

War exposure and Post-traumatic Stress as Predictors of Portuguese Colonial War Veterans'

Physical Health

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Abstract

The relationship between war exposure and PTSD has been largely investigated but the impact of the combat experience on physical health has only recently merited attention. The authors investigated the relationship between war exposure, psychological and physical health among 350 Portuguese colonial war veterans. The role of current PTSD symptoms as a mediator of these relationships was also investigated. The results showed that 39% of the veterans met criteria for current PTSD diagnosis and psychological distress was present in half of the sample. Pain, fatigue and sleep problems were the most reported physical symptoms and mental health and gastro-intestinal problems, the most reported illnesses. Combat exposure variables were significant predictors of current health. The results indicated that veterans with higher exposure to war trauma maintained higher current levels of psychological distress and presented more physical health problems and physical symptoms than those less exposed. Mediation analyses showed that current PTSD was a full mediator of the relationship between war exposure and physical health outcomes.

Key words: war veterans, post-traumatic stress, physical health, predictors, Portuguese

veterans

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The relationship between participation in combat and the development of post-traumatic stress disorder (PTSD) has been one of the most studied areas of traumatic stress. Data has shown that PTSD is common sequelae of war exposure. Research has also shown a clear association between severity of war exposure and post-war psychological adjustment (e.g. Abu-Saba, 1999; Fontana & Rosenheck, 1999; Keane, Kaloupek, & Kolb, 1998; Schnurr & Spiro, 1999).

The impact of war exposure on physical health is a more recent topic of interest for researchers, but not less relevant. Research has shown a significant relationship between war exposure and health, and this effect is frequently mediated by the presence of PTSD (Taft, Stern, King, & King, 1999). For example, Kulka and colleagues (1990) found that veterans have twice the probability of describing their health as "bad" and presenting symptoms for medical problems as same age individuals without war experience. This relationship is stronger in individuals that developed PTSD. In Wolfe, Schnurr, Brown, and Furey's study (1994) of nurse veterans from Vietnam, PTSD diagnosis was related to a more negative health perception, and more cardiovascular, dermatological, gynaecological, eye, ear and throat symptoms. A recent study conducted with Iraq war veterans (Hoge, Terhakopian, Castro, Messer, & Engel, 2007) found that those experiencing PTSD reported worse health, more physical complaints and health care visits, and more missed work days than those without a PTSD diagnosis. Studies using objective measures of health status have also found support for the relationship between war experience, PTSD and physical morbidity (Schnurr, Spiro, & Paris, 2000), namely cardiovascular disease (Boscarino & Chang, 1999), digestive, musculoskeletal, endocrine- metabolic-nutritional, respiratory and infectious diseases (Boscarino, 1997), and autoimmune diseases (Boscarino, 2004). In line with these findings, a twin study of Vietnam veterans found a strong association between PTSD symptomatology and asthma (Goodwin, Fisher, & Goldberg, 2007).

Some studies have tried to determine the specific contribution of the three PTSD symptom clusters (hyper-arousal, avoidance and re-experiencing the traumatic event) to disease vulnerability among war veterans. For example, Kimerling, Clum and Wolfe (2000) analyzed the unique contribution of each cluster in a sample of female Vietnam War veterans and found that hyper-arousal was the strongest predictor of health complaints. Hoge and colleagues (2007) replicated these findings among Iraq army combat infantry veterans.

Several explanations have been advanced for the relationship between war-related PTSD and disease vulnerability. For instance, Boscarino (2004) suggested that the biological mechanisms related to alterations in cortisol and catecholamine levels that are seen in PTSD could explain its effects on immune functioning and the increased susceptibility to some types of diseases, such as cardiovascular and autoimmune diseases. According to Friedman and Schnurr (1995), the comorbidity between PTSD and negative affect (e.g. anger, depression), avoidant behaviours and risk behaviours (e.g. alcohol and drug consumption), could also explain this relationship. An alternative explanation involves McEwen's (2000) concept of *allostatic* load, which addresses the long term impact of physiological changes in adaptation to chronic stress. This concurs with the idea that the long term persistence of the PTSD symptom cluster hyper-arousal plays an important role in the impact of combat exposure and PTSD on health (Litz, Keane, Fisher, Marx, & Monaco, 1992).

