

## **Economic Effects of PTSD: A Review**

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## **1. INTRODUCTORY AND METHODOLOGICAL COMMENTS**

This review is organized into three major parts. The first states the purpose of the review, describes the way in which the review was conducted, and discusses the nature of the data and problems and cautions needed in interpreting the literature. The second major part presents the review itself. The third part is the conclusion, broken into a section on substantive conclusions about what is known concerning economic impacts of PTSD, and a section of recommendations concerning methodology and research design for future studies in this area or to assist in the critical evaluation of research.

### **1.1\_ Purpose of this review**

There is by now a considerable literature on post-traumatic stress disorder, or PTSD. A subset of that literature deals with PTSD in the context of military conflicts such as wars, peace keeping or peace making activities. Most of the general literature, and of that subset, focuses on conceptualization and measurement of PTSD, the causes of PTSD and factors increasing vulnerability to it, and the consequences of PTSD for mental health. These consequences are sometimes extended to include alcohol and drug problems, and marital problems. Although research efforts in military-related PTSD has grown significantly in recent years, the bulk of research focuses on the determinants of PTSD and the possible contributions or interaction effects of risk factors prior to the military experience on the development of PTSD or, alternatively, when looking at the consequences of PTSD, attention focuses on psychiatric and psychological consequences of PTSD and on sorting out the relationships of PTSD to depression and other psychiatric and psychological phenomena (Rosenheck and Fontana, 1994). In contrast to most of the research studies, the focus of this review is on economic consequences of PTSD. The purpose of this review is to examine the research literature on PTSD in the military context, in order to assess what is known of the impact PTSD can have on occupational and economic status.

### **1.2 How the review was conducted**

Several approaches were taken to assembling the literature. The library staff of the University of North Carolina at Chapel Hill, notably Danielle Borasky, MLS and Amy Funderburk, MLS, conducted systematic searches of the medical and social science literature, using PubMed, PsychInfo, Sociological Abstracts, and the EBSCO Military and Government Collection. These searches were not confined strictly to PTSD but included broader search terms for mental health and depression; and they were not restricted to the military context. Rather, the focus on the military context was done at the review stage. A second basis of the review occurred through the generosity and collegiality of Major Jeffrey Scott Yarvis, U.S. Army, who made available the systematic literature review that he had conducted in support of his doctoral dissertation research on subthreshold PTSD, using the Canadian Forces 1999 survey (Yarvis 2004). This was an invaluable input to the review as it allowed our library staff to obtain some sense of the scope of the research area and publication sources, and to gather additional and emerging articles by authors included in his review. A third basis of the review has been the steady stream of references and articles in digital format, distributed by Colonel Ken Scott, D. Med., of National Defence Headquarters in Ottawa through his invaluable listserv on military health issues. Not only the hundreds of references he has provided, but his scholarly and critical commentary on methods and results of research in this area, as well as the ways in which media often distort science, proved to be invaluable in keeping the review current. A fourth basis of the review was the website of the National Center for PTSD (<http://www.ncptsd.org>), which is run by the U.S. Department of Veterans Affairs and provides access not only to reports on PTSD by its own staff but to a wide literature in the area. A fifth basis of the review was input from David Pedlar, Ph.D., Director of the Research Directorate of Veterans Affairs Canada, who pointed me to several scholars doing important work in this area. The review encompassed books and book chapters, monographs and reports as well as journal articles, and of course it made use of other literature reviews that have been done in the general PTSD area (there are no general literature reviews in the precise area being pursued here). The bibliographies of articles, as read, were scoured for other relevant sources and these were secured online or through the outstanding library system of The University of North Carolina at Chapel Hill. In summary, the identification of relevant material used several different approaches that, despite the partial redundancy of results,

enhanced the scope of literature covered. At the same time, the field of research to be reviewed was narrowed to focus on the occupational and economic aspects of PTSD. While library staff were invaluable in identification of literature, the literature found was screened and reviewed solely by the author.

### **1.3 Cautions when interpreting the literature**

PTSD research is relatively new and some aspects of it, especially concerning the development and sequelae of PTSD in the context of peace keeping and peace making missions, is newer still. Over the course of the brief history of PTSD research, there have been many advances in conceptualization, methodology, measurement, and statistical techniques applied to the analysis.

Before moving to the core of the review, it is worthwhile to note some of the problems that reflect on the rapid changes in this recent area.

#### **1.3.1 Conceptualization and Measurement**

PTSD can be seen as an emerging construct. Without at all denying the reality of PTSD, it must be admitted that stress related to trauma in military or combat situations has been thought of in different ways and, historically, given many different names. As conceptualization of what is now called PTSD changes, so has measurement. Moreover, the process is in fact dialectical, as the examination of data leads to changes in conceptualization of PTSD, which stimulates new measurement efforts. Two examples of this are work done to identify elements of PTSD that might be novel in peace keeping and peace making situations as contrasted with more traditional forms of military conflict, and work to distinguish the concept of sub-threshold PTSD from full PTSD. This is not the place to review this topic in great detail. However, a sense of the changing conceptualization is given here.

Based on an examination of *The Diary of Samuel Pepys*, Daly (1983: 64), described reactions of Pepys and others he described to two London disasters: the Plague of 1665 and the Great Fire of London, which occurred in 1666. He suggests that PTSD is evident in these reactions and that, while only recently officially acknowledged, one might query the temporal constancy of post-traumatic stress disorder and ask whether it has just appeared or if it always

existed. (Daly 1983: 64). However, PTSD was established as a psychiatric diagnosis only in 1980, when it became an entry in the third edition of the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders (DSM-III)*. As with many disease labels given recognition in DSMs, the addition of PTSD to the Manual came only as the result of a long political struggle (as outlined in detail by Scott, 1990). The definition has since been modified three times (Yarvis 2004, with input from various clinical and epidemiological studies (Davis 1999; Yarvis 2004)).

In the military context, a number of different terms have been used over the centuries to describe trauma related to combat exposure or other military experience. Examples are 'shell shock', from World War I, 'combat fatigue', 'combat exhaustion', and 'combat neuroses' from World War II (Bar-On, 1986; Davis 1999; Scott 1990; Yarvis 2004, ch.1). Some of these terms made reference to symptoms that would now be 'collected' under the formal definition of PTSD. In a study based on formal records of pensioned British Army veterans from different eras, it was found that, whereas Boer War and earlier veterans on war pensions tended to attribute their pensionable condition to 'the psychological stress of military service', and this rose to about one in four for World War II pensioners. In contrast, Gulf War pensioners were more likely to make attribution to toxic exposures rather than to stress (Jones, Hodgins-Vermaas, McCartney, et al., 2002: 4). It was American Vietnam veterans (along with some significant allies in the Veterans Administration and academia) who drove the political process leading to acceptance of PTSD as an official diagnosis in DSM (Scott 1990), and a major factor in doing so was to recognize that, unlike diagnoses previously in use, there was a stress-related consequence of military experience that had long-term consequences. Whereas earlier conceptions of combat-related stress problems often assumed the phenomena to be transient, and often assumed they were related to cowardice, it was eventually recognized that the experience of traumatic events could produce lasting, or chronic, consequences (Brett 1996).

