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Deployment and Psychological Correlates of Suicide-Related Ideation and Behaviors for a Sample of U.S. Airmen and Marines

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Abstract

OBJECTIVE: The three primary objectives of this dissertation study were as follows: (1) To examine the relationship among deployment, psychological related factors, and self-reported suicide ideation following military deployment; (2) To better understand the role of mediators in the relationship between suicide ideation and suicide death; and (3) To determine whether a relationship between deployment history and suicide exists. **METHOD:** A total of 581,996 Post Deployment Health Assessment (PDHA) and Post Deployment Health Reassessment (PDHRA) records of United States Air Force and Marine Corps personnel, maintained by the Armed Forces Health Surveillance Center (AFHSC), were obtained. Logistic regression models were used to determine deployment and psychological correlates of suicide ideation. Hopelessness, alcohol misuse, interpersonal conflict, and impulsivity were examined as possible mediators in the relationship between suicide ideation and suicide. Finally, a sample of 221 service members known to have died by suicide was compared to a cohort of 884 service members known to be living at the time of each suicide death using a conditional logistic regression model to better understand the relationship between deployment and suicide. **RESULTS:** The sample for the analyses pertaining to suicide ideation (N = 108,412 of matched PDHAs/PDHRAs) consisted of 77.6% Airmen and 22.4% Marines – primarily male (87.5%), less than 35 years of age (76.6%), Caucasian (71%), Active Duty (87%), and with ranks of E1-E6 (75.6%). After adjusting for sex, age, and branch of service, deployment locations to Afghanistan and Iraq, exposure to wounded, killed, or dead as well as being physically injured while on deployment were found to be significantly associated with reported suicide ideation. However, number of deployments was not associated with reported suicide ideation. Significant and elevated odds ratios were obtained for depressive symptoms, interpersonal conflict, trauma symptoms, and alcohol misuse. There

was inadequate power for the mediational analyses. The conditional logistic regression indicated a significant relationship between deployment history and suicide; however, after controlling for demographic variables, a non-significant relationship between deployment history and suicide emerged. **CONCLUSIONS:** Reported suicide ideation, among Marines and Airmen with histories of at least one deployment, appear to be associated with a number of deployment and psychological-related factors. Providers are encouraged to pay increased attention to depression and interpersonal conflict in relation to suicide ideation post-deployment. Given the low reports of suicide ideation compared with national samples, future revisions of the post-deployment health assessment forms should consider factors such as stigma and possible under-reporting of suicide ideation. Finally, deployment does not appear to be related to suicide once a number of demographic factors are taken into account. Longitudinal research is required to better understand the interaction of pre-deployment factors with experiences during and after deployment that may increase risk for suicide ideation and eventual death by suicide.

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Introduction

Suicide is a significant global and national public health problem that is preventable. In recent years, the Department of Defense (DoD) and the United States (U.S.) Department of Veterans Administration (VA) have implemented focused efforts to address the problem of suicide given the observed increase in suicides among active duty military personnel and Veterans. While the civilian epidemiology literature has provided a clear understanding of the risk and protective factors for suicide, much remains unknown about military specific factors associated with suicide. For instance, the role of deployment in relation to suicide is unclear. The operations tempo associated with Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) has increased the likelihood that military personnel will experience at least one deployment.

Military deployment is often a stressful event due to a number of reasons and either independently or in combination with other biopsychosocial stressors may contribute to suicide ideation, attempts, and deaths. The association between deployment and suicide may be related to specific deployment-related factors such as length of deployment, location of deployment, number of deployments, physical injury, illness, and traumatic events during deployment, perceived threat, problem solving and coping skills, and/or interpersonal problems initiated or exacerbated during the time of deployment. Furthermore, once a person returns from a deployment, there may be a sensitive period which includes post-deployment adjustment-related factors such as the onset or the worsening of psychiatric symptomatology, medical injuries and/or pain, changes in one's schema of self, moral injury, guilt, and/or shame, continued exacerbation of interpersonal problems, and actual or perceived lack of social support.

This dissertation directly addresses the topic of deployment related factors in relation to suicide ideation and suicide among military personnel. More specifically, service members from two branches of the military – the U.S. Air Force (USAF) and the U.S. Marine Corps (USMC) – have been selected to serve as cases for the research. The research has been conducted with the support of the USAF Suicide Prevention Program and the USMC Suicide Prevention Program which have both provided suicide data for the purposes of advancing scientific knowledge on the topic of deployment and suicide. In addition, the Armed Forces Health Surveillance Center has provided information documented on post-deployment health forms completed by returning Airmen and Marines for the purposes of identification of suicide ideation cases and analyses as outlined in this dissertation. In the sections below, a brief note on suicide nomenclature and a careful review of the empirical literature on suicide epidemiology, established risk and protective factors, military suicide, and deployment-related stressors are provided. Moreover, the significance of the research is noted followed by study aims, hypotheses, and methodology.

Suicide Nomenclature

The terminology used in this dissertation is in accord with the accepted nomenclature (as outlined by Silverman, Berman, Sanddal, O'Carroll, and Joiner, 2007) in the field of suicidology. The reader is expected to be familiar with traditional terminology including terms such as suicide, suicide ideation and suicide attempt. However, please note that more up-to-date suicide nomenclature is also used in the manuscript. *Suicide-related thoughts* or *suicide-related ideations* will be used to refer to instances where the individual may have thoughts of suicide with no suicidal intent, with an undetermined degree of suicidal intent, or with some suicidal intent. *Suicide-related behaviors* will be used to refer to self-harm with no intent to die, with an

undetermined degree of suicidal intent, suicide attempt (some degree of suicidal intent), and suicide (fatal outcome).

Public Health Significance of Suicide

Global Impact of Suicide

Rates of suicide worldwide approach one million with a mortality rate of 16 per 100,000 or 1 death by suicide every 40 seconds (reported for 2000, the World Health Organization [WHO], 2006). Suicide accounts for almost half of all violence-related deaths (Anderson & Smith, 2003) and is ranked among the top three causes of death for men and women aged 15-44 (WHO, 2006). Estimates of the worldwide prevalence of suicide are based on individual national mortality registries that report to WHO; the reliability of these registries varies greatly and may under-represent the frequency of death by suicide (WHO, 2006). Examining the prevalence of suicide-related thoughts and behaviors is even more complex because such information is not uniformly collected and if collected, is not always reliable due to inconsistent suicide nomenclature utilized. Given the ratio of 10 to 40 suicide attempts to every suicide, 9 to 36 million annual suicide attempts worldwide have been estimated (Bertolote et al., 2006; WHO, 2006).

National Impact of Suicide

In 2007, the mortality rate due to suicide was 11.5 per 100,000 in the U.S., making it the 11th leading cause of death for that year. Among Americans aged 15-24, suicide remains the third leading cause of death behind accidents and homicides (American Association of Suicide (AAS), 2008). Rates of suicide are higher among males as compared to females (18.3 and 4.8 per 100,000, respectively). Rates are higher among Caucasians than non-Caucasians (12.9 and 5.6 per 100,000, respectively), and among the elderly than the young (14.3 and 9.7 per 100,000,

respectively). Overall, elderly adults have rates of suicide almost 50% higher than other age groups within the U.S. Increased rates among males, Caucasians, and the elderly may be attributable to the use of more lethal means; the use of firearms as a mechanism for suicide has been found to increase with age (Kaplan, Adamek, & Johnson, 1994; Moscicki, 2001) and nearly 80% of all suicides by firearm are carried out by Caucasian males (Moscicki, 2001).

The National Mental Health Association estimates that 500,000 non-fatal suicide events occur in the U.S. every year (2006). In 2002, there were more than 90,000 hospitalizations and 324,000 emergency room admissions attributed to suicide-related thoughts and behaviors (CDC, 2004). Death and injuries from suicide-related behaviors are estimated at $25 billion per year in direct costs such as health care services, funeral services, autopsies, and cause-of-death investigations, as well as indirect costs such as lost productivity (CDC, 2006). Despite recently stabilized rates, suicide remains an important public health problem in the U.S., not only because of the tragic loss of life and the devastating effects on those left behind, but particularly because death by suicide is preventable.

Suicide-related behaviors in the U.S. military. From 1995 to date, suicide has consistently ranked as the 2nd or 3rd leading cause of death in the U.S. military (Jones, Kennedy, & Hourani, 2006; USACHPPM, 2006). Despite some variations by calendar year and service, suicides in the U.S. military have remained relatively stable and significantly lower than age-matched civilian rates for the last ten years (Eaton, Messer, Wilson, & Hoge, 2006; Sentell, Lacroix, Sentell, & Finstuen, 1997). As in civilian cases, it is important to note that military suicide rates may be underestimated by as much as 21% due to reporting and classification errors (Carr, Hoge, Gardner, & Potter, 2004; Eaton et al., 2006).

Risk Factors for Suicide

Definition of Risk Factor

A *risk factor* is any variable that increases the likelihood of an adverse outcome which can be measured and which precedes the outcome in time (Moscicki, 2001; Kraemer et al., 1997; Last, 1983). Risk factors are often described in terms of the chronology and significance of their influence on suicide. *Distal risk factors* are those factors which create an underlying vulnerability in an individual; they include exposure to specific or environmental pressures and may produce physical or mental health conditions. Distal factors are viewed as necessary but not sufficient for suicide. *Proximal risk factors* are chronologically closer to the suicide event; they act directly as precipitating factors. Proximal risk factors are considered both necessary and sufficient for the initiation of suicide (Moscicki, 2001). There are many established risk factors for suicide. These have been organized into the following categories described below: sociodemographic, psychopathology, behavioral/mood features, and stressful life events.

Sociodemographic

Sociodemographic variables associated with suicide include age, gender, race/ethnicity, and marital status (Durkheim, 1897; Moscicki, 1997; Moscicki, 2001). Suicide rates from 1950 to 2007 can be examined by specific gender, race/ethnicity, and age categories using the National Center for Health Statistics' WISQARS (Web-based Injury Statistics Query System, 2010). Among U.S. males, Caucasians and Hispanics maintain the overall highest suicide rates among all races, followed by Native Americans, African Americans, and Asian/Pacific Islanders (U.S. Department of Health and Human Services, 2006). Among Caucasian males, suicide rates demonstrate a steady increase with age until they peak at 26.7 per 100,000 for men aged 45-49, decline to 21.9 per 100,000 at 60-64 years of age, and then rise to 45.2 per 100,000 at 80-84

years of age. African American male suicide rates also demonstrate two peaks; one at 25-29 years of age and another in the early- to mid-70's. American Indian/Alaskan Natives demonstrate high suicide rates early in life, for instance among 15-19 year-olds (27.0 per 100,000) and among 25-29 year-olds (32.7 per 100,000).

Among U.S. females the overall suicide rate from 1999-2004 was roughly four times lower that of males (5.2 per 100,000 versus 22.7 per 100,000). Across all races, female suicide rates demonstrated a single peak, after which death by suicide became less likely with increasing age. Among white females this peak occurred between 45-59 years of age; among African American females it occurred between 40-44 years; and among American Indian/Alaskan Native females the suicide rate was highest among 15-19 year olds (National Center for Health Statistics' WISQARS, 2010).

Marital status also demonstrates a significant impact on suicide behavior. Individuals who have been divorced or widowed demonstrate much higher rates of suicide than those who are married; this is true across all age groups. Suicide rates are highest for individuals widowed in the first half of life; evidence demonstrates that young widowers are at higher risk than married individuals regardless of race/ethnicity. Widowed Caucasian and African-American males demonstrated the highest risk between 20 and 39 years of age; female widows were at greatest risk between 25 and 35 years of age (Luoma & Pearson, 1996).

Axis I Psychopathology

Mental disorders including mood and substance use have been associated with over 90% of suicides in the U.S. and Europe and are a demonstrated risk factor in suicide attempts (Moscicki, 2001). Mood disorders are the most frequent diagnoses found in psychological autopsies of suicides; this is true for both males and females across age groups. However,

diagnoses of mood disorders are more common in females who die by suicide than in males (Rich, Ricketts, Fowler, & Young, 1988). The specific Axis I disorder most frequently present at the time of suicide death is Major Depressive Disorder (MDD).

The second most frequent, and often co-occurring, mental disorder among those who die by suicide is a substance-related disorder. More specifically, alcohol related disorders significantly predict suicide (Allen, Cross, & Swanner, 2005; Arsenault-Lapierre et al., 2004; Esposito-Smythers & Spirito, 2004; Kolves et al., 2006). Approximately 20-25% of those who die by suicide are under the influence of alcohol at the time of death (Goldsmith et al., 2002). Individuals diagnosed with alcohol use disorders are at a 10 times greater risk for suicide than the general population (Conner et al., 2007). Overall, substance abuse of any kind is associated with higher levels of suicide ideation, frequent and repeated suicide attempts, and greater lethality of attempts (Crumley, 1990; Moscicki, 1991; Lewinsohn, Rodhe, & Seeley, 1996).

Polysubstance abuse has been indicated in most cases of suicides. Individuals most frequently abuse alcohol in combination with cocaine and/or marijuana (Moscicki, 1991). A 2006 report by the Substance Abuse and Mental Health Services Administration (SAMHSA) indicates that an average of 2.3 substances per suicide attempt was present in cases treated at Emergency Departments within the U.S. Among drug-related suicide attempts in individuals 18 years of age and older, 33.2% involved alcohol, 28.4% involved illicit drugs, and 36% involved pain medications. Psychotherapeutic medications were involved in 58.9% of drug-related suicide attempts (SAMHSA, 2006).

As the number of diagnosed mental and/or medical disorders (i.e., comorbidity) increases, so does the risk for suicide-related thoughts and behaviors. Comorbid mental, addictive, and physical disorders have been indicated in 70-80% of suicides (Shaffer et al., 1996;

Brent, Perper, & Goldstein, & Kolko, 1988; Shafii, Steltz-Lenarsky, Derrick, Beckner, & Whittinghill, 1988). Specifically, the comorbidity of mood with substance abuse disorders and mood with personality disorders greatly increases the risk of attempted suicide (Shaffer et al., 1996; Shaffer et al., 1988; Henriksson et al., 1995; Moscicki, 1991).

One of the strongest risk factors for suicide is a previous suicide attempt (Fawcett et al., 1990; Nordstrom et al., 1995). The National Comorbidity Survey Replication study found that individuals with a prior suicide attempt had an extremely elevated risk of recurrent suicide attempt (Borges et al., 2006); this was true even when controlling for sociodemographic variables. A previous suicide attempt may be the strongest predictor of future attempts among the elderly; this population shows lower ratios of attempts to deaths and demonstrates little variation in clinical and sociodemographic variables between those who attempt and those who die by suicide (Frierson, 1991; Andrews & Lewinsohn, 1992). This indicates that older individuals who attempt suicide should be considered to be at a considerably higher risk for future suicide (Moscicki, 1991).

Mood and substance use disorders that are present in an individual's family history also represent risk factors; individuals who attempt or die by suicide are likely to come from families with a history of mood disorders, substance abuse disorders, and suicide-related ideation and behaviors (Moscicki, 2001). A family history of suicide has been associated with an earlier age of first suicide attempt (Roy, 2004) and a greater likelihood of multiple attempts (Jeglic, 2005; Tremeau et al., 2005). This increased risk associated with family history may be related to environmental characteristics; for instance, negative parenting and a history of physical and/or sexual abuse have been associated with adolescent suicide attempts (Wagner, 1997). A disrupted family environment as indicated by separation, divorce, widowhood, family conflict, or legal

problems has also been associated with suicide (Smith, Mercy, & Conn, 1988; Luoma & Pearson, 1996). Increased suicide risk is best conceptualized as an interaction between biological vulnerabilities and environmental stressors (Kety, 1986; Roy, 1989; Moscicki, 1991; Wagner, 1997).

Other Risk Factors

Behavioral and mood features are important proximal risk factors associated with suicide. These immediate antecedents to suicide often combine with preexisting distal risk factors to increase the overall likelihood of suicide-related behaviors (Moscicki, 1991; Henriksson, 1993; Shaffer et al., 1996). Proximal risk factors that have been examined for their role in suicide-related behaviors include hopelessness, impulsivity, the availability of firearms, and specific stressful life events.

A feeling of "hopelessness" has been shown to be strongly related to suicide. Self-reported feelings of hopelessness have demonstrated better predictive relevance for suicide intent than other aspects of depression including guilt, loss of appetite, and irritability (Lester & Beck, 1975; Lester, Beck, & Mitchell, 1979). In a 10-year follow-up study of psychiatric inpatients, self-reported hopelessness was the strongest predictor of suicide death in the 5-10 years following admission (Beck, Steer, Kovacs, & Garrison, 1985).

In addition to being present as a distal psychopathological condition associated with large proportions of suicides, impulsivity has also been shown to act as a direct precipitant of suicide-related behaviors. Intoxication, for instance, most frequently with alcohol, is a highly significant correlate of suicide indicative of impulsivity (Moscicki, 1991). Intoxication has been linked with impulsivity and with young age at the time of suicide death (Henricsson et al., 1993; Brent &

Perper, 1988). Additionally, intoxication and impulsivity both may be related to the suicide method and its lethality.

The availability of firearms in the home is one of the strongest proximal risk factors for suicide in the U.S. The presence of one or more firearms in the home increases the risk of suicide for males and females across all age groups; this remains true even when controlling for other risk factors such as depression and alcohol use (Kellerman & Reay, 1986; Kellerman et al., 1992). The increased risk associated with keeping a firearm in the home does not appear to vary with respect to the type of firearm used or whether the weapon is stored separately from the ammunition (Brent et al., 1991).

Moreover, stressful life events act as precipitants for suicide-related ideation and behaviors. In young people, the most frequently cited stressor that play a role in suicide-related behaviors is interpersonal loss or conflict, economic and/or legal problems, moving, and/or a humiliating experience (Brent et al., 1993; Lesage et al., 1994). In older individuals, medical illness is the most frequently cited stressor that contributes to suicide-related thoughts and behaviors (Henriksson et al., 1995; Moscicki, 2001).

Military Service. Many sociodemographic, psychological, and behavioral factors associated with suicide that occur in the general population are also present in the military. However, civilian based stressors can become magnified during one's service and either independently or in combination with military based stressors result in a heightened likelihood of suicide-related behaviors. Military personnel as compared with the general U.S. population are more likely to have access to weapons and participate in weapons training. A disproportionately high number of young Caucasian males (Maxfield, 2004) are serving in the military – all with access and knowledge about the usage of firearms. Furthermore, service in deployed settings is a

significant and stressful life event for those serving in the military. Exposure to traumatic events and combat during deployment, reactions and cognitive appraisal of deployment-related events while in theater, and adjustment to civilian life after return from deployment are all components of military service that may increase the likelihood of suicide. To set the foundation for the aims and hypotheses of this dissertation, a review of deployment-related stressors and the conceptualized trajectories to suicide are provided below.

Military Deployments, Psychological Well-Being, and Suicide-Related Behaviors

Following the terrorist attacks of September 11, 2001, military engagement in OEF and OIF was initiated in October of 2001 and March of 2003, respectively. Since October 2001, approximately 1.64 million U.S. service members have deployed in support of these operations (AMSA, 2007; Tanielian & Jaycox, 2008). Surveillance data indicates that the majority of those who deploy in support of OEF/OIF are male (89%), active duty rather than Reserve or Guard (70%), and Caucasian (67%). Approximately 63% of those deployed are younger than 30 years old and 50% are married (AMSA, 2007). Overall, the various effects of military deployment on health and well-being are complex and expected to be inter-related. Multiple pre-deployment biopsychosocial vulnerabilities can interact with deployment experiences and post-deployment related stressors to significantly impact a service member's psychological well-being and subsequent functioning (King, King, Vogt, Knight, & Samper, 2006). The association between deployment-related factors and psychological well-being is briefly reviewed here.

Deployment and Psychological Well-Being

Length of deployment and psychological well-being. Military personnel report increased levels of distress (daSilva, Paiva, Rodigues, & Ricardo, 1998) as deployments progress. In addition, a greater number of psychiatric and physical health symptoms are reported

following long deployments as compared to shorter ones (Ritzer et al., 1999). This effect may be moderated by gender; a recent study found that deployment length was related to increases in depression and posttraumatic stress in male soldiers but not in female soldiers (Adler, Huffman, Bliese & Castro, 2005).

Location of deployment and psychological well-being. Recent surveys of OIF and OEF veterans indicate that deployment location may be associated with the extent of psychological well-being. For instance, duty in Iraq is associated with higher incidences of positive screenings for depression, generalized anxiety, and posttraumatic stress disorder (PTSD) than is duty in Afghanistan (Hoge et al., 2004).

Types of exposure during deployment and psychological well-being. Deployed service members are at risk for multiple forms of injury and illness, including non-combat related sickness as well as combat-related injuries. Troops in Afghanistan and Iraq frequently report diarrhea (54.4% in Afghanistan and 76.8% in Iraq), respiratory illness (69.1%), non-combat injuries (34.7%), and leishmaniasis (2.1%). Studies indicate that medical evacuations for such non-combat illnesses and injuries are 3-6 times more likely that evacuation for combat-related wounds (Sanders et al., 2005; Hawley-Bowland, 2004).

Despite the prevalence of non-combat injury and illness, combat deployments also increase the likelihood of exposure to physical injury. Of all service members screened for injury due to blast exposures, motor vehicle accidents, falls, or gunshot wounds to the head or neck area, 59% are eventually diagnosed with some form of Traumatic Brain Injury (TBI; Tate, 2001; Warden, 2006). Military surveillance data (AMSA, 2007) indicates that TBI-related hospitalizations due to "battle casualties" increased following September 11th. From January of 2003 to December of 2007, the Defense and Veteran's Brain Injury Center clinics have seen

5,263 service members for evaluation and management of TBI (French & Parkinson, 2008). Overall, 22% of all wounded returnees from the OEF/OIF theaters of operation demonstrate some form of TBI (DVA, 2006; Tate, 2001; Warden, 2006).

Perhaps the most impactful exposure during deployment in relation to psychological well-being is related to participation in combat operations (King, King, Vogt, Knight, & Samper, 2006). A 2008 study of 50,184 service members found that those who reported any form of combat exposure demonstrated significantly higher odds of reporting post-deployment PTSD symptoms than did those who did not deploy. Traditionally, being fired on and/or witnessing the injury or death of others has been the focus of studies regarding traumatic stress reactions (Kaylor et al., 1987; Solomon, Garb, Bleich, & Grupper, 1987; Kulka et al., 1990). Service members report greater psychiatric symptomatology following specific military-related combat duties such as handling human remains (Sutker, Uddo, Brailey, Vasterling, & Errera, 1994; McCarroll, Ursano, & Fullerton, 1995; King, King, Vogt, Knight, & Samper, 2006). Findings regarding the impact of specific military duties on mental health generally seem relate to an individual's exposure to atrocity or extreme violence (King, King, Gudanowsky, & Vreven, 1995; Brewin, Andrews, & Valentine, 2000) during the deployment.