Sociodemographic and background variables, such as socioeconomic status and early trauma history, can also contribute to the impact of the combat experience and increase the probability of health complaints and illnesses during adulthood (Link & Phelan, 1995). For example, King, King, Foy, Keane, and Fairbank (1999) showed that veterans with low socioeconomic status and early trauma presented more PTSD symptomatology than their cohorts. Another study (Bremner, Southwick, Johnson, Yehuda, & Charney, 1993) also found that childhood physical abuse predicted combat-related post-traumatic stress disorders in Vietnam veterans. These findings suggest that these variables should be taken into consideration as covariates when studying the impact of combat-related PTSD on health.

The current study focuses on Portuguese colonial war veterans, aiming to replicate the findings presented above (mainly from U.S. veterans) in a sample of European veterans. In contrast to their American counterparts, more than thirty years after the end of the Portuguese colonial war, very few studies have been conducted on this population. Given that many readers may be unfamiliar with this war, we provide summary information on the period, duration, and nature of this conflict.

From 1961 to 1974, the Portuguese military was involved in combat operations that have come to be known as the Portuguese Colonial Wars. This conflict took place in Angola, Mozambique and Guinea, three African countries that were former Portuguese colonies and were fighting for their independence. There were a total of 1,000,000 Portuguese soldiers involved (about 10% of the country's population), 10,000 were killed, and 40,000 wounded (Comissão para o Estudo das Campanhas de África, 1988). The end of the Portuguese dictatorial government in 1974 generated an anti-war climate that resulted in a generalized

“denial” of the colonial war and its reminders. For example, it was only in 1999, more than 20 years after the war, that PTSD was recognised as a cause of disability.

The current study aims to test the generalizability of findings on the relationship among war exposure, PTSD and physical health, from veterans in similar war scenarios (e.g. Vietnam War) to the Portuguese veteran population. Several factors support the study of these relationships among Portuguese colonial war veterans. First, the participation in the colonial war was mandatory for all young men. Second, their war experience was characterized by intense combat and high unpredictability, as is typical of guerrilla war. Both the mandatory nature of soldier drafting and the guerrilla characteristics are likely to increase vulnerability to PTSD and poor health outcomes. . Third, to characterize this veteran population and the impact of their war experience on current health is also of social relevance due to the potential impact of this research on creating policy directed at this neglected group.

The specific aims of this study were: (a) to characterize the war experience of Portuguese colonial war veterans in terms of war exposure, and current psychological and physical health, (b) to investigate the unique contribution of combat experience, and PTSD symptomatology to reported illnesses and physical symptoms, when controlling for socioeconomic status, history of childhood abuse and neglect and current psychological distress, (c) to investigate the role of PTSD as a possible mediator of the relationship between war exposure and health variables. Given the similarities in combat experience between the Portuguese veterans and other veteran samples with high exposure described in the literature (e.g. from the Vietnam War), we expect to find a significant percentage of probable PTSD diagnosis (at least 30%) and a strong association between the degree of war exposure and health outcomes. We also expect that PTSD symptomatology will act as a partial or full mediator of the relationship between combat exposure and physical health.

Method

Participants

Participants were Portuguese colonial war veterans from Angola, Mozambique and Guinea (stationed between 1961 and 1974), selected from a data base of a Veterans Association. The sample of 350 Caucasian men had a mean age of 57 years ($SD = 3.69$). Marital status was as follows: 92% were married; 2% single; 4% divorced and 2% widowed. Education level was very low, with 68% having only a total of four years of education (equivalent to a primary level of education).

Measures

Military History Questionnaire. The Military History Questionnaire (MHQ; Maia, McIntyre, Pereira & Fernandes, 2001) includes two sections. The first part includes questions regarding dates, places, type of military mission, and military history. The second part consists of 11 questions that assess combat exposure severity. This questionnaire took into account the characteristics of the Portuguese colonial war, such as its tropical location guerrilla warfare. Items covered a variety of adverse situations, such as severity of combat exposure and exposure to other adversities. These items included poor quality of, and limited supply of water and food, lack of sleep, hot and humid climate, degree of threat to personal safety, war and other injuries, illness, number of deaths among colleagues, civilians and war enemies, contact with human remains and moving bodies, and perpetration of violence against enemies and civilians (e.g. destruction of villages, genocide). Each item was coded as a dichotomous variable (Yes or No). In this study, a combined score entitled “Severity of War Exposure Index”, varying between 0 and 11, was computed by adding the 11 items included in the second part of this questionnaire. Principal components factor analysis using varimax rotation was used and the scree plot inspection of the results suggested a one factor solution that explained 49% of the variance. The internal consistency reliability of the scores for this index was good ($\alpha = .79$).