Needless to say, the conceptual evolution of thinking about PTSD has been paralleled by a good deal of research concerning measurement and instrumentation (e.g., Asmundson, Wright, McCreary and Pedlar 2003; Blanchard, Jone-Alexander, Buckley & Forneris 1996;

Buckley, Blanchard & Hickling 1998; Fontana & Rosenheck 1994; Weathers, Litz, Herman et al., 1993). The consequence is a lack of full comparability across epidemiological or survey-based research studies using different conceptualization and measurement of PTSD, as well as a lack of clarity as to how to consider clinical data. Moreover, conceptual advances such as the recognition of the clinical significance of sub-threshold PTSD and the development of a measurement protocol to do so (Schützwohl & Maercker 1999; Yarvis 2004) have not as yet been used in support of research dealing with the economic consequences of PTSD, which is the focus of this review.

### **1.3.2 Reporting bias**

Reporting bias can sometimes distort research findings. People may distort self-reports of disability status in order to secure compensation. Rosenheck et al., (1995) cite studies from the general (not veteran-specific) literature to suggest that reporting biases do not affect the relationship between disability payment levels and participation in the labor force. However, there might also be reporting biases due to recall or motivational factors, or to the recovery process, that influence the ways in which veterans describe the severity of their combat experiences (Aldwin, Levenson and Spiro, 1994).

Wessely, Unwin, Hotopaf, et al. (2003) found increases in reporting traumatic and toxic hazards among UK Gulf War veterans but not Bosnia veterans. As they point out, increased media discussion of "Gulf War Syndrome" may account for this differential in recall discrepancy. On the one hand, media attention to problems of combat or peacekeeping veterans may increase knowledge and actually enhance accurate recall; but on the other hand, media exposure might motivate veterans to inflate their reports. These authors cite another study (Roemer et al., 1998) in which the authors report that PTSD scores at a second assessment were associated with reports of exposures to seven specific war-related stressors in a small (n=460) sample of US Somalia peacekeepers. However, Wessely et al. found both "forgetting" and "remembering" such exposures was associated with "current health perceptions": "Remembering more exposures over time was associated with worsening perception of health; conversely, improved perception of health was associated with forgetting previously recalled exposures"

(Wessely, et al., 1994: 320). In this study, PTSD scores has no relationship to forgetting or remembering patterns or with measures of general mental health. The issue of reporting bias is far from resolved. For example, in a study of 137 Dutch peacekeepers in Cambodia, the investigators found no evidence in inconsistencies in self reports given at two points in time, 3 and 4 years after the peacekeeping service. (Bramsen, Dirkswager, van Esch & van der Ploeg 2001)

### **1.3.3 Need to disentangle age, period and cohort effects.**

PTSD is a chronic condition. Thus, understanding it requires an understanding of time. Clearly, the PTSD symptoms would have to appear at a later point in time than, or at the least not prior to, the exposure to trauma. The great advance in defining PTSD, as noted earlier, is its recognition that symptoms can surface some time after the trauma, and they can persist over time. However, other factors related to time influence PTSD and its possible consequences, such as employment status and economic attainment. These factors may influence any or all of: vulnerability to trauma, whether trauma leads to PTSD, and how PTSD may affect behavior related to employment and economic attainment.

Social factors related to demographic characteristics such as class, race and gender may play a role in the development of PTSD (Litz, King, King, Orsillor & Friedman 1997) and may also play a role in the response to PTSD in the subsequent lives of those who suffer from it. Even race and gender cannot be assumed to be constants over time. Consider, for example, how the meaning of race and gender, and the consequences of these changing meanings, must have differentially affected the labor market chances of women and men, or people of different races, in the periods following World War II, Korea, Vietnam, and the Gulf War.

Socioeconomic status (social class position) has been demonstrated in several conflicts to be associated with exposure to heavy conflict: the lower the social class the more likely someone in the military is to be exposed to direct combat. SES is also correlated with race. However, race has had variable effects, at least for American soldiers, in relation to combat exposure. Black and Hispanic veterans were less likely than whites to be exposed to combat in World War II (no doubt due to racial segregation in the US forces), more likely to be exposed to

combat in Korea, but only marginally more exposed than whites in Vietnam (Rosenheck & Fontana 1994: 338). But lower socioeconomic status may also be associated with reduced resources in the individual to cope with the trauma, and therefore higher vulnerability to develop PTSD once exposed to trauma and lower ability to cope with PTSD symptoms once experienced. Thus, it is important to assess predisposing factors to trauma exposure, symptom acquisition, coping and recovery as these play out over time. Cross-sectional studies have little ability to sort out the varying contribution of factors such as socioeconomic status or educational status over time.

Yet another dimension of time is cohort. A cohort is a group of people who experience the same event at the same historical time. Most often we refer to birth cohorts or, in lay terms, to generations. The occupational status of veterans with PTSD or mental health problems is influenced not only by their disability but by social and economic factors that prevail at the time of their service and when they subsequently re-enter civilian life, whether disabled or not. An American study that compared those with and without military service in the early 1980s found that the former experienced higher employment rates and that military service is associated with modest long-range increases in subsequent civilian earnings among nonwhite veterans, but reduced civilian earnings among white veterans (Angrist 1998). The size of the US armed forces grew significantly during the early 1980s, followed by declines from 1987 through 1992. Declines were particularly strong among black men, and the major reason for the declines (or perhaps it is more accurate to say the major vehicle to reduce recruitments), was the raising of entry standards and test-score cutoffs. Thus, the economic status of veterans can be influenced by cohort effects on selection into the military, such as whether a draft was in place, or the standards set for recruits. Such selection effects have been extensively studied by Angrist (1990, Angrist and Krueger 1994), and by others whom they cite. Moreover, different cohorts of veterans experience differences in the nature and extent of their training experiences while still in the military, and these might be expected to influence post-discharge economic outcomes (see discussion of Mangum and Ball, 1989, below).

