The preceding chapters examined various issues pertaining to the possible role of stress exposure in the health problems experienced by veterans of the Persian Gulf War. This chapter summarizes key findings and presents a synthesis of our review.

WHAT DOES THE GENERAL SCIENTIFIC LITERATURE SAY ABOUT THE NATURE OF STRESS?

The perception of stress is a complex process, involving both the individual and the environment. Whether individuals perceive circumstances as stressful depends upon their own unique life experiences, as well as their personal, social, and biological resources and vulnerabilities. Mere exposure to challenging life circumstances is not sufficient, in itself, to produce stress, but certain events are more likely than others to be perceived as stressful.

Disease and illness are overlapping, but distinct, constructs. Whereas disease refers to diagnosable physical and psychiatric syndromes, illness refers to the subjective experience of poor health. Illness can manifest itself as bodily symptoms stemming from multiple sources—including psychological, physical, and social agents—and may or may not reflect the presence of an underlying disease. The relationship of illness to disease is complex. A person may experience ill health with no underlying disease. Conversely, individuals may suffer from an underlying disease without regarding themselves as ill.

Perceived stress sets in motion an interrelated set of physiological, behavioral, emotional, and cognitive responses aimed at adapting to environmental demands. Although these responses have adaptive short-term benefits, over time they may act in concert with other host and environmental risk factors to increase the likelihood of poor health.

War-zone deployment is associated with exposure to a spectrum of potentially stressful circumstances, ranging from events such as separation from loved
ones to noncombat war-zone events such as harsh living conditions, to combat events such as traditional combat and its often gruesome aftermath. Apart from actual exposure to combat, war-zone deployment is often associated with the perception that oneself or others are at risk of serious injury or loss of life. Although the literature on noncombat exposures associated with war-zone deployment is still emerging, there is increasing recognition that any one of these perceived or actual exposures may contribute to adverse stress reactions. It is not necessary to participate in actual combat to experience stress, nor is it necessary to experience an event of high magnitude.

DOES EVIDENCE INDICATE THAT DEPLOYED TROOPS WERE EXPOSED TO STRESS IN THE GULF?

Available data suffer from limitations including a lack of general applicability to all troops stationed in the Gulf. Nonetheless, the in-theater and postdeployment interview and survey data converge in suggesting that deployment to the Persian Gulf was perceived by many personnel as a stressful life experience. Although potentially stressful exposures were not perceived as stressful by all exposed personnel, data suggest that large numbers of surveyed veterans reported moderate to high levels of stress resulting from exposure to multiple stressful circumstances. Although comparatively few personnel participated in actual combat, deployed service members experienced a wide range of stressful life experiences including—but not limited to—short deployment notice, uncertainty about the mission and length of deployment, harsh and crowded living conditions, long work hours, separation from loved ones and indigenous populations, concern about polluted environmental conditions, fear of missile attack, prolonged anticipation of chemical and biological weapon attack, and indirect exposure to combat and its often horrifying aftermath. Some evidence suggests that reservists may have experienced somewhat higher levels of perceived stress, perhaps owing to differing expectations about military obligations, differing levels of preparedness and training, the rapidity and abruptness of their mobilization, and the manner in which they were assigned to units.

Although many of the hardships and dangers experienced by veterans of the Gulf War were similar to those experienced by veterans of other wars, this was the first war since WWI in which the clear threat of chemical warfare was known by the troops prior to entering the theater of operations; this was compounded by the combined threats of nuclear and biological weapons. Another difference between the Persian Gulf War and many other previous wars is that U.S. troops in the Gulf experienced low casualty rates. It is possible, albeit speculative, that the greater mortality and more severe morbidity associated with other wars may have drawn attention away from, or obscured recognition of the presence of, psychological or physical symptoms such as those experienced in the Gulf.
DOES THE GENERAL SCIENTIFIC LITERATURE UNRELATED TO THE GULF WAR SUGGEST THAT STRESS CAN CONTRIBUTE TO POOR HEALTH?

The empirical literature on exposure to stress provides ample evidence that perceived or actual exposure to stressful events—including combat or war-zone exposure—can contribute to various psychological or physical health problems. Relatively common self-reported reactions to stress include symptoms of depression, anxiety, impaired memory, and concentration difficulties, as well as symptoms of irritability, fatigue, headaches, back and neck aches, gastrointestinal complaints, and breathing difficulty, that may be due to either psychological or physical health problems. More severe forms of mental illness, including depression and PTSD, have also been linked to exposure to stressful events. The onset of problems varies, with some individuals reporting delayed onset of symptoms. In some instances, what appears as delayed onset of symptoms, however, might be more aptly characterized as delayed medical help-seeking. The duration of problems also varies. Although many psychological and bodily symptoms recede with the passage of time, it is not uncommon for symptoms or illnesses to persist long after the stressful event itself has passed.

