

# Chapter 5

## WALTER REED ARMY INSTITUTE OF RESEARCH CONTRIBUTIONS DURING OPERATIONS IRAQI FREEDOM AND ENDURING FREEDOM: FROM RESEARCH TO PUBLIC HEALTH POLICY

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## INTRODUCTION

Research examining the mental health impact of war has typically been conducted years (and often decades) after combat.<sup>1-3</sup> Before Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), researchers at Walter Reed Army Institute of Research (WRAIR) established an international reputation in deployment psychology. This experience put WRAIR researchers in a position to become leaders in new initiatives to understand the psychological impact of OIF and OEF. During the 1991 Persian Gulf War (Operations Desert Shield and Desert Storm), WRAIR research teams surveyed and interviewed US Army units in theater and postdeployment to assess the psychological impact of deployment to combat.<sup>4-12</sup> WRAIR teams also conducted in-theater research with units deployed to Operation Just Cause in Panama in 1989,<sup>13</sup> Operation Restore Hope in Somalia in 1993,<sup>14</sup>

Operation Uphold Democracy in Haiti in 1994,<sup>15</sup> and throughout the Balkans in the mid-1990s in support of Operation Provide Promise in Croatia,<sup>16</sup> Operation Joint Endeavor in Bosnia,<sup>17</sup> and Operation Joint Guardian in Kosovo.<sup>18</sup> When troop mobilizations began for both OEF and OIF in 2002 and 2003, researchers at WRAIR developed and executed a comprehensive research plan to examine the psychological health of soldiers during combat. This program provided real-time data as the war was occurring that led to multiple health policy changes to improve the mental health and well-being of service members and their families. This chapter outlines some of the key mental health research initiatives by WRAIR scientists with a focus on efforts that directly influenced mental health policies, programs, and training for service members serving in war.

## WALTER REED ARMY INSTITUTE OF RESEARCH

WRAIR is a premier Department of Defense (DoD) biomedical research center that integrates basic research and advanced technology to protect and sustain military service members. The WRAIR mental health research program is located at two sites: (1) the Department of Military Psychiatry, Division of Psychiatry and Neuroscience, at the main institute in Silver Spring, Maryland, and (2) the US Army Research Unit—Europe in Heidelberg, Germany. Approximately 35 employees work at the two sites. The program is multidisciplinary, including

research and clinical psychologists, psychiatrists, social workers, and sociologists, as well as expertise in clinical evaluation and management, organizational psychology, individual and unit performance, leadership, psychiatric epidemiology, and healthcare services research. In addition to military psychology and psychiatry research, the division includes two other world-class research programs, one focused on sustaining performance during sleep deprivation and the other on reducing the impact of battlefield head injuries.

## FROM RESEARCH TO PUBLIC HEALTH POLICY

After the events of September 11, 2001, and the onset of the war in Afghanistan, WRAIR researchers embarked on a comprehensive research program to measure the mental health impact of OEF and OIF on military service members. The program, called “Interventions to Enhance Warfighter Psychological Resilience,” was predicated on the recognition that few studies examined combat-related mental health problems, posttraumatic stress disorder (PTSD), or healthcare utilization proximal to the time of war. Such population-based health service utilization research had generally been impossible in previous wars, in part because of the lack of integrated electronic databases, which became available only after the Persian Gulf War.

The research program also recognized the need for data to guide public health policies to address

war-related mental health problems. The research agenda established by WRAIR focused on three types of products: (1) information products identifying factors that predict high rates of mental disorders, gaps in service delivery, stigma and barriers to care, and the association of mental health with functional impairment and readiness; (2) assessment tools that provide effective methods of conducting psychological health screening in deployed troops; and (3) prevention and early interventions to support psychological adjustment to the demands of combat, prevent stress-related performance degradation, and improve resiliency and health. These tools are the cornerstones of prevention and early intervention efforts. The remainder of this chapter lists WRAIR’s significant efforts and accomplishments from this research program.