Rosenheck and Fontana hypothesize that PTSD symptoms would be similar across US veterans from three different wars (World War II, Korea, Vietnam) but that Asocial

maladjustment problems would differ among veterans of the three wars, assuming that such problems are shaped as much by postwar sociocultural factors as by the psychological sequelae of combat...@ (Rosenheck and Fontana, 1994: 333). I question whether PTSD symptoms would in fact be experienced in the same way among veterans of these wars or other conflicts. Limited research focusing on the analysis of symptoms suggests that symptom experience might differ, due to the nature of the conflict theater in which the conflict occurs and to the cultural ideas as to combat stress and the causation of illness (Bar-On, et al., 1986; Hallman, Kipen, Diefenbach, et al. 2003; Jones, Hodgins-Vermaas, McCartney et al., 2002.). It is widely accepted in research on the social and cultural aspects of illness that the very experience of symptoms is shaped by culture. Thus, Kleinman (1988: 10) notes that the meaning of illness symptoms A... depends on shared understandings in particular cultures and not infrequently diverges among different social groups. The meanings of symptoms are standardized «truths» in a local cultural system...@. In any case, to the extent that data are available, this review will be concerned with social and economic behavior and not with health symptoms or with «social maladjustment». Economic status and employment status are the primary matters of concern. Social maladjustment may contribute to low socioeconomic status or, for example, to unemployment, but this by no means certain.

A different example of a generational cohort effect is that veterans suffering from PTSD may manifest behavior related to their disorder in different ways in different milieu. Rosenheck and Fontana (1994) have emphasized that veterans of different wars and conflicts left military service in different eras. They note,

Aln contrast to the relative similarity of PTSD symptomatology among veterans of the three wars, substantial differences exist in social adjustment (e.g., marital status, vocational performance, and involvement with the criminal justice system). The typical clinical image of the combat veteran suffering from PTSD is of a divorced, vocationally unstable, substance abusing Vietnam veteran. As our review demonstrates, however, this contemporary stereotype of the traumatized veteran has less to do with specific problems associated with combat related PTSD than it does with the adaptive style of socially marginal men of the 1980s. The vast majority of World War II veterans with PTSD, for example, are married. These men, while deeply

troubled and highly symptomatic, were members of a generation in which divorce was less acceptable and families more often stayed together through adversity.@ (Rosenheck and Fontana 1994: 355).

Rosenheck and Fontana (1994) note that comparisons of veterans of different conflicts raises critical questions of sorting out age and generational cohort effects. Discussing their analyses of World War II, Korea and Vietnam veterans in the US, Rosenheck and Fontana state:

Conclusions concerning the impact of combat on veterans of the three wars are complicated by the potentially confounding influences of current age and generational membership. Although the attribution of effects to either of these influences is largely a matter of interpretation, age effects such as increasing medical problems or widowhood are primarily biologically determined and could be expected to be the same for all generations. In contrast, generational effects are likely to be determined more by sociocultural factors. Divorce and drug abuse, for example, are more frequent among veterans who reached adulthood during the 1960s. Although these veterans are younger than their World War II counterparts, it is less their youth than the generation to which they belong that most likely accounts for these effects.@ (Rosenheck and Fontana 1994: 333).

Ideally, longitudinal data are preferred when trying to sort out causation. Failing that, cross-sectional studies can be persuasive as to causation if the important variables can be temporally identified. An important Canadian example of this problem is the Goss Gilroy report (1998), of a cross-sectional study conducted in the Canadian military about five years after the completion of the Gulf War. A census of Canadian Armed Forces personnel deployed to the Gulf War theater was compared with a matched sample of personnel who were not deployed but eligible to go. The samples were matched for gender and age group. The survey was conducted in 1997, whereas the Gulf War troops had been deployed in 1991-2. The study found that those with service in the Gulf War theater were more likely to report symptoms of PTSD as well as to report a provider diagnosis of PTSD, than those not serving in the Gulf War theater. There was a

significant negative correlation between income status and each of these PTSD measures. However, the implication of this is not at all clear because the income measure is at the time of the PTSD measures. It could be that those who developed PTSD experienced a consequential decline in income. Alternatively, it is conceivable that personnel from lower-income backgrounds prior to entry into the service would, on leaving the service, re-enter civilian occupations at a lower-income level than those whose socioeconomic background was higher. To the extent that this is the case, it could be inferred that low socioeconomic status is associated with greater risk of experiencing PTSD in the first place (as has been found in some longitudinal studies. See Schlenger et al., 1992). The simple correlation between income status and PTSD status cannot sort out causation.

#### **1.3.4 Statistical modeling issues**

Research on the consequences of PTSD and other mental health consequences of combat experience often uses a stress model, and as Aldwin, Levenson and Spiro (1994: 35) have noted,

A... the statistics commonly used in most stress research assume that there is a linear relationship between stress and outcomes. However, it is quite possible that nonlinear relationships may exist; for example, j curves or asymptotic ones are quite likely for stress and negative outcomes. It is also entirely possible that there may be an inverted-u relationship between stress and positive outcomes.... For example, Schnurr Rosenberg, and Friedman(1993) found that moderate exposure to combat resulted in more desirable effects in terms of personality change than die either low or high exposure.@

Rosenheck and Fontana (1994), in their paper modeling factors associated with homelessness in Vietnam veterans, present an excellent discussion of the difficulties in developing causal models. They show that structural equation modeling (SEM), which requires strong reasoning for the temporal ordering of variables from cross-sectional data, can be used to evaluate hypothesized causal relationships. On theoretical and logical grounds, a selection of variables can be entered into a model incorporating hypothesized causal sequences. In an extension of multiple regression

analysis, all equations describing all postulated causal linkages among variables are solved simultaneously.

### **1.3.5 Treatment**

One factor making it difficult to gauge long-term effects of any illness is treatment. If the person is being treated, that treatment might influence any number of factors indirectly through its effects on the illness, or perhaps directly. The economic implications of treatment for those with PTSD or mental health problems can be very complex. For example, Rosenheck, Frisman and Sindelar (1995) point out that general studies of Social Security Disability Insurance (SSDI) have found that being judged disabled and eligible for a disability pension can act to reduce the likelihood an individual will seek employment; however, they also report that a 1989 survey of disabled veterans (Survey of Disabled Veterans, 1989) found only one percent reported having ever reduced employment-seeking in order to preserve benefits. These authors examined cross-sectional data from the National Vietnam Veterans Readjustment Survey, conducted 1997-8, to assess the effects of various levels of VA compensation for those disabled by injuries or diseases. They found, controlling for many other factors, first that there was no difference in the effects of compensation levels between those with psychiatric and non-psychiatric disorders and, second, that lower levels of compensation (partial disability) had little effect on employment. Thus, those who had applied for disability compensation but were denied it did not work more hours, or earn more, than those whose applications were successful and whose compensation was less than \$500 per month. However, those who received higher levels of compensation did work fewer hours and earn less.