The available literature also suggests that stress exposure may act as a contributing risk factor for a range of physical illnesses and disease, including cardiovascular disorders, although the strength of the evidence varies depending upon the health problem in question, and associations are typically modest.

With respect to war-zone or combat exposure, a small number of studies suggest that such exposure is associated with self-reported short-term and chronic health complaints and conditions, as well as higher levels of medical help-seeking. On the other hand, little definitive evidence indicates that war zone or combat exposure as such contributes to actual physical disease. In several studies of war veterans in which a relationship between stress exposure and self-reported physical health problems were observed, these findings have not been borne out by objective medical examination.

ARE THE PROBLEMS REPORTED BY CCEP AND VA REGISTRY PARTICIPANTS CONSISTENT WITH THE SCIENTIFIC LITERATURE LINKING STRESS TO HEALTH PROBLEMS?

To date, approximately 70,000 veterans—roughly 10 percent of the total force deployed to the Gulf—have been evaluated in the CCEP and VA Registry programs. These persons have suffered from a broad range of ailments, the majority of which appear to be well-defined medical and psychological conditions. A sizeable subset of these registry participants, slightly less than 20 percent, have
reported symptoms that have eluded traditional medical explanation. The latter figure equals about 2 percent of those who served in the Persian Gulf War.

Deriving conclusions about the possible contribution of stress solely from consideration of the range of conditions suffered by participants in the Gulf War clinical registries cannot be done with any degree of certainty. Although the general scientific literature has implicated stress exposure as a contributing factor in various well-defined conditions, including some health problems experienced by Gulf War veterans, few problems or symptoms are uniquely characteristic of stress exposure. Thus, with the possible exception of PTSD, the stress of Gulf War service cannot be conclusively determined to have played a contributing role merely from the observed presence of these disorders or symptoms.

Similarly, although some of the symptoms reported by those registry participants with ill-defined conditions seem consistent with stress exposure, these symptoms are also consistent with various other possible etiologies. In sum, the possibility that stress may have either contributed to or exacerbated the health problems of some registry participants (and, by extrapolation, some Gulf War veterans) can neither be ruled out nor proven based upon currently published descriptive registry data.

WHAT CAN BE CONCLUDED FROM THE SCIENTIFIC LITERATURE BEARING DIRECTLY ON THE LINK BETWEEN GULF WAR STRESS EXPOSURE AND SUBSEQUENT HEALTH PROBLEMS?

A number of empirical studies have examined the health consequences of Gulf War service. Many of these studies relied exclusively on comparison of deployed and nondeployed troops without actually assessing stress exposure. Although this research generally shows that deployed troops reported more health problems than nondeployed troops, these studies are silent as to whether any detected differences between the deployed and nondeployed groups are attributable to stress, to other possible exposures, or to preexisting group differences.

A small body of studies, however, directly examined the association between Gulf War stress exposure and subsequent health problems in veterans. In the main, available research focused on the relationship between stress exposure and PTSD symptoms, perhaps owing to the importance of this health problem in the last major war, Vietnam. A secondary focus of available research centered on detecting other psychological health consequences of stress exposure. By contrast, we found very few studies that were designed or reported in a manner that permits conclusions concerning the relationship between stress exposure and bodily symptoms. Although a few studies examined the relationship between stress exposure and self-reported bodily symptoms or functional
impairment, we identified no research studies in which stress was adequately assessed that simultaneously attempted to corroborate subjective health complaints with either physical examination or laboratory test procedures.

In general, although hampered by the previously described methodological limitations, the available empirical research on samples of Gulf War veterans indicates that stress exposure was associated with PTSD or PTSD-like symptoms. With respect to other psychological problems, the data were somewhat less conclusive. Still, the majority of studies tended to support an association between stress exposure and psychological distress. For both PTSD and other psychological health problems, the association between stress exposure and health problems was generally modest, but more marked in persons exposed to high-stress (combat-related) conditions. By contrast, little evidence links stress exposure to an increase in self-reported bodily symptoms, in part because of the paucity of research on this topic.

CONCLUDING OBSERVATION

The scientific study of stress and its impact on health has made enormous advances in recent years. Unfortunately, these scientific strides have generally not been accompanied by an evolution in popularly held misconceptions about stress. The societal stigma associated with stress as an explanation of poor health and disease has contributed greatly to the politicized environment that sometimes characterizes public discourse concerning the health problems suffered by Gulf War veterans.

Although it is inappropriate to rely upon stress exposure as a default explanation for the myriad health problems reported by Gulf War veterans in the absence of a thorough review of research concerning all plausible causes, we think it equally inappropriate to assume that stress played no role. To do so would ignore what the scientific literature shows about the relationship between stress and health.