## INITIAL RESEARCH ON THE IMPACT OF MENTAL DISORDERS BEFORE SEPTEMBER 11, 2001

Using population-based healthcare data systems, researchers at WRAIR established baseline prevalence rates of healthcare service use for mental health problems before September 11, 2001.<sup>19-22</sup> These studies, comparing major *International Classification of Disease*, 9th revision, illness categories, established that mental disorders were the most important source of occupational and medical morbidity as measured by use of medical services and attrition from service. The studies demonstrated that 12%

of service members utilized mental health services each year, that mental disorders was the leading category of inpatient hospital bed days, and that mental disorders was the disease category most strongly correlated with attrition from military service and attrition from initial entry training. Such results provided a benchmark for understanding the importance of supporting the mental health of service members during the ensuing wars in Iraq and Afghanistan.

## MENTAL HEALTH IMPACT OF THE PENTAGON ATTACK

Immediately after the September 11th attack on the Pentagon, the Army Surgeon General's Office established a comprehensive outreach program for Pentagon employees named "Operation Solace" and tasked the US Army Center for Health Promotion and Preventive Medicine to conduct a survey assessing the mental health effects on the employees. WRAIR, together with colleagues at the Center, Uniformed Services University of the Health Sciences, and the Of-

fice of The Army Surgeon General, rapidly developed and validated a brief survey instrument and provided descriptive data on the outreach program.<sup>23-25</sup> This survey instrument, along with prototype instruments fielded during deployments in Bosnia and Kosovo, influenced the development of the Post-Deployment Health Assessment (PDHA) implemented by the DoD in 2003 to assess the population-level impact of deployment to a combat zone.

## RESEARCH RELATED TO OPERATIONS ENDURING FREEDOM AND IRAQI FREEDOM

In October 2001, the United States and coalition partners initiated OEF combat operations in Afghanistan, followed by OIF, the largest sustained ground operation since the Vietnam War, in Iraq in March 2003. The wars in Afghanistan and Iraq offered a unique opportunity to examine the mental health impact of combat deployment and, in turn, inform military health policy as the wars progressed.

### Epidemiological Consultations of Suicide and Homicide Clusters

Just before OIF and OEF, WRAIR investigators established procedures to conduct epidemiological investigations of clusters of serious behavioral health problems, such as suicides or homicides, applying methodology developed for infectious disease outbreaks. Although infectious disease epidemiological consultations (EPICONS) were common in the military and in civilian public health departments, investigations of behavioral health clusters lacked well-established methodology.

The first military behavioral health EPICON to establish the methodology was conducted in 2000. Its objective was to identify correlates of an outbreak of suicidal behaviors and completed suicides among

soldiers in basic training at Fort Leonard Wood, Missouri.<sup>26</sup> Since then, WRAIR investigators have been involved as part of Army Medical Department multidisciplinary teams in conducting EPICONS to address clusters of suicides and homicides at other posts. These clusters have been linked primarily to the high operational tempo of combat operations in Afghanistan and Iraq, as well as marital and family stressors.<sup>27-29</sup>

An EPICON that received national media attention pertained to a cluster of suicides and homicides at Fort Bragg, North Carolina, among soldiers involved in operations in Afghanistan.<sup>27</sup> This investigation resulted in recommendations that led to the 2003 establishment of the Army Deployment Cycle Support Program,<sup>30</sup> a comprehensive program designed to support soldiers and family members throughout the deployment cycle and assure that soldiers who return home from the combat environment because of serious family stressors are evaluated upon return to duty.

### Land Combat Study

One of the most well known epidemiological surveillance studies pertaining to OIF and OEF is the large-scale, 5-year Land Combat Study. Initiated in 2003, the study involves anonymous cross-sectional

and longitudinal surveys that assess the mental health and well-being of service members in combat infantry brigades serving in Iraq and Afghanistan. The surveys use validated measures to assess the mental health and well-being of service members at different points during their deployment cycle (before, during, and after deployment). Surveys have been collected from over 50,000 service members, mostly from Army brigade combat teams but also from Marine Expeditionary Forces and Navy engineers working in ground operational units. Data have also been collected from military spouses.