### **1.3.6 Effects of different military service theater and within-theater experiences**

All wars or conflict situations are not alike, and the experiences of soldiers in any given war or conflict situation are similarly not all alike. Without differentiating intensity of conflict exposure of individual veterans, Anderson and Mitchell (1992), analyzing data from the NIMH Epidemiologic Catchment Area Program in the US, found differences among Vietnam, Korean and World War II veterans. Vietnam veterans, for example, were more likely to experience

alcoholism and drug abuse than veterans of the other conflicts, while significant differences in depression were not found. This study did not include a specific measure of PTSD, and these authors do not provide a systematic interpretation of these differences. Others have addressed the problems in this area.

Rosenheck and Fontana (1994, p. 331) note that *In spite of the lack of empirical data, there is considerable speculation about differences in the experiences of veterans of different wars, particularly between veterans of World War II and the Vietnam Conflict. Some have suggested that both the guerilla nature of combat in Vietnam and the public controversy surrounding the war resulted in a degree of social alienation and psychological stress among Vietnam veterans that was relative uncommon among veterans of World War II.*<sup>@</sup>

While not a study of PTSD but rather of the economic impact of military service of Germans in the Second World War, Mass and Settersten (1999) found that soldiers experienced more downward occupational mobility following the end of the war than did non-soldiers, but that they were also more likely to experience upward mobility. In other words, they were less likely to be occupationally stable in social status. Moreover, the longer the length of military service, the more negative the effect on subsequent occupational status, even controlling for pre-war educational and occupational attainment. A study of Japanese men born between 1918 and 1924 found that those who served in the Second World War were more likely than men who did not to suffer economic hardship at the end of the war, but this did not impair their subsequent occupational achievement (Elder & Meguro, 1987). These studies have limited applicability to our concerns because they do not include measures of PTSD, and because the post-war experiences of German and Japanese veterans occurred in two countries devastated by the effects of war.

The nature of the conflict situation probably also has an influence on the prevalence and nature of PTSD among military who are involved. Unfortunately, the most extensive data on PTSD epidemiology, causes and consequences are from the US military experience in Vietnam. Little is known about PTSD in relation to peacekeeping and peace enforcing, and even less about PTSD and subsequent occupational and economic outcomes for those groups.

An overview of stress in peacekeeping is provided by Egge, Mortensen, & Weisæth

1996, who go so far as to speculate that a series of post-traumatic stress symptoms was observed in many soldiers that might be tentatively termed 'peace keepers' stress syndrome', which, in addition to the classic PTSD symptoms could include 'fear of losing control over one's aggression, rather than fear of external threats.' (p. 269). Research on US military personnel on peacekeeping duty in Somalia leads the authors to suggest that the differences between peacekeeping of this sort and previous conflict situations may be very important (Litz, King, King et al. 1997; Litz, Orsillo, Friedman et al., 1997). Consistent with Egge et al.'s suggestion, they reasoned that the formal definition and mandate of peacekeepers requires them, more than typical combat soldiers, to exercise restraint. However, they found pressure to uphold restraint was not implicated in their causal models predicting PTSD.

Bartone & Adler (1998) provide an analysis of psychological stress among United States soldiers serving as peacekeepers in the former Yugoslavia (the first UN peacekeeping exercise in which US troops participated), at pre-deployment and following phases of deployment, examining these in relation to different stressors. However, just one of five types of stressors was directly related to conflict or combat-related trauma. Labeled 'threat or danger', it referred to the variables, threat to life or limb, mines, snipers or disease, and exposure to death. Among the other factors, 'powerlessness' included rules of engagement restrictions and constraints on movement and action. This factor appears to relate to the concept of 'restraint' described by Litz and colleagues and Egge et al.'s concerns, noted in the previous paragraph.

Litz (1996) presents a typology of stressors associated with peacekeeping/enforcing missions in Sinai, Lebanon, Somalia and Bosnia (which constitute a range from low stressors to extreme stressors), and he also notes that just as the UN has deployed more men and women on such missions since the end of the cold war than before, there has also been a shift to more intense conflict and danger (Litz 1996). The same general point is made in an analytical literature review of peacekeeping stress by University of Guelph scholars, Lamerson & Kelloway (1996), and the extent to which Canadian peacekeepers in the former Yugoslavia were exposed to direct attack is reported by Lamerson (1995) as about two-thirds.

Similarly, the nature of military conflict experiences, as characteristics of different wars or conflicts, or different forms of experience (such as combat exposure) within different

war or conflict situations may influence both whether one develops PTSD and how PTSD works its way out to influence subsequent social and economic behavior (Litz, King, King, Orsillor & Friedman 1997). Ideally, the research process in this area would be well served by longitudinal studies that track individuals over time, noting the mental health status and their social and economic behavior and status, and with adequate measurement to move beyond rather abstract categorization of conflict theaters to a precise description of the nature and source of the traumatic experiences.

### **1.3.7 Differences between clinical and non-clinical populations**

The Rosenheck and Fontana paper discussed earlier raises an additional point about interpreting data. They examine national-level survey data of US veterans of three wars (World War II, Korea and Vietnam) but lack PTSD diagnostic data. However, they are able to compare their survey data with clinical data from a large study (PCT Study) of PTSD Clinical Teams in 24 cities. The clinical sample showed the PCT veterans of each era to be older, more frequently divorced or unmarried, less likely to be employed, and far less well off financially than their counterparts in the general population .... Among Vietnam era veterans, greater percentages of blacks and Hispanics are present in the PCT sample than in the general population of veterans. (Rosenheck and Fontana 1994: 243). Clinical studies are not representative of the general population of service personnel who have PTSD, because all who suffer PTSD or other functional impairments do not seek clinical attention, and because those who do are likely to differ in some ways, other than health status, from those who do not.

This can be seen in a clinical study conducted in the UK and focusing on Gulf War veterans, in which comparisons were also made to a random selection of Gulf War veterans. Those who presented to a Medical Assessment Panel (MAP) were more likely to have health symptoms, but variability in health beliefs had a stronger relationship to presenting for assessment than health symptoms themselves. Thus,

Believing that one's health has been affected by Gulf War service and thinking that one has Gulf War syndrome were far more powerful predictors (of MAP attendance).

Furthermore, the help-seeking group (MAP) differed from non-help-seekers (non-MAP) in terms of their health attributions despite controlling for the level of physical functioning. This suggests that rather than attracting veterans with ill health in general, the MAP is assessing those who attribute their health problems directly to Gulf War service.@ (Hull, David, Hyams, et al., 2002: 751).