Response to Traumatic Event Scale – RTES. The RTES scale (McIntyre & Ventura, 1996) is a two-section self-report questionnaire developed in Portugal on the basis of the DSM-IV criteria for PTSD. The first section has 18 items with a varied response format in which participants describe the traumatic event(s) experienced in the past and the personal changes attributed to them. In the second section, 17 dichotomous items describe current PTSD symptoms according to DSM – IV criteria for the disorder. It includes the three clusters Re-experiencing the Event, Avoidance and Arousal. Subjects were considered positive for probable PTSD diagnosis if they endorsed one symptom in the first cluster, three in the second and two in the third, and these symptoms were associated with the traumatic event described in the first section of the PTSD scale. In the current study, the internal consistency reliability of this 17-item scale was very good ($\alpha = .95$). The coefficient alpha reliability values for the three clusters were the following: Re-experiencing the Event ($\alpha = .93$) Avoidance ($\alpha = .90$) and Arousal ($\alpha = .87$).

Childhood Trauma Questionnaire - CTQ. The Childhood Trauma Questionnaire (Bernstein & Fink, 1998, Portuguese version: McIntyre & Costa, 2004) is a self-report inventory that provides screening for history of abuse and neglect in a 5-point Likert scale. Higher scores are indicative of more childhood trauma. CTQ inquires about five types of

mistreatment: emotional, physical, and sexual abuse, and emotional and physical neglect. The Portuguese version (Costa, 2006) showed adequate psychometric characteristics, including a good internal consistency reliability ($\alpha = .72$). In the current study, we found the same value of internal consistency ($\alpha = .72$).

Brief Symptom Inventory - BSI. The Brief Symptom Inventory (Derogatis, 1993; Portuguese version: Canavarro, 1999) is a short-form of the SCL-90-R. This is a 53-item self-report questionnaire which evaluates psychological distress. Subjects describe how they were affected by symptoms in the past seven days on a 5-point scale (not at all = 0; extremely = 4). The inventory describes nine symptom dimensions: somatisation, obsessive-compulsivity, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. It is also possible to calculate summary measures such as the Global Severity Index (GSI), computed by summing all the responses and dividing by the total number of items, and the Positive Symptoms Index (PSI), a global index that reflects the intensity and number of symptoms and is computed by dividing the Global Severity Index by the number of symptoms (Canavarro, 1999). The cut off score for clinical cases in the Portuguese adaptation was 1.7 on the PSI. The coefficient alpha reliability of the total scale in our sample was very good ($\alpha = .97$).

Rotterdam Symptom Checklist - RSCL. The original version of the RSCL (Haes et al, 1990; Portuguese adaptation by McIntyre & Gameiro, 1998) is a list of physical and psychological symptoms representing two subscales which were empirically derived (two-factor solution). In this study, only the Physical Symptom scale was used, which included 20 items, such as lack of appetite, tiredness, muscular and back pain, difficulty sleeping, diarrhoea, , and dry mouth. Each item is scored on a 1–4 point Likert scale where higher scores are indicative of greater symptom severity. The internal consistency reliability coefficient of the scale scores in this sample was very good ($\alpha = .91$) and equivalent to the Portuguese adaptation (Gameiro, 1999).

Current Illness Checklist. This is a 10-item list of reported diseases with a dichotomous response format (Yes or No) (Maia et al., 2001). Reported illnesses include respiratory conditions (e.g. asthma), endocrine (e.g. diabetes) and cardiovascular disease, gastro-intestinal problems, urinary and neurological illness (e.g. epilepsy), mental illness (e.g. depression), infectious, allergic and skin disease. A total score was computed by adding the items endorsed by the subjects, which represents the number of illnesses reported.