The impact of military duties on mental health may also be related to pre-existing individual vulnerabilities. There is growing evidence that exposure to death, injury, trauma or atrocity may not sufficiently account for the development of post-traumatic psychopathology and psychosocial concerns (Shalev, 1996; Yehuda, 1999; Brewin, Andrews, & Valentine, 2000). Multiple pre-trauma factors appear to play an important role in the way stressful experiences differentially impact individuals. In a meta-analysis of 85 data sets from studies examining PTSD, Brewin, Andrews, and Valentine (2000) found that female gender; social, educational,

and intellectual disadvantages; psychiatric history; and a history of previous abuse, trauma, or childhood adversity may enhance the likelihood of mental illness following traumatic exposure. Concerns regarding family members or interpersonal relationships that exist prior to traumatic exposure have also been shown to increase individual risk for developing mental health concerns (King, King, Vogt, Knight, & Samper, 2006; Takehito et al., 2008). Finally, studies of trauma survivors demonstrate that previous exposure to trauma is associated with greater distress following a subsequent trauma (Brewin, Andrews, & Valentine, 2000; McFarlane, 2000; Adler, Huffman, Bliese, & Castro, 2005).

Deployment and Suicide-Related Behaviors

The possible association between suicide-related behaviors and military deployment has recently garnered much attention. The DoD, the American Psychological Association, the Defense Health Board Task Force for the Prevention of Suicide in the Armed Forces, and the RAND Corporation are all in agreement that more needs to be done to better understand the association between deployment and suicide-related behaviors. The existence of pre-deployment factors combined with traumatic experiences, mental health concerns, and interpersonal difficulties that may be present during and after deployment appear to be associated with suicide-related behaviors among military personnel. To date, there is no clear scientific understanding about whether or not factors such as deployment length, location, number, exposure to death and/or trauma, and/or post-deployment adjustment are related to suicide behaviors among military personnel and Veterans. The section below summarizes the limited literature on this topic.

Deployment-related mental health symptoms and suicide-related behaviors. Service members returning from military deployment experience relatively high rates of mental disorders

including depression, anxiety, substance abuse, and PTSD (Hoge, Auchterlonie, & Milliken, 2006; Brown, Hull, & Horn, 2007; Kolkow, Spira, Morse, & Grieger, 2007). Returning service members also report quality of life impairments such as decreased emotional well-being, social functioning, and general health, as well as increased rates of impulsive drinking (Erbes, Westermeyer, Engdahl, & Johnsen, 2007). Nearly 1 in 8 individuals with a history of deployment receive at least one mental health diagnosis; 1 in 20 receives more than one (AMSA, 2007). Recent studies of returning military personnel from deployed settings show that screening and clinician assessment identify 20.3% of active duty and 42.4% of reserve component soldiers as requiring mental health treatment (Milliken, Auchterlonie, & Hoge, 2007).

The highest rates of mental health diagnoses occur in females (17.4% cumulative incidence), those of "other" race/ethnicities (15.0% cumulative incidence), and among separated or divorced service members (16.2% cumulative incidence) (AMSA, 2007). Post-deployment mental health assessments indicate that those most likely to screen positive for PTSD are those in the medical professions (54.7%), in a Reserve component (53.0%), and officers (52.9%). The least likely are those in the Air Force (36.6%) or Marine Corps (36.7%) and the youngest in age (39.6% are less than 20 years old) (AMSA, 2007).

The increased incidence of positive screenings for mental health concerns, mostly associated with duty in Iraq (Hoge et al., 2004), places service members at greater risk for suicide-related behaviors. Duty in Iraq has also been associated with an increased number of stressful experiences, such as engaging in firefights (Hoge et al., 2004), which has been previously discussed as an important risk factor for suicide (Brent, Perper, & Moritz et al., 1993; Lesage et al., 1994).

The number of service members reporting mental health concerns are likely to increase with time, as psychological problems have been found to increase from the time of return to several months post-deployment (Hoge et al., 2004; Grieger et al., 2006). Military surveillance data indicates that mental and behavioral health referrals increase in the 3-6 months following return from deployment, as do service member-reported ratings of "fair" or "poor" health (AMSA, 2007). This increase in mental health concerns may exert a lasting effect on service members; veterans of the1990-1991 Persian Gulf War demonstrate significantly higher mortality rates than other veterans who served during the same period but did not deploy (Kang & Bullman, 1996). This excess mortality as compared to controls is also observed among veterans of the Vietnam War (CDC, 1987; Watanabe & Kang, 1995). A 2011 study of service members in the active duty component during 2005 or 2007 found an increase in suicide rates for all services and specific risk factors for suicide including mental health diagnoses, mental health visits, and the use of selective serotonin reuptake inhibitors (Hyman, Ireland, Frost, & Cottrell, 2001).

Deployment-related physical health symptoms indicators and suicide-related behaviors. The association of suicide with physical injury and chronic pain is approximately double that of the general population, with suicide attempts ranging from 5-14% in some populations (Tang & Crane, 2006). Among injured and chronic pain populations, variables such as dimensions of pain (frequency, duration, and intensity), insomnia, helplessness, and hopelessness serve as important risk factors for suicide events (Tang & Crane, 2006). Individuals with concussion, cranial fracture, or cerebral contusion/hemorrhage have also been shown to be at increased risk for suicide-related behaviors in relation to the general public (Teasdale & Engberg, 2001).

Among soldiers diagnosed with mild TBI, poor general health, missed workdays, medical visits, and somatic and post-concussive symptoms are more common than among soldiers reporting other physical injuries (Hoge et al., 2008). Individuals with TBI may also be at increased risk for PTSD and other anxiety disorders if damage to the prefrontal cortex results in the disruption of neural networks involved in the regulation of anxiety (Bryant, 2008). Chronic pain, auditory and other sensory dysfunction, sexual changes, and changes in body image can also occur following TBI which may all be associated with an increased risk for suicide-related behaviors (French & Parkinson, 2008).

Deployment-related interpersonal factors and suicide-related behaviors. In addition to psychological concerns, service members also cite interpersonal concerns following deployment as a significant stressor. A 2008 study of OIF veterans found that significant numbers reported post-deployment concerns about social support. Service members reported that they did not feel that family and friends provided the emotional or instrumental support they needed (Vogt et al., 2008). Other studies have found that families report financial difficulties (Wasileski, 1982), spousal arguments, (Wasileski, 1982), physical aggression and abuse of a spouse (McCarroll, 2000; Wasileski, 1982), and child abuse (Blount et al., 1992; Wasileski, 1982) following a military deployment. Such interpersonal and family concerns may place service members at increased risk for self-harm as financial problems, relationship difficulties, and social isolation have all been identified as risk factors for suicide-related behaviors (Brown et al., 2000; Moscicki, 2001). In a military-specific study of risk factors for suicide among individuals in the active duty component during 2005 or 2007, separation and divorce were associated with suicide (Hyman, Ireland, Frost, & Cottrell, 2011).

One study of positive and negative consequences of military deployment did allow participants to write-in comments regarding their deployment experiences (Newby, McCarroll, Ursano, Fan, Shigemura, & Tucker-Harris, 2005). Among 951 deployed Army soldiers serving in Bosnia, being "away from family/missed important events" and "deterioration of marital/significant other relationship" were the second and third most frequently reported negative consequences of deployment. However, participants were not asked directly about suicide-related ideation and behaviors. A recent study addressing both interpersonal concerns and suicide ideation among 1,195 Navy personnel deployed in support of OIF/OEF found that as many as 27% of service members reported "stressors in the family that could negatively affect the service member" which was associated with incidence of suicide ideation and/or attempts in 3 to 4% of the sample. Additionally, among those who reported instances of suicide ideation and/or attempts, 27% reported multiple instances (McNulty, 2005).

Current DoD Efforts to Promote Psychological Health Post-Deployment and to Prevent Suicide-Related Ideation and Behaviors

In addition to service-specific Suicide Prevention Programs, current DoD efforts to reduce suicide behaviors include developing a better understanding of military-specific risk and resilience factors (Army Study to Assess Risk and Resilience in Servicemembers [STARRS]), enhancing assessment of pre-deployment and post-deployment risk indicators, and promoting the delivery of empirically supported suicide prevention programs and interventions. The following section provides a review of DoD prevention strategies that aim to minimize risk factors and maximize protective factors in order to reduce of the incidence of suicide-related behaviors following return from deployment.

Building Resilience

Resilience is a concept with a short but varied history. Compared with some other constructs in psychology, resilience is a new idea. For example, the term "stress" appears as early as 1914 in the biomedical literature, in a paper on emotion and psychoendocrine function by Walter Cannon. In contrast, published research regarding "resilient" reactions to adverse events does not appear until the late 1980's (Walsh, 2003). Despite this late arrival, resilience has been a frequent target for researchers attempting to examine and explain individual differences in "hardy" or "optimistic" response patterns. Today, definitions of resilience still vary, but most current literature referring to resilience focuses on some form of emotional stamina. Efforts to build resilience are considered within the DoD as a strategy to boost social, psychiatric, and behavioral variables that might act as protective factors against suicide-related ideation and behaviors. One important factor in building resilience is related to social support.

Building resilience through increase in social support. Studies of children who thrive despite poverty, illness, maltreatment, and parental mental illness reveal a crucial influence of significant relationships as moderators of the impact of stressful conditions (Patterson & Garwick, 1994; Patterson, 2002; Walsh, 2003). The role of social support in individual resilience is supported by research which demonstrates that individuals describing themselves as lonely report increased perceptions of stress (Hawkley et al., 2005). In Gulf War I Veterans, variables such as relating to others, personal strength, and post-traumatic growth were predicted by the self-reported presence of social support (Maguen et al., 2006). These findings are supported by studies indicating that social support may act as a buffer against psychological stressors. More importantly, increased levels of social support have been associated with reduced levels of suicidal ideation (Stroebe, Stroebe, & Abakoumkin, 2005).

Building resilience through promotion of psychological health. Individual psychiatric features that contribute to resilient responses to stress include healthy self-esteem, belief in personal self-efficacy, and a repertoire of problem-solving strategies (Rutter, 1987). Overall, an individual's ability to select and apply the appropriate problem-solving strategy based on the demands of the situation is directly related to measures of psychological resilience (Hawkley et al., 2005). Conversely, deficits in an individual's ability to apply adaptive problem solving strategies may result in a depletion of resources, cognitive rigidity, dichotomous thinking – all of which serve as risk factors for suicide-related behaviors (Cavanagh et al., 1999; King et al., 2000).

Many studies suggest that resilient individuals not only problem-solve differently than others, but also demonstrate specific adaptive behaviors (Wagnild & Young, 1993). These behaviors include illness prevention (O'Connell & Mayo, 1988; Caplan, 1990) as well as the maintenance of somatic health (Wagnild & Young, 1993) and physical "robustness" (Honzik, 1984). The tendency to monitor personal health and actively seek support when necessary has been linked to positive outcomes following traumatic experiences (Charney, 2006). Adaptive "help-seeking" behavior is an important factor in establishing psychological health and preventing suicide.

The 2010 DoD Task Force on the Prevention of Suicide by Members of the Armed Forces report also emphasized a "comprehensive public health approach" focused on reducing risk and increasing protective factors. The report highlighted four primary focus areas including Organization and Leadership; Surveillance, Investigation, and Research; Access to and Delivery of Quality Care; and Wellness Enhancement and Training. This report specifically downplayed the importance of risk factors and emphasized the responsibility of the DoD to organize and

provide comprehensive care, including "a culture of total fitness" which emphasizes individual and service resiliency.

Provision of Healthcare Services to Military Personnel

The health and wellness needs of military personnel are predominantly addressed by the Military Health Services System (MHSS). In the U.S. alone, the MHSS operates 117 military hospitals and 400 military clinics. Recent reviews have generated some concern about the provision of care by the MHSS. In an analysis of the military health system and its ability to address increases in the need for mental health care services, the American Psychological Association's Military Deployment Services Task Force (2007) identified three main barriers to care. These included the process of receiving referrals, difficulties in scheduling appointments, and the stigma associated with receiving care. The stigma item in particular has been the focus of recent studies. Hoge et al. (2004) found that Soldiers and Marines frequently cited concerns about being stigmatized for seeking mental health services. More alarmingly, those service members who screened positive for a mental disorder were almost twice as likely to report stigma concerns as those who did not screen positive. Among those who screened positive, only 38 to 45 percent indicated that they would be interested in receiving helping services (Hoge et al., 2004).

The recommendations of the Defense Health Board's Task Force on Mental Health (2007) address these and other concerns by proposing specific changes in the military health care system. These changes include building a culture of support for psychological health by dispelling stigma, making professionals more accessible, and making assessment procedures an effective, efficient, and normal part of military life; ensuring a full continuum of care through prevention, early intervention, and treatment; and providing sufficient resources through the

allocation of staff and the use of healthcare networks. Several established assessment and referral systems already in place address these recommendations.

Post-Deployment Health Assessments

As part of its Force Health Protection program, the U.S. military, as mandated by the Assistant Secretary of Defense for Health Affairs (DoD Instruction 6490.03), requires deployment-related health assessments of all service members including Active Duty, National Guard, and Reserve members. Assessments are also offered to members that have separated or retired since returning from deployment (Deployment Health Clinical Center). These assessments include the Pre-Deployment Health Assessment (PDHA; DD Form 2795 – see Appendix B), the Post-Deployment Health Assessment (DD Form 2796 – see Appendix C), and the Post-Deployment Health Re-Assessment (PDHRA; DD Form 2900 – see Appendix D). A summary of these measures is additionally provided in Appendix A.

Service members are contacted by their unit leaders and provided with information on how to access their service-specific electronic or web-enabled version when they fall within the timeframe for completing the PDHRA. After service members have completed the form, they meet with a healthcare provider to discuss any concerns they have endorsed and receive referrals if further evaluation or treatment is warranted (Deployment Health Clinical Center). The data is sent electronically to the Armed Forces Health Surveillance Center for inclusion in the Defense Medical Surveillance System (DMSS). These deployment-related assessment tools collect information on stressful life events and resultant mental health concerns, interpersonal difficulties, suicide ideation as well individual factors and behaviors which may serve a protective function.

This dissertation study is an examination of health assessment information collected by the Department of Defense (i.e., via PDHA and PDHRA). The primary objective was to evaluate deployment and psychological factors which were significantly correlated with suicide ideation. The secondary objective was to examine whether or not several selected mediators would explain the relationship between suicide ideation and death. The third objective was to explore the relationship between deployment history and suicide using a deployed deceased sample of USAF and USMC service members as compared to a matched living cohort.

Summary

Suicide remains an important global and national public health problem not only in the civilian sector but also among military service members and Veterans. The operations tempo associated with OIF/OEF has increased the likelihood that service members will participate in at least one deployment. The stressors associated with a military deployment may independently or in combination with pre-existing biopsychosocial vulnerability contribute to suicide-related ideation and behaviors. The increased association with suicide may be associated with specific deployment factors such as length of deployment (daSilva, Paiva, Rodigues, & Ricardo, 1998; Ritzer et al., 1999), location of deployment (Hoge et al., 2004), exposure to injury and illness (Sanders et al., 2005; Hawley-Bowland, 2004), perceived threat or physical injury (King, King, Foy, Keane, & Fairbank, 1999; Rosen, Wright, Marlowe, Bartone, & Gifford, 1999), or interpersonal problems. Furthermore, post-deployment factors may also contribute to the likelihood of suicide. These factors include mental illness (Hoge, Aughterlonie, & Milliken, 2006; Brown, Hull, & Horn, 2007; Kolkow, Spira, Morse, & Grieger, 2007), increased impulsivity (e.g., alcohol use) (Erbes, Westermeyer, Engdahl, & Johnsen, 2007), concerns

regarding interpersonal relationships and social support (Vogt et al., 2008; McCarroll, 2000; Blount et al., 1992; Wasileski, 1982).

Specific Aims and Hypotheses

Factors Associated with Reported Suicide Ideation Post Deployment

Aim 1: Deployment-Related Factors and Suicide Ideation. The first aim of this dissertation was to assess whether deployment-related factors including total number of deployments (in the past 5 years at the time of completion of post-deployment assessments), location of deployment, physical injury during deployment, and exposure to wounded, killed, or dead during deployment would be associated with reported suicide ideation among a combined sample of USAF and USMC Active Duty, Guard, and Reserves, as measured by the PDHA and PDHRA (administered June 2005 – June 2008).[1]

Hypothesis 1A. Total number of deployments (in the past 5 years at the time of completion of post-deployment assessments) will be significantly associated with reported suicide ideation.

Hypothesis 1B. Deployment to Iraq as compared to Afghanistan and other locations will be significantly associated with reported suicide ideation.

Hypothesis 1C. Physical injury during deployment will be significantly associated with reported suicide ideation.

Hypothesis 1D. Exposure to wounded, killed, or dead during deployment will be significantly associated with reported suicide ideation.

Aim 2: Psychological Factors and Suicide Ideation. The second aim of this dissertation was to determine whether psychological factors including depression, trauma,

[1] Please note that the last completed and AFHSC registered PDHA and PDHRA for each service member was used for the study analyses.

alcohol misuse within the past month, and interpersonal conflict (i.e., "*serious conflicts with your spouse, family members, close friends, or at work that continue to cause you worry or concern")* (as reported on the PDHRA) are significantly associated with reported suicide ideation among a combined sample of USAF and USMC Active Duty, Guard, and Reserves, as measured by the PDHRA.[2]

***Hypothesis 2A*.** Symptoms of depression in the past month will be significantly associated with reported suicide ideation.

***Hypothesis 2B*.** Symptoms of psychological trauma in the past month will be significantly associated with reported suicide ideation.

***Hypothesis 2C*.** Alcohol misuse in the past month will be significantly associated with reported suicide ideation.

***Hypothesis 2D*.** Interpersonal conflict with one's spouse, family members, close friends, or work colleagues since return from deployment will be significantly associated with reported suicide ideation.

Mediational Analyses: Suicide Ideation and Suicide

Aim 3: Mediators in the Relationship between Suicide Ideation and Suicide. The third aim of this dissertation was to test a meditational model to explain the relationship between reported suicide ideation and suicide. Based on a review of the scientific literature, four factors were examined within the mediation model: (1) hopelessness; (2) alcohol misuse; (3) interpersonal conflict; and (4) impulsivity.[2]

[2] Please note that the last completed and AFHSC registered PDHRA for each service member was used for the study analyses.

Hypothesis 3A. Hopelessness will serve as a mediator between reported suicide ideation and suicide.

Hypothesis 3B. Alcohol misuse in the past month will serve as a mediator between reported suicide ideation and suicide.

Hypothesis 3C. Interpersonal conflict with one's spouse, family members, close friends, or work colleagues will serve as a mediator between reported suicide ideation and suicide.

Hypothesis 3D. Impulsivity will serve as a mediator between reported suicide ideation and suicide.

Relationship between Deployment History and Suicide

Aim 4: To determine the relationship between deployment history and suicide.

Hypothesis 4A. A history of deployment will be significantly associated with suicide.

Research Design and Methodology

Aims 1, 2, and 3

Design. Aims 1-3 utilized an observational cohort design to (a) examine the relationship between deployment-related factors, psychological factors, and reported suicide ideation (Aims 1 & 2); and (b) conduct a meditational analysis to examine the relationship between suicide ideation and suicide (Aim 3). The information on deployment-related and psychological factors was extracted from PDHA forms (2003 and 2008 versions) and PDHRA forms (2005 and 2008 versions) completed between June 2005 and June 2008 and chronologically matched as described under "Construction of Database for Aims 1 and 2" below.

Participants. Individuals included in this study were active duty, Reserve, and Guard members of the USAF and USMC with a matched PDHA and PDHRA completed between June of 2005 and June of 2008.

Measures. Aims 1 and 2 relied on data from two questionnaires described below.

Post-Deployment Health Assessment (PDHA; DD Form 2796). The purpose of the Post-Deployment Health Assessment screening is to review each service member's health, mental health or psychosocial issues commonly associated with deployments, special medications taken during the deployment, possible deployment-related occupational and/or environmental exposures, and to discuss deployment-related health concerns. Each individual who requires a PDHA must be scheduled for a person-to-person health assessment with a trained health care provider during in-theater medical out-processing or within 30 days after returning to home or processing station. The provider will document concerns and referral needs and discuss resources available to help resolve any post-deployment issues. The current version of the PDHA, which is dated January 2008, replaces the previous version dated April 2003. The form was updated to enhance questions on physical and behavioral health and to add questions regarding traumatic brain injury (Deployment Health Clinical Center). In addition to demographic data, the PDHA forms contain information about the members' most recent deployment including location of deployment, total number of deployments to OIF, OEF, and/or Other locations in the past 5 years, being physically hurt during deployment, exposure to wounded, killed, or dead during deployment, and symptoms of depression, PTSD, alcohol misuse, or interpersonal conflict following the most recent deployment.

Post-Deployment Health Re-Assessment (PDHRA; DD Form 2900). The PDHRA incorporates an 18-item self-report questionnaire and a 12-item consultation with a primary care provider, but additionally focuses on health concerns that emerge during the three- to six-month time period following return from deployment. The PDHRA was implemented in June of 2005 and is offered to all service members returning from an operational deployment. The form was

updated in 2008 to enhance questions regarding behavioral health and to add questions addressing traumatic brain injury (Deployment Health Clinical Center).

