX prevalence found among Army women in this study are closer to the prevalence rates of probable PTSD (21.0 %), depression (38.3 %), and anxiety (24.1 %) among women who separated from active duty after OEF/OIF/OND deployments (Street et al. 2013), albeit, direct comparisons between claims data and self-reported symptoms are tenuous at best.

The MHT prevalence (18.1 %) among Army women in this study was similar to the prevalence (17.1 %) U. S. civilian women reported on the 2009 National Survey on Drug Use and Health (NSDUH; Substance Abuse and Mental Health Services Administration 2010). Prevalence of mood disorders (20.2 %) among Army women in this study are more than double that found among U. S. civilian women age 18–39 years among whom moderate to severe symptoms of depression are estimated to be 9.3 %. (Pratt and Brody 2014). Combined rates of pre-deployment symptoms related to anxiety, adjustment, or PTSD, appear to be roughly similar to the proportion of U. S. adult women who reported feelings of “nervousness, restlessness, or serious psychological distress” all or most of the time in the month prior to responding to the 2012 National Health Interview Survey (Blackwell et al. 2014). Caution should be used comparing prevalence of MHDX and MHT between active duty military and civilian populations. The military population is screened annually for mental health problems, has access to free MHT, and has disparate stressors, not the least of which are deployment stressors and combat exposures.

Methodological differences and criteria by which providers diagnose MHDX could account for different prevalence estimates. This study provide objective, more conservative MHDX and MHT rates based on DoD MDR medical claims, whereas most prior studies used prospective or retrospective self-report measures. Because Army women may under-report psychological symptoms, estimating MHDX and MHT prevalence using DoD medical claims/encounters yields a conservative estimate of mental health problems in Army women. Thus, prevalence estimates from this study may underestimate pre-deployment mental health problems among Army women because: (1) psychological symptoms can result in functional impairment but not result in MHDX; (2) perceptions about public and self-stigma, mental illness, and MHT; (3) potential repercussions from commanding officers and military comrades, and (4) reluctance to seek MHT in the DoD MHS (Stecker et al. 2013; Zinzow et al. 2012).

Multiple military, deployment, and psychosocial factors (e.g., perceived stigma) could account for low pre-deployment MHT rates compared to MHDX rates. Army service members usually receive prior notice of deployments, and, during the 365 days prior to deployment, may be engaged in mandatory military training and briefings, and personal, family, and financial preparation for deployment. Army women, especially those who are single or single parents, may be overwhelmed with pre-deployment training and personal responsibilities, and neglect their MHT needs. New onset of pre-deployment MHDX may result from the high operations tempo of deployment preparation and may not be readily apparent during the pre-deployment health assessment or to Army women themselves. Consequently, pre-deployment stressors have the potential to exacerbate current mental health problems, or military and personal stressors for which they may or may not be receiving MHT. On average, over one-third of Army personnel perceived that they would be stigmatized if they sought help for mental health problems, and 20 % perceived help-seeking would have a negative impact on their military career (U. S. Department of Defense 2013a). Thus, fear of stigmatization may partially account for low pre-deployment MHT rates among Army women. Furthermore, Army women who are receiving pre-deployment MHT may prematurely terminate MHT to meet the demands of pre-deployment training and planning, which may also account for our finding that more Army women had MHDX in the pre-deployment year than received MHT (26.2 vs. 18.1 %, respectively). Hence, Army women who develop clinically significant or chronic symptoms during the pre-deployment year may not recognize their MHT needs, under-report their symptoms in pre-deployment health assessments, or defer help-seeking as a result of perceived stigma or their commitment to unit readiness and the deployment mission. Additional research is needed to determine factors associated with whether Army women receiving pre-deployment MHT continue or prematurely terminate MHT in order to deploy.