Data from some of the first units to return from OIF and OEF deployments were rapidly analyzed and published in the *New England Journal of Medicine* in July 2004.<sup>31</sup> This publication provided the first systematic look at the mental health of soldiers and Marines involved in combat operations in Iraq and Afghanistan. The study indicated that 12% to 13% of soldiers and marines from combat units surveyed 3 to 4 months after returning from deployment to Iraq met the screening definition of PTSD, compared with 5% at predeployment. In addition, 15% to 17% of those surveyed at postdeployment met the screening definition of PTSD, major depression, or generalized anxiety disorder, compared with 9% at predeployment.

To maximize specificity for population-level prevalence estimates, investigators used stringent cut-off criteria to determine mental disorders in this study. Using more sensitive criteria widely validated in clinical care settings, the study indicated that 18% to 20% of soldiers returning from combat in Iraq had significant symptoms of PTSD, and 28% to 29% had significant symptoms of PTSD, depression, or anxiety. The study also found deployment to be associated with alcohol misuse: 24% to 35% of subjects reported using more alcohol than intended, and 20% to 29% reported wanting or needing to drink less.

Besides establishing the prevalence of mental health symptoms among military personnel returning from combat, another critical finding identified by this study was the problem with stigma and barriers to care. The study showed that the majority of service members who had significant mental health problems did not receive care, and concerns about stigma and other barriers to care were pervasive. The study led to widespread DoD, public, media, and congressional interest, as well as multiple new clinical, research, and public health efforts throughout DoD and the Veterans Administration to mitigate stigma, remove barriers to care, and improve the screening and treatment of PTSD after deployment.

A subsequent publication from the Land Combat Study assessed the prevalence of mental health prob-

lems 12 months postdeployment. In this sample, 17% of service members met the criteria for PTSD, major depression, and/or generalized anxiety using the stringent cut-off criteria.<sup>32</sup> This finding confirmed that no decrease in symptoms occurred during the first year postdeployment. This 1-year period was the same amount of time many units had before rotating back to Iraq or Afghanistan for a subsequent deployment, suggesting that the soldiers had not recovered from the first deployment when they left for their second deployment.

The study also demonstrated that soldiers with PTSD symptoms were much more likely than soldiers from the same deployments who did not have PTSD symptoms to experience lower ratings of general health, more missed work days, higher use of medical services, and higher somatic symptom levels. These findings were independent of being wounded or injured. The study highlighted the comorbidity of PTSD with physical health problems and the need to evaluate veterans who present with somatic concerns for PTSD. This study was one of several that provided data supporting the implementation of new DoD programs to enhance mental health screening and management in primary care settings.<sup>33</sup>

### Mental Health Advisory Teams

Another important OIF initiative is the epidemiological assessment of the mental health and well-being of troops during deployment. Each year, the Army surgeon general deploys a team of mental health experts together with researchers from WRAIR to conduct anonymous assessments of the mental health of troops in Iraq. These teams use similar surveys to those administered as part of the WRAIR Land Combat Study research protocol, and also assess the adequacy and distribution of behavioral health resources in theater.<sup>34-37</sup>

Key findings from the mental health advisory team missions included:

- Fifteen to twenty percent of combat troops deployed to Iraq experience significant symptoms of acute stress, PTSD, or depression, and twenty percent of married service members experience marital concerns.
- Longer deployments, multiple deployments, greater time away from the basecamp, and combat frequency and intensity all contribute to higher rates of PTSD, depression, and marital problems.
- Combat frequency and mental health problems are associated with ethical mistreatment

of noncombatants.