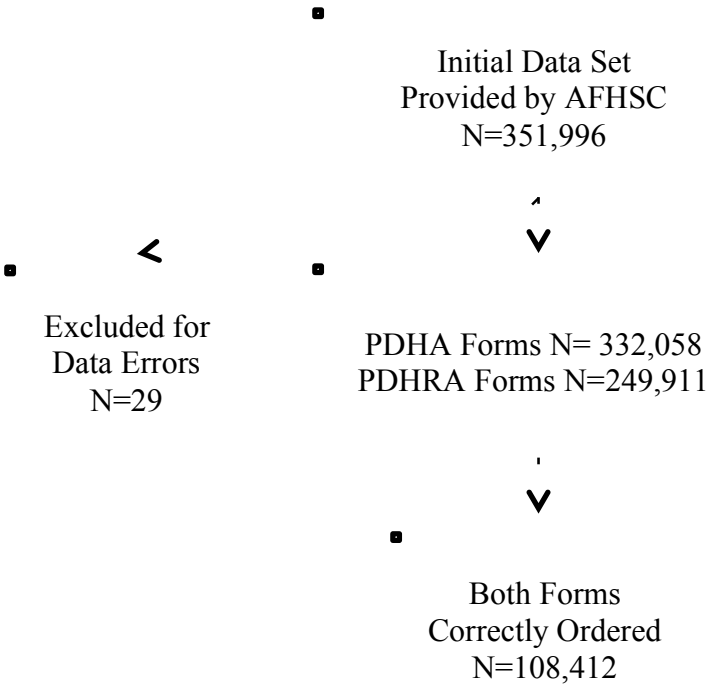
Sources of Data. Information for the study was obtained from three DoD sources: (1) the USAF Office of Suicide Prevention (i.e., social security numbers of USAF personnel with suicides during the requested period), (2) the USMC Office of Suicide Prevention (i.e., social security numbers of USMC personnel with suicides during the requested period), and (3) the Armed Forces Health Surveillance Center (AFHSC) (i.e., post deployment health data).

Construction of Database for Aims 1, 2, and 3. The final database provided by AFHSC to Capt Branlund included data on all available PDHA and PDHRA forms completed between June 2005 and June 2008 by USAF and USMC service members. In order to assist with the identification of multiple PDHA or PDHRA forms completed by the same service member at different time points, the AFHSC assigned unique identifiers to individual service members and the PDHA and PDHRA forms were ordered by sequence of completion date.

For the purposes of data analyses presented in this dissertation, the database was refined such that only the most recently dated set of chronologically ordered PDHA and PDHRA forms for each service member was actually included (if completed correctly, the PDHA should have been completed prior to the PDHRA). This means that duplicates were removed and the analyses were conducted on individuals, using only each person's most recent PDHA/PDHRA set on record. Therefore, individuals with unmatched PDHA and PDHRA forms were excluded from the analyses. There were also two forms removed due to obvious data entry error. These two forms had the same study identifier but did not list the same age, time in service, or grade data and were therefore eliminated before the study analyses were performed.

The original data file provided by AFHSC (i.e., prior to the elimination of multiple forms and unmatched forms), consisted of the following: 26,186 PDHAs (2005 version); 305,872 PDHAs (2008 version); 22,402 PDHRAs (2005 version) and 227,509 PDHRAs (2008 version) – all completed between June 2005 and June 2008 by USAF and USMC service members. As stated previously, only the most recent set of forms in which the PDHA preceded the PDHRA in time were retained for each individual. These sets were also checked to ensure that both forms assessed the same deployment.

Figure 2. Cases for Analyses, Aims 1 & 2



The modified data file used for study analyses consisted of chronologically ordered PDHA and PDHRA forms for a total of 108,412 service members (n = 84,154 USAF [78%]; n = 24,258 USMC [22%]). For these identified cases (i.e., with both PDHA and PDHRA for a single

deployment), the completion date gap between PDHA and PDHRA of 1 - 180 days was found; the mean completion date gap was 124 days with a standard deviation of 4.5 days. This date gap falls within the expected 3-6 month time frame between PDHA and PDHRA form completion.

The retained sample represented 31% of the original data set provided by AFHSC. There are multiple reasons for the low number of complete, chronologically ordered forms. First, this data set was drawn from 2005-2008, during initial implementation of the post-deployment forms. Administrative and military Command support for form completion and collection may have been underdeveloped at that time. Even in locations with established administrative support, compliance may have been low. Post-deployment forms are between four and seven pages long and may be seen as burdensome or inconvenient. To date, no data exists on the compliance rates pertaining to the completion of PDHA/PDHRA forms within any timeframe since onset of OIF/OEF.

In our sample, there were more PDHA forms than PDHRA forms; this may be related to the timing of form completion. PDHA completion occurs before or immediately after return from deployment, and is part of a comprehensive medical, financial, and administrative process. PDHRA completion, in contrast, occurs well after return from deployment and is not embedded in a larger process, which may contribute to lower compliance.

Loss to follow-up should also be considered; individuals who depart Active Duty status (such as Guard and Reserve members), who separate from the military entirely, or who die following deployment may not complete both post-deployment forms. Departure from any military status is even more likely if the service member is experiencing psychological symptoms; a 2006 study found that military service members who screened positive for a mental

health concern were significantly more likely to leave service for any reason during the year after deployment than were those who screened negative (Hoge et al., 2006).

The retained sample also contained varying levels of missing self-report deployment-related and mental health items. Overall, missing data for the "impulsivity" item and the "saw wounded, killed, or dead" item were much lower than missing data for other items. This large difference can be attributed to the difference in data collection; the "impulsivity" item was the only deployment-related or mental health item drawn from the portion of the PDHRA completed by providers as opposed to service members. The addition of a provider completing the medical portion of the PDHRA likely increases compliance and decreases missing data for the "impulsivity" item; the possibility of increased compliance for the PDHA vs. the PDHRA has already been discussed and can be applied to the "saw wounded, killed, or dead" item.

Aim 4

Design. Aim 4 utilized a matched case control design to evaluate the association between deployment history and suicide death. The sample included USAF and USMC suicide decedent service members and a matched cohort (matched on sex, age, and military service branch) known to be living at the time of the suicide deaths. Information on the social security numbers of suicide decedents within the USAF and USMC, occurring between the dates of March 2005 and June 2008, was submitted by each Suicide Prevention Program directly to the AFHSC.

Participants. Individuals within this study were active duty, Reserve, and Guard members of the USAF and USMC. The "suicide" group consisted of service members who had died by suicide between March of 2005 and June of 2008 (i.e., 39 months). The second subset of

participants consisted of a matched living cohort. Please note that for this aim, PDHA/PDHRA data was not used.

Sources of data. To construct the database for this Aim, the following steps were followed by AFHSC. First, AFHSC created a dataset by extracting demographic and service-related information from DMSS records, for all 221 service members identified by the USAF and USMC as having died by suicide between March 2005 and June 2008. Second, AFHSC matched each 1 of the 221 cases with service members known to be living at the time of each suicide. Based on the strong association of sex and age with suicide and their potential confounding influence, the suicide cases and the living cases were matched on sex and age. In addition, the two samples were matched on military service branch (e.g., USAF and USMC). The AFHSC then randomly selected 4 matched controls per suicide case (personal communication with Dr. Angela Eick, Epidemiologist, AFHSC). Data on race/ethnicity, marital status, rank, time in service, and service component information was provided directly from the DMSS records maintained by the AFHSC. Unique identifiers were given to each individual in the dataset and all identifying information was deleted prior to data transmission to Capt Shannon Branlund.

Human Subjects Protection

The study was reviewed by the Uniformed Services University of the Health Sciences Institutional Review Board (IRB). Approval of protocol T072M3-01 was obtained on February 17, 2010 (FWA 00001628; DoD Assurance P60001). The research study was recognized as *Exempt* Human Subjects Research with no more than minimal risk.

Data Analytic Procedures

Aim 1: Deployment-Related Factors and Suicide Ideation

Aim 1 was to assess whether deployment-related factors including total number of deployments (in the past 5 years at the time of completion of post-deployment assessments), location of deployments, being physically hurt during deployment, and exposure to wounded, killed, or dead during deployment are associated with reported suicide ideation among a combined sample of USAF and USMC Active Duty, Guard, and Reserves, as measured by the PDHA and PDHRA (administered June 2005 – June 2008). Table 1 provides detailed coding information on each variable used for this aim.

Outcome Variable: Suicide ideation (categorical variable: Yes, No on the PDHRA) as reported by individual service members who had both a completed PDHA and PDHRA with only the most recent registered forms being entered into the study analyses.

Independent Variables: Total number of deployments (in the past 5 years at the time of completion of post-deployment assessments; categorical variable); location of deployments (categorical variable: Iraq, Afghanistan, Other); being physically hurt during deployment (categorical variable: Yes, No); and exposure to wounded, killed, or dead during deployment (categorical variable: Yes, No).

Covariates: Sex, age, and military service branch were used as covariates.

Table 1. Variables Used for Analyses, Aim 1

Type of Variable	Variable and Description	Form & Item Numbers	Categories
Dependent Variable	Suicide Ideation *"Over the PAST MONTH, have you been bothered by thoughts that you would be better off dead or hurting yourself in some way?"*	PDHRA 2005: Health Care Provider #2a 2008: Health Care Provider #2a	Yes No
Independent Variable	Number of Deployments in Past 5 Yrs *"Total Deployments in Past 5 Years to OIF, OEF, Other"* *(Total Combined number of deployments to*	PDHRA 2005: Front Page Entry 2008: Front Page Entry	1 2 3 4

	OIF, OEF, and Other)		5 or more
Independent Variable	Location of Deployment *"Location of Operation"*	PDHRA 2005:Front Page Entry 2008: Front Page Entry	Iraq Afghanistan Other
Independent Variable	Being Physically Hurt During Deployment *"During your deployment were you wounded, injured, assaulted, or otherwise physically hurt?"*	PDHRA 2005: #5 2008: #7	Yes No
Independent Variable	Exposure to Wounded, Dead, or Killed During Deployment *"Did you see anyone wounded, killed, or dead during this deployment?"*	PDHA 2003: #7 2008: #10	Yes No
Covariate	Sex *"Gender: Male or Female"*	PDHRA	Male Female
Covariate	Age	Provided by AFHSC *Age in Years (Categorized)*	18-24 25-34 35-44 45-54 55+
Covariate	Service Branch *"Service Branch"*	PDHRA 2005: Front Page Entry 2008: Front Page Entry	Air Force Marine Corps

Analyses: A logistic regression model with the outcome and the independent variables outlined above was used to examine the relationship between deployment-related factors and suicide ideation. The potential confounding due to age, sex and military branch was handled by entering those variables in the first block, and then adding the factor of interest. Covariates were selected based on a review of existing scientific literature, which showed that previous studies of this type have controlled for similar military and demographic variables (e.g., Brailey, Vasterling, Proctor, Constans, & Friedman, 2007). Covariates could alternately have been selected based on observed between-group differences in demographic and military service variables of those reporting suicide ideation versus those not reporting suicide ideation. In consultation with several dissertation committee members, the literature review served as the basis of the covariate selection.

Additional covariates were considered for these analyses, however low numbers in various subgroups caused regression models to fail. Combining small subgroups into larger groups was considered, however combined subgroups were also problematic. For example, in order to create a group large enough to counter the size of the lower enlisted ranks, this study would have needed to combine both senior enlisted and officer ranks into an "all other" group. This strategy would not have contributed new information beyond the previously discussed association with younger age ranges, because junior enlisted ranks are generally associated with younger ages. Further, additional restructured demographic variables such as race/ethnicity, marital status, and military service component were not associated with our chosen deployment-related variables. For this reason, only those covariates supported by the prior research and retained by regression models were used.

Aim 2: Psychological Factors and Suicide Ideation

Aim 2 was to determine whether psychological factors for suicide including depression, trauma, alcohol misuse within the past month, and interpersonal conflict with one's spouse, family members, close friends, or work colleagues are associated with self-reported suicide ideation among a combined sample of USAF and USMC Active Duty, Guard, and Reserves, as measured by the PDHRA.

Outcome Variable: Suicide ideation (categorical variable: Yes, No on the PDHRA) as reported by individual service members who had both a completed PDHA and PDHRA with only the last registered forms being entered into the study analyses.

Independent Variables: Self-reported psychological indicators for suicide including depression, trauma, alcohol misuse within the past month, and interpersonal conflict (categorical variables: Yes, No).

Covariates: Sex, age, and military service branch were used as covariates.

Table 2. Variables Used for Analyses, Aim 2

Type of Variable	Variable and Description	Form & Item Numbers	Categories
Dependent Variable	Suicide Ideation *"Over the PAST MONTH, have you been bothered by thoughts that you would be better off dead or hurting yourself in some way?"*	PDHRA 2005: Health Care Provider #2a 2008: Health Care Provider #2a	Yes No
Independent Variable	Symptoms of Depression *"Over the PAST MONTH, have you been bothered by the following problems?* *a. Little interest or pleasure in doing things* *b. Feeling down, depressed, or hopeless"*	PDHRA 2005: #11a; 2008: #14a PDHRA 2005: #11b; 2008: #14b	Not at all = No Few or several days = Yes More than half the days = Yes Nearly every day = Yes (Any positive answer on items a and/ or b = Yes)
Independent Variable	Symptoms of Trauma *"Have you had any experience that was so frightening, horrible, or upsetting that, IN THE PAST MONTH you….* *a. Have had any nightmares about it or thought about it when you did not want to* *b. Tried hard not to think about it or went out of your way to avoid situations that remind you of it* *c. Were constantly on guard, watchful, or easily startled* *d. Felt numb or detached from others, activities, or your surroundings?"*	PDHRA 2005: #9 a –d 2008: #12 a-d	Yes No (Any "yes" answer on items a, b, c, and/or d = Yes)
Independent Variable	Alcohol Misuse *"a. In the PAST MONTH, did you use alcohol more than you meant to?* *b. In the PAST MONTH, have you felt that you wanted to or needed to cut down on your drinking?"*	PDHRA 2005: #10a & b 2008: #13a & b	Yes No (Any "yes" answer on items a and/or b = 1)
Independent Variable	Interpersonal Conflict *"Since return from your deployment, have you had serious conflicts with your spouse, family members, close*	PDHRA 2005: #8 2008: #11	Yes No Unsure = No

	friends, or at work that continue to cause you worry or concern?"		
Covariate	Sex *"Gender, Male or Female"*	PDHRA 2005: Front Page Entry 2008: Front Page Entry	Male Female
Covariate	Age	Provided by AFHSC Age in Years (Categorized)	Yes No Missing
Covariate	Service Branch *"Service Branch"*	DD PDHRA 2005: Front Page Entry 2008: Front Page Entry	Air Force Marine Corps

Analyses: A logistic regression model with the outcome and the independent variables outlined above was used to examine the relationship between psychological factors and suicide ideation. Similar to Aim 1, the potential confounding due to age, sex and military branch was handled by entering those variables in the first block, and then adding the factor of interest.

Additional covariates were considered for these analyses, however low numbers in various subgroups caused regression models to fail. Combining small subgroups into larger groups was considered, however combined subgroups were also problematic. For example, in order to create a group large enough to counter the size of the lower enlisted ranks, this study would have needed to combine both senior enlisted and officer ranks into an "all other" group. This strategy would not have contributed new information beyond the previously discussed association with younger age ranges, because junior enlisted ranks are generally associated with younger ages. Further, additional restructured demographic variables such as race/ethnicity, marital status, and military service component were not associated with our chosen deployment-related variables. For this reason, only those covariates supported by the research and retained by regression models were used.

Power Analysis for Aims 1 and 2

Previous studies of Deployment Health Assessments have estimated that approximately 1.2% of service members returning from deployment report suicide ideation (e.g., Miliken et al., 2007). Using the base reference proportion of 1.2% for suicide ideation, the power of this study to detect a given odds ratio is provided in Table 3. Table 4 provides the number of valid cases required to have 80% power of detecting a given odds ratio.

Table 3. Power to Detect a Given Odds Ratio (Suicide Ideation) for Current Study (N=108,412)

Odds Ratio	Power for Suicidal Ideation Rate of 1.2%
1.25	0.92
1.50	0.99
1.75	0.99
2.00	0.99
2.25	0.99
2.50	0.99
2.75	0.99
3.00	0.99

Table 4. N Required for 80% Power with Given Base Rates (Suicide Ideation) for Current Study

Odds Ratio	N Required for Suicidal Ideation Rate of 1.2%
1.25	72,685
1.50	19,770
1.75	9,490
2.00	5,730
2.25	3,920

2.50	2,895
2.75	2,255
3.00	1,825

A total of 108,412 individuals with completed and chronologically ordered PDHA and PDHRA forms (including those with missing data) were included in the final analyses; there were 238 cases (0.22%) of positive endorsements for suicide ideation. Sample size of 108,412 was therefore sufficient for analyses with suicide ideation as the dependent variable. Sample size calculations were conducted using nQuery Advisor® 6.0 software (Statistical Solutions, Cork, Ireland).

Aim 3. Mediational Analyses: Suicide Ideation and Suicide

Aim 3 was to examine potential mediators (i.e., hopelessness, alcohol misuse, interpersonal conflict, and impulsivity) in the relationship between suicide ideation and suicide.

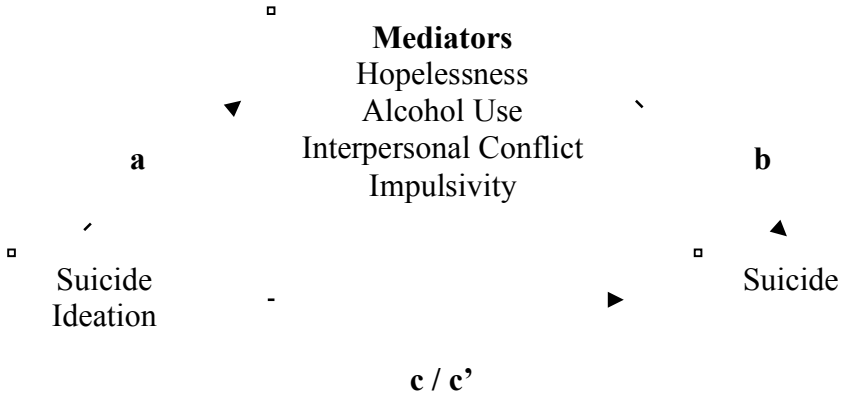
Independent Variable: Suicide ideation (categorical variable: Yes, No), as reported by individual service members who had both a completed PDHA and PDHRA with only the last registered forms being entered into the study analyses.

Mediating Variables: Hopelessness, alcohol misuse, interpersonal conflict, and impulsivity

Dependent Variable: Suicide (categorical variable: Yes, No). For the social security numbers of service members who had died by suicide between March 2005 and June 2008 (N = 221) there were 79 PDHA and PDHRA forms available. After the elimination of multiple forms there were 55 individuals service members in the data set. After refinement for matched, chronologically ordered sets of PDHA and PDHRA forms, there were only 8 suicide cases left in the data set. In an effort to maximize the forms available for analysis, the Aim 3 data set was re-

constructed without matching PDHA forms to PDHRA forms. Aim 3 variables were drawn completely from the PDHRA form, so it was not necessary to match PDHA and PDHRA forms for this analysis. From the 55 retained forms, there were 47 PDHA forms and 24 PDHRA forms in the data set.

Figure 3. Mediation Model.



Analyses: This model required that significant correlation coefficients be demonstrated between the IV and DV when the mediating variables were not controlled (path c), the IV and mediating variables (path a), and the mediating variables and DV (path b) prior to demonstrating that the IV does not predict the DV when controlling for the mediating variables (path c').

Table 5. Variables Used for Analyses, Aim 3

Type of Variable	Variable and Description	Form & Item Numbers	Categories
Outcome	Suicide Ideation *"Over the PAST MONTH, have you been bothered by thoughts that you would be better off dead or hurting yourself in some way?"*	DD 2900 2005: Health Care Provider #2a 2008: Health Care Provider #2a	Yes No
Outcome	Suicide	Social security numbers of	Yes

	USAF and USMC service members/cases with a recorded suicide and completed PDHRA between June 2005 to June 2008	suicide cases transmitted by USAF and USMC Suicide Prevention Programs directly to AFHSC	No
Mediator	Hopelessness "Over the PAST MONTH, have you been bothered by the following problems? b. feeling down, depressed, or hopeless"	DD 2900 2005: #11b 2008: #14b	Not at all = No Few or several days = Yes More than half the days = Yes Nearly every day = Yes (Any positive answer on a and/or b = Yes)
Mediator	Alcohol Misuse *"a. In the PAST MONTH, did you use alcohol more than you meant to?* *b. In the PAST MONTH, have you felt that you wanted to or needed to cut down on your drinking?"*	DD 2900 2005: #10a & b 2008: #13a & b	Yes No (Any "yes" answer on items a and/or b = Yes)
Mediator	Interpersonal Conflict *"Since return from your deployment, have you had serious conflicts with your spouse, family members, close friends, or at work that continue to cause you worry or concern?"*	DD 2900 2005: #8 2008: #11	Yes No Unsure = No
Mediator	Impulsivity *"Since return from your deployment, have you had thoughts or concerns that you might hurt or lost control with someone?"*	DD 2900 2005: Health Care Provider #2b 2008: Health Care Provider #2b	Yes No Unsure = No

Power Analysis for Aim 3

The 2009 rate for suicide in the USAF was 12 per 100,000; the USAF suicide rate as opposed to the USMC suicide rate was selected for the conduct of the power analysis for Aims 1 and 2 given that it is the most representative base rate due to the large proportion of USAF members included in this study. As a reminder, 78% of the chronologically ordered PDHA and PDHRA forms out of the total of 108,412 service members belonged to USAF personnel. Using the base reference proportion of 12/100,000 for suicide, the power of this study to detect a given odds ratio is provided in Table 6. Table 7 provides the number of valid cases required to have 80% power of detecting a given odds ratio.

Table 6. Power to Detect a Given Odds Ratio (Suicide) for Current Study (N=108,412)

Odds Ratio	Power with Suicide Rate of 1.2 per 10,000
1.25	0.08
1.50	0.13
1.75	0.20
2.00	0.27
2.25	0.35
2.50	0.43
2.75	0.51
3.00	0.58

Table 7. N Required for 80% Power with Given Base Rates (Suicide)

For Current Study (N=108,412)

Odds Ratio	N Required for Suicide Rate of 1.2 per 10,000
1.25	8,587,785
1.50	2,328,145
1.75	1,114,165
2.00	670,925
2.25	457,440
2.50	337,010
2.75	261,730
3.00	211,150

Aim 4. Matched Case-Controlled Study: Deployment History and Suicide

The goal of Aim 4 was to determine the relationship between deployment history and suicide.

Independent Variable: Any deployment history (categorical variable: Yes, No; provided by AFHSC).

Dependent Variables: Living status (categorical variable: Yes, No). Please note that the social security numbers of service members who had died by suicide between March 2005 and

June 2008 (N = 221) were transmitted by the USAF and USMC Suicide Prevention Offices directly to AFHSC which then matched the suicide cases to the living cohort.

Analyses: Data from a group of USAF and USMC service members known to have died by suicide and a matched cohort known to be living at the time of each suicide was used to conduct a conditional logistic regression. Based on the strong association of sex and age with suicide and their potential confounding influence, the suicide cases and the living cases were matched on sex and age. In addition, the two samples were matched on military service branch (e.g. USAF, USMC). All matching was completed by the AFHSC and additional data on race/ethnicity, marital status, rank, time in service, and service component information was also provided by AFHSC.