Consistent with the Gelberg–Andersen Behavioral Model for Vulnerable Populations (Gelberg et al. 2000), this study found that, among active duty Army women, any behavioral health treatment during their post-September 11th military service was a predisposing factor for pre-deployment MHT (i.e., 61 % higher than expected encounters), being an officer was a barrier to receiving pre-deployment MHT (i.e., 35 % fewer than expected encounters), and any physical injury during their post-September 11th military service increased need for pre-deployment MHT. Surprisingly, prior deployments and dwell time were not associated with

vulnerability for pre-deployment MHT among Army women. Previous research with predominantly military men has shown that pre-deployment problems (i.e., insomnia, functional impairment, PTSD symptoms) are associated with subsequent deployment and post-deployment MHDX and MHT (Gehrman et al. 2013; MacDonald et al. 2013; Wright et al. 2011), suggesting that pre-deployment MHDX and MHT may increase vulnerability for subsequent psychological problems and need for MHT. In this cohort of Army women, it is unknown if receiving pre-deployment MHT is protective or poses a vulnerability to in-theater or post-deployment MHDX and MHT. Multiple factors, such as combat exposure and MST, could influence deployment and post-deployment resilience and vulnerability. Wooten (2012) found that deployed Army National Guard women reporting high levels of pre-deployment stress and low levels of post-deployment stress were more likely to be resilient. Additional research is needed to determine the association between pre-deployment MHDX and MHT, deployment and post-deployment problems, and resilience among women in active duty, National Guard and Reserve (NG/R) components of the military—especially NG/R members who reportedly have higher prevalence of mental health problems compared to active duty members (Milliken et al. 2007).

Identifying pre-deployment MHDX and MHT among Army women could result in more informed decision-making about pre-deployment mental health status, deployment readiness, and strategies to improve military health surveillance (e.g., pre-deployment screening). Currently, it is unknown if Army women with pre-deployment MHDX and/or receiving MHT are identified for continuity of care in-theater or have higher rates of in-theater MHT. Current study findings suggest the need for strategies to identify Army women with pre-deployment MHDX and/or MHT during pre-deployment health assessments for continuity of care in-theater to promote deployment resilience. Although Army women with pre-deployment MHDX and receiving MHT may be deployable, ensuring continuity of care from pre-deployment to the deployment phase may be a public health approach to preventing the onset of new symptoms and subsequent MHDX during deployment and post-deployment. One strategy is to confidentially refer Army women with pre-deployment MHDX and MHT for an initial in-theater assessment to ensure adjustment to the deployment environment does not result in an exacerbation of pre-deployment symptoms. An unintended consequence of these referrals is that women may be stigmatized and less likely to seek or continue MHT. However, prior research found that mental health problems are the primary reason military women were evacuated from Iraq and Afghanistan (Armed Forces Health Surveillance Center 2011b), which suggest the need for strategies for early identification of mental health problems in-theater. Considering that a significant proportion of deployed service members receiving in-theater MHT and/or medically evacuated return to full duty (Cohen et al. 2010; Larson et al. 2011), ensuring continuity of care from pre-deployment to deployment can potentially reduce in-theater military occupational impairment and medical evacuations associated with pre-existing conditions. Given current in-theater systems of care, continuity of care for pre-deployment MHDX could be managed with minimal impact on the deployment mission and have a positive impact on deployment readiness. Moreover, proactive strategies regarding continuity of care from pre-deployment to deployment is consistent with the DoD's focus on health promotion, prevention of chronic conditions, and

destigmatizing help-seeking behaviors; which has the potential of preventing premature termination of MHT, enhancing deployment readiness, and sustaining warfighting capability.

Current findings could also inform commanders' decisions about deploying military personnel with pre-existing conditions. The U. S. Army's Deployment Health Assessment Program (DHAP; U. S. Department of Defense 1997; U. S. Department of Defense 2011) is a commander's program administered at the unit level that identifies physical and behavioral health problems by conducting pre-deployment and post-deployment health assessments, and providing referrals as needed. Although pre-deployment mental health screening has been associated with decreased occupational impairment and medical evacuation for mental health problems during deployment (Warner et al. 2011), self-reporting of MHDX and MHT on the pre-deployment assessment has low validity for identifying military members with pre-existing MHDX and MHT (Nevin 2009). We focused exclusively on pre-deployment MHDX and MHT patterns of deployed Army women to better understand pre-deployment risk and protective factors associated with need for pre-deployment MHT. Army commanders make the final decision to deploy Soldiers with medical conditions (U. S. Department of the Army 2011), and advising commanders about the mental health problems among women that may require MHT will assist them in making informed decisions that promote deployment resilience and military readiness among military women before and during deployment. Recent evidence further suggest that DoD prevention initiatives that address pre-existing MHDX could potentially mitigate suicide risk (LeardMann et al. 2013). Our findings will also assist behavioral health providers in understanding pre-deployment characteristics that suggest a need for pre-deployment MHT and follow up care in-theater.