Procedures

The sampling method was systematic random sampling, with 500 subjects being selected from a list of 35,000 members of a Veterans association which covered residents in all continental Portugal. The 500 veterans were invited to participate in the study by telephone interview in which the purpose of the study was explained as well as the conditions for participation (e.g. questions regarding confidentiality, right to withdraw at any time). Participants were told the study's purpose was to characterize the physical and psychological health of Portuguese veterans who participated in the colonial war. They were also told the study was not associated with the on-going government assessment of war disability which aimed to provide financial compensation for those who would be considered disabled. Participation rate was 70% of all invited and the resulting sample of 350 participants was representative of the colonial war veteran population in terms of age, level of education, marital and socioeconomic status. Those who agreed to participate attended a first meeting in which they signed an informed consent form and filled out the questionnaire package. Questionnaires were group-administered by a trained psychologist (maximum of 10 veterans per group). Data were collected between May 2004 and May 2005.

Results

Characterization of the Portuguese War Veterans in terms of war exposure and current morbidity

The results on the Severity of War Exposure Index showed moderately high exposure ($M= 6.43$, $SD= 2.68$, range of 0-11). An analysis of each item reveals that 63% of the veterans reported that "they were in combat situations where their life was threatened"; 73% reported "seeing colleagues wounded" and 67% "witnessing colleagues being killed in combat". About half of the veterans (56%) acknowledged that they saw corpses of colleagues and one third of the participants (33%) stated that they moved dead bodies during their stay in Africa. Consistent with the nature of a guerrilla war, 40% of the veterans reported injuries, 16% witnessed civilian casualties, 10% moved civilian bodies, 16% saw enemy bodies and 13% moved them.

Psychological distress meriting clinical attention, as measured by the BSI (cut-off in PSI), was present in 49% of participants. It is noteworthy that 28% of veterans reported having asked for help to deal with psychological or psychiatric problems.

In terms of current Post-Traumatic Stress Disorder symptoms, 128 subjects, (39%) fulfilled the criteria for probable PTSD diagnosis. Cluster averages were divided by the number of items per cluster to generate corrected means which could be used for cluster

comparison. Arousal was the predominant symptom cluster reported by these veterans, followed by Re-experiencing of the traumatic event (Table 2).

Regarding the history of childhood trauma (CTQ), veterans reported a significant history of physical and psychological abuse as well as neglect. More specifically, in terms of physical abuse, 31% stated having been beaten and bruised, and 28% having been hit with objects. Psychological abuse was reported by 18% of veterans (e.g. insults, being humiliated) but only six veterans acknowledged sexual abuse. Neglect was more prevalent, with 47% of veterans reporting lack of food, 61% indicating insufficient or inadequate clothing and 62% little or no support with school tasks.

The five physical symptoms most reported on the RSCL were back pain, muscle soreness, fatigue and difficulty falling asleep, whereas the least endorsed were stomach pain, lack of appetite, nausea and pain in swallowing (see Table 1). The most reported illnesses were mental health problems (65%), gastro-intestinal disorders (41%) and cardiovascular disease (38%).

In summary, this representative sample of Portuguese colonial war veterans shows high war exposure, significant levels of psychological distress, including PTSD symptomatology and a variety of physical complaints and reported diseases.

The Relationship between War Exposure and Physical Health

The relationship between war exposure and reported physical health was investigated first using Spearman correlation coefficients among the variables studied, and secondly by means of hierarchical linear regression analyses with socioeconomic status entered in the first step (only when it was a significant correlate of the outcome variable) and history of child abuse and neglect entered in the second step. War exposure was entered in the third step, overall psychological distress in the fourth step and PTSD symptoms in the last step. Following Miles and Shevlin's (2001) suggestions, to resolve the high collinearity found between the BSI and the PTSD scale scores, the Phobic Anxiety and Anxiety subscales were removed from the total BSI score (due to having the greatest symptom overlap with the PTSD symptoms). In order to compare the relative contribution of the different PTSD clusters, further regressions were run including each PTSD symptom cluster in the last step. The dependent variables were the number of illnesses reported and the RSCL physical symptom score.

Table 2 shows Spearman correlation coefficients among war exposure, psychological and physical morbidity variables. The results showed significant positive correlations between war exposure and all clinical variables studied, which ranged from .26 to .45. As

expected, war exposure was positively correlated with both physical symptoms and reported illnesses, although current PTSD symptoms presented higher correlations with both psychological and physical morbidity, than war exposure.