Power Analysis for Aim 4: In order to maximize the power associated with this Study, each service member known to have died by suicide between March of 2005 and June of 2008 (N= 221) was matched by the AFHSC to 4 service members known to have been living at the time of the suicide death (vonBelle, 2002). This was expected to generate a group size of approximately 1,000 service members. Because these analyses did not require any information from PDHA and/or PDHRA forms, suicide death cases could be included in the analyses even if they had not completed deployment-related forms and the start date could be March 2005. For this reason the number of suicide cases available for the analyses pertaining to this study aim was larger than the previously used suicide sample which required a completed PDHA and/or PDHRA. A preliminary power analysis was conducted presuming the 4:1 ratio of controls to suicide cases and at least 50% deployment history among suicide cases. Using a 5% two-sided significance level with 80% power, the analysis showed the total sample size would need to be at least 1,000. The obtained sample size for this Aim was 1,105 service members.

Data Recoding for Aim 4: All string-format variables in the data file originally sent from AFHSC were recoded into numeric variables, with missing values manually defined when the value was blank. Observations with missing values for a particular variable were excluded from analyses involving that variable.

Results

Description of Sample for Aims 1 and 2

The sample retained for analysis for specific aims 1 and 2 contained only the most recent set of chronologically ordered PDHA/PDHRA forms completed by each individual service member. This sample was largely male, aged 25-34, enlisted in the active duty USAF as an E-4 through E-6 with 1-4 years of service, and married. There were 84,154 USAF service members (77.6%) and 24,258 USMC service members (22.4%) in the retained sample. Despite the larger number of USAF members in the sample, suicide ideation was endorsed by USMC members more frequently than by USAF members (60.1% and 39.9%, respectively). Both groups were predominantly male and Caucasian; USAF members were more likely to be married, older, and higher in rank with more time in service than USMC members. Demographic and military service characteristics of the entire sample as well as the USAF and USMC service members are provided in Table 8. Tables 9 and 10 provide demographic comparisons between the study sample and the broader DoD military data.

In terms of deployment-related and psychological factors, the majority of the total sample endorsed a history of 1-2 deployments to locations other than Iraq and Afghanistan where they did not encounter wounded, dead, or killed and were not physically injured. The total sample was also more likely to deny psychological factors than to endorse them. Demographic and military service characteristics for personnel with or without reported suicide ideation are

provided in Table 9. Table 10 provides a summary of the deployment-related and psychological factors for the same group of personnel with or without reported suicide ideation. A total of 238 (0.22%) of individuals reported some level of suicide ideation. Overall, service members who endorsed suicide ideation were predominantly male, married, aged 18-24, and Caucasian with 1-4 years of time in service.

Aim 1. Deployment-Related Factors and Suicide Ideation

The goal of this aim was to assess whether deployment-related factors including total number of deployments (in past 5 years at the time of completion of post-deployment assessments), location of deployment, being physically hurt during deployment, and exposure to wounded, killed, or dead during deployment are correlates of reported suicide ideation among a combined sample of USAF and USMC Active Duty, Guard, and Reserves, as measured by the PDHA and PDHRA (administered June 2005 – June 2008).

Suicide ideation was reported by 238 out of 108,412 service members (22 per 10,000). Adjustments for the following potential confounders were made: sex (baseline was male), age (baseline was ages 18-24), and service branch (baseline was USAF). Findings based on the logistic regression model (see Table 11 below) indicate that location of deployment, being physically injured during deployment, and exposure to wounded, killed, or dead during deployment were significantly associated with an increase in self-reported suicide ideation; number of deployments was not.

Table 11. Deployment Related Factors and Suicide Ideation

Variable	Adjusted Odds Ratio† (95% CI)	Unadjusted Odds Ratio (95% CI)
Deployment location		
Other	1 (Reference Group)	1
Afghanistan	1.97 (1.08-3.59)*	1.64 (0.90-2.98)
Iraq	1.76 (1.19-2.62)**	3.21 (2.24-4.58)***
Number of deployments		
1	1 (Reference Group)	1
2	0.85 (0.62-1.18)	1.32 (0.75-2.29)
3	1.22 (0.80-1.87)	0.93 (0.52-1.66)
4	1.80 (1.06-3.07)	1.06 (0.56-2.00)
5+	1.39 (0.78-2.47)	1.32 (0.65-2.67)
Exposure to wounded, killed, or dead	2.13 (1.64-2.77)***	2.98 (2.31-3.85)***
Physically injured	3.23 (2.46-4.24)***	3.70 (2.82-4.85)***

*p<.05; **p<.01; ***p<.001.
† Adjusted for sex, age, and branch of service
Unless otherwise specified, the reference group is "No" as reported on post-deployment forms

Hypothesis 1A – Number of deployments and SI. Overall, number of deployments did not have a statistically significant association (p=0.068) with suicidal ideation (the model compared 2-5+ deployments to a baseline level of one deployment). From the total sample, 40,006 (36.9%) members reported one deployment, 28,704 (26.5%) reported two deployments, 12,812 (11.8%) reported three deployments, 6,066 (5.6%) reported four deployments, and 6,541 (6.0%) reported five or more deployments. This finding did not confirm the hypothesis that number of deployments would be significantly associated with suicide ideation.

Hypothesis 1B - Deployment location and SI. Among the 108,412 service members in this study, 40,766 (37.6%) reported deployment to Iraq, 8,025 (7.4%) reported deployment to Afghanistan, and 33,244 (30.7%) reported deployment to "other" locations. After adjusting for the covariates (sex, age, and service branch), the odds of suicide ideation were 1.76 times higher among service members deployed to Iraq as compared to locations other than Iraq or Afghanistan (95% CI: 1.19-2.62). The odds of suicide ideation were 1.97 times higher for

deployment to Afghanistan as compared to all locations other than Iraq or Afghanistan (95% CI: 1.08 – 3.59). The unadjusted odds ratios were 1.64 for Afghanistan (95% CI: 0.90-2.98) and 3.21 for Iraq (95% CI: 2.24-4.58). These findings support the hypothesis that deployment to Iraq would serve as a correlate of suicide ideation; however deployment to Afghanistan was more strongly related to suicide ideation than deployment to Iraq.

Hypothesis 1C - Being physically injured during deployment and SI. A total of 12,403 service members in this sample endorsed being physically injured during a deployment (11.4%). Given the covariates, the odds of suicidal ideation were 3.23 times higher (95% CI: 2.46-4.24) among service members reporting physical injury. The unadjusted odds ratio was 3.70 (95% CI: 2.82-4.85). These findings support the hypothesis that self-reported injury while on deployment is associated with a significant increase in self-reported suicide ideation.

Hypothesis 1D – Exposure to wounded, killed or dead during deployment and SI. The total number of service members reporting exposure to wounded, killed, or dead during deployment was 22,731 (21%). After adjusting for the covariates, the odds of suicidal ideation were 2.13 times higher (95% CI: 1.64- 2.77) among service members exposed to wounded, killed, or dead during deployment. The unadjusted odds ratio for exposure was 2.98 (95% CI: 2.31-3.85). This supported the hypothesis that exposure to wounded, killed, or dead during deployment was associated with a significant increase in self-reported suicide ideation.

Aim 2. Psychological Factors and Suicide Ideation

The second aim was to determine whether psychological factors including depression, psychological trauma, alcohol misuse within the past month, and interpersonal conflict with one's spouse, family members, close friends, or work colleagues would be significantly correlated with reported suicide ideation among a combined sample of USAF and USMC Active

Duty, Guard, and Reserves, as measured by the PDHRA. All psychological factors examined in this aim were significantly associated with an increase in suicide ideation. Findings based on the logistic regression model are provided in Table 12 below.

Table 12. Psychological Factors and Suicide Ideation

Variable	Adjusted Odds Ratio† (95% CI)	Unadjusted Odds Ratio (95% CI)
Symptoms of depression	51.87 (29.52-91.14)***	65.20 (37.27-114.08)***
Symptoms of PTSD	16.59 (12.38-22.23)***	21.67 (16.34-28.74)***
Alcohol Misuse	8.26 (6.19-11.03)***	13.24 (10.15-17.26)***
Interpersonal conflict	20.07 (15.40-26.15)***	25.11 (19.37-32.55)***

*p<.05; **p<.01; ***p<.001.
† Adjusted for sex, age, and branch of service
Unless otherwise specified, the reference group is "No" as reported on post-deployment forms

Hypothesis 2A – Depression and SI. A total of 21,783 service members reported symptoms of depression following deployment (20.1%). Given the covariates, the odds of suicidal ideation were 51.87 times higher (95% CI: 29.52- 91.14) among service members reporting symptoms of depression. The unadjusted odds ratio was 65.20 (95% CI: 37.27-114.08). While this result is statistically significant, the 95% confidence interval is very wide, indicating that the true odds ratio cannot be estimated with any reasonable degree of precision, and should be interpreted with caution. Overall, these findings support the hypothesis that self-reported symptoms of depression are associated with a significant increase in self-reported suicide ideation.

Hypothesis 2B – Psychological trauma and SI. A total of 10,805 service members reported symptoms of psychological trauma following deployment (10%). Given the demographic covariates, the odds of suicide ideation were 16.59 times higher (95% CI: 12.38-22.23) among service members who reported symptoms of trauma. The unadjusted odds ratio

was 21.67 (95% CI: 16.34-28.74). While this result is statistically significant, the 95% confidence interval is very wide, indicating that the true odds ratio cannot be estimated with any reasonable degree of precision, and should be interpreted with caution. Overall, these findings support the hypothesis that self-reported symptoms of psychological trauma are associated with a significant increase in self-reported suicide ideation.

Hypothesis 2C – Alcohol Misuse and SI. A total of 4,539 (4.2%) service members reported alcohol misuse following deployment; 88 (1.9%) of these members also reported suicide ideation. Given the covariates, the odds of suicide ideation were 8.26 times higher among service members reporting alcohol misuse (95% CI: 6.19-11.03). The unadjusted odds ratio was 13.24 (95% CI: 10.15-17.26). These findings confirm the hypothesis that self-reported alcohol misuse following a deployment is significantly associated with an increase in self-reported suicide ideation.

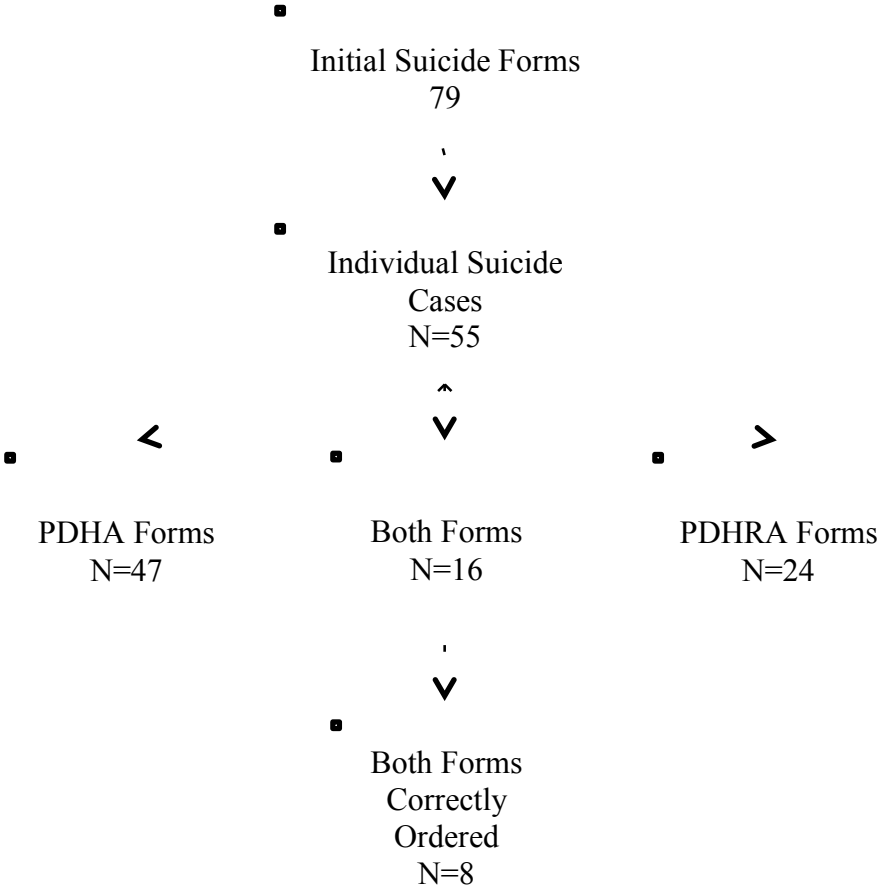
Hypothesis 2D – Interpersonal conflict with one's spouse, family members, close friends, or work colleagues and SI. A total of 5,605 service members reported interpersonal conflict after return from deployment (5.2%). Given the covariates, the odds of suicide ideation were 20.07 times higher (95% CI: 15.40-26.15) among service members who reported interpersonal conflict with one's spouse, family members, close friends, or work colleagues. The unadjusted odds ratio was 25.11 (95% CI: 19.37-32-55). While this result is statistically significant, the 95% confidence interval is very wide, indicating that the true odds ratio cannot be estimated with any reasonable degree of precision, and should be interpreted with caution. Overall, the findings support the original hypothesis that self-reported symptoms of interpersonal

conflict with one's spouse, family members, close friends, or work colleagues are significantly associated with an increase in self-reported suicide ideation.

Aim 3. Mediational Analyses: Suicide Ideation and Suicide

To test mediation models for hopelessness, alcohol misuse, impulsivity, and interpersonal conflict in the relationship between SI and SD, the following analytic approach was used. In step 1 of the mediation analysis, we needed to demonstrate a significant correlation between suicide ideation and suicide (when the mediating variables are not controlled for). From the initial 221 suicide cases provided by the USAF and USMC, there were 79 post-deployment forms available. Those forms were narrowed to 55 individual service members; 8 cases presented with both post-deployment forms in chronological order, providing insufficient cases to run this analysis. Meaningful analysis of simple relationships between suicide ideation or suicide and the mediator variables was also not possible given the low number of factor endorsements (Impulsivity = 0; Interpersonal Conflict = 0; Alcohol Misuse = 2; Hopelessness = 3). As mentioned in the previous section, efforts to include only PDHRA forms also resulted in insufficient cases (N=24). No cases of suicide which also reported suicide ideation on post-deployment forms were found. Given the insufficient sample size, the steps for the mediational analyses could not be performed beyond this point. Table 2 below shows the steps taken to determine the number of suicide cases available for analysis.

Figure 4. Suicide Cases Available for Analysis



Aim 4. Relationship between Deployment History and Suicide

The dataset for the analyses pertaining to this aim contained 1,105 cases (i.e., 221 suicide cases and 844 control cases). Based on the strong association of sex and age with suicide and their potential confounding influence, the suicide cases and the living cases were matched by AFHSC on sex and age. In addition, the two samples were matched on military service branch (e.g. USAF, USMC). The conditional logistic regression model was used to examine the impact of deployment on the likelihood of death by suicide both before and after controlling for

additional demographic variables previously mentioned (marital status, race/ethnicity, military service component (e.g. Active Duty, National Guard), rank, and time in service). In this data set, 125 of 221 suicide cases had a history of deployment (57%) and 420 of 884 controls had a history of deployment (48%).

The demographic data provided by AFHSC contained some under-populated categories. For example, there were very few military officers or members of racial/ethnic groups other than Caucasian in the data set. In order to retain the demographic variables as covariates, the under-populated categories were combined into larger, more inclusive categories. For marital status, two groups were created (Married and Other); race/ethnicity contained two groups (Caucasian and Other); military service component contained two groups (Active Duty and Other, including Guard and Reserve); military rank contained three groups (Junior Enlisted, Senior Enlisted, and Officer); and time in service contained four groups (Less than One Year, 1-4 Years, 5-8 Years, and 9+ Years). Demographics categories were compared against selected baseline sub-categories during conditional logistic regression analyses.

Hypothesis 4A – Deployment history and suicide. Before adjusting for demographic variables (marital status, race/ethnicity, military service component, rank, and time in service), deployment was associated with increased odds of suicide (odds ratio = 1.58, 95% CI = 1.13 - 2.2). However, after adding the demographic covariates into the model, the relationship between deployment and suicide was no longer statistically significant (odds ratio = 1.3, 95% CI = 0.9 – 1.9). Results are provided below in Table 13.

The demographic variables that were significantly related to suicide death, taking into account the matching on sex, age, and branch of service conducted by AFHSC, included military service component, rank, and time in service. Specifically, Active Duty members were less likely

to die by suicide than Guard or Reserve members; officers and senior enlisted members were less likely to die by suicide than junior enlisted members; and the odds of dying by suicide increased with time in service regardless of age, sex, and military service branch. The relationship between time in service and suicide was significant for 1-4 years in service (as compared to less than one year) and for 5-8 years in service (as compared to less than one year); the relationship was not significant for 9 or more years in service.

Table 13. Conditional Logistic Regression

Regression Model	**Odds Ratio (95% CI)**
Deployment †	1.58 (1.13-2.20)**
Deployment with Covariates †	1.30 (0.90-1.87)
Marital Status (Married vs. Other)	1.04 (0.73-1.50)
Race (Caucasian vs. Other)	0.91 (0.63-1.29)
Component (Active Duty vs. Other)	0.04 (0.01-0.11) ***
Rank (Officer vs. Junior Enlisted)	0.16 (0.07-0.38) ***
(Senior vs. Junior Enlisted)	0.39 (0.23-0.67) ***
Time in Service (1-4 vs. <1 Year)	2.56 (1.32-4.96) *
(5-8 vs. <1 Year)	3.71 (1.50-9.20) *
(9+ vs. <1 Year)	2.85 (0.80-10.15)

† Sample matched for sex, age, and military service branch
*p<.05; **p<.01; ***p<.001.

Discussion

Given the public health significance of suicide in the military, this study aimed to increase our overall understanding of deployment and psychological factors associated with suicide ideation based on a population-based examination of Airmen and Marines.

In general, the demographic information in this sample was in accord with previous DoD data (Maxfield, 2004; Hoge et al., 2004). The sample as a whole was predominantly male; this was expected based on military gender demographics in which females are underrepresented (Maxfield, 2004). The sample also consisted of a greater number of service members aged 18-34

of Caucasian race. This demographic finding is also in keeping with known military demographics (Maxfield, 2004), and with a 2009 study of USAF suicide burden which identified increased suicide mortality in enlisted men (Yamane & Butler, 2009).

Factors Associated with Suicide Ideation Post-Deployment

Deployment-Related Factors. In this study, deployment to Iraq and Afghanistan compared with other locations was found to be significantly associated with reported suicide ideation post-deployment. Specifically, the odds ratio for suicide ideation among service members deployed to Afghanistan (1.97) was slightly higher than the odds ratio among those deployed to Iraq (1.76). The confidence intervals for the two odds ratios overlap substantially, suggesting that the difference observed between deployment to Afghanistan and deployment to Iraq in this study may be due to chance and significance levels should be interpreted with caution.

However, this finding does mirror findings from other studies (Hoge et al., 2004; Brent, Perper, & Moritz et al., 1993; Lesage et al., 1994) which have shown positive screenings for stressful experiences and mental health concerns following military deployment to certain locations. Previous studies, however, have identified deployment to Iraq as associated with higher incidences of positive screenings for depression, generalized anxiety, and PTSD compared with deployment to Afghanistan (Hoge et al., 2004), or have examined deployment risk by military service rather than location (Hyman et al., 2011). However, it is important to note that these studies were primarily conducted during the initial years of the OIF/OEF conflicts; a change in the operational activities and tempo associated with each deployment location may have changed over time. Further research in this area is needed to delineate the specific deployment location factors related to suicide ideation. Clinically, behavioral healthcare

providers are cautioned not to erroneously assume that if an individual has been deployed to a location other than Iraq that he or she may be considered to be at a lower risk for suicide-related ideation.

Being physically hurt while on deployment was also significantly associated with suicide ideation in our sample of Airmen and Marines. This finding is consistent with research that shows the risk of suicide ideation and suicide among those with physical injury and chronic pain is approximately double that of the general population (Tang & Crane, 2006). While the post-deployment health assessment data used in this study did not specify the type of injury sustained by the service member, similar research regarding injury while on military deployment indicates that up to 59% of all service members screened for injury due to blast exposures, motor vehicle accidents, falls, or gunshot wounds to the head or neck are eventually diagnosed with some form of Traumatic Brain Injury (Tate, 2001; Warden, 2006).

Furthermore, the DoD Task Force on Suicide Prevention (2010) has specifically noted the role of physical illness in 33% of USMC suicides between 1999 and 2007. Our findings pertaining to being physically hurt while on deployment are clinically significant because they highlight the need to pay particularly close attention to the psychological health of service members who are returning from deployment with some form of injury. A deployment related physical injury may have a significant impact on the service member's daily functions during the post-deployment adjustment phase. Targeted medical as well as psychiatric treatment for this group of returning service members may be an important suicide prevention strategy.

This study found that exposure to death and/or injury during deployment was also significantly related to suicide ideation. There is existing data regarding the impact of exposure to death and/or injury on suicide-related ideation and/or behaviors, and this data is in keeping

with our findings. Previous studies have examined exposure to combat and other specific military duties such as handling human remains as risk factors for traumatic stress reactions (Kaylor et al., 1987; King, King, Vogt, Knight, & Samper, 2006; Solomon, Garb, Bleich, & Grupper, 1987; Kulka et al., 1990). A 2011 study of U.S. military OIF veterans also found that having killed someone while on military deployment was indirectly related to suicidal ideation in a study where depression and PTSD symptoms mediated the relationship between killing while on deployment and suicidal thinking after return from deployment (Maguen, Luxton, Skopp, Gahm, Reger, & Metzler et al., 2011), adding evidence to the theory that multiple deployment-related factors and experiences may influence suicide behaviors.

In keeping with the findings regarding exposure to death and injury is the fact that 60.1% of the suicide ideators in our study were USMC members despite USMC composing only 22% of the sample. While we do not have specific information regarding the duty descriptions of the USAF and USMC members in our sample, it is traditionally more likely that USMC members would be exposed to combat, killing, and injury on deployment as compared to most USAF career fields. This combat exposure may contribute to the frequency of self-reported ideation among USMC members in this study.

Our study did not find a significant relationship between number of deployments and suicidal ideation. To date, there is no empirical data on the relationship between deployment length and/or multiple deployments and suicide ideation, so these findings regarding number of deployments cannot be meaningfully compared to other data. While multiple efforts to enhance our understanding of military suicide are underway, including the IASP Task Force on Defense and Police Forces, the NATO Exploratory Team on international military suicide, the DoD Suicide Prevention and Risk Reduction Committee (SPARRC), and the DoD Suicide Event

Report (DoDSER) system, the issue of multiple military deployments remains complex and poorly understood.