- Good unit leadership is key to sustaining mental health and well-being among combat troops.<sup>34-37</sup>

As a result of these findings, the Army revised the combat and operational stress control doctrine and training,<sup>38</sup> mandated stress control training for all deployment mental health professionals, and ensured that sufficient mental health personnel (credentialed providers and mental health technicians) are available in theater. The mental health advisory teams identified an optimal ratio of at least one mental health professional for every 1,000 troops, supporting the Army's effort to ensure optimal distribution and access to services throughout theater. The findings also led to the inclusion of new training initiatives for soldiers and leaders developed by WRAIR researchers.<sup>39</sup>

### Research on Deployment Mental Health Screening

Another important WRAIR research initiative has focused on psychological screening. DoD-wide psychological screening began in 1996 with the deployment of US forces to Bosnia and continued as a commander's program with the subsequent deployment to Kosovo.<sup>40</sup> Psychological screening was designed to identify individuals in need of follow-up mental health services and provide a proactive way to link individuals with mental health professionals.

The current DoD screening program was launched in April 2003, a month after the ground war began in Iraq. At that time, the DoD mandated that all service members complete a PDHA immediately upon return from any deployment using a brief screening instrument combined with a clinical interview.<sup>41</sup> Initiated to meet an immediate need, the program generated controversy for being started before any evidence was available to support the effectiveness of such a program.<sup>42,43</sup>

The goal of WRAIR's screening research program has been to validate and improve the screening for mental health problems associated with deployment. In keeping with these goals, WRAIR conducted a series of studies to identify the appropriate content for predeployment and postdeployment screening,<sup>44</sup> the best approach to screening,<sup>45</sup> the psychometrics of the screening instruments,<sup>46</sup> and effective implementation strategies.<sup>47</sup> The results of this research and subsequent program evaluation<sup>48</sup> have influenced the development of the DoD psychological screening program for military personnel returning from Iraq. Three WRAIR studies were particularly notable in guiding the DoD-wide postdeployment screening program.

The first study looked at the timing of the screening process. Shortly after the PDHA was initiated, researchers at the WRAIR unit in Europe determined that soldiers were two to five times more likely to report mental health concerns 4 months after returning from deployment than they were immediately upon return from deployment.<sup>47</sup> The data were communicated to DoD Health Affairs in early 2004 and led to an immediate triservice mandate to expand the PDHA program to include a second screen, the Post-Deployment Health Reassessment (PDHRA), 3 to 6 months after return from deployment.<sup>49</sup>

A second study included a series of analyses that validated the mental health questions used on the PDHA and PDHRA against a "gold-standard" structured diagnostic interview.<sup>46</sup> This study demonstrated that the PDHA questions had acceptable sensitivity and specificity in identifying individuals who needed further evaluation or treatment and contributed to a better understanding of how to score the PDHA and PDHRA questionnaires.

The third study, conducted in collaboration with the Army Medical Surveillance Activity, evaluated the lessons learned from the PDHA program on a population-wide level. The study showed that combat duty in Iraq was correlated with high utilization of mental health services and attrition from military service postdeployment.<sup>48</sup> One third of soldiers returning from OIF utilized mental health services in medical treatment facilities in the year after returning home (including screening, prevention, and treatment services). However, the PDHA was found to have limited utility in predicting the level of mental health services that were needed postdeployment. These data highlight the challenges in ensuring that adequate resources are available to meet the mental health needs of returning veterans. The data also supported the DoD Health Affairs' decision to expand the PDHA program to include the PDHRA 3 to 6 months postdeployment.

### Wartime Studies of Leadership and Unit Factors in Operational Units

A unique feature of WRAIR research has been studies of the relationship between mental health and unit factors such as leadership. Studies have collected data from large intact units (eg, brigade combat teams), thereby including responses from members of the same subordinate units (eg, companies and platoons). This sampling strategy provides an opportunity to examine shared collective perceptions of unit members about cohesion and leadership and understand how these perceptions relate to mental health.<sup>50,51</sup> The research has shown that variables of this nature have

both main-effect and moderating influences.<sup>52</sup> In terms of main effects, perceptions of leadership, cohesion, and other aspects of the social environment have been shown to be directly related to mental health outcomes. That is, units with positive perceptions of leadership and cohesion also tend to report low levels of psychological problems, and this shared unit effect is often stronger than the effect analyzed as an individual-level relationship.<sup>51,53</sup> Leadership and other unit factors have also been shown to interact with various stressors such that the negative effects of stressors are weakened when unit factors are positive. This finding suggests that leadership, cohesion, and other forms of social climate may serve to protect soldiers from combat stressors. In one example, shared perceptions of leadership provided a protective influence for soldiers deployed to Haiti.<sup>54</sup> As noted, a key finding from the fourth mental health advisory team assessment in Iraq (2006) was that good unit leadership was associated with fewer mental health problems.<sup>37</sup> As a result of these research findings, WRAIR developed training materials to improve leader behaviors and enhance the mental health of units.