Regression analyses to predict reported illnesses yielded a significant overall model, $F(4,231) = 19.26, p < .001$ (see Table 3). Predictors were significant, accounting for 25% of the variance in reported illnesses. History of childhood trauma and war exposure were significant distal predictors of reported illnesses, accounting for 3% and 7% of the variance, respectively, with more history of abuse and neglect and higher war exposure associated with higher number of reported illnesses. When these distal predictors were controlled, current overall psychological distress explained an additional 10% of the variance. PTSD symptoms explained an additional 5% of the variance, being associated with higher number of reported illnesses. Regression analyses were conducted to test the unique contribution of each PTSD symptom cluster to reported illnesses. The results showed that all three clusters were significant predictors of reported illnesses: Avoidance had the higher ΔR^2 (5%), followed by Re-experiencing the Event (3%) and Arousal (2%).

The results of the hierarchical linear regression for physical symptoms (Table 3) show that the model explained 45% of the variance in physical symptoms, with war exposure and current psychological distress contributing with the largest unique variance (7% and 24%, respectively) Current PTSD symptoms explained a significant but modest 2% of the variance³. Socioeconomic status predicted 9% of variance in physical symptoms and the history of childhood abuse and neglect predicted 3%. The three PTSD symptom clusters were significant predictors of physical symptoms. Arousal was the strongest predictor, explaining 3% of unique variance, followed by Avoidance (2%) and Re-experiencing the Event (1%).

Baron and Kenny's (1986) criteria were used to test whether PTSD symptoms were mediators of the relationship between war exposure and reported health problems. Regression analyses were run to test whether war exposure (after controlling for history of child abuse and neglect) was a significant predictor of PTSD. Results (see Table 4) showed that the model was significant $F(2, 253) = 31.43, p < .001$, war exposure explaining 20% of PTSD variance. Previous analyses had already shown that war exposure and PTSD were significant predictors of reported illnesses (Table 3). The standardized beta coefficient for

³ Due to the potential confounding effects of symptom overlap between the RSCL physical symptom scale and the RTES, we reanalyzed the data removing the RSCL symptoms that are characteristic of anxiety or mood disorders (lack of appetite, fatigue, lack of energy, nausea, difficulty falling asleep, dizziness, lack of sexual desire and dry mouth). The regression results continued to support the association found between PTSD and physical symptoms.

war exposure as predictor of reported illnesses was .28 and for PTSD was .29. The regression analysis with PTSD and war exposure as joint predictors of reported illnesses (Step 2) showed that war exposure was no longer a significant predictor of reported illnesses ($\beta = .10$) whereas PTSD remained a strong predictor ($\beta = .37$), which supports the hypothesis of complete mediation by PTSD. Regarding the mediation effect of PTSD for the relationship between war exposure and physical symptoms, two mediation conditions had already been established: War exposure and PTSD were independent predictors of physical symptoms (Table 3) and war exposure was a significant predictor of PTSD as described in the previous mediation analysis. The standardized beta coefficients for war exposure and PTSD as predictors of physical symptoms were .27 and .21, respectively. The mediation analysis results (Table 4) show that war exposure was no longer a significant predictor ($\beta = .05$) whereas PTSD remained a significant predictor ($\beta = .45$), which supports the hypothesized mediation.

Following Preacher and Hayes' (2004) recommendations, Sobel tests were run to evaluate the statistical significance of the differences in standardized coefficients. The results, for reported illnesses ($Z=4.79, p<.001$) and physical symptoms ($Z= 5.42, p<.001$), showed that PTSD is a mediator of the relation between war exposure and health variables.

Discussion

The results showed that a high percentage of veterans were exposed to extremely difficult combat situations, such as fearing for their own lives, witnessing colleagues being killed and moving civilian bodies. In terms of their current psychological and physical functioning, these veterans were characterized by significant psychological distress, a high prevalence of PTSD, and a considerable number of reported physical symptoms.