Psychological Factors. In this study, reported symptoms of depression were significantly associated with suicide ideation. Studies of military populations show similar findings; service members returning from military deployment experience relatively high rates of depression symptoms (Hoge, Auchterlonie, & Milliken, 2006; Brown, Hull, & Horn, 2007; Kolkow, Spira, Morse, & Grieger, 2007), and OEF/OIF veterans with diagnoses of depressive disorder or posttraumatic stress disorder endorse suicidal ideation (Lemaire & Graham, 2011; Pietrzak, Goldstien, Malley, Rivers, Johnson et al., 2011). Clinically, behavioral healthcare providers must closely assess and monitor service members who are depressed and provide evidence-based care to manage suicide risk.

Our study also found a significant relationship between suicidal ideation and self-reported symptoms of trauma and alcohol misuse. In the military population, previous studies have shown that service members returning from military deployments experience relatively high rates of PTSD and substance use (Hoge, Auchterlonie, & Milliken, 2006; Brown, Hull, & Horn, 2007; Kolkow, Spira, Morse, & Grieger, 2007; Pietrzak et al., 2009), including a 2012 study which showed 13.9% of a previously deployed U.S. military population screened positive for probable PTSD and 39% screened positive for probable alcohol abuse (Eisen, Schultz, Vogt, Glickman, & Elwy et al., 2012). We expect that service members who screen positive on trauma and depressive symptoms are a vulnerable group for suicide-related ideation and must be treated for these conditions to address suicide risk.

Finally, our results showed a significant relationship between reported suicidal ideation and interpersonal conflict. This finding is in keeping with civilian literature demonstrating that

stressful life events such as interpersonal loss and conflict act as precipitants for suicide-related behaviors (Brent, Perper, Moritz, Baugher, Roth, et al., 1993; Lesage, Boyer, & Grunberg et al., 1994). A 2009 study of OIF and OEF veterans found that "psychosocial difficulties" and low social support were related to suicide ideation (Pietrzak et al., 2009). The DoD Task Force on the Prevention of Suicide by Members of the Armed Forces (2010) also highlighted the role of relationship problems in 67% of USAF suicides between calendar years 2003 and 2009 and 53% of USMC suicides identified between 1999 and 2007.

Mediational Analyses on Suicide Ideation and Suicide Death

Our examination of the mediational role of impulsivity, interpersonal conflict, hopelessness, and alcohol misuse could not be completed due to low numbers of suicide cases with complete post-deployment forms. Gaining a better understanding of the mediators in the relationship between suicide ideation and death by suicide is extremely important to our suicide prevention efforts. Suicide remains a statistically rare event and large sample sizes are required to be able to run these types of mediational models. Studies that can capitalize on merging various databases (e.g., what is being conducted in the ARMY STARRS study) can further our understanding of mediators that best explain the relationship between suicide ideation and death.

It is important to note that our refined data set did not include any cases in which service members that died by suicide indicated suicide ideation on their post-deployment health assessment forms. For the 8 individual service members with completed and matched post-deployment forms, this indicates that service members who ultimately died by suicide completed all required post-deployment assessments but denied suicidal ideation. This finding is in keeping with a 2011 study of active duty USAF members which emphasized assessment of multiple risk and prevention factors (individual, family, organization/workplace, and community) as opposed

to single, direct measures of suicide ideation (Langhrichsen-Rohling, Snarr, Slep, Heyman, Foran, et al., 2011). This finding also suggests that post-deployment health assessments might be poor assessments of actual suicide risk. For the remaining cases of suicide death without completed and matched forms, there is concern that service members did not participate in the required assessments. Possible reasons for incomplete assessment have been discussed elsewhere in this paper (e.g. Guard or Reserve troops lost to follow-up), however for the suicide group it must also be considered that the service members died by suicide before completing the measures, possibly while deployed.

The lack of relationship between suicide ideation and suicide in this study could also indicate concerns for the accuracy of our suicide ideation assessment. It is possible that military members who disclose suicide ideation on post-deployment assessment forms do not experience true intent to die by suicide. It is also possible that members who disclosed suicide ideation received mental health assistance and the ideation resolved; as noted in the Future Directions section of this paper we did not examine healthcare utilization in this study. Finally, our study did not support previous research which has suggested a relationship between suicide and military deployment.

Deployment History and Suicide

The present study found that the relationship between military deployment and suicide was not statistically significant after adjusting for demographic variables. The sample examined in this aim was largely male, Caucasian, married, and between the ages of 17 and 24 with an average deployment rate of 52.5%. The finding that adjusting for military service component, rank, and time in service decreased the statistical significance of the regression model seems to highlight that deployment by itself does not appear to be associated with suicide. The role of

demographic variables, factors pre-deployment, experiences during deployment, and stressors following return from deployment need further examination.

Recommendations Regarding Post-Deployment Health Assessment, Suicide-Related Ideations and Behaviors

This study generated important findings regarding the utility of the PDHA and PDHRA as research tools. Discrepancies between the two forms make it difficult to evaluate changes in self-reported symptoms during the assessment period immediately post-deployment to the assessment period three to six months after deployment. These discrepancies exist in deployment- and mental-health related items as well as general demographic and service-related variables and occur both between forms (PDHA and PDHRA) and within forms (PDHA version 2003 to version 2008). Assessment and tracking of physical and mental health concerns across the post-deployment spectrum would be greatly facilitated by standardization of forms. While this may serve to lengthen some forms and the time it takes to complete them, the current inconsistencies threaten the research utility of the assessment process and increased time requirements would be justified.

Clinical and Policy Related Suicide Prevention Implications

The clinical implications of this study include validation of the use of PDHA and PDHRA to assess deployment-related and psychological factors following deployment. This study found that multiple items assessed on these forms including deployment details and mental health symptoms are statistically related to willingness to report self-reported suicide ideation among Airmen and Marines. This study also validates the use of mental health practitioners to contact service members who report mental health symptoms on the PDHRA in order to offer further screening and/or care as appropriate, given the association between these symptoms and

suicide ideation. Finally, this study found that service members showed a willingness to disclose suicide ideation during post-deployment health assessment, despite previous findings regarding the stigma associated with receiving care. This willingness to disclose suicide ideation could be the result of DoD efforts to promote psychological health, encourage resiliency, and decrease stigma.

In addition to validating the use of the assessment forms, we also found potential support for focusing clinical intervention and services on service members with specific deployment-related and psychological factors present, for example exposure to death and injury, deployment to certain locations, and symptoms of depression, trauma, conflict, and alcohol misuse. The identification of specific factors associated with deployment as opposed to the overall experience of deployment alone is an important step in understanding self-reported suicide ideation in the United States military.

Finally, our conditional regression examining deployment and suicide showed that the statistical significance of deployment was eliminated after the addition of certain demographic covariates into the regression model. This supports the importance of proven demographic variables in evaluating a service member's risk for suicide behavior. The impact of demographic variables can also be seen in differences between the adjusted and unadjusted odds ratios for suicide ideation analyses. This finding could help identify and refine specific demographic targets, including specific military components, ranks, and time in service, for post-deployment intervention and suicide prevention efforts.

Strengths and Limitations

A major weakness of this study pertaining to the suicide ideation analyses is associated with the exclusive reliance on self-reported post-deployment health data which may not

adequately reflect the service members' distress after return from deployment. Results were further limited when confidence intervals were wide due to the small sample size. Thus, although several significant associations were found, the magnitude of the associations could not be estimated with any degree of precision. A notable weakness associated with the previously discussed sample-size problems for the mediational aim of the study must also be mentioned given that the answers to the questions about the mediational role of several factors in the relationship between suicide ideation and suicide remained largely unanswered. Finally, many demographic variables could not be used in the regression models due to missing data and/or under-populated variable groupings. This particular issue could have been addressed through the use of multiple imputation models to replace missing data. While we examined the possibility of using multiple imputation, the planned regression models were sufficient to answer the specific questions of this dissertation study after adjustment. Therefore, no imputations were performed. Given the missing data encountered in the post deployment health questionnaires, future researchers may formulate a priori plan for the handling of missing data while considering the aims and hypotheses of their planned study.

This dissertation also has a number of strengths. First, given the population based epidemiologic nature of the data, we were able to generate valuable scientific information about deployment, psychological factors, and suicide ideation. To date, this is the first study in the military that has examined the relationship of such factors to reported suicide ideation in a sample of Air Force and Marine Corps service members. Second, this study contributes to our understanding of how deployment may or may not be related to suicide ideation. Third, our findings have important clinical and policy implications for the DoD and contribute to the advancement of targeted suicide prevention efforts within the DoD system.

Future Directions

Future studies of this type should recognize the potential barriers of missing data and plan to adjust for under-populated items and sub-groups using scientifically supported statistical techniques such as multiple imputation analysis or cross-referencing with additional databases. For example, The National Defense Authorization Act (NDAA) for Fiscal Year 2010 (Section 708) mandates four person-to-person mental health assessments for each member of the Armed Forces who deploys in connection with a military contingency operation. This developing database may be helpful in future research. It may also be helpful to expand sample sizes as the PDHA and the PDHRA assessment data continues to be collected within the DoD and the expanded data set would offer more power for certain analyses. Finally, examining samples from the Army and the Navy PDHA and PDHRA assessments would additionally contribute to the knowledge base regarding suicide-related ideation and behaviors in the U.S. military. Current efforts to carefully examine deployment and psychological factors are underway for the Army (STARRS: Army Study to Assess Risk and Resilience in Service members).

Another important next step in this field would be to link mental health symptoms on PDHA and PDHRA to healthcare utilization. Existing military medical databases could be examined for relationships between psychosocial concerns following deployment and related medical or mental health treatment. This type of study would be an important step in determining the utility of PDHA and PDHRA assessments in identifying at-risk members, utilization of services by these members, and the success of population-based efforts to reduce suicide risk. Finally, future DoD efforts to collect population-based data on post-deployment health should consider the use of multiple suicide-related questions that can lead to a differentiation between suicide ideation, intent, and planning.

Tables

Table 8. Demographic and Military Service Characteristics for USAF and USMC Service Members with Paired PDHA and PDHRA Forms (N=108,412)

Characteristics	Valid for Analysis No (%)	USAF (N=84,154) No (%)	USMC (N=24,258) No (%)
Sex			
Male	94807 (87.5)	71329 (84.8)	23478 (96.8)
Female	13605 (12.5)	12825 (15.2)	780 (3.2)
Age			
18-24	40795 (37.6)	24370 (29.0)	16425 (67.7)
25-34	42255 (39.0)	36118 (42.9)	6137 (25.3)
35-44	20793 (19.2)	19221 (22.8)	1572 (6.5)
45-54	4157 (3.8)	4035 (4.2)	122 (0.5)
55+	412 (0.4)	410 (0.5)	2 (0)
Race/Ethnicity			
Asian/Pacific Islander	4392 (4.1)	3508 (4.2)	884 (3.6)
Black/African American	12231 (11.3)	10381 (12.3)	1850 (7.6)
Hispanic/Puerto Rican/Mexican	8593 (7.9)	5243 (6.2)	3350 (13.8)
Native American/ Alaskan Native	1293 (1.2)	825 (1.0)	468 (1.9)
White/Caucasian	77757 (71.1)	61113 (72.6)	16644 (68.6)
Other	973 (0.9)	840 (1.0)	133 (0.5)
Unknown	3173 (2.9)	2244 (2.7)	929 (3.8)
Marital Status			
Never Married	10465 (9.7)	3209 (3.8)	7256 (29.9)
Married	59944 (55.3)	49940 (59.3)	10004 (41.2)
Separated	1102 (1.0)	604 (0.7)	498 (2.1)
Divorced	7779 (7.2)	6971 (8.3)	808 (3.3)
Widowed	104 (0.1)	78 (0.1)	26 (0.1)
Unknown	0 (0)	22983 (27.3)	4428 (18.3)
Missing	29018 (26.8)	369 (0.4)	1238 (5.1)
Military Component			
Active Duty	94631 (87.3)	71934 (85.5)	22697 (93.6)
Nat'l Guard	11328 (10.4)	11328 (13.5)	0 (0)
Reserve	2453 (2.3)	892 (1.1)	1561 (6.4)
Time in Service			
>1 year	6 (0)	6 (0)	0 (0)
1-4 years	45658 (42.1)	27821 (33.1)	17837 (73.5)
5-8 Years	21830 (20.1)	19239 (22.9)	2591 (10.7)
9-12 years	12456 (11.5)	10830 (12.8)	1653 (6.8)
13-16 years	10350 (9.5)	9269 (11.0)	1081 (4.5)
17+ years	18112 (16.7)	17016 (20.2)	1096 (4.5)
Rank/Grade			
E1-3	16419 (15.1)	7647 (9.1)	8772 (36.2)
E4-6	65561 (60.5)	53052 (63.0)	12509 (51.6)
E7-9	11402 (10.5)	10243 (12.2)	1159 (4.8)
O1-3	9354 (8.6)	8117 (9.6)	1237 (5.1)
O4-6	0 (0)	0 (0)	0 (0)
O7-10	12 (0)	12 (0)	0 (0)
W1-5	198 (0.2)	0 (0)	198 (0.8)
Other	0 (0)	0 (0)	0 (0)
Missing	5466 (5.0)	5083 (6.0)	383 (1.6)

Percentages may not be exact due to rounding

Table 9. Demographic and Military Service Characteristics for USAF Service Members from the Current Study versus National USAF Data

Characteristics	USAF (Current Study) (%)	USAF (National Data)* (%, Where Available)
Sex		
Male	71329 (84.8)	212492 (80.7)
Female	12825 (15.2)	50747(19.3)
Age		
18-24	24370 (29.0)	100686 (38.2)
25-34	36118 (42.9)	109042 (41.4)
35-44	19221 (22.8)	47505 (18)
45+	4445 (5.2)	6206 (2.32)
Race/Ethnicity		
Asian/Pacific Islander	3508 (4.2)	6537 (2.5)
Black/African American	10381 (12.3)	44012 (16.7)
Hispanic/Puerto Rican/Mexican	5243 (6.2)	13485 (5.1)
Native American/Alaskan Native	825 (1.0)	1861 (0.7)
White/Caucasian	61113 (72.6)	188462 (71.5)
Other	840 (1.0)	N/A
Unknown	2244 (2.7)	12532 (4.8)
Marital Status		
Never Married	3209 (3.8)	N/A
Married	49940 (59.3)	147138 (55.8)**
Separated	604 (0.7)	N/A
Divorced	6971 (8.3)	19729 (7.5)**
Widowed	78 (0.1)	196 (0.1)**
Unknown	22983 (27.3)	N/A
Missing	369 (0.4)	N/A
Grade		
E1-3	7647 (9.1)	(25.8)
E4-6	53052 (63.0)	(61.2)
E7-9	10243 (12.2)	(13)
Time in service		
<1 year	6 (0)	N/A
1-4 years	27821 (33.1)	N/A
5-8 years	19239 (22.9)	N/A
9-12 years	10830 (12.8)	N/A
13-16 years	9269 (11.0)	N/A
17+ years	17016 (20.2)	N/A

* National Data drawn from report of Population Representation in the Military (2010); this data reflects only active duty enlisted members and is not representative of Guard/Reserve component or officer ranks.

** National Data regarding Marital Status drawn from the Air Force Personnel Center Interactive Demographic Analysis System for FY 2011.

Percentages may not be exact due to rounding

Table 10. Demographic and Military Service Characteristics for USMC Service Members from the Current Study versus National USMC Data

Characteristics	USMC (N=24258) No (%)	USMC National Data* (%, Where Available)
Sex		
Male	23478 (96.8)	169003 (93.3)
Female	780 (3.2)	12218 (6.7)
Age		
18-24	16425 (67.7)	115878 (63.9)
25-34	6137 (25.3)	52047 (28.7)
35-44	1572 (6.5)	12107 (6.7)
45+	124 (0.5)	1187 (0.7)
Race/Ethnicity		
Asian/Pacific Islander	884 (3.6)	4005 (2.2)
Black/African American	1850 (7.6)	19704 (10.9)
Hispanic/Puerto Rican/Mexican	3350 (13.8)	24888 (13.7)
Native American/Alaskan Native	468 (1.9)	2048 (1.1)
White/Caucasian	16644 (68.6)	141983 (71.5)
Other	133 (0.5)	N/A
Unknown	929 (3.8)	N/A
Marital Status		
Never Married	7256 (29.9)	N/A
Married	10004 (41.2)	(46.5)
Separated	498 (2.1)	N/A
Divorced	808 (3.3)	N/A
Widowed	26 (0.1)	N/A
Unknown	4428 (18.3)	N/A
Missing	1238 (5.1)	N/A
Grade		N/A
E1-3	8772 (36.2)	(46.4)
E4-6	12509 (51.6)	(45.4)
E7-9	1159 (4.8)	(8.1)
Time in service		
<1 year	0 (0)	N/A
1-4 years	17837 (73.5)	N/A
5-8 years	2591 (10.7)	N/A
9-12 years	1653 (6.8)	N/A
13-16 years	1081 (4.5)	N/A
17+ years	1096 (4.5)	N/A

* National Data drawn from report of Population Representation in the Military (2010); this data reflects only active duty enlisted members and is not representative of Guard/Reserve component or officer rank.
Percentages may not be exact due to rounding

Table 14. Demographic and Military Service Characteristics for Personnel with or without Self-Reported Suicide Ideation

Characteristics	SI (N=238)	No SI (N=104266)	Missing (N=3908)	Total (N=108412)
Sex				
Male	214 (89.9)	91198 (87.5)	3395 (86.9)	94807
Female	24 (10.1)	13068 (12.5)	513 (13.1)	13605
Age				
18-24	136 (57.1)	39343 (37.7)	1316 (33.7)	40795
25-34	62 (26)	40468 (38.8)	1725 (44.1)	42255
35-44	34 (14.2)	20001 (19.2)	758 (19.4)	20793
45-54	3 (1.3)	4055 (3.9)	99 (2.5)	4157
55+	3 (1.3)	399 (0.4)	10 (0.3)	412
Race/Ethnicity				
Asian/Pacific Islander	12 (5)	4186 (4.0)	194 (5.0)	4392
Black/African American	32 (13.4)	11654 (11.2)	545 (13.9)	12231
Hispanic/Puerto Rican/Mexican	19 (8)	8340 (8.0)	234 (6.0)	8593
Native American/ Alaskan Native	3 (0.4)	1250 (1.2)	40 (1.0)	1293
White/Caucasian	154 (64.7)	74865 (71.8)	2738 (70.0)	77757
Other	3 (0.4)	914 (0.9)	56 (1.4)	973
Unknown	15 (6.3)	3057 (2.9)	101 (2.6)	3173
Marital Status				
Never Married	55 (23.1)	9225 (8.8)	1185 (30.3)	10465
Married	106 (44.5)	57749 (55.4)	2089 (53.5)	59944
Separated	13 (5.5)	1076 (1.0)	13 (0.3)	1102
Divorced	18 (7.6)	7508 (7.2)	253 (6.5)	7779
Widowed	1 (0.4)	103 (0.1)	0	104
Unknown	40 (16.8)	27371 (26.3)	0	27411
Missing	5 (2.1)	1234 (1.2)	368 (9.4)	1607
Military Branch				
Air Force	95 (39.9)	80153 (76.9)	3906 (99.9)	84154
Marine Corps	143 (60.1)	24113 (23.1)	2 (0.1)	24258
Military Component				
Active Duty	208 (87.4)	90614 (86.9)	3809 (97.5)	94631
Nat'l Guard	12 (5.0)	11235 (10.8)	81 (2.0)	11328
Reserve	18 (7.6)	2417 (2.3)	18 (0.5)	2453
Time in Service				
>1 year	0	6 (0.0)	0	6
1-4 years	155 (65.1)	44006 (42.2)	1497 (38.3)	45658
5-8 Years	26 (10.9)	20907 (20.1)	897 (23.0)	21830
9-12 years	17 (7.1)	11911 (11.4)	528 (13.5)	12456
13-16 years	9 (3.8)	9911 (9.5)	430 (11.0)	10350
17+ years	31 (13.0)	17525 (16.8)	556 (14.2)	18112
Rank/Grade				
E1-3	86 (36.1)	15741 (15.1)	592 (15.1)	16419
E4-6	130 (54.6)	63118 (60.5)	2313 (59.2)	65561
E7-9	17 (7.1)	11015 (10.6)	370 (9.5)	11402
O1-3	5 (2.1)	8947 (8.6)	402 (10.3)	9354
O4-6	0	0	0	0
O7-10	0	9 (0.0)	3 (0.0)	12
W1-5	0	198 (0.2)	0	198
Missing	0	5238 (5.0)	228 (5.8)	5466

Percentages may not be exact due to rounding

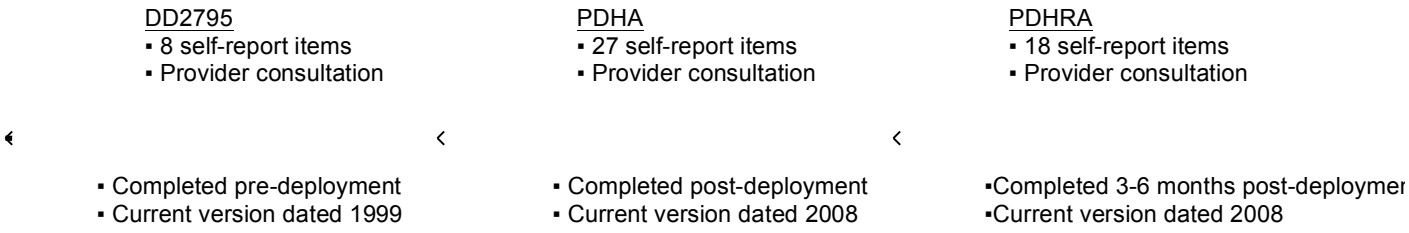
Table 15. Deployment-Related and Psychological Factors for Personnel with or without Self-Reported Suicide Ideation

Characteristics	SI (N=238)	No SI (N=104266)	Missing (N=3908)	Total (N=108412
Number of deployments				
1	113 (47.5)	38785 (37.2)	1108 (28.4)	40006
2	57 (23.9)	27778 (26.6)	869 (22.2)	28704
3	29 (12.2)	12377 (11.9)	406 (10.4)	12812
4	17 (7.1)	5834 (5.6)	215 (5.5)	6066
5+	14 (5.9)	6317 (6.0)	210 (5.4)	6541
Missing	8 (3.4)	13175 (12.6)	1100 (28.1)	14283
Location of deployment				
Iraq	149 (62.6)	40617 (39.0)	0	40766
Afghanistan	15 (6.3)	8010 (7.7)	0	8025
Other	38 (16.0)	33206 (31.8)	0	33244
Missing	36 (15.1)	22433 (21.5)	3908 (100)	26377
Saw wounded, dead, killed				
No	132 (55.5)	82119 (78.8)	3428 (87.7)	85679
Yes	106 (44.5)	22146 (21.2)	479 (12.3)	22731
Missing	0	1 (0.0)	1 (0.0)	2
Physically injured				
No	159 (66.8)	91887 (88.1)	3374 (86.3)	95429
Yes	78 (32.8)	12194 (11.7)	131 (3.4)	12403
Missing	1 (0.4)	185 (0.1)	403 (10.3)	589
Symptoms of depression				
No	13 (5.5)	81236 (77.9)	3310 (84.7)	84559
Yes	223 (93.7)	21372 (20.5)	188 (4.8)	21783
Missing	2 (0.8)	1658 (1.6)	410 (10.5)	2070
Symptoms of PTSD				
No	68 (28.6)	93287 (89.5)	3478 (89.0)	96833
Yes	168 (70.6)	10637 (10.2)	17 (0.4)	10822
Missing	2 (0.8)	342 (0.3)	413 (10.6)	757
Alcohol Misuse				
No	149 (62.6)	99538 (95.5)	3489 (89.2)	103176
Yes	88 (37.0)	4441 (4.3)	10 (0.3)	4539
Missing	1 (0.4)	287 (0.3)	409 (10.5)	697
Interpersonal conflict				
No	99 (41.6)	98462 (94.4)	3409 (87.2)	98561
Yes	138 (58.0)	5467 (5.2)	8 (0.2)	5605
Missing	1 (0.4)	337 (0.3)	410 (10.5)	410
Hopelessness				
No	21 (8.8)	87819 (84.2)	3406 (87.2)	87840
Yes	215 (90.3)	14527 (13.9)	91 (2.3)	14742
Missing	2 (0.8)	1920 (1.8)	411 (10.5)	5830
Impulsivity				
No	126 (52.9)	64324 (61.7)	0	64450
Yes	111 (46.6)	565 (0.5)	0	676
Missing	1 (0.4)	39377 (37.8)	3908 (100)	43286

Percentages may not be exact due to rounding

Figures

Figure 1. Description of Different Versions of Post-Deployment Assessment Forms



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APPENDIX A
Health Assessment Forms

DD Form 2795

The Pre-Deployment Health Assessment Form is a required screening that allows military service members to report information about their general health and share any concerns they have prior to deployment. The form includes an interview portion completed by a health care provider (Deployment Health Clinical Center). This form was initiated in May of 1999.