Schlenger, Kulka, Fairbank, et al. (1992) provide an extensive discussion and data concerning clinical and self-report measures such as the Mississippi Combat-Related PTSD scale, and discuss validation measures, as well as a measure differentiating different levels of potential exposure to stressors that might lead to PTSD. They differentiate being in the military during the war period, being in the Vietnam theater (including offshore and air involvement), high combat war zone versus moderate and low intensity war zone within the theater). Kang et al. (2003) developed a scale for intensity of stressors in a study of US military in the Gulf War, using the following items: the individual had worn chemical protective gear or heard chemical alarms sounding, had been involved in direct combat duty, and had witnessed any deaths. They found a strong relationship between stress intensity and rate of PTSD, using the 17 item PTSD Checklist (PCL) (Jones-Alexander, Buckley, et al., 1996).

## **2 FINDINGS**

Having described the objectives and methodology of this review, and a very long list of difficulties encountered in interpreting the data, we now turn to the findings in the literature that are specific to our goal of understanding the occupational and economic effects of PTSD from the war and conflict situation. The literature provides some data about four different types of socioeconomic factors: family status, educational attainment, employment, and income.

### **2.1 An overview study**

Using multivariate analysis of SOV-III data (a 1987 survey of US veterans) in the USA, Rosenheck and Fontana 1994) found a relationship between combat exposure and poor general health, work limitations, and mental health problems in veterans from World War II, Korea, and

Vietnam. For example, combat veterans from the last two of these three conflicts were more than 2.5 times as likely as noncombat veterans to have a mental health problem. However, results concerning marital status, educational attainment, and income were not so clear:

When premilitary characteristics are statistically controlled, combat is not significantly associated with current educational level for veterans of any era. Korean combat veterans are 1.6 times more likely than noncombat veterans to be divorced.... Vietnam combat veterans have significantly higher incomes than noncombat veterans...@ (Rosenheck and Fontana 1994: 341).

This study is limited by the fact that direct measures of PTSD were not available in the SOV-III data. Instead, the survey asked respondents whether they had, in their lifetime, experienced any of 66 illnesses. Three of the illnesses might be related to PTSD: psychiatric problems, alcohol problems, and drug problems. They counted someone as having a mental health problem if any of these three illnesses were reported. Moreover, the data on the nature of the military experience are limited and the analysis is thus restricted to comparing veterans with and without combat exposure.

## **2.2 Family matters**

As noted above, Rosenheck and Fontana (1994) found some evidence that higher levels of combat exposure are associated with marital difficulties. While only indirectly related to family status, I here briefly consider the veteran in a family context, on the premise that Veterans Affairs Canada always attempts to place the veteran client in a family context, and on the additional premise of >linked lives=, inherent in the life course perspective, which assumes that an individual's occupational and family careers are intertwined and that one's social ties greatly effect one's own behavior (Marshall & Mueller, 2002). In a study by Prigerson, Maciejewski, & Rosenheck (2001), which is described more fully below (and which is confined to men who reported one of nine types of trauma experience, of which one was combat trauma), men who reported combat trauma as the most significant event in their lives, when compared to those who reported some other kind of trauma as most significant, were more likely to be divorced (O.R

2.52), and their odds of reporting physical violence or abuse towards their spouses were greater than for men reporting seven of the other eight trauma types (O.R. 2.51) (Prigerson, et al. 2001: 104-5).

Homelessness is another social factor that has been investigated in relation to combat exposure, PTSD and other psychiatric disorders. Rosenheck and Fontana (1994) used data from 1460 male veterans in the National Vietnam Veterans Readjustment Study. PTSD was one of a set of psychiatric disorders investigated to see if it related to homelessness (a reported period of having no regular place to live for at least a month of so<sup>@</sup> at some time in the past<sup>B</sup> although all respondents had a home at the time of survey administration. Fifteen percent of the variance in homelessness was predicted by their model, but PTSD did not have a direct effect on homelessness, when PTSD was considered along with all other factors in the model. Nor was a direct pathway found linking combat exposure or war zone atrocities to homelessness. However, combat exposure and exposure to atrocities in combat was associated indirectly, through other factors. As an example, War zone stressors .... contributed to low levels of social support, non-PTSD psychiatric and substance abuse disorders, and being unmarried, all of which contributed directly to homelessness<sup>@</sup> (Rosenheck & Fontana 1994: 424). As well, social support during the year of discharge had a stronger association with reports of homelessness than any other variable in their model (i.e., pre-military factors such as trauma, psychiatric treatment, and conduct disorders, and military experiences such as extent of combat and atrocity exposure).

Of possibly more general interest, this study found that some factors that were antecedent to wartime experiences had a measurable impact on the reported severity of combat exposure and exposure to atrocities in combat. These were reports of having experienced childhood abuse and reports of conduct disorders prior to age 15. In a life course perspective, this suggests the importance of childhood experiences, perhaps as selection factors, in shaping exposures that are likely to be associated with combat-related psychiatric disorders, including PTSD.

### **2.3 Educational Attainment**

As noted earlier, different cohorts will have entered military service with differing ranges of

educational attainment at entry, and they will also have experienced different types and levels of education and training while in the military. Presumably some but not all types of military training is related to post-discharge employment patterns. Mangum and Ball (1989) point out that in the 1960s, it was estimated that there were civilian counterparts for about 80% of US military jobs, with increasing technological developments in the armed forces, this transferability of skills is likely higher. American surveys from the 1980s suggest that perhaps half of veterans think their military training enhanced their post-discharge employment outcomes and that about one-third of veterans entered occupations similar to their military codes (Mangum and Ball, 1989). This may suggest that some kinds of military training experiences have substantively specific transferability while others (e.g., acquisition of leadership skills, discipline) may have more general payoffs for post-discharge occupational success. Beyond these differences, it is of interest to know whether, controlling for prior educational and training attainment, veterans who experience depression or PTSD vary in post-discharge educational attainment. Unfortunately, the literature is not at all helpful in terms of the last question, which is key for this review.

As noted above, Rosenheck and Fontana (1994) found no evidence of a relationship between combat experience and subsequent educational attainment, but their study had no direct measures of PTSD. It is possible that low education increased vulnerability to exposure to trauma and also left the individual with less coping resources to deal with that trauma and avoid PTSD. However, as that study had no measures of PTSD we cannot rule this possibility in or out on the basis of that study.

## **2.4 Employment**

The fourth edition of the DSM (DSM-IV), specifies that patients diagnosed with PTSD demonstrate clinically significant distress or impairment in social, occupational, or other important areas of functioning (Satzick, Marmar, Weiss, et al. 1997). Thus, we should anticipate, definitionally, that those with PTSD will experience difficulties in employment.