As expected, the prevalence for probable PTSD diagnosis for this sample (39%), is similar to the one found in samples of veterans with high war exposure. In an epidemiological study conducted by request of the American Congress in 1984 (National Vietnam Veterans Readjustment Study, Keane, 1998), the prevalence of PTSD for Vietnam veterans was 15%, although in subjects highly exposed, this percentage increased to 36%, which is close to the values we found. Arousal was the most reported PTSD symptom cluster by Portuguese veterans. This may be due to the fact that arousal symptoms are the most persistent and difficult cluster to change with treatment (e.g. Paulsen & Krippner, 2007). However, it is also important to recognize that arousal symptoms have the greatest overlap with general psychological distress, which was elevated in this sample of veterans (56%).

The relationship between PTSD and the presence of other psychological problems has been well documented in the literature (e.g. Joseph, Williams, & Yule, 1997; Kulka, et al.,

1990). In our sample, psychological distress was reported by about half of the sample, although only half of these acknowledged seeking professional help to deal with their psychological problems. The values we obtained for psychological distress were higher than those reported in another study in a matched non-veteran male sample (Couto, 2007) and in comparison to the cut off scores indicated for the normative data (Canavarro, 1999). These data are in line with reports from other veteran populations indicating that PTSD pathology is only one aspect of the psychological difficulties experienced in post-war life (e.g. Long, McDonald, & Chamberlain, 1996; McFarlane & Papay, 1992).

Physical morbidity, as evaluated by the RSCL, was also elevated, although to a lesser extent than psychological morbidity. Pain symptoms, fatigue and sleep problems were the most reported. An analysis of the correlation coefficients shows that physical symptoms were closely associated with psychological distress and current symptoms of PTSD. The literature has shown this relationship in different traumatized populations (Boscarino, 2004; Hoge et al., 2007; Wolfe et al., 1994).

Despite the number of physical symptoms reported by these veterans, the mean for reported illnesses was relatively low, although this report was still significantly correlated with psychological distress and PTSD, and with physical symptoms. We consider that this discrepancy may be related to the way the reported illnesses were evaluated. Whereas in the RSCL, participants had to endorse a simple list of physical symptoms, the list of reported illnesses was more complex and used medical jargon, such as “infectious diseases, neurological illnesses”, which is more difficult to understand by a population with a low educational level (68% had less than a total of four years of education). This bias may have generated a lower endorsement of reported illnesses. The fact that the RSCL physical symptoms’ dimension includes symptoms that are also present in anxiety and mood disorders (symptom overlap), including PTSD, and these were prevalent in this sample, may also explain the higher endorsement of the RSCL items.

In terms of the history of childhood trauma and abuse, neglect was present in over half of the veterans, and physical abuse in about one third of the sample. The high values for neglect may be related to the low socioeconomic level of the family of origin of the participants, probably linked with the added effects of poverty. The literature has referred to “cumulative adversity” as the co-occurrence of abuse and other adverse circumstances, which produces increased vulnerability (Turner & Loyd, 1995). In addition to this, there is evidence that a history of abuse or neglect predicts both health complaints and physical morbidity in adulthood (e.g. Felitti et al., 1998; Sansone, Butler, Dakroub, & Pole, 2006). In our sample,

the history of abuse and neglect presented low but significant positive correlations with current psychological distress and PTSD symptoms, with the higher correlations being with reported illnesses and physical symptoms.

The main goal of this study was to investigate the generalizability of previous findings to Portuguese veterans in terms of the relationship between war exposure, PTSD symptoms, and reported physical health. The results confirmed the expected associations suggesting that given similar levels of war exposure and combat characteristics (as in guerrilla warfare), the expected associations between this experience and long-term psychological distress and physical sequelae, tend to occur, as detailed below.

We found a significant relationship between historical variables of exposure to adversity (childhood trauma and war) and current reported illnesses as well as physical symptoms. War exposure accounted for more than double the variance in reported illnesses as compared to childhood trauma. These results are in line with previous research, such as that of Kulka and colleagues (1990) who found more medical symptoms in Vietnam War veterans than in a matched sample of non-veterans. Wagner, Wolf, Rotnitsky, Proctor, and Erickson (2000), in a longitudinal study of Gulf War veterans, reported that the degree of war exposure predicted health complaints two years later. If we consider the degree of war exposure in our sample as moderately high, and the fact that these veterans received little or no help from the Portuguese government to deal with their problems for the past 30 years, the results obtained are not surprising.