DD Form 2796

The purpose of the Post-Deployment Health Assessment screening is to review each service member's current health, mental health or psychosocial issues commonly associated with deployments, special medications taken during the deployment, possible deployment-related occupational/environmental exposures, and to discuss deployment-related health concerns. Positive responses require the use of supplemental assessment tools and/or referrals for medical consultation. Each individual who requires a DD Form 2796 must be scheduled for a face-to-face health assessment with a trained health care provider (physician, physician assistant, nurse practitioner, advanced practice nurse, independent duty corpsman, independent duty medical technician, or Special Forces medical sergeant) during in-theater medical out-processing or within 30 days after returning to home or processing station. The provider will document concerns and referral needs and discuss resources available to help resolve any post-deployment issues. The current version of the DD Form 2796, which is dated January 2008, replaces the previous version dated April 2003. The form was updated to enhance questions on physical and behavioral health and add questions regarding traumatic brain injury (Deployment Health Clinical Center).

DD Form 2900

The Post-Deployment Health Reassessment (PDHRA) Program is a program mandated by the Assistant Secretary of Defense for Health Affairs in March 2005 and designed to identify and address health concerns, with specific emphasis on mental health, that have emerged over time since deployment. The PDHRA provides for a second health assessment using DD Form 2900 during the three- to six-month time period after return from deployment, ideally at the three to four month mark. The reassessment is scheduled for completion before the end of 180 days after return so that Reserve Component members have the option of treatment using their TRICARE health benefit. After servicemembers have completed the form, a healthcare provider will discuss with the service member any health concerns which they have indicated on the form and will make referrals to appropriate healthcare or community-based services if further evaluation or treatment is needed. The current version of the DD Form 2900, which is dated January 2008, replaces the original version dated June 2005. The form was updated to enhance questions on behavioral health and add questions on traumatic brain injury (Deployment Health Clinical Center).

APPENDIX B

PDHA Post-Deployment Health Assessment (2003 Version)

4 Pages Total

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
- ○ Male
- ○ Female

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

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

Pay Grade

○ E1	○ O01	○ W1
○ E2	○ O02	○ W2
○ E3	○ O03	○ W3
○ E4	○ O04	○ W4
○ E5	○ O05	○ W5
○ E6	○ O06	
○ E7	○ O07	○ Other
○ E8	○ O08	
○ E9	○ O09	
	○ O10	

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

To what areas were you mainly deployed: (mark all that apply - list where/date arrived)
- ○ Kuwait _____
- ○ Qatar _____
- ○ Afghanistan _____
- ○ Bosnia _____
- ○ On a ship _____
- ○ Iraq _____
- ○ Turkey _____
- ○ Uzbekistan _____
- ○ Kosovo _____
- ○ CONUS _____
- ○ 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	
○	○	○	Medical threat debriefing completed
○	○	○	Medical information sheet distributed
○	○	○	Post Deployment serum specimen collected

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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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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

_____

_____

_____

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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 33348

APPENDIX C

PDHA Post-Deployment Health Assessment (2008 Version)

7 Pages Total

This form must be completed electronically. Handwritten forms will not be accepted.

POST-DEPLOYMENT HEALTH ASSESSMENT (PDHA)

PRIVACY ACT STATEMENT

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

PRINCIPAL PURPOSE(S): To assess your state of health after deployment in support of military operations and to assist military healthcare providers in identifying and providing present and future medical care you may need. The information you provide may result in a referral for additional healthcare that may include medical, dental or behavioral healthcare or diverse community support services.

ROUTINE USE(S): In addition to those disclosures generally permitted under 5 U.S.C. 552a(b) of the Privacy Act, to other Federal and State agencies and civilian healthcare providers, as necessary, in order to provide necessary medical care and treatment. Responses may be used to guide possible referrals.

DISCLOSURE: Voluntary. If not provided, healthcare WILL BE furnished, but comprehensive care may not be possible.

INSTRUCTIONS: Please read each question completely and carefully before entering your response or marking your selection. **YOU ARE ENCOURAGED TO ANSWER EACH QUESTION. ANSWERING THESE QUESTIONS WILL NOT DELAY YOUR RETURN HOME.** Withholding or providing inaccurate information may impair a healthcare provider's ability to identify health problems and refer you to appropriate sources for additional evaluation or treatment. If you do not understand a question, please ask for help.

DEMOGRAPHICS

Last Name _____ **First Name** _____ **Middle Initial** _____

Social Security Number _____ **Today's Date** *(dd/mmm/yyyy)* _____

Name of Your Unit during this Deployment _____ **Date of Birth** *(dd/mmm/yyyy)* _____

Gender
O Male O Female

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

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

Pay Grade
- O E1 O E2 O E3 O E4 O E5 O E6 O E7 O E8 O E9
- O O1 O O2 O O3 O O4 O O5 O O6 O O7 O O8 O O9 O O10
- O W1 O W2 O W3 O W4 O W5
- O Other

Date of arrival in theater *(dd/mmm/yyyy)* _____

Date of departure from theater *(dd/mmm/yyyy)* _____ **Name of Operation:** _____

Location of Operation. To what areas were you mainly deployed *(land-based operations for more than 30 days)*?
(Please mark all that apply, including the number of months spent at each location.)

- O Country 1 _____ Time at location *(months)* _____
- O Country 2 _____ Time at location *(months)* _____
- O Country 3 _____ Time at location *(months)* _____
- O Country 4 _____ Time at location *(months)* _____
- O Country 5 _____ Time at location *(months)* _____

Occupational specialty during this deployment *(MOS/AOC, NEC/NOBC, or AFSC)*: _____

Combat specialty: _____

Current Contact Information:
Phone: _____
Cell: _____
DSN: _____
Email: _____
Address: _____

Point of Contact who can always reach you:
Name: _____
Phone: _____
Email: _____
Mailing Address: _____

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number:

1. **Overall, how would you rate your health during the PAST MONTH?**
   - O Excellent
   - O Very Good
   - O Good
   - O Fair
   - O Poor

2. **Compared to before this deployment, how would you rate your health in general now?**
   - O Much better now than before I deployed
   - O Somewhat better now than before I deployed
   - O About the same as before I deployed
   - O Somewhat worse now than before I deployed
   - O Much worse now than before I deployed

3. **During the past 4 weeks, how difficult have physical health problems** *(illness or injury)* **made it for you to do your work or other regular daily activities?**
   - O Not difficult at all
   - O Somewhat difficult
   - O Very difficult
   - O Extremely difficult

4. **During the past 4 weeks, how difficult have emotional problems** *(such as feeling depressed or anxious)* **made it for you to do your work, take care of things at home, or get along with other people?**
   - O Not difficult at all
   - O Somewhat difficult
   - O Very difficult
   - O Extremely difficult

5. **How many times were you seen by a healthcare provider** *(physician, PA, medic, corpsman, etc.)* **for a medical problem or concern during this deployment?**

6. **Did you have to spend one or more nights in a hospital as a patient during this deployment?**
   - O No
   - O Yes. Reason/dates:

7. **Were you wounded, injured, assaulted or otherwise hurt during this deployment?**
   - O No
   - O Yes

7a. **IF YES, are you still having problems related to this event?**
   - O No
   - O Yes
   - O Unsure

8. **For any of the following symptoms, please indicate whether you went to see a healthcare provider** *(physician, PA, medic, corpsman, etc.)*, **were placed on quarters** *(Qtrs)* **or given light/limited duty** *(Profile)*, **and whether you are still bothered by the symptom now.**

Symptom	Sick Call?		Qtrs/Profile?		Still Bothered?		Symptom	Sick Call?		Qtrs/Profile?		Still Bothered?	
	No	Yes	No	Yes	No	Yes		No	Yes	No	Yes	No	Yes
Fever	O	O	O	O	O	O	Dizzy, light headed, passed out	O	O	O	O	O	O
Cough lasting more than 3 weeks	O	O	O	O	O	O	Diarrhea	O	O	O	O	O	O
Trouble breathing	O	O	O	O	O	O	Vomiting	O	O	O	O	O	O
Bad headaches	O	O	O	O	O	O	Frequent indigestion/ heartburn	O	O	O	O	O	O
Generally feeling weak	O	O	O	O	O	O	Problems sleeping or still feeling tired after sleeping	O	O	O	O	O	O
Muscle aches	O	O	O	O	O	O	Trouble concentrating, easily distracted	O	O	O	O	O	O
Swollen, stiff or painful joints	O	O	O	O	O	O	Forgetful or trouble remembering things	O	O	O	O	O	O
Back pain	O	O	O	O	O	O	Hard to make up your mind or make decisions	O	O	O	O	O	O
Numbness or tingling in hands or feet	O	O	O	O	O	O	Increased irritability	O	O	O	O	O	O
Trouble hearing	O	O	O	O	O	O	Skin diseases or rashes	O	O	O	O	O	O
Ringing in the ears	O	O	O	O	O	O	Other *(please list)*:	O	O	O	O	O	O
Watery, red eyes	O	O	O	O	O	O							
Dimming of vision, like the lights were going out	O	O	O	O	O	O							
Chest pain or pressure	O	O	O	O	O	O							

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number:

9.a. During this deployment, did you experience any of the following events? *(Mark all that apply)*

(1) Blast or explosion *(IED, RPG, land mine, grenade, etc.)*	O No	O Yes
(2) Vehicular accident/crash *(any vehicle, including aircraft)*	O No	O Yes
(3) Fragment wound or bullet wound above your shoulders	O No	O Yes
(4) Fall	O No	O Yes
(5) Other event *(for example, a sports injury to your head)*. Describe:	O No	O Yes

9.b. Did any of the following happen to you, or were you told happened to you, IMMEDIATELY after any of the event(s) you just noted in question 9.a.? *(Mark all that apply)*

(1) Lost consciousness or got "knocked out"	O No	O Yes
(2) Felt dazed, confused, or "saw stars"	O No	O Yes
(3) Didn't remember the event	O No	O Yes
(4) Had a concussion	O No	O Yes
(5) Had a head injury	O No	O Yes

9.c. Did any of the following problems begin or get worse after the event(s) you noted in question 9.a.? *(Mark all that apply)*

(1) Memory problems or lapses	O No	O Yes
(2) Balance problems or dizziness	O No	O Yes
(3) Ringing in the ears	O No	O Yes
(4) Sensitivity to bright light	O No	O Yes
(5) Irritability	O No	O Yes
(6) Headaches	O No	O Yes
(7) Sleep problems	O No	O Yes

9.d. In the past week, have you had any of the symptoms you indicated in 9.c.? *(Mark all that apply)*

(1) Memory problems or lapses	O No	O Yes
(2) Balance problems or dizziness	O No	O Yes
(3) Ringing in the ears	O No	O Yes
(4) Sensitivity to bright light	O No	O Yes
(5) Irritability	O No	O Yes
(6) Headaches	O No	O Yes
(7) Sleep problems	O No	O Yes

10. Did you encounter dead bodies or see people killed or wounded during this deployment? *(Mark all that apply)*
O No O Yes (O Enemy O Coalition O Civilian)

11. Were you engaged in direct combat where you discharged a weapon?
O No O Yes (O land O sea O air)

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

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

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

14. Over the PAST MONTH, have you been bothered by the following problems?

	Not at all	Few or several days	More than half the days	Nearly every day
a. Little interest or pleasure in doing things	O	O	O	O
b. Feeling down, depressed, or hopeless	O	O	O	O

15. Alcohol is occasionally available during deployments, e.g., R&R, port call, etc. Prior to deploying or during this deployment:

a. Did you use alcohol more than you meant to? O No O Yes

b. Have you felt that you wanted to or needed to cut down on your drinking? O No O Yes

c. How often do you have a drink containing alcohol?
O Never O Monthly or less O 2 to 4 times a month O 2 to 3 times a week O 4 or more times a week

d. How many drinks containing alcohol do you have on a typical day when you are drinking?
O 1 or 2 O 3 or 4 O 5 or 6 O 7 to 9 O 10 or more

e. How often do you have six or more drinks on one occasion?
O Never O Less than monthly O Monthly O Weekly O Daily

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number:

16. Are you worried about your health because you were exposed to: *(Mark all that apply)*	No	Yes
Animal bites	O	O
Animal bodies *(dead)*	O	O
Chlorine gas	O	O
Depleted uranium *(If yes, explain)* _____	O	O
Excessive vibration	O	O
Fog oils (smoke screen	O	O
Garbage	O	O
Human blood, body fluids, body parts, or dead bodies	O	O
Industrial pollution	O	O
Insect bites	O	O
Ionizing radiation	O	O
JP8 or other fuels	O	O
Lasers	O	O
Loud noises	O	O
Paints	O	O
Pesticides	O	O
Radar/Microwaves	O	O
Sand/dust	O	O
Smoke from burning trash or feces	O	O
Smoke from oil fire	O	O
Solvents	O	O
Tent heater smoke	O	O
Vehicle or truck exhaust fumes	O	O
Other exposures to toxic chemicals or materials, such as ammonia, nitric acid, etc.: *(If yes, explain)* _____	O	O

17. Were you exposed to any chemicals or other hazard *(industrial, environmental, etc.)* **that required you to seek immediate medical care?**

O No O Yes

18. Did you enter or closely inspect any destroyed military vehicles?

O No O Yes

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

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

_____

20. This question assesses your personal risk for exposure to tuberculosis or other local infectious diseases. Would you say your INDOOR contact with local or 3rd country nationals was:

O None O Minimal *(less than 1 hour per week)* O Moderate *(1 or more hours per week, but not daily)* O Extensive *(at least 1 hour per day, every day)*

21. Force Health Protection Measures. Please indicate which of the following items you used during this deployment and how often you used them.

	Daily	Most days	Some days	Never	Not available	Not required
DEET insect repellent applied to skin	O	O	O	O	O	O
Pesticide-treated uniforms	O	O	O	O	O	O
Eye protection *(not commercial sunglasses or prescription glasses)*	O	O	O	O	O	O
Hearing protection	O	O	O	O	O	O
N-95 or other respirator *(not gas mask)*	O	O	O	O	O	O
Pills to stay awake, like dexedrine	O	O	O	O	O	O
Anti-NBC meds	O	O	O	O	O	O
Pyridostigmine *(nerve agent pill)*	O	O	O	O	O	O
Nerve agent antidote injector	O	O	O	O	O	O
Seizure/convulsion antidote injector	O	O	O	O	O	O
NBC gas mask	O	O	O	O	O	O
MOPP over garments	O	O	O	O	O	O

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number:

22. **Did you receive any vaccinations just before or during this deployment?**
    - O Smallpox *(leaves a scar on the arm)*
    - O Anthrax
    - O Botulism
    - O Typhoid
    - O Meningococcal
    - O Yellow Fever
    - O Other, list: _____
    - O No
    - O Don't know

23. **Were you told to take medicines to prevent malaria?**
    - O No O Yes

    If YES, please indicate which medicines you took and whether you missed any doses. *(Mark all that apply)*

Anti-malarial medications	Took All Pills
O Chloroquine (Aralen®)	O No O Yes
O Doxycycline (Vibramycin®)	O No O Yes
O Mefloquine (Lariam®)	O No O Yes
O Primaquine	O No O Yes
O Other : _____	O No O Yes

24. **Would you like to schedule a visit with a healthcare provider to further discuss your health concern(s)?** O No O Yes

25. **Are you currently interested in receiving information or assistance for a stress, emotional or alcohol concern?** O No O Yes

26. **Are you currently interested in receiving assistance for a family or relationship concern?** O No O Yes

27. **Would you like to schedule a visit with a chaplain or a community support counselor?** O No O Yes

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number:

Health Care Provider Only

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

1. **Do you have any medical or dental problems that developed during this deployment?** O Yes O No
   If yes, are the problems still bothering you now? O Yes O No

2. **Are you currently on a profile (or LIMDU) that restricts your activities (light or limited duty)?** O Yes O No
   If yes: For what reason? _____ O NA
   Is your condition due to an injury or illness that occurred during the deployment? O Yes O No O NA
   Did you have similar problems prior to deployment? O Yes O No O NA
   If so, did your condition worsen during the deployment? O Yes O No O NA

3. **Ask the following behavioral risk questions. Conduct risk assessment as necessary.**
   a. Over the PAST MONTH, have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way? O Yes O No
      IF YES, about how often have you been bothered by these thoughts? O A few days O More than half of the time O Nearly every day
   b. Over the PAST MONTH, have you had thoughts or concerns that you might hurt or lose control with someone? O Yes O No O Unsure

4. **If member reports YES or UNSURE responses to 3.a. or 3.b., conduct risk assessment.**
   a. Does member pose a current risk for harm to self or others? O No, not a current risk O Yes, poses a current risk O Unsure
   b. Outcome of assessment O Immediate referral O Routine follow-up referral O Referral not indicated

5. **Alcohol screening result**
   O No evidence of alcohol-related problems
   O Potential alcohol problem (positive response to either question 15.a. or 15.b. and/or AUDIT-C (questions 15.c.-e.) score of 4 or more for men or 3 or more for women).
   Refer to PCM for evaluation. O Yes O No

6. **During this deployment have you sought, or do you now intend to seek, counseling or care for your mental health?** O Yes O No

7. **Traumatic Brain Injury (TBI) risk assessment**
   O No evidence of risk based on responses to questions 9.a. - d.
   O Potential TBI with persistent symptoms, based on responses to question 9.d.
   Refer for additional evaluation. O Yes O No

8. **Tuberculosis risk assessment, based on response to question 20.**
   O Minimal risk
   O Increased risk
   Recommend tuberculosis skin testing in 60-90 days O Yes O No

9. **Depleted Uranium (DU) risk assessment, based on responses to question 16 (DU, Yes) or question 18 (Yes).**
   O No evidence of exposure to depleted uranium
   O Potential exposure to depleted uranium
   Refer to PCM for completion of DD Form 2872 and possible 24-hour urinalysis. O Yes O No

10. **Do you have any other concerns about possible exposures or events during this deployment that you feel may affect your health?** O Yes O No
    Please list your concerns: _____

11. **Do you currently have any questions or concerns about your health?** O Yes O No
    Please list your concerns: _____

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number:

Health Assessment

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

11. Identified Concerns	Minor Concern	Major Concern	Already Under Care	
			Yes	No
○ Physical Symptom(s)	○	○	○	○
○ Exposure Symptom(s)	○	○	○	○
○ Environmental	○	○	○	○
○ Occupational	○	○	○	○
○ Combat or mission-related	○	○	○	○
○ Depression symptoms	○	○	○	○
○ PTSD symptoms	○	○	○	○
○ Anger/Aggression	○	○	○	○
○ Suicidal Ideation	○	○	○	○
○ Social/Family Conflict	○	○	○	○
○ Alcohol Use	○	○	○	○
○ Other:_____	○	○	○	○

13. Comments:

12. Referral Information	Within 24 hours	Within 7 days	Within 30 days
a. Primary Care, Family Practice	○	○	○
b. Behavioral Health in Primary Care	○	○	○
c. Mental Health Specialty Care	○	○	○
d. Other specialty care:			
Audiology	○	○	○
Cardiology	○	○	○
Dentistry	○	○	○
Dermatology	○	○	○
ENT	○	○	○
GI	○	○	○
Internal Medicine	○	○	○
Neurology	○	○	○
OB/GYN	○	○	○
Ophthalmology	○	○	○
Optometry	○	○	○
Orthopedics	○	○	○
Pulmonology	○	○	○
Urology	○	○	○
e. Case Manager, Care Manager	○	○	○
f. Substance Abuse Program	○	○	○
g. Health Promotion, Health Education	○	○	○
h. Chaplain	○	○	○
i. Family Support, Community Service	○	○	○
j. Military OneSource	○	○	○
k. Other: _____	○	○	○
l. No referral made ○			

I certify that this review process has been completed.