Study strengths included use of a large sample of Army women who recently returned from deployment and use of DoD MDR data based on provider-assigned clinical diagnostic codes from electronic medical records rather than self-report data. Because clinical protocols differ among military services and the health care available to active versus reserve components differ substantially, the findings of this study do not generalize to other military services (i.e., Air Force, Navy, Marines) or Army NG/R. While the primary focus was receipt of MHT, we lacked person-summary records on ambulatory treatment (e.g., psychological counseling, group therapy, primary care advice) and psychotropic medications, which may have resulted in an underestimation of treatment utilization. Multivariate model coefficients reflect the combined effect of having MHDX and MHT, and MHDX was not a predictor of treatment because in these claims data they were not independent—receipt of MHT required an assigned MHDX. We modeled pre-deployment characteristics with time-invariant measures although age and/or marital status may have changed for some Army women during observation periods; this may have resulted in measurement error albeit minimal.

Additional study limitations included the use of administrative claims data, which likely underestimates the prevalence of MHDX among Army women because claims data typically only capture information associated with the reason for a medical encounter (Klabunde et al. 2002; Schneeweiss and Avorn 2005). Further, MHDX required the presence of MHDX on two separate claims, which was used to avoid including MHDX that were tentative and later ruled out upon further assessment (Schneeweiss and Avorn 2005). Counterbalancing the requirement of two claims, we examined MHDX in all positions not the principle diagnosis

on a claim. While the prevalence of MHDX may be an underestimate, we used methods comparable to other claims-based studies. Another limitation is that Army women in this study could have been receiving MHT during the 365 days prior to the start date of the pre-deployment year and continued MHT into the pre-deployment year.

Given that receiving pre-deployment MHDX and MHT could be a vulnerability or protective and resilience-enhancing, our study findings suggest competing hypotheses for future research—vulnerability and resilience hypotheses. Vulnerability hypotheses purport that military women with pre-deployment MHDX are more susceptible to deployment and post-deployment problems than women without pre-deployment MHDX, and may not seek treatment due to stigma or fear of negative consequences associated with their military career or deployment status (i.e., being deployable versus non-deployable). Pre-deployment MHDX and/or MHT may also be a vulnerability if symptoms recur or are exacerbated during deployment. Resilience hypotheses suggest that Army women who had pre-deployment MHDXs and successfully completed MHT may have increased coping self-efficacy, resilience to stress, and deployment resilience and decreased posttraumatic stress reactions. Future research should examine MHDX and MHT from pre-deployment to post-deployment among active duty and NG/R women to test these competing hypotheses.

In this study, we found that a substantial proportion of active duty Army women returning from OEF/OIF/OND deployments in FY2010 had MHDX and MHT documented in their military health records in the year prior to deployment. Recent evidence from military health records found that 76 % more active duty service members received an initial MHDX in 2012 than in 2000 (i.e., before OEF/OIF/OND) and had 88 % more MHT visits during the same period (Armed Forces Health Surveillance Center 2014), suggesting an upward trend in MHDX and MHT among active duty personnel over the course of the Iraq and Afghanistan wars. Although the Army has expanded the DHAP to reduce non-deployability and promote the early identification and referral of service members for behavior health problems before and after deployment (U. S. Department of Defense 2013b), our findings suggest gender-specific pre-deployment assessment protocols may promote the identification and referral of Army women with pre-existing MHDX for in-theater continuity of care to promote resilience throughout the deployment cycle. Improved understanding of risk and resilience factors among Army women will be valuable to DoD's efforts to improve the health of our diverse armed forces and facilitate the more effective alignment of accession, retention, and deployment policies.