The role of current psychological distress in reported illnesses and physical complaints was also explored. Current psychological distress was a significant predictor of reported health variables. In the context of this veteran population, psychological distress may be construed as a potential mediator of the relationship between war exposure and health or as mediator of the relationship between PTSD and health. It was not the focus of this study to investigate the mediating effect of psychological distress but the positive correlations found between these variables (Table 2), especially between PTSD and psychological distress, support further investigating these relations. It is noteworthy that the association between war exposure and current PTSD symptoms is much higher than with current psychological distress. This supports the focus of our study on PTSD as a mediator between war exposure and reported health. However, the association of psychological distress with PTSD in this veteran population merits attention, especially from an intervention standpoint, thus supporting the need to address both PTSD symptoms and broader psychological distress in the prevention of long term physical sequelae of war exposure.

In this study, we were particularly interested in determining the unique contribution of PTSD to reported physical health, as an independent predictor and as a mediator, controlling for historical variables and current psychological distress. As expected, PTSD added explanatory power to the prediction model, especially in terms of reported illnesses. The association between PTSD and physical problems stretched across all three symptom clusters. Therefore, the data did not support the differential association of hyperarousal symptoms, a cluster with a strong physiological component, with physical health. The literature has shown that veterans who have PTSD symptoms are more likely to present health complaints after the war. For example, Wolfe et al. (1994) found that nurse veterans from the Vietnam War who developed PTSD presented poorer self-reported health than those who did not present PTSD. In separate studies, Shalev, Bleich, and Ursano (1990), and Solomon (1988) also reported that veterans from the Lebanon conflict, with PTSD, presented more physical complaints than those without PTSD.

Several explanations have been given to account for the relationship between exposure to adversity and later physical morbidity. Behavioral factors (e.g. Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995), such as the greater involvement in health risk behaviors (e.g. alcohol and drug use) as well as the lower involvement in preventive behaviors (e.g. exercise, healthy diet, safe sex), have been advanced as explaining this link. Negative affect, such as depression and hostility, have also been identified as potential mediators for this relationship, with negative affect being associated with increased risk for cardiovascular disease (e.g. Ford, 2004), reduced immune system functioning (Dougall & Baum, 2004) and decreased therapeutic adherence (e.g. DiMatteo, Lepper, & Croghan, 2000). In addition to these arguments, the possibility that traumatic events themselves may be associated with physical problems (e.g. traumatic brain injury) should also be considered, and may account for the association found between PTSD and physical problems (e.g. Hoge et al., 2008).

A key issue in understanding the long term health vulnerabilities of the combat experience is to determine the psychological mediators in this relationship. This study tested the role of PTSD as a unique potential mediator for the relationship between war exposure and current physical health. The data supported the hypothesized mediation suggesting that war exposure predicts long term physical morbidity via PTSD symptomatology. These findings are in line with the literature (e.g. Schnurr et al., 2000; Taft et al., 1999) and point to the role of early diagnosis and treatment of PTSD in war veterans as an important step in the prevention of later physical ailments (e.g. Paulsen & Krippner, 2007).

To our knowledge, this constitutes the first representative study of the Portuguese veterans of the colonial wars which identifies the relative weight of war exposure and proximal predictors of physical health while controlling for other past trauma. The random selection of the sample also supports the generalizability of these results to the Portuguese colonial wars veteran population. This data is potentially interesting because it replicates previous findings in a European veteran population involved in an armed conflict in the same time period as the more studied population of U.S. veterans from the Vietnam War.

Despite its merit in terms of generalizability of previous veteran studies and innovation regarding the Portuguese veteran population, some limitations of the study need to be pointed out. Regarding the measures used, the first concern has to do with the health complaints instrument (RSCL). Although only the physical sub-scale of the RSCL was used, some of the items overlap with the psychological distress and PTSD symptom scales, which could explain the predictor-outcome relationships found. In order to address this issue, we reanalyzed the data by removing from the RSCL scale physical symptoms that are characteristic of anxiety and mood disorders (e.g. fatigue) and the association between PTSD and physical symptoms was maintained, which corroborates our previous findings.

Another limitation is related to the fact that symptoms and war exposure were assessed with self-report measures, which are subject to social desirability factors. The corroboration of the self-report data by more objective data, such as medical records of mental and physical illness, would have increased the validity of the study. This is also a correlational study and thus no causal links can be established. However, the results of the Portuguese study are congruent with the international findings from longitudinal studies, which lends support to the relationships that were found. An additional limitation may be considered in terms of the selection of covariates. The choice of early trauma history as a covariate is well supported by the literature but further studies could consider other trauma history when investigating the impact of war-related PTSD on health.