In the PCT study of World War II, Korea, and Vietnam veterans, based on VA clinical data collected nationally from 24 cities, Rosenheck and Fontana (1994) report that retirement is at higher ages the earlier the conflict. This is not surprising given a secular move to earlier

retirement in the years following World War II (with a slight reversal of that trend only since about 1985) (Marshall and Taylor, in press). However, they also found that Vietnam veterans report greater job instability than veterans from the earlier wars. Of the Vietnam veterans, 37.4% report having quit or been fired from a job over ten times. Vietnam veterans and also Korean War veterans in this clinical sample report more criminal incarceration than did the World War II veterans, despite the fact that they have had fewer opportunities, because of younger age, to commit crimes.

Prigerson, Maciejewski and Rosenheck (2001) used the National Comorbidity Study, confining their analysis to 1703 men who had reported a traumatic event, and then analyzed the sequelae of combat-related trauma versus other types of reported trauma. Specifically, they compared 96 men who listed combat trauma as their most upsetting life experience with the remainder, who reported some other form of trauma as the most upsetting. Among the variables explored were unemployment, and having been fired or lost a business in the last year. A series of logistic regression models compared the effect of combat trauma directly to any other category of trauma, or to any specific other trauma. Adjustment was made for the fact that men who reported combat trauma as the most upsetting lifetime experience, when compared to those who reported any other type of trauma as most significant, were significantly older, lower in socioeconomic origins, less likely to be Caucasian, and reported more other traumatic events. Adjusted odds ratios confirmed the importance of combat trauma as associated with subsequent PTSD, as those reporting combat trauma as the most significant trauma were more than seven times as likely as those who did not to meet criteria for PTSD in their lifetime. The only type of trauma more likely to be associated with lifetime PTSD was reports of rape or molestation.

Moreover, those reporting combat trauma as their worst experience were 2.3 times more likely to report unresolved PTSD symptoms. Almost 4 in 10 reported that their PTSD symptoms were still ongoing (Prigerson et al. 2001: 104). On the other hand, the likelihood of a lifetime affective disorder was lower for the combat trauma group relative to those who reported other traumas as the worst experience (adjusted odds nearly 2.6% lower).

All this is background for the employment factors that are of interest in this review. The results are dramatic. Those men who reported that combat trauma was their worst event

were 3.55 times more likely to report unemployment in the previous year than those who reported a non-combat event as their worst trauma. The only two individual events associated with higher odds of reporting unemployment in the previous year were those exposed to a natural disaster and those reporting another qualifying trauma. Men in the trauma group were also much more likely to report having been fired in the last year (odds ratio 2.77) (Prigerson et al. 2001: 104).

Prigerson et al. (2001: 107) note that their results concerning PTSD and occupational morbidity are consistent with the findings of Engel, et al. (1999) in his study of Gulf War veterans, although Engel et al., (1999) did not examine the effects of combat trauma, *per se*, nor its effects relative to other traumas.

In a subsequent paper, also using the National Comorbidity Survey, these authors (Prigerson et al., 2002) examine direct and indirect effects of combat exposure, prior PTSD and recent outcomes. In terms of current unemployment, and also job loss (having been fired or lost a business in last 12 months), combat exposure is found to have major direct positive effects, while PTSD has less extensive but negative direct effects. The path models illustrate how combat directly affected current or recent occupational morbidity an effect that was *not* mediated by PTSD. These findings suggest that something particular to the war experience, and not a function of combat-related PTSD, makes it difficult to remain employed. (Prigerson et al., 2002: 62).

An earlier study by Anderson and Mitchell (1992), discussed in a previous section, included no PTSD measures but did examine the effects of military service in three theaters (WW II, Korea, Vietnam) on subsequent employment status. They found no evidence of a direct effect, but rather a secondary effect through mental health. Specifically, they found that military experience increased the likelihood of some mental health problems and that these, in turn, were associated with reduced likelihood of being employed. The mental health conditions implicated in these effects included alcohol and drug abuse and the presence of some DSM diagnoses, but not depression and, as noted, PTSD was not measured.

Savoca and Rosenheck (2000) examined the civilian labor market experiences of Vietnam-era veterans, as influenced by psychiatric disorders, using the National Survey of the

Vietnam Generation. This survey, completed in the late 1980s, included veterans who had been on active duty in the period 1964-1975, and examined effects on employment probability of lifetime psychiatric disorders of four types: major depression, anxiety disorders, substance abuse/dependence, and combat-related PTSD (measured by the Mississippi PTSD Scale). The dependent variables were hourly earnings, and hours worked, conditioned on being employed. PTSD was associated with significantly lower rates of employment; and, if the veteran were employed, PTSD was associated with lower earnings. Anxiety disorder had similar, though slightly less strong results. A diagnosis of major depression was associated with lower wages, but not with the typical number of hours worked in a week.

Savoca and Rosenheck (2000: 205) dramatically illustrate the importance of PTSD for employment status: "By these measures the most important determinants of the probability of employment are marital status and health, particularly the presence or absence of PTSD, anxiety disorder and major depression. The effect of PTSD is almost twice the magnitude of a two-standard-deviation change in years of schooling."

Using a different data file, the National Vietnam Veterans Readjustment Study, Zatzick, Marmar, Weiss, et al. (1997) studied the association between PTSD (Mississippi Scale) on a number of outcomes, including employment. Their analysis controls for co-morbidities, either psychiatric or physical. Occupational status was defined as either working or not working at the time of the survey, and the working category includes two respondents active in schoolwork and two active in housework. The not working category included 61 respondents reporting unemployment, and 40 reporting permanent layoff or inability to work due to disability. Those retired or those on temporary layoff were excluded from the analysis. Logistic regression models examined the effects of PTSD controlling for socio-demographic variables and psychiatric and physical comorbidities. These investigators found that the prevalence of PTSD was significantly greater in respondents who also reported comorbid psychiatric disorders. "Indeed, most subjects with depression, panic disorder, or drug abuse also met criteria for PTSD, as did about one in three subjects with alcohol abuse" (Zatzick et al., 1997: 1692). However, adjusting for comorbidities, those with PTSD were still significantly less likely to be working (22.6% vs 4.3%, adjusted odds ratio 1.5-7.6) In another measure related to employment status, they also found

those with PTSD significantly more likely to report having spent all or part of a day in bed during the previous two weeks because of physical illness or injury (8.5% vs 4.9%, adjusted odds ratio 0.8-4.6) (Satzick et al., 1997: 1693). The authors note that the cross-sectional nature of the study does not allow them to assess any causal relationship among PTSD and comorbidities, or any of these and unemployment.