Provider's signature and stamp:

This visit is coded by V70.5 _ E

Date *(dd/mmm/yyyy)*

S A M P L E

Ancillary Staff/Administrative Section

14. Member was provided the following:	15. Referral was made to the following healthcare or support system:
○ Medical Threat Debrief	○ Military Treatment Facility
○ Health Education and Information	○ Division/Line-based medical resource
○ Health Care Benefits and Resources Information	○ VA Medical Center or Community Clinic
○ Appointment Assistance	○ Vet Center
○ Service member declined to complete form	○ TRICARE Provider
○ Service member declined to complete interview/assessment	○ Contract Support: _____
○ Service member declined referral for services	○ Community Service: _____
○ LOD	○ Other: _____
○ Post-deployment blood specimen collected (if required)	○ None
○ Other: _____	

APPENDIX D

PDHRA Post-Deployment Health Reassessment (2005 Version)

4 Pages Total

POST-DEPLOYMENT HEALTH REASSESSMENT (PDHRA)

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 in support of military operations and to assist military healthcare providers, including behavioral health providers, in identifying present and future medical care needs you may have. The information you provide may result in a referral for additional healthcare that may include behavioral healthcare.

Routine Use: To other Federal and State agencies and civilian healthcare providers as necessary in order to provide necessary medical care and treatment. Responses may be used to guide possible referrals.

Disclosure: Disclosure is voluntary.

INSTRUCTIONS: Please read each question completely and carefully before making your selections. Provide a response for each question. If you do not understand a question, ask the administrator. Please respond based on your MOST RECENT DEPLOYMENT.

Demographics

Last Name

First Name **MI**

Today's Date (dd/mm/yyyy) / /

DOB (dd/mm/yyyy) / /

Date arrived theater (mm/yyyy) /

Date departed theater (mm/yyyy) /

Social Security Number — —

Gender
- ○ Male
- ○ Female

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

Marital Status
- ○ Never Married
- ○ Married
- ○ Separated
- ○ Divorced
- ○ Widowed

Status Prior to Deployment
- ○ Active Duty
- ○ Selected Reserves - Reserve - Unit
- ○ Selected Reserves - Reserve - AGR
- ○ Selected Reserves - Reserve - IMA
- ○ Selected Reserves - National Guard - Unit
- ○ Selected Reserves - National Guard - AGR
- ○ Ready Reserves - IRR
- ○ Ready Reserves - ING
- ○ Civilian Government Employee
- ○ Other

Pay Grade

○ E1	○ O01	○ W1
○ E2	○ O02	○ W2
○ E3	○ O03	○ W3
○ E4	○ O04	○ W4
○ E5	○ O05	○ W5
○ E6	○ O06	
○ E7	○ O07	○ Other
○ E8	○ O08	
○ E9	○ O09	
	○ O10	

Location of Operation
- ○ Iraq
- ○ Afghanistan
- ○ Kuwait
- ○ Qatar
- ○ Bosnia/Kosovo
- ○ SW Asia - other
- ○ Africa
- ○ South America
- ○ North America
- ○ Australia
- ○ Europe
- ○ On a ship
- ○ Other: _____

Since return from deployment I have:
- ○ Maintained/returned to previous status
- ○ Transitioned to Selected Reserves: _____
- ○ Transitioned to Ready Reserves: _____
- ○ Retired from Military Service
- ○ Separated from Military Service

Current Contact Information:

Phone: _____
Cell: _____
DSN: _____
Email: _____
Address: _____

Total Deployments in Past 5 Years:

OIF	OEF	Other
○ 1	○ 1	○ 1
○ 2	○ 2	○ 2
○ 3	○ 3	○ 3
○ 4	○ 4	○ 4
○ 5 or more	○ 5 or more	○ 5 or more

Current Unit of Assignment

_____

Current Assignment Location

_____

_____

Point of Contact who can always reach you:

Name: _____
Phone: _____
Email: _____
Mailing Address: _____

33348

DD FORM 2900, JUN 2005 ASD(HA) APPROVED

1. Overall, how would you rate your health during the PAST MONTH?
   ○ Excellent ○ Very Good ○ Good ○ Fair ○ Poor

2. Compared to before your most recent deployment, how would you rate your health in general now?
   ○ Much better now than before I deployed
   ○ Somewhat better now than before I deployed
   ○ About the same as before I deployed
   ○ Somewhat worse now than before I deployed
   ○ Much worse now than before I deployed

3. Since you returned from deployment, about how many times have you seen a healthcare provider for any reason, such as in sick call, emergency room, primary care, family doctor, or mental health provider?
   ○ No visits ○ 1 visit ○ 2-3 visits ○ 4-5 visits ○ Over 6 visits

4. Since you returned from deployment, have you been hospitalized? ○ Yes ○ No

5. During your deployment, were you wounded, injured, assaulted or otherwise physically hurt? ○ Yes ○ No
   If NO, skip to Question 6.

   5a. **IF YES**, are you still having problems related to this wound, assault, or injury? ○ Yes ○ No ○ Unsure

6. Other than wounds or injuries, do you currently have a health concern or condition that you feel is related to your deployment? ○ Yes ○ No ○ Unsure
   IF NO, skip to Question 7.

   6a. **IF YES**, please mark the item(s) that best describe your deployment-related condition or concern:

   ○ Chronic cough
   ○ Runny nose
   ○ Fever
   ○ Weakness
   ○ Headaches
   ○ Swollen, stiff or painful joints
   ○ Back pain
   ○ Muscle aches
   ○ Numbness or tingling in hands or feet
   ○ Skin diseases or rashes
   ○ Ringing of the ears
   ○ Redness of eyes with tearing
   ○ Dimming of vision, like the lights were going out
   ○ Chest pain or pressure
   ○ Dizziness, fainting, light headedness
   ○ Difficulty breathing
   ○ Diarrhea, vomiting, or frequent indigestion
   ○ Problems sleeping or still feeling tired after sleeping
   ○ Difficulty remembering
   ○ Increased irritability
   ○ Taking more risks such as driving faster
   ○ Other: _____

7. Do you have any persistent major concerns regarding the health effects of something you believe you may have been exposed to or encountered while deployed? ○ Yes ○ No
   IF NO, skip to Question 8.

   7a. **IF YES**, please mark the item(s) that best describe your concern:

   ○ 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
   ○ Radiation
   ○ Radar/microwaves
   ○ Lasers
   ○ Loud noises
   ○ Excessive vibration
   ○ Industrial pollution
   ○ Sand/dust
   ○ Blast or motor vehicle accident
   ○ Depleted Uranium (if yes, explain)
   _____
   ○ Other: _____

8. Since return from your deployment, have you had serious conflicts with your spouse, family members, close friends, or at work that continue to cause you worry or concern? ○ Yes ○ No ○ Unsure

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

   a. Have had any nightmares about it or thought about it when you did not want to ○ Yes ○ No

   b. Tried hard not to think about it or went out of your way to avoid situations that remind you of it ○ Yes ○ No

   c. Were constantly on guard, watchful, or easily startled ○ Yes ○ No

   d. Felt numb or detached from others, activities, or your surroundings ○ Yes ○ No

10. a. In the PAST MONTH, did you use alcohol more than you meant to? ○ Yes ○ No

    b. In the PAST MONTH, have you felt that you wanted to or needed to cut down on your drinking? ○ Yes ○ No

11. Over the PAST MONTH, have you been bothered by the following problems?	Not at all	Few or several days	More than half the days	Nearly every day
a. Little interest or pleasure in doing things	○	○	○	○
b. Feeling down, depressed, or hopeless	○	○	○	○

12. If you checked off any problems or concerns on this questionnaire, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

    ○ Not difficult at all ○ Somewhat difficult ○ Very difficult ○ Extremely difficult

13. Would you like to schedule a visit with a healthcare provider to further discuss your health concern(s)? ○ Yes ○ No

14. Are you currently interested in receiving information or assistance for a stress, emotional or alcohol concern? ○ Yes ○ No

15. Are you currently interested in receiving assistance for a family or relationship concern? ○ Yes ○ No

16. Would you like to schedule a visit with a chaplain or a community support counselor? ○ Yes ○ No

Health Care Provider Only

SERVICE MEMBER'S SOCIAL SECURITY # ___ - ___ - ____

DATE (dd/mm/yyyy) __ / __ / ____

Provider Review and Interview

1. Review symptoms and deployment concerns identified on form:
   - ○ Confirmed screening results as reported
   - ○ Screening results modified, amended, clarified during interview: _____
2. Ask behavioral risk questions.
   a. Over the PAST MONTH, have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way? ○ Yes ○ No
      IF YES, about how often have you been bothered by these thoughts? ○ Very few days ○ More than half of the time ○ Nearly every day
   b. Since return from your deployment, have you had thoughts or concerns that you might hurt or lose control with someone? ○ Yes ○ No ○ Unsure
3. **IF YES OR UNSURE** to behavioral risk questions, conduct risk assessment.
   a. Does member pose a current risk for harm to self or others? ○ No, not a current risk ○ Yes, poses a current risk ○ Unsure, referred
   b. Outcome of assessment ○ Immediate referral ○ Routine follow-up referral ○ Referral not indicated
4. Record additional questions or concerns identified by patient during interview:

_____

_____

Assessment and Referral:

After my interview with the service member and review of this form, there is a need for further evaluation and follow-up as indicated below. (More than one may be noted for patients with multiple concerns.)

5. Identified Concerns

	Minor Concern	Major Concern	Already Under Care: Yes	Already Under Care: No
○ Physical Symptom	○	○	○	○
○ Exposure Concern	○	○	○	○
○ Depression Symptoms	○	○	○	○
○ PTSD Symptoms	○	○	○	○
○ Anger/Aggression	○	○	○	○
○ Suicidal Ideation	○	○	○	○
○ Social/Family Conflict	○	○	○	○
○ Alcohol Use	○	○	○	○
○ Other: _____	○	○	○	○
○ None				

6. Referral Information
   - ○ a. No referral made
   - ○ b. Immediate/emergent care
   - ○ c. Primary Care, Family Practice
   - ○ d. Specialty Care: _____
   - ○ e. Behavioral Health in Primary Care
   - ○ f. Mental Health Specialty Care
   - ○ g. Case Manager, Care Manager
   - ○ h. Substance Abuse Program
   - ○ i. Health Promotion, Health Education
   - ○ j. Other Healthcare Service
   - ○ k. Chaplain
   - ○ l. Family Support, Community Service
   - ○ m. Military OneSource
   - ○ n. Other: _____
7. Comments:

_____

_____
8. Provider
   a. Name (Last, First) _____
   b. Signature and stamp: _____

ICD-9 Code for this visit: V70.5_6

Ancillary Staff/Administrative Section

9. Member was provided the following:
   - ○ Health Education and Information
   - ○ Health Care Benefits and Resources Information
   - ○ Appointment Assistance
   - ○ Service member declined to complete form
   - ○ Service member declined to complete interview/assessment
   - ○ Service member declined referral for services
   - ○ Other: _____

     _____
10. Referral made to the following healthcare or support system:
    - ○ Military Treatment Facility
    - ○ Division/Line-Based Medical Resource
    - ○ VA Medical Center or Community Clinic
    - ○ Vet Center
    - ○ TRICARE Provider
    - ○ Contract Support: _____
    - ○ Community Service: _____
    - ○ Other: _____
    - ○ None

33348

APPENDIX E

PDHRA Post-Deployment Health Reassessment (2008 Version)

5 Pages Total

This form must be completed electronically. Handwritten forms will not be accepted.

POST-DEPLOYMENT HEALTH RE-ASSESSMENT (PDHRA)

PRIVACY ACT STATEMENT

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

PRINCIPAL PURPOSE(S): To assess your state of health after deployment in support of military operations and to assist military healthcare providers in identifying and providing present and future medical care you may need. The information you provide may result in a referral for additional healthcare that may include medical, dental or behavioral healthcare or diverse community support services.

ROUTINE USE(S): In addition to those disclosures generally permitted under 5 U.S.C. 552a(b) of the Privacy Act, to other Federal and State agencies and civilian healthcare providers, as necessary, in order to provide necessary medical care and treatment.

DISCLOSURE: Voluntary. If not provided, healthcare WILL BE furnished, but comprehensive care may not be possible.

INSTRUCTIONS: Please read each question completely and carefully before entering your response or marking your selection. **YOU ARE ENCOURAGED TO ANSWER EACH QUESTION.** Withholding or providing inaccurate information may impair a healthcare provider's ability to identify health problems and refer you to appropriate sources for additional evaluation or treatment. If you do not understand a question, please ask for help. Please respond based on your **MOST RECENT DEPLOYMENT**.

DEMOGRAPHICS

Last Name _____ **First Name** _____ **Middle Initial** _____

Social Security Number _____ **Date of Birth** *(dd/mmm/yyyy)* _____ **Today's Date** *(dd/mmm/yyyy)* _____

Date arrived theater *(dd/mmm/yyyy)* _____ **Date departed theater** *(dd/mmm/yyyy)* _____

Gender
- O Male
- O Female

Marital Status
- O Never Married
- O Married
- O Separated
- O Divorced
- O Widowed

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

Status Prior to Deployment
- O Active Duty
- O Selected Reserves - Reserve - Unit
- O Selected Reserves - Reserve - AGR
- O Selected Reserves - Reserve - IMA
- O Selected Reserves - National Guard - Unit
- O Selected Reserves - National Guard - AGR
- O Ready Reserves - IRR
- O Ready Reserves - ING
- O Civilian Government Employee
- O Other

Pay Grade

O E1	O O1	O W1
O E2	O O2	O W2
O E3	O O3	O W3
O E4	O O4	O W4
O E5	O O5	O W5
O E6	O O6	
O E7	O O7	O Other
O E8	O O8	
O E9	O O9	
	O O10	

Location of Operation
To what areas were you mainly deployed *(land-based operations more than 30 days)*? Please mark all that apply, including the number of months spent at each location.

O Country 1	_____	Months ____
O Country 2	_____	Months ____
O Country 3	_____	Months ____
O Country 4	_____	Months ____
O Country 5	_____	Months ____

Since return from deployment I have:
- O Maintained/returned to previous status
- O Transitioned to Selected Reserves
- O Transitioned to IRR
- O Transitioned to ING
- O Retired from Military Service
- O Separated from Military Service

Current Contact Information:
Phone: _____
Cell: _____
DSN: _____
Email: _____
Address: _____

Total Deployments in Past 5 Years:

OIF	OEF	Other
O 1	O 1	O 1
O 2	O 2	O 2
O 3	O 3	O 3
O 4	O 4	O 4
O 5 or more	O 5 or more	O 5 or more

Current Unit of Assignment _____

Current Assignment Location _____

Point of Contact who can always reach you:
Name: _____
Phone: _____
Email: _____
Mailing Address: _____

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number:

1. **Overall, how would you rate your health during the PAST MONTH?**
   - O Excellent
   - O Very Good
   - O Good
   - O Fair
   - O Poor

2. **Compared to before your most recent deployment, how would you rate your health in general now?**
   - O Much better now than before I deployed
   - O Somewhat better now than before I deployed
   - O About the same as before I deployed
   - O Somewhat worse now than before I deployed
   - O Much worse now than before I deployed

3. **During the past 4 weeks, how difficult have physical health problems** *(illness or injury)* **made it for you to do your work or other regular daily activities?**
   - O Not difficult at all
   - O Somewhat difficult
   - O Very difficult
   - O Extremely difficult

4. **During the past 4 weeks, how difficult have emotional problems** *(such as feeling depressed or anxious)* **made it for you to do your work, take care of things at home, or get along with other people?**
   - O Not difficult at all
   - O Somewhat difficult
   - O Very difficult
   - O Extremely difficult

5. **Since you returned from deployment, about how many times have you seen a healthcare provider for any reason, such as in sick call, emergency room, primary care, family doctor, or mental health provider?**
   - O No visits
   - O 1 visit
   - O 2-3 visits
   - O 4-5 visits
   - O 6 or more

6. **Since you returned from deployment, have you been hospitalized?** O Yes O No

7. **During your deployment, were you wounded, injured, assaulted or otherwise physically hurt?** O Yes O No

   If **NO**, skip to Question 8.

7a. If **YES**, are you still having problems related to this wound, assault, or injury? O Yes O No O Unsure

8. **In addition to wounds or injuries you listed in question 7., do you currently have a health concern or condition that you feel is related to your deployment?** O Yes O No O Unsure

   If **NO**, skip to Question 9.

8a. If **YES**, please mark the item(s) that best describe your deployment-related condition or concern:

O Fever	O Dimming of vision, like the lights were going out
O Cough lasting more than 3 weeks	O Chest pain or pressure
O Trouble breathing	O Dizzy, light headed, passed out
O Bad headaches	O Diarrhea, vomiting, or frequent indigestion/heartburn
O Generally feeling weak	O Problems sleeping or still feeling tired after sleeping
O Muscle aches	O Trouble concentrating, easily distracted
O Swollen, stiff or painful joints	O Forgetful or trouble remembering things
O Back pain	O Hard to make up your mind or make decisions
O Numbness or tingling in hands or feet	O Increased irritability
O Trouble hearing	O Taking more risks such as driving faster
O Ringing in the ears	O Skin diseases or rashes
O Watery, red eyes	O Other *(please list)*: _____

9a. During this deployment, did you experience any of the following events? *(Mark all that apply)*

	Yes	No
(1) Blast or explosion *(IED, RPG, land mine, grenade, etc.)*	O	O
(2) Vehicular accident/crash *(any vehicle, including aircraft)*	O	O
(3) Fragment wound or bullet wound above your shoulders	O	O
(4) Fall	O	O
(5) Other event *(for example, a sports injury to your head)*. Describe:	O	O

9b. Did any of the following happen to you, or were you told happened to you, IMMEDIATELY after any of the event(s) you just noted in question 9a.? *(Mark all that apply)*

	Yes	No
(1) Lost consciousness or got "knocked out"	O	O
(2) Felt dazed, confused, or "saw stars"	O	O
(3) Didn't remember the event	O	O
(4) Had a concussion	O	O
(5) Had a head injury	O	O

c. Did any of the following problems begin or get worse after the event(s) you noted in question 9a.? *(Mark all that apply)*

	Yes	No
(1) Memory problems or lapses	O	O
(2) Balance problems or dizziness	O	O
(3) Ringing in the ears	O	O
(4) Sensitivity to bright light	O	O
(5) Irritability	O	O
(6) Headaches	O	O
(7) Sleep problems	O	O

d. In the past week, have you had any of the symptoms you indicated in 9c.? *(Mark all that apply)*

	Yes	No
(1) Memory problems or lapses	O	O
(2) Balance problems or dizziness	O	O
(3) Ringing in the ears	O	O
(4) Sensitivity to bright light	O	O
(5) Irritability	O	O
(6) Headaches	O	O
(7) Sleep problems	O	O

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number:

10. Do you have any persistent major concerns regarding the health effects of something you believe you may have been exposed to or encountered while deployed? ○ Yes ○ No
If **NO**, skip to question 11.

10a. If **YES,** please mark the item(s) that best describe your concern:

○ Animal bites	○ Loud noises
○ Animal bodies *(dead)*	○ Paints
○ Chlorine gas	○ Pesticides
○ Depleted uranium *(If yes, explain)* _____	○ Radar/Microwaves
○ Excessive vibration	○ Sand/dust
○ Fog oils (smoke screen	○ Smoke from burning trash or feces
○ Garbage	○ Smoke from oil fire
○ Human blood, body fluids, body parts, or dead bodies	○ Solvents
○ Industrial pollution	○ Tent heater smoke
○ Insect bites	○ Vehicle or truck exhaust fumes
○ Ionizing radiation	○ Other exposures to toxic chemicals or materials, such as ammonia, nitric acid, etc.: *(If yes, explain)*
○ JP8 or other fuels	_____
○ Lasers	

11. Since return from your deployment, have you had serious conflicts with your spouse, family members, close friends, or at work that continue to cause you worry or concern? ○ Yes ○ No ○ Unsure

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

a. Have had nightmares about it or thought about it when you did not want to? ○ Yes ○ No

b. Tried hard not to think about it or went out of your way to avoid situations that remind you of it? ○ Yes ○ No

c. Were constantly on guard, watchful, or easily startled? ○ Yes ○ No

d. Felt numb or detached from others, activities, or your surroundings? ○ Yes ○ No

13a. In the PAST MONTH, Did you use alcohol more than you meant to? ○ Yes ○ No

b. In the PAST MONTH, have you felt that you wanted to or needed to cut down on your drinking? ○ Yes ○ No

c. How often do you have a drink containing alcohol?
○ Never ○ Monthly or less ○ 2 to 4 times a month ○ 2 to 3 times a week ○ 4 or more times a week

d. How many drinks containing alcohol do you have on a typical day when you are drinking?
○ 1 or 2 ○ 3 or 4 ○ 5 or 6 ○ 7 to 9 ○ 10 or more

e. How often do you have six or more drinks on one occasion?
○ Never ○ Less than monthly ○ Monthly ○ Weekly ○ Daily

14. Over the PAST MONTH, have you been bothered by the following problems?	Not at all	Few or several days	More than half the days	Nearly every day
a. Little interest or pleasure in doing things	○	○	○	○
b. Feeling down, depressed, or hopeless	○	○	○	○

15. Would you like to schedule a visit with a healthcare provider to further discuss your health concern(s)? ○ Yes ○ No

16. Are you currently interested in receiving information or assistance for a stress, emotional or alcohol concern? ○ Yes ○ No

17. Are you currently interested in receiving assistance for a family or relationship concern? ○ Yes ○ No

18. Would you like to schedule a visit with a chaplain or a community support counselor? ○ Yes ○ No

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number: **Date** *(dd/mmm/yyyy)*:

Health Care Provider Only

Provider Review and Interview

1. Review symptoms and deployment concerns identified on form:

O Confirmed screening results as reported

O Screening results modified, amended, clarified during interview:

_____

2. Ask behavioral risk questions. Conduct risk assessment.

a. Over the PAST MONTH, have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way? O Yes O No

IF **YES**, about how often have you been bothered by these thoughts? O Very few days O More than half of the time O Nearly every day

b. Since return from your deployment, have you had thoughts or concerns that you might hurt or lose control with someone? O Yes O No O Unsure

3. If member reports positive or unsure response to 2a. or 2b., conduct risk assessment.

a. Does member pose a current risk for harm to self or others? O No, not a current risk O Yes, poses a current risk O Unsure

b. Outcome of assessment O Immediate referral O Routine follow-up referral O Referral not indicated

4. Alcohol screening result

O No evidence of alcohol-related problems.

O Potential alcohol problem (positive response to either question 13a. or 13b. and/or AUDIT-C (questions 13c.-e.) score of 4 or more for men or 3 or more for women).
Refer to PCM for evaluation. O Yes O No

5. Traumatic Brain Injury (TBI) risk assessment

O No evidence of risk based on responses to questions 9.a. - d.