The findings of this study are of particular interest, since they add to existing evidence relating war exposure to long-term psychological and physical vulnerability. Whereas research on other populations was conducted closer in time to the combat experience, the Portuguese data, which was collected over 30 years after the colonial wars, suggests that these relationships are long lasting. Another interesting feature of this study is that other veteran populations that have been studied, such as the Gulf War veterans, have had greater access to health services directed at veterans than did the Portuguese sample. Therefore, our data sheds further light on what may happen when proper care is not provided for returning soldiers. We

hope that this study will inspire further research on the long term health sequelae of combat experience. These data are essential in informing intervention strategies that aim to promote psychological and physical well-being for war veterans in Portugal and other countries.

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Table 1

Means and Standard Deviations for the Physical Symptoms (RSCL) in Portuguese War Veterans

(N=350)

	<i>M</i>	<i>SD</i>
Back pain	1.83	1.13
Muscle pain or soreness	1.68	1.12
Fatigue	1.67	1.03
Difficulty falling asleep	1.61	1.16
Numbness or tingling of the hands or feet	1.51	1.18
Headaches	1.36	1.09
Lack of energy	1.35	1.01
Dry mouth	1.26	1.12
Sore eyes	1.25	1.08
Lack of sexual desire	1.21	0.98
Heartburn	1.13	1.09
Dizziness	1.12	1.05
Shortness of breath	0.85	1.00
Shivering	0.80	0.93
Constipation	0.77	0.98
Diarrhoea	0.60	0.91
Stomach pain	0.69	0.90
Lack of appetite	0.67	0.93
Nausea	0.57	0.84
Pain in swallowing	0.51	0.80

Table 2

Spearman Rho Correlation Coefficients among Socioeconomic Status (SES), History of Child Abuse and Neglect, War Exposure, Psychological Distress, PTSD Symptoms, Reported Illnesses and Physical Symptoms (n range = 243-317).

Measure	1	2	3	4	5	6	7	8	9	10
1. SES	-									
2. History of child abuse and neglect	.31**	-								
3. War exposure	.12*	.16**	-							
4. General Psychological Distress	.07	.17**	.26**	-						
5. PTSD symptoms	.04	.14*	.44**	.54**	-					
6. Re-experiencing	.04	.13*	.45**	.48**	.90**	-				
7. Avoidance	.01	.10	.41**	.50**	.93**	.87**	-			
8. Arousal	.02	.15**	.35**	.51**	.87**	.67**	.71**	-		
9. Reported Illnesses	.07	.19**	.29**	.34**	.38**	.37**	.38**	.30**	-	
10. Physical Symptoms	.26**	.24**	.27**	.58**	.48**	.40**	.44**	.49**	.43**	-
<i>M</i>	16.74	8.69	6.43	0.90	6.78	0.43 ^a	0.33 ^a	0.50 ^a	2.28	41.26
<i>SD</i>	3.33	4.77	2.68	0.67	6.19	0.44	0.37	0.40	1.55	12.44

Note. PTSD = Post-Traumatic Stress Disorder.

* $p < .05$. ** $p < .01$.

^a Corrected PTSD symptom cluster means (mean divided by number of items in cluster)

Table 4

Hierarchical Multiple Regressions to Test PTSD as Mediator Between War Exposure and Reported Illnesses, and Between War Exposure and Physical Symptoms

Predictors/Outcomes	ΔR^2	β
A. War Exposure/PTSD		
Step 1	.03	
History of child abuse and neglect		.18**
Step 2	.20	
War Exposure		.41***
Total $R^2=.20$ ***		
B. War exposure and PTSD/Reported Illnesses		
Step 1	.03	
History of child abuse and neglect		.18**
Step 2	.20	
War Exposure		.10
PTSD		.37***
Total $R^2=.21$ ***		
C. War exposure and PTSD/Physical Symptoms		
Step 1	.07	
History of child abuse and neglect		.27***
Step 2	.29	
War exposure		.05
PTSD		.45***
Total $R^2=.29$ ***		

** $p < .01$. *** $p < .001$.