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Table 1

Prevalence of pre-deployment year mental health diagnosis and mental health treatment in active duty Army women returning from deployment in FY2010 (N = 14,633), unadjusted

Mental health diagnosis and treatment	Pre-deployment year <i>n</i> (%)
Any select mental health diagnosis ^a	3835 (26.2)
Mood disorders	2950 (20.2)
Adjustment disorders	1392 (9.5)
Anxiety disorders (excluding PTSD)	849 (5.8)
PTSD	276 (1.9 %)
Any mental health treatment ^{b,c}	2647 (18.1)
Any mental health treatment, outpatient	2570 (17.5)
Any mental health treatment, inpatient	77 (0.53)

PTSD posttraumatic stress disorder

^aOne inpatient or two outpatient claims/encounters with diagnosis (any position) satisfying Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS) definitions of Mood, Adjustment, or Anxiety Disorders (not including PTSD) or meeting Ill, Injured, and Wounded (IIW) definition of PTSD

^bAny inpatient or outpatient claim/encounter assigned Major Diagnostic Category 19, mental diseases and disorders (principal position)

^cAll 2647 Army women who had any MH treatment had at least one outpatient MHT encounter

Table 2

Characteristics of active duty Army women returning from deployment in FY2010 (N = 14,633), by pre-deployment year mental health treatment

Characteristics ^a	Pre-deployment year Mental health treatment ^b		p-value
	MHT n = 2647	No MHT n = 11,986	
Age (year), mean (SD)	27.3 (7.0)	27.8 (7.3)	*
Age (group), n (%)			*
18–24	1175 (44.4)	5048 (42.1)	
25–29	698 (26.4)	2959 (24.7)	
30–39	573 (21.7)	2923 (24.4)	
40+	201 (7.6)	1056 (8.8)	
Race/ethnicity, n (%)			***
White	1129 (42.7)	4604 (38.4)	
Black	835 (31.6)	4386 (36.6)	
Asian	484 (18.3)	1938 (16.2)	
Other	199 (7.5)	1058 (8.8)	
Marital status, n (%)			*
Married	1269 (47.9)	5587 (46.6)	
Divorced/widowed	391 (14.8)	1540 (12.9)	
Single	987 (37.3)	4859 (40.5)	
Single parent status, n (%)	420 (15.9)	1814 (15.1)	
No. child dependents, mean (SD)	0.91 (1.24)	0.90 (1.26)	
Rank group, n (%)			***
Enlisted	2372 (89.6)	9552 (79.7)	
Officer	234 (8.8)	2167 (18.1)	
Warrant officer	41 (1.6)	267 (2.2)	
Months of TRICARE eligibility, median (25th, 75th percentile)	41 (21, 78)	42 (19, 93)	
Any deployments prior to deployment ending in FY2010, n (%)	1316 (49.7)	5962 (49.7)	
Cumulative months deployed up to deployment ending in FY2010, given any, mean (SD)	13.4 (7.4)	13.6 (7.6)	
Short dwell time ^c between immediately prior deployment (if any) and deployment ending in FY2010, n (%)	153 (11.6)	755 (12.7)	
Physical injury ^d , during post-September 11th military service ^e , n (%)	182 (6.9)	508 (4.2)	***
Any behavioral health treatment ^f , during post-September 11th military service ^e , n (%)	1357 (51.3)	2712 (22.6)	***
Any select mental health diagnosis ^g , pre-deployment year, n (%)	2201 (83.2)	1634 (13.6)	***
Mood disorders, pre-deployment year, n (%)	1447 (54.7)	1503 (12.5)	***
Adjustment disorders, pre-deployment year, n (%)	1300 (49.1)	92 (0.8)	***
Anxiety disorders (excluding PTSD) n (%)	750 (28.3)	99 (0.8)	***
PTSD, pre-deployment year, n (%)	251 (9.5)	25 (0.2)	***

χ^2 test of independence for categorical variables. Wilcoxon rank-sum test for continuous variables *MHT* mental health treatment, *PTSD* posttraumatic stress disorder

^a Measured at start of FY2010 deployment except for months of TRICARE eligibility which was measured from date of entry into the military until end date of pre-deployment year

^b Any inpatient or outpatient claim/encounter assigned the Major Diagnostic Category (MDC) 19, mental diseases and disorders (principal position)