O Potential TBI with persistent symptoms, based on responses to question 9d.
Refer for additional evaluation. O Yes O No

6. Record additional questions or concerns identified by patient during interview:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

This form must be completed electronically. Handwritten forms will not be accepted.

Service Member's Social Security Number: **Date** *(dd/mmm/yyyy)*:

Assessment and Referral: After my interview with the service member and review of this form, there is a need for further evaluation and follow-up as indicated below. (More than one may be noted for patients with multiple concerns.)

7. Identified Concerns	Minor Concern	Major Concern	Already Under Care	
			Yes	No
○ Physical Symptom(s)	○	○	○	○
○ Exposure Symptom(s)	○	○	○	○
○ Depression symptoms	○	○	○	○
○ PTSD symptoms	○	○	○	○
○ Anger/Aggression	○	○	○	○
○ Suicidal Ideation	○	○	○	○
○ Social/Family Conflict	○	○	○	○
○ Alcohol Use	○	○	○	○
○ Other: _____	○	○	○	○

9. Comments:

8. Referral Information	Within 24 hours	Within 7 days	Within 30 days
a. Primary Care, Family Practice	○	○	○
b. Behavioral Health in Primary Care	○	○	○
c. Mental Health Specialty Care	○	○	○
d. Other specialty care:			
Audiology	○	○	○
Cardiology	○	○	○
Dentistry	○	○	○
Dermatology	○	○	○
ENT	○	○	○
GI	○	○	○
Internal Medicine	○	○	○
Neurology	○	○	○
OB/GYN	○	○	○
Ophthalmology	○	○	○
Optometry	○	○	○
Orthopedics	○	○	○
Pulmonology	○	○	○
Urology	○	○	○
e. Case Manager, Care Manager	○	○	○
f. Substance Abuse Program	○	○	○
g. Health Promotion, Health Education	○	○	○
h. Chaplain	○	○	○
i. Family Support, Community Service	○	○	○
j. Military OneSource	○	○	○
k. Other: _____	○	○	○
l. No referral made ○			

I certify that this review process has been completed.

10. Provider's signature and stamp:

ICD-9 Code for this visit: V70.5 _ F

S A M P L E

Ancillary Staff/Administrative Section

11. Member was provided the following:	12. Referral was made to the following healthcare or support system:
○ Health Education and Information	○ Military Treatment Facility
○ Health Care Benefits and Resources Information	○ Division/Line-based medical resource
○ Appointment Assistance	○ VA Medical Center or Community Clinic
○ Service member declined to complete form	○ Vet Center
○ Service member declined to complete interview/assessment	○ TRICARE Provider
○ Service member declined referral for services	○ Contract Support: _____
○ LOD	○ Community Service: _____
○ Other: _____	○ Other: _____
	○ None

APPENDIX F

Letter of Support

Armed Forces Health Surveillance Center

1 Page Total

DEPARTMENT OF DEFENSE
ARMED FORCES HEALTH SURVEILLANCE CENTER
503 ROBERT GRANT AVENUE
SILVER SPRING MD 20910-7500

REPLY TO
ATTENTION OF:

MCHB-CG-AFD

04 SEP 09

MEMORANDUM FOR CAPT SHANNON BRANLUND, USAF, UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES, BETHESDA, MARYLAND 20814

SUBJECT: Access to data in support of research protocol amendment.

1. This letter is submitted to indicate that the Armed Force Health Surveillance Center (AFHSC) is willing to support the research protocol entitled "Deployment-Related Correlates of Suicide Behavior in the United States Military".

2. AFHSC maintains and operates the Defense Medical Surveillance System (DMSS) which is essential toward the completion of this study. AFHSC agrees to provide the data as specified in the protocol. For the case-control portion of this study, AFHSC will receive a list of SSNs of Marines and Airmen who committed suicide and then select 4 matched controls for every case. AFHSC understands that this study requires the use of PHI to identify the cases. However, after identification of cases and matched controls, AFHSC will strip PHI from all files and it will not be made available to the researchers.

3. These data will be made available provided the study has Institutional Review Board and Human Use Committee (IRB / HUC) approvals from an appropriate military Institutional Review Board. Any changes or modifications made to the submitted or approved protocol regarding the efforts of AFHSC must be submitted to the undersigned with changes clearly indicated.

4. If there are any questions concerning this letter, please contact the undersigned at (301) 319-3240, fax (301) 319-7620 or e-mail: 'steven.tobler@us.army.mil'.

FOR

STEVEN K. TOBLER
LTC, MC, USA
Armed Forces Health Surveillance Center
USACHPPM

Printed on Recycled Paper

APPENDIX G

Letter of Support

Air Force Office of Suicide Prevention

1 Page Total

DEPARTMENT OF THE AIR FORCE
AIR FORCE MEDICAL OPERATIONS AGENCY
SAN ANTONIO TEXAS

19 Oct 09

MEMORANDUM FOR Shannon Branlund, Capt, USAF
Clinical Psychology Doctoral Student
Uniformed Services University of the Health Sciences

Marjan G. Holloway, Ph.D.
Assistant Professor, Medical & Clinical Psychology
Uniformed Services University of the Health Sciences

SUBJECT: Support for Dissertation Research Project Entitled: "Deployment-Related Correlates of Suicide *Behavior in the United States Military*"

1. This letter is submitted to indicate that the Air Force Office of Suicide Prevention will support the research study entitled "Deployment-Related Correlates of Suicide Behavior in the United States Military".

2. As stated in the study protocol, the USAF Office of Suicide Prevention will provide the social security numbers of Airmen who died by suicide between March of 2005 and June of 2008 directly to the Armed Forces Health Surveillance Center (AFHSC). Any identifying information regarding these Airmen will be sanitized by AFHSC before data is forwarded to study researchers.

3. For questions or concerns regarding this letter, please contact Lt Col Kindt at Michael.kindt@lackland.af.mil or 210-925-2591

MICHAEL T. KINDT, Lt Col, USAF, BSC
AF Suicide Prevention Program Manager
Air Force Medical Operations Agency

APPENDIX H

Letter of Support

Marine Corps Suicide Prevention Program Office

1 Page Total

DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
3280 RUSSELL ROAD
QUANTICO, VIRGINIA 22134-5103

IN REPLY REFER TO:
1700
MRS-4
19 OCT 2009

From: Director, Personal and Family Readiness Division
To: Capt Shannon Branlund, USUHS, Bethesda

SUBJ: PROVISION OF DATA IN SUPPORT OF RESEARCH PROTOCOL

1. This letter is submitted to indicate that the Marine Corps Suicide Prevention Program (MCSPP) Office is willing to support the research protocol entitled "Deployment-Related Correlates of Suicide Behavior in the United States Military."

2. The MCSPP Office maintains the official data of record on suicides by Marines. As this proposed study aims to better understand military suicide behavior by analyzing and comparing certain aspects of Marine and Airmen suicides, the inclusion of the appropriate population to be studied is essential to the success of the study. As stated in the study protocol, the MCSPP Office will provide the social security numbers of Marines who died by suicide between March of 2005 and June of 2008 directly to the Armed Forces Health Surveillance Center (AFHSC). The Marine Corps and AFHSC recognize that this study requires the use of PHI to identify cases, however the Marine Corps understands that AFHSC will only use the social security numbers to provide matched control cases and will then strip PHI from all files and that it will not be made available to the researchers.

3. If there are any questions concerning this letter, please contact my command representative at (703) 784-9542 or e-mail: aaron.werbel@usmc.mil.

K. J. LEWIS
By direction

APPENDIX I

PDHA and PDHRA Coding Details (Dependent and Independent Variables)

5 Pages Total

Data derived from the matched PDHAs and PDHRAs for the same individual were merged based on the AFHSC assigned unique identifier. Demographic information, deployment-related information, and psychological factors were re-coded as necessary in preparation for study analyses. The sections below describe re-coding details for the study variables.

Independent Variables.

Total number of deployments in the past 5 years at the time of completion of post-deployment assessments. This information was provided by AFHSC in three separate variables: 1) OIF deployments (1-5+), 2) OEF deployments (1-5+), and 3) Other deployments 1-5+ deployments. These three separate variables were merged into one variable by adding the number of deployments recorded for OIF, OEF, and Other – resulting in the total number of deployments in the past 5 years as reported on the most recently completed post-deployment form (PDHRA). Original deployment form data coding which used 1,2,3,4 and 5+ was retained for each of the three possible deployment locations and individuals were coded based on the highest number of reported deployments. As such, it is possible that for individuals with more than one report of multiple deployments the total number of deployments is underestimated. For example, an individual with 5+ OEF deployments and 2 OIF deployments was coded as 5+ (the highest number of reported deployments) rather than 7+, which could represent an underestimation of the total number of deployments.

Location of deployment. This information was provided by AFHSC in 13 separate variables: Iraq, Afghanistan, Kuwait, Quatar, Bosnia/Kosovo, South West Asia, Africa, South America, North America, Australia, Europe, On a ship, Other. These separate variables were merged into a single location variable to determine location of most recent deployment (Iraq, Afghanistan, and Other). Based on the hypothesis that deployment to Iraq as compared to Afghanistan and Other locations would be significantly correlated with suicide ideation, deployment to Iraq was considered an important risk indicator and thus any reported deployment to Iraq was coded as "Iraq" regardless of additional reports. Similarly, any reported deployment to Afghanistan (in the absence of a reported deployment to Iraq) was coded as "Afghanistan". All other locations (in the absence of a reported deployment to Iraq or Afghanistan) were coded as "Other".

Being physically hurt during deployment. This information was provided by AFHSC in a single variable with "Yes" and "No" answers that was recoded only to clearly indicate missing information where necessary. This was accomplished with a user-defined SPSS variable.

Exposure to wounded, killed, or dead. This variable was derived from the PDHA. The data was provided by AFHSC in two separate variables: 1) "Saw anyone wounded, killed, or dead during deployment" (2003 version) and 2) "Saw anyone wounded, killed, or dead during deployment" (2008 version). These separate variables were merged into a single "Saw anyone wounded, killed, or dead during deployment" variable. As previously mentioned, the PDHA data was also merged with the PDHRA data by unique identifier. When necessary the data was also recoded using a user-identified SPSS variable to clearly indicate missing information.

Symptoms of Depression. This information was provided by AFHSC in two separate variables regarding the following problems over the past month: "Little interest or pleasure in

doing things", and "Feeling down, depressed, or hopeless". Answers to these items were provided by AFMSC in levels of severity: "Not at all", "Few or several days", "More than half the days", and "Nearly every day". As previously mentioned, some variables in the data set used for Studies 1 and 2 included blank entry fields/variables. The multiple options for level of severity combined with missing entry fields allowed for very small numbers within the variables and levels provided by AFHSC. Preliminary analysis showed that small numbers within the variables and levels would cause regression models to fail. In order to retain the depression item for analysis, the levels of severity were recoded as dichotomous variables with "Not at all" coded as "No" and all other levels coded as "Yes". This coding also mirrors the examination of the item in military treatment environments where any "yes" answers at any level require interview assessment to examine the service member more closely. The two variables were then merged into a single depression variable. When necessary the data was also recoded with a user-identified SPSS variable to clearly indicate missing information.

Symptoms of Trauma: This information was provided by AFHSC in for separate variables regarding the following trauma-related experiences over the past month: "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", and " Felt numb or detached from others, activities, or your surroundings". As previously discussed, the possibility of blank entry fields allowed for small numbers within each of the four variables. Preliminary analysis showed that small numbers within the variables and levels would cause regression models to fail. In order to retain the trauma item for analysis, the four separate variables were merged into a single trauma variable. Any positive answer from any of the four separate trauma variables was coded as a "Yes"

endorsement for the final merged trauma variable. When necessary the data was also recoded with a user-identified SPSS variable to clearly indicate missing information.

Alcohol Misuse. This information was provided by AFHSC in two separate variables regarding alcohol misuse in the past month: "Did you use alcohol more than you meant to" and "Have you felt that you wanted to or needed to cut down on your drinking". As previously discussed, the possibility of blank entry fields allowed for small numbers that would cause regression models to fail. In order to retain the alcohol misuse item for analysis, the two separate variables were merged into a single alcohol misuse variable. Any positive answer from either of the alcohol misuse variables was coded as a "Yes" endorsement for the final merged alcohol misuse variable. When necessary the data was also recoded with a user-identified SPSS variable to clearly indicate missing information.

Interpersonal Conflict. This information as provided by AFHSC in a single variable with "Yes", "No", and "Unsure" answers that was recoded only to clearly indicate missing information with a user-defined SPSS variable.

Hopelessness. This information was provided by AFHSC in a single variable regarding "Feeling down, depressed, or hopeless" over the past month. Answers were provided by AFMSC in levels of severity: "Not at all", "Few or several days", "More than half the days", and "Nearly every day". As previously mentioned, some variables in the data set used for Studies 1 and 2 included blank entry fields/variables and the levels of severity were recoded as dichotomous variables with "Not at all" coded as "No" and all other levels coded as "Yes". This coding reflects the examination of the item in military treatment environments where any "yes" answers at any level require interview assessment to examine the service member more closely. When necessary the data was also recoded to clearly indicate missing information.

Impulsivity. This information as provided by AFHSC in a single variable with "Yes" and "No" answers that was recoded only to clearly indicate missing information.

Outcome Variables.

Suicide Ideation. The suicide ideation variable provided by AFHSC was coded into "Yes" and "No".

Suicide. The suicide variable was provided by AFHSC as a "Yes" or "No" item for all PDHA and PDHRA forms in the data set. The suicide and suicide ideation variables were merged into a single outcome variable to prevent service members who had expressed suicide ideation *and* died by suicide from being counted in multiple outcome groups. The final outcome variable was coded using three groups: 1) "Yes" for suicidal ideation but "No" for suicide, 2) "Yes" for suicide, and 3) "No/Unsure" for suicidal ideation and "No" for suicide. When multiple forms were completed by the same service member, only the most recently completed forms were retained for analysis. In the final refined data set, there were no cases of suicide which also included self-reported suicide ideation.

APPENDIX J

List of Acronyms

AFHSC	Armed Forces Health Surveillance Center
AMSA	Army Medical Surveilance Activity (Previous title of AFHSC)
CDC	Centers for Disease Control
DD Form	Defense Department Form
DoD	Department of Defense
MDD	Major Depressive Disorder
PDHA	Post Deployment Health Assessment
PDHRA	Post Deployment Health Re-Assessment
PTSD	Posttraumatic Stress Disorder
SD	Suicide Death
SI	Suicide Ideation
TBI	Traumatic Brain Injury
USAF	United States Air Force
USMC	United States Marine Corps

APPENDIX K

Regression Analyses: Correlates of Suicide Ideation

Regression Analyses: Correlates of Suicide Ideation

Variable	B	S.E.	Wald	Df	Sig.	O.R.	95% CI
Deployment location				2			
Afghanistan	0.68	0.31	4.82	1	0.03	1.97	1.08-3.59
Iraq	0.57	0.20	7.90	1	0.01	1.76	1.19-2.62
Number of deployments			8.74	4	0.07		
1 (Baseline)							
2	-0.16	0.17	0.95	1	0.33	0.85	0.62-1.18
3	0.20	0.22	0.85	1	0.36	1.22	0.80-1.87
4	0.59	0.27	4.72	1	0.03	1.80	1.06-3.07
5	0.33	0.29	1.27	1	0.26	1.4	0.78-2.47
Exposure to wounded, killed, or dead	0.76	0.13	31.65	1	0.00	2.13	1.64-2.77
Physically injured	1.17	0.14	70.67	1	0.00	3.23	2.46-4.24
Symptoms of depression	3.95	0.29	188.49	1	0.00	51.87	29.52-91.14
Symptoms of PTSD	2.81	0.15	353.76	1	0.00	16.59	12.38-22.29
Alcohol Misuse	2.11	0.15	205.07	1	0.00	8.26	6.19-11.03
Interpersonal conflict	3.00	0.14	493.60	1	0.00	20.07	15.40-26.15

APPENDIX L

Conditional Regression Analysis: Correlates of Suicide

Regression Analyses: Correlates of Suicide Ideation

Variable	Wald	Df	Sig.	O.R.	95% CI
Deployment	7.09	1	0.01	1.58	1.13-2.20
Deployment with Covariates	1.92	1	0.17	1.30	0.90-1.87
Marital Status	0.05	1	0.82		
Other vs. Married				1.04	0.73-1.50
Race/Ethnicity	0.30	1	0.58		
Other vs. White				0.91	0.63-1.29
Service Component	31.77	1	< 0.001		
Other vs. Active Duty				0.04	0.01-0.11
Rank	19.35	2	< 0.001		
Officer vs. Jr. Enlisted				0.16	0.07-0.38
Sr. Enlisted vs. Jr. Enlisted				0.39	0.23-0.67
Time in Service	9.41	3	0.02		
1-4 Yrs vs. Less than 1 Yr				2.56	1.32-4.96
5-8 Yrs vs. Less than 1 Yr				3.71	1.50-9.20
9+ Yrs vs. Less than 1 Yr				2.85	0.80-10.15

APPENDIX M

Exclusion of Suicide Analyses

Construction of Database for Analyses with Suicide as Outcome.

The USAF and USMC Offices of Suicide Prevention identified all Airmen and Marines who had died by suicide between March 2005 and June 2008 and provided the Social Security Numbers (SSNs) of these service members directly to AFHSC. The AFHSC (under the supervision of Dr. Angie Eick, Ph.D., ScM, Special Studies Lead) identified those individuals who had completed PDHA and PDHRA information during the time period of June 2005 to June 2008. A total of 55 out of the originally identified 221 (i.e., 36%) USAF and USMC suicide decedents had completed PDHA and PDHRA forms on file with AFHSC and the information pertaining to these service members' suicide status was specifically labeled as such in the final de-identified database provided by AFHSC to Capt Branlund for this dissertation.

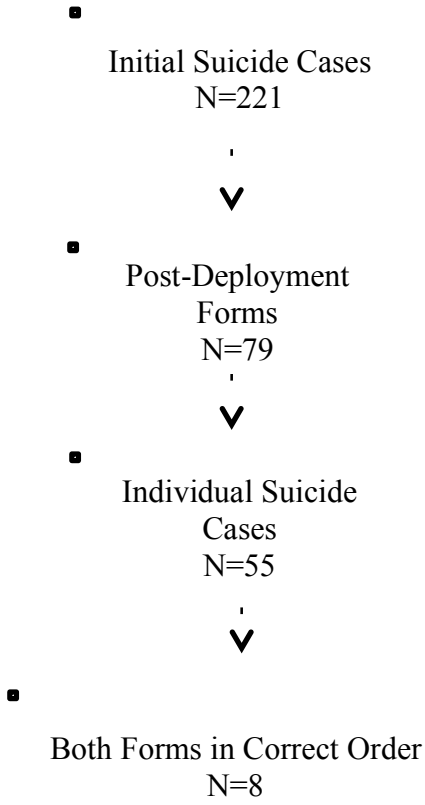
Please note that based on consultation with Dr. Eick at the AFHSC, a number of explanations are possible to justify the absence of PDHA and PDHRA information for all 221 suicide decedents. First, there is the possibility that these individuals had no history of deployment. Second, the DoD activation date of the PDHRA (DD Form 2900) was June 2005. As a result, for those service members with suicides registered between March 2005 and June 2005, there is no PDHRA data available. The request for completed PDHA and PDHRA information during the time period of March 2005 to June 2008 was made in error; the request should have included a June 2005 start date based on implementation of the PDHRA. (The March 2005 request was based on a goal of incorporating as much PDHA and PDHRA data as possible and had not taken into account the June 2005 start date.) An additional reason for low numbers of PDHRA forms is related to the time frame for completion; the PDHRA can only be

completed during the three- to six-month time period following return from deployment. It is likely that implementation and tracking of the PDHRA requirement was not consistent for the first three- to six-month period after the form was initiated in June 2005; for those members with suicides registered for three to six months after June 2005 it is unlikely that a PDHRA form was completed.

For the regression analyses pertaining to the suicide death outcome, power was significantly compromised. As stated earlier, AFHSC identified only 79 total PDHA and/or PDHRA forms completed by USAF and USMC suicide decedents with recorded deaths between March 2005 and June 2008. After the elimination of multiple forms completed by the same individual, there were 55 individual service members (24.9%) with completed deployment forms. Air Force findings that show 45% of suicides between CY03 and CY09 involved Airmen who had a history of deployment (DoD Task Force Report 2010). Similar statistics were not provided for the Marine Corps. However, the Air Force data is sufficient to show that elimination of multiple forms completed by the same individual caused the sample to deviate significantly from the known population.

After the data set was further refined to eliminate incorrectly ordered forms, a total of only 8 suicide cases with completed and matched PDHA and PDHRA for the same deployment were retained. Figure 1 illustrates the data refining procedures for the suicide death sample. The total number of retained cases was 8; the retained sample did not contain sufficient cases based on the power analyses (Tables 6 and 7 below).

Figure 1. Suicide Cases Available for Analysis



Power Analysis: Previous studies of Deployment Health Assessments have indicated that approximately 1.2% of service members returning from deployment report some level of suicide ideation (Miliken et al., 2007). Based on this relatively low event proportion, we requested from AFHSC information regarding all Airmen and Marines who reported suicide ideation via the PDHRA since the initiation of the form in June 2005. Using the base reference proportions of 1.2% for suicidal ideation and 12/100,000 for suicide, the power of this study to detect a given increase in the odds ratio is provided in Table 6. (The selected base rate for suicide is the 2009

rate for suicide in the USAF; this number was selected as the most representative base rate due to the large proportion of USAF members included in this study.) Table 7 gives the number of valid cases required to have 80% power of detecting a given odds ratio.

Table 6. Power to Detect a Given Odds Ratio (Suicide)

Odds Ratio	N Required for 80% Power with Suicide Rate of 1.2 per 10,000
1.25	0.079
1.50	0.130
1.75	0.196
2.00	0.272
2.25	0.352
2.50	0.432
2.75	0.507
3.00	0.577

Table 7. N Required for 80% Power with Given Base Rates (Suicide)

Odds Ratio	Suicide Rate of 1.2 per 10,000
1.25	8,587,785
1.50	2,328,145
1.75	1,114,165
2.00	670,925
2.25	457,440
2.50	337,010
2.75	261,730
3.00	211,150

Overall, refinement of the data set reduced the number of participants and the associated power for regression analyses. As mentioned, it also generated a data set that did not reflect the

target population we intended to examine. Thus, the suicide outcome was eliminated from this Dissertation.