### **Battlemind Training**

At the time that the DoD's Deployment Cycle Support Program was initiated, no standardized combat and deployment stress training packages existed to prepare soldiers for the stressors of war, or to facilitate their transition home, and no integrated mental health training occurred across the deployment cycle. Thus, it was up to behavioral health professionals at each military post to come up with their own training material to meet the requirements of the program.

To address this need, WRAIR researchers created a validated standardized mental health risk communication training program called "Battlemind." Battlemind educates soldiers and leaders about

- what to expect at each phase of the deployment cycle,
- how to look out for their own mental health,
- how to help their fellow unit members, and
- resources available for them to get help if they need it during and after deployment.

The content of Battlemind training, based on results and lessons learned from studies of OIF and OEF combat soldiers, focuses on the strengths and skills that help soldiers survive in combat.

Following the piloting of the first Battlemind products in 2005 and 2006, several new products have been developed and disseminated in collaboration with

the Army Medical Department (AMEDD) Center and School. Several prototype Battlemind training modules have been developed and piloted for each phase of the deployment cycle. Predeployment training includes a module for soldiers and leaders that builds resilience by anticipating combat stressors and typical reactions while identifying actions that can be taken to meet these challenges. Predeployment modules have also been developed for behavioral health professionals and military spouses.

During deployments in Iraq, mental health professionals are using two types of Battlemind psychological debriefing techniques developed by WRAIR.<sup>55</sup> Event-driven Battlemind psychological debriefing is designed for use after a critical event, and time-driven Battlemind psychological debriefing is designed for use periodically over the course of a 12- or 15-month deployment. Both of these techniques actively integrate Battlemind concepts, using structured group discussion to review key issues, reinforce positive mental health strategies, encourage unit members to look out for one another, and keep individuals focused on professional and ethical conduct.

The practice of psychological debriefing is controversial, and controlled research examining the efficacy of debriefing with at-risk cohesive occupational groups is lacking.<sup>56,57</sup> WRAIR demonstrated the efficacy of postdeployment Battlemind psychological debriefing in a group randomized-control trial in which platoons were assigned to different types of postdeployment transition training.<sup>58</sup> The debriefing techniques used in this study were the basis for in-theater debriefing models and a postdeployment Battlemind psychological debriefing model now integrated into the Combat Operational Stress course taught at the AMEDD Center and School.

In the same study, Battlemind training conducted at reintegration and at 3 to 6 months postdeployment was also found to effectively reduce mental health symptoms over time.<sup>59</sup> These two postdeployment training modules highlight combat skills that can be adapted to facilitate the transition home. A postdeployment Battlemind training module has also been developed for spouses. Additional Battlemind training products under development include a first aid module for medics, basic Battlemind during initial military training, and leadership development courses. Several training DVDs have also been developed to supplement the Battlemind system.

Battlemind training is currently integrated into the Deployment Cycle Support Program directive and is part of the standard training that soldiers receive before and after combat deployment.<sup>30,39</sup> Battlemind training offered for spouses is specifically designed to

strengthen their resilience during times of separation due to war. As each Battlemind product is fielded, it has been made available on its Web site, [www.battlemind.org](http://www.battlemind.org). Other nations including Canada, the United Kingdom, and Australia are also adopting Battlemind training.