An earlier report based on the same study (National Vietnam Veterans Readjustment Study) sheds only a little further insight into the effects of PTSD on occupational status by analyzing data from the spouses or partners of Vietnam veterans (Kulka, Schlenger, Fairbank, Hough, Jordan, Marmar & Weiss, 1990). Spouses and partners of Vietnam veterans completed a Readjustment Index to describe the status of the spouse/partner, in which they commented on his or her trouble finding or holding jobs, among other problems such as problems with the law, drinking, drug or mental health problems. From these an index is constructed and the spouses of veterans with PTSD are shown to have dramatically more problems than those without. However, the authors do not report individually on employment status.

## **2.5 Income**

Mangum and Ball (1989) investigated the effects of military service on subsequent income, using data from the National Longitudinal Survey-Youth Cohort. However, they did not deal with the effects of PTSD or of combat experience. They found significant generational cohort differences in income attainment. Reviewing the literature to that point, they found that military service had an earnings premium for pre-Vietnam era veterans of World War II and the Korean Conflict, and that this premium was less strong the lower the education. They cite one study (Fredland and Little 1980) that found the premium only for those who had less than 12 years of education. Most of these studies failed to control for occupation in the military or subsequently, or for similarity between the type of work done in the service and subsequently. In the case of Vietnam-era veterans compared to non-veterans, white veterans were found to have fared worse than non-veterans in income, but when appropriate controls were used in the analysis (for age, time and cohort) the wage gap was found to be only two per cent for all veterans of that era; and again, the benefits were experienced only by those with less than 12 years of education (Mangum and Ball

1989, drawing on Berger & Hirsh 1983).

In the 1987 survey of veterans, Rosenheck and Fontana (1994:30) found that Vietnam combat veterans have significantly higher incomes than non-combat veterans but again, this study has the disadvantage of having no direct measures of PTSD. Combat does not inevitably lead to PTSD or other stress disorders. In their own study, Mangum and Ball (1983) studied veterans, both men and women, from the post-draft era following the Vietnam War, and focused on skills transferability in relation to labor market experiences. They found more skills transfer than previous studies would suggest. Regrettably, this study provides no analyses distinguishing those with active combat from those without, or distinguishing those with PTSD or related disorders from those without.

Citing the early Mangum and Ball study in contrast to the more recent research by Angrist (1990, 1998, Angrist & Krueger 1994), Savoca and Rosenheck (2000:199) suggest that: AA newer generation of work has established that the observed differences between veterans and non-veteran civilian wages reflect, in part, a nonrandom selection process that leads to the enlistment of persons whose average civilian earnings potential differ from the average in the general population. When this process is accounted for in wage comparisons, the results suggest that male veterans from all eras incur a civilian wage penalty.@

Their own study (described above in relation to employment status) found that Vietnam male veterans with PTSD have 16% lower wages than those without, and that a male veteran with major depression has a 35% lower wage than one who does not. Surprisingly, there was a positive association between having a diagnosis of generalized anxiety disorder and hourly wages.

Indirect evidence of the effects of PTSD on income can be found in the report from the National Vietnam Veterans Readjustment Study (Kulka, Schlenger, Fairbank, Hough, Jordan, Marmar & Weiss, 1990). In its chapter, APTSD Among Vietnam Veterans: A Family Perspective, Kulka et al., do not present data on how the Vietnam veterans= income status may have been affected by PTSD, but they do present data on the extent to which the veteran=s spouses were employed. There were no significant differences by PTSD status, for either male or female veterans, in the proportion of time the veteran and spouse lived together in which the spouse or

partner was employed. The proportion whose spouse was currently working also did not significantly vary for male veterans with and without PTSD, and about 97% of male spouses or partners of female veterans were working. In terms of occupational prestige, there was a tendency, but not statistically significant, for the spouses/partners of veterans without PTSD to work in occupations of higher prestige (Kulka, et al., 1990: 244). While these results say nothing of personal income, they do suggest that family, or household, income might be unrelated to PTSD status in US Vietnam veterans.

### **3 CONCLUSIONS**

The data specific to occupational and economic impacts of PTSD in the military situation are remarkably thin. This is truly a neglected topic, the neglect of which is inconsistent with the historic concern of governments to aid those who have served their country in uniform, in order to ensure that, once they have shed the uniform, they will be economically secure. Because the research is thin, I have in this review discussed a number of conceptual and methodological issues that will hopefully be useful to the VAC Research Directorate, not only in the interpretation of research but in the potentially supporting new research that meets desirable conceptual and methodological standards. I first summarize my substantive conclusions, and second, summarize the conceptual and methodological issues.

#### **3.1 Substantive conclusions**

As a general substantive conclusion, there is sufficient evidence to suggest the following:

a. In a global sense, the existing research literature provides modest support for the fact that PTSD is associated with adverse impacts in family life, income and occupational security in those who experience it. This is in itself unsurprising, since the formal defining criteria for PTSD, in DSM-IV, include adverse employment experiences.

b. If one assumes that family stability is both supportive of and motivational for occupational participation and the establishment of income security, then it can confidently be surmised that

PTSD will have adverse effects, through its well-demonstrated relationship to family disorganization and homelessness, on occupational stability and economic well-being.

c. The evidence is unclear as to the relationship between PTSD and subsequent educational attainment. Theoretically, it may be supposed that low education increases vulnerability to exposure to trauma and subsequently to PTSD, that it is associated with lower personal resources to cope with and overcome PTSD, and that it provides a less adequate basis than does higher education to launch into further educational endeavors after release from service. Empirically, these relationships have yet to be investigated.

d. The evidence from a small but impressive number of studies allows us to describe in part how PTSD has an adverse impact on employment. Self-reports of trauma in combat situations are strongly associated with unemployment, having been fired or lost a business, and this relationship persists when controlling for socioeconomic origins, age, race and reported other traumatic events. This relationship is not only statistically significant but substantively strong, and there is consistency across a small number of studies in this finding.

e. However, the relationship between combat exposure, PTSD and unemployment requires disentangling as one study finds that it is something about the war experience, rather than PTSD itself, which leads to employment difficulties, while another well controlled study finds PTSD to be a much stronger determinant than education of subsequent employment status, and a third study, controlling for co-morbidities, finds that the prevalence of PTSD is significantly associated with unemployment. The latter study, however, is cross-sectional, making it difficult to address causation. To summarize this point, there is strongly suggestive evidence that PTSD adversely affects labor market chances, but this area needs more investigation.