^c Short dwell time = less than 365 days from end date of immediate prior deployment to begin date of FY2010 deployment. Applicable only to Army women with more than one deployment

^d Based on Ill, Injured, and Wounded definition which includes lower body amputations, burns, fractures, concussion, spinal cord injury, shrapnel, or blindness

^e Post-September 11th military service = any military service since FY2002 and ending the day before the begin date of the “pre-deployment year”, which is the 365 days prior to the begin date of the deployment ending in FY2010

^f Any inpatient or outpatient claim/encounter assigned MDC 19 or 20, alcohol/other drug use or alcohol/drug induced mental disorders (principal position)

^g One inpatient or two outpatient claims/encounters with diagnosis (any position) meeting the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS) definitions of mood, adjustment or anxiety disorders (not including PTSD) or meeting Ill, Injured, and Wounded (IIW) definition of PTSD

 $p < 0.0001$.

**
 $p < 0.001$.

*
 $p < 0.05$

Table 3

Multivariate associations between demographic, military, and prior deployment characteristics and pre-deployment year mental health treatment, active duty Army women returning from deployment in FY2010 (N = 14,633)

Demographic, military and prior deployment Characteristics ^a	Mental Health Treatment in pre-deployment year			
	Model 1		Model 2	
	Any MHT ^b (All Army women, n = 14,633)		Number of outpatient MHT encounters ^c (MHT users only, n = 2647)	
	Adjusted odds ratio	95 % CI	Adjusted rate ratio	95 % CI
Age (in years)	1.00	0.99–1.01	1.01	1.00–1.02
Race/ethnicity (ref = white)				
Asian	0.95	0.84–1.07	1.12	0.92–1.37
Black	0.76 ***	0.68–0.84	0.85	0.72–1.01
Other	0.74 **	0.62–0.88	1.13	0.85–1.51
Marital status (ref = married)				
Single	0.94	0.84–1.06	1.11	0.91–1.34
Divorced/widowed	1.07	0.90–1.27	1.11	0.84–1.46
Single parent (ref = no)	0.97	0.82–1.14	0.85	0.64–1.11
Officer/warrant officer (ref = enlisted)	0.49 ***	0.43–0.57	0.65 **	0.50–0.84
No. of child dependents	0.98	0.94–1.03	0.97	0.90–1.04
Months of TRICARE eligibility (per quartile)	0.91 *	0.87–0.97	0.95	0.86–1.03
Any deployments prior to deployment ending in FY2010 (ref = no)	1.00	0.90–1.10	1.09	0.92–1.30
Short dwell time ^d between immediately preceding deployment and deployment ending in FY2010 (ref = no/no prior deployment)	1.00	0.82–1.21	0.72	0.72–1.37
Physical injury ^e , post-September 11th military service ^f (ref = no)	1.58 ***	1.32–1.90	1.01	0.76–1.35
Any behavioral health treatment ^g , post-September 11th military service ^f (ref = no)	3.78 ***	3.45–4.15	1.61 ***	1.38–1.88

MHT mental health treatment

^a Measured at start of FY2010 deployment except for months of TRICARE eligibility which was measured from date of entry into the military until end date of pre-deployment year

^b Any outpatient or inpatient claim/encounter assigned Major Diagnostic Category (MDC) 19, mental diseases and disorders (principal position); multivariate logistic regression model

^c Number of outpatient claims/encounters assigned MDC 19; zero-truncated negative binomial regression model

^d Short dwell time = less than 365 days from end date of immediate prior deployment to begin date of FY2010 deployment. Applicable only to Army women with more than one deployment

^e Based on Ill, Injured, and Wounded definition which includes lower body amputations, burns, fractures, concussion, spinal cord injury, shrapnel, or blindness

^fPost-September 11th military service = any military service since FY2002 and ending the day before the begin date of the “pre-deployment year”, which is the 365 days prior to the begin date of the deployment ending in FY2010

^gAny inpatient or outpatient claim/encounter assigned MDC 19, mental diseases and disorders, or MDC 20, alcohol/other drug use or alcohol/drug induced mental disorders (principal position) since FY2002

 $p < 0.0001$.

**
 $p < 0.001$.

*
 $p < 0.05$