### Army Medical Department General Officers Behavioral Health Summit

In June 2006, WRAIR hosted a general officers summit for the Army surgeon general and the commander

of the US Army Medical Research and Materiel Command. The 2-day conference, attended by 20 AMEDD general officers, was conducted with three primary goals: (1) to arrive at a common understanding (or “lexicon”) of available data on the mental health impact of combat, (2) to evaluate best practices and lessons learned so that consistent approaches can be established across components and installations, and (3) to establish the AMEDD behavioral health strategy. The conference achieved its goals and led to the publication of a comprehensive report on Army behavioral healthcare strategy.<sup>60</sup>

## OTHER WRAIR MENTAL HEALTH RESEARCH INITIATIVES

WRAIR researchers have been involved in a variety of related efforts, including assessing how adverse early childhood experiences affect psychological adjustment following combat,<sup>61</sup> assessing the appropriateness of PTSD diagnostic criteria applied to combat veterans,<sup>62</sup> and developing a conceptual model for understanding the stigma of mental health problems.<sup>63</sup>

The research program has also led to innovations in the development of tools to help unit leaders assess the behavioral health status of their units. WRAIR researchers have used their knowledge of health measures, military norms from the Land Combat Study, and feedback from unit commanders to develop a unit needs assessment program, designed for behavioral health professionals to provide consultation to military units. The program includes tools, scoring guidelines, implementation recommendations, and a briefing template to facilitate the behavioral health assessment of units.

Given the complexities associated with analyzing large data sets collected from soldiers hierarchically nested within military units (squads, platoons, companies, etc), the WRAIR research program has also contributed to innovations in statistical software and statistical techniques. Many of these innovations have been implemented in the open-source statistical language R.<sup>64</sup> For instance, the “lme4” package in R is designed to analyze hierarchical mixed-effects models containing dichotomous outcomes (eg, meeting or not meeting PTSD thresholds). The algorithms used in the lme4 package were developed by the University of Wisconsin and the Toyon Research Corporation (Goleta, Calif) in a Small Business Technology Transfer

Program grant managed by WRAIR scientists.

In another example, WRAIR researchers developed and maintain the multilevel package for R, providing a number of routines for determining whether group members significantly agree about shared concepts such as unit leadership or cohesion. Finally, the package “lrm” is designed to perform item response theory analyses on specific survey items to aid in creating scales with good psychometric properties. WRAIR scientists provided funding to expand the lrm package to handle multiresponse items (eg, strongly disagree, disagree, neither, agree, strongly agree). Each of these developments has contributed to the analyses of complex multilevel data sets involving health outcomes.

WRAIR researchers are active in publishing their work in peer-reviewed journals and other outlets. In 2006 the work of several WRAIR researchers was showcased in a four-volume book series, *Military Life: The Psychology of Serving in Peace and Combat*.<sup>65-68</sup> WRAIR research figures prominently throughout this comprehensive examination of the psychological issues facing military personnel and their families. The series also provides an agenda for military psychology research in the coming years.

Finally, WRAIR research has been widely cited by medical policy makers and lawmakers, and has contributed to significant increases in funding for PTSD treatment and research within the DoD and Veterans Administration. The fiscal year 2007 Congressional appropriation, for example, included a total of \$450 million for research and treatment initiatives in the area of PTSD, and another \$450 million for traumatic brain injury.

## SUMMARY

In keeping with its tradition of working directly with military units in times of conflict, WRAIR has been at the forefront of mental health research since

the events of September 11, 2001. Researchers have conducted comprehensive analyses of the mental health impact of OIF/OEF, improved deployment-

related screening initiatives, and developed interventions to improve the psychological health of US troops. The program has been focused on directly supporting operational units, deploying research teams into Iraq and Afghanistan, generating timely products relevant to current operations, and informing healthcare policies on an Army- and DoD-wide level. Future directions include the development of advanced training modalities to improve resiliency and

mitigate the mental health effects of combat, randomized controlled trials to assess early interventions, and studies of the relationship between PTSD and combat injuries, including traumatic brain injuries. Through balancing scientific rigor with the behavioral health needs of military personnel, WRAIR researchers will remain focused on delivering quality information and training products in support of service members and their families.

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