f. The relationship between PTSD and subsequent income status is influenced by cohort factors. Regardless of PTSD or other physical or health problems of veterans, income following release from service is likely to be conditioned by cohort differences in the social class selectivity of

people into the armed forces, by cohort differences in the types of skills training they receive while in the armed forces, and by cohort differences in economic conditions at the time of release from service. In different historical periods, the armed forces may attract people from higher or lower socioeconomic backgrounds and with varying levels of educational attainment. Those with higher SES and education prior to entry into the armed forces are likely to be advantaged, post-release, in the job market. Similarly, the types of skills training that will be received while in the service likely varies by cohort (as well as by speciality within the forces). With increasingly technical education offered by the armed forces in support of an increasingly technical organizational and resource structure, veterans of more recent conflict situations are likely to be better trained with transferable skills than veterans of earlier conflicts. All these factors may sort veterans into types of jobs that offer more opportunities for high earnings.

g. The evidence is not strong for a direct relationship of PTSD to income status, but one major study, the (US) National Survey of the Vietnam Generation, found that veterans who experienced PTSD subsequently had significantly reduced incomes. Moreover, the more substantiated findings that PTSD is associated with greater job instability and unemployment support the inference that there would be derivative reductions in earnings.

### **3.2 Conceptual and methodological conclusions**

It should be clear from the material immediately above that much of our understanding of the relationship of PTSD to economic status in the years following discharge from the service is highly speculative. Despite this, there is little reason to question the belief that those with PTSD are likely to experience significant economic hardship. The set of factors influencing the extent to which this is so includes income, education and occupational history (which affects income), as well as the veteran's family situation; however, the precise ways in which these factors are operative are not understood. The following are suggestions to guide future research in this area:

h. Although clinical research is of critical importance to understand the causes, nature and health consequences of PTSD and related mental health problems, our knowledge of the economic

consequences of PTSD is most likely to be enhanced by large-scale social and economic surveys.

i. Because PTSD is a chronic illness that often persists over a considerable duration of time, longitudinal studies are the most valuable research approach. Data collection should ideally begin with those in service who are still healthy, and prior to the experience of service-related trauma.

j. If longitudinal data cannot be collected, it is critical to gather retrospective measures that establish the timing of key variables. It may be possible to record-link to medical and other administrative records to establish physical and psychological states prior to the experience of trauma. Questions should be asked about the timing of changes in health states, treatment regimens, family status, educational attainment, occupational status, and income.

k. Efforts should continue in the refinement of measures of PTSD that are sensitive not only to trauma in the military conflict situation, but to the different types of conflicts that peace keepers and peace makers experience. When considering research studies already conducted, the analyst should be sensitive to the nature of the measures that are being used, the type of conflict, variability in exposure to deaths, atrocities and other factors often witnessed or experienced in current military service.

l. The PTSD experience should ideally be viewed in light of the family, which can be important in providing economic and social support, or as a source of economic and social strain for the person experiencing PTSD, or as victimized by PTSD-induced behavior. Yet this is one of the weakest areas of research so far.

m. The most sophisticated statistical procedures should be brought to bear in the analysis of PTSD and its economic effects. Reference has been made above to some of the approaches suitable for longitudinal analysis, and the need to deal with non-linear relationships. In addition, PTSD analysts should employ the multi-level modeling approaches that are increasingly used in epidemiological and sociological research to analyze nested social and behavioral contexts (for

example, to simultaneously take into account conflict theater, types of trauma exposure, and individual characteristics associated with the development of PTSD trajectories).

Before concluding this review, it is important to recognize that military service, whether in «conventional» wars such as WW II, Korea or Vietnam, or in peacekeeping and peace enforcing situations, can have positive effects on people, both emotionally and economically. Thus, in the UNIFIL (United Nations Interim Force in Lebanon) survey of Norwegian military engaged in peacekeeping in Lebanon who had experienced considerable stress but only little classical combat trauma, over 90% of the soldiers reported that their experience had contributed to their positive personal development.... Equivalent patterns of positive attitude covered areas such as self-perception of inter-human relationships, expansion of personal horizons, and coping with stress and increased self-confidence, despite the fact that some had PTSD symptoms (Egge et al., 1996: 271). A final recommendation, then, would be to pay attention not only to factors enhancing vulnerability to PTSD and its adverse contexts, but also to factors reducing this vulnerability.

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## APPENDIX

### MAJOR DATA SOURCES CONCERNING ECONOMIC ASPECTS OF PTSD

#### **National Vietnam Veterans Readjustment Study**

The purpose of this survey was to assess prevalence of PTSD and other post-war psychological symptoms, and their relationship to adjustment to civilian life. It is described as Ato date [1997], the most comprehensive collection of information regarding the association of combat-related PTSD with functioning and quality of life (Zatzick et al., 1997: 1691).

The survey was A... completed in the late 1980s and included a cohort of 1,200 male veterans of the Vietnam theater (those veterans who served in Vietnam or its surrounding waters or airspace). Each participant completed the National Survey of the Vietnam Generation, a household interview lasting approximately 5 hours.... The survey response rate was 83%.@ (Zatzick et al., 1997: 1691). The sample is representative of the 3.1 million veterans who served in that theater.

Used by: Kulka et al. (1990); Rosenheck and Fontana (1994, 1995), Fontana and Rosenheck (1995); Savoca and Rosenheck (2000); Schlenger, et al., 1992; and Zatzick et al. (1997).

#### **National Comorbidity Survey (NCS).**

A representative sample of the US population aged 15-54, N=8098, surveyed from 1990 through 1992. The survey asks about 11 types of traumatic experiences, one of which is exposure to combat, and used a modified form of the Composite International Diagnostic Interview includes measures for mental disorder definitions in DSM-III-R: depression, substance use disorders. Symptom questions in the Diagnostic Interview Schedule were used to evaluate DSM-III PTSD criteria B through D (re-experiencing, avoidance, hyperarousal). Questions were asked only for the Amost upsetting trauma@. (Prigerson, Maciejewski & Rosenheck 2002).

Used by: Prigerson, Maciejewski & Rosenheck (2002).

#### **National Health Survey of Gulf War Era Veterans and Their Families**

Conducted in 1995, the survey was A designed to compare the health of a population-based, stratified random sample of 15,000 US troops deployed into the Gulf region with that of 15,000 troops deployed elsewhere.@ (Kang, et al., 2003: 142). Respondents were randomly selected from DOD-identified populations and included those who had served on active duty, whether or not they had been separated from active service (all are referred to as veterans). Women were over-sampled, so as to secure 300 female respondents. The overall response rate was 76.3% for Gulf veterans and 63.2% for non-Gulf veterans.

Used by: Kang et al. (2003).