



# The role of locus of control and coping style in predicting longitudinal PTSD-trajectories after combat exposure



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## ARTICLE INFO

### Article history:

Received 2 March 2015

Received in revised form 18 March 2015

Accepted 19 March 2015

Available online 28 March 2015

### Keywords:

Trauma

Posttraumatic stress disorder

Combat

Coping

Locus of control

Veterans

## ABSTRACT

While longitudinal posttraumatic stress responses are known to be heterogeneous, little is known about predictors of those responses. We investigated if locus of control (LOC) and coping style are associated with long-term PTSD-trajectories after exposure to combat. Six hundred and seventy five Israeli soldiers with or without combat stress reaction (CSR) from the Lebanon war were assessed 1, 2, and 20 years after the war. Combat exposure, LOC, and coping style were then investigated as covariates of the trajectories of resilience, recovery, delayed onset, and chronicity. Symptomatic trajectories in the CSR and the non-CSR group were significantly associated to varying degrees with perceived life threat during combat (ORs: 1.76–2.53), internal LOC (0.77–0.87), emotional coping style (0.28–0.34), and low use of problem-focused coping (2.12–3.11). In conclusion, assessment of LOC and coping can aid prediction of chronic PTSD outcomes of combat exposure.

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## 1. Introduction

An unresolved debate in the literature on posttraumatic stress disorder (PTSD) concerns issues of vulnerability to stress-induced psychopathology. Research has indicated that whereas the majority of individuals exposed to traumatic events do not succumb to stress, a significant minority experience subsequent psychopathology (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Importantly, most of those who develop PTSD remain sensitized and vulnerable to subsequent adversity (Solomon, 1993; Solomon & Mikulincer, 2006). This study aims to examine the association of two psychological attributes, namely locus of control (LOC) and coping style with long-term PTSD trajectories.

Longitudinal studies investigating trajectories of PTSD in military samples have repeatedly found posttraumatic stress responses to be heterogeneous (Andersen, Karstoft, Bertelsen, & Madsen, 2014; Bonanno et al., 2012; Dickstein, Suvak, Litz, & Adler, 2010; Orcutt, Erickson, & Wolfe, 2004). These studies suggest that while the predominant trajectory is that of resilience, symptomatic trajectories are also observed. More precisely, trajectories of recovery,

delayed onset, and chronicity have most often been identified (Andersen et al., 2014; Bonanno et al., 2012; Dickstein et al., 2010; Orcutt et al., 2004). Since heterogeneous trajectories seem to be the norm, a pertinent aim is the identification of vulnerability markers which will enable the prediction of individual trajectories of stress reactions. This will in turn permit the early identification of individuals who will go on to develop chronic PTSD.

Several variables have been identified as risk factors for PTSD in the general population and in the military. More specifically, demographics (e.g., gender and age), pre-trauma functioning, peri-traumatic characteristics (such as combat exposure), peri-traumatic functioning (e.g. combat stress reaction (CSR); Solomon, 1993), and posttraumatic support all play a role in predicting PTSD (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). However, the sum of explained variability in two often cited meta-analyses is low (<20%; Brewin et al., 2000; Ozer et al., 2003). Thus, a great deal of the variance remains unexplained and additional predictive variables need to be identified. Whereas demographic variables, peri-traumatic reactions, and posttraumatic support have often been investigated in studies of military trauma, the implication of psychological attributes in the prediction of long-term PTSD-trajectories has, less often, been under scrutiny.

We aim to examine the role of combat exposure and two psychological attributes in predicting individual differences in long-term posttraumatic stress response in soldiers who did or did not

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experience a combat stress reaction (CSR). CSR describes acute stress reactions following exposure to PTE in a military context and is defined as a functional breakdown on the battlefield that limits the individual's ability to function as a combatant (Solomon, 1993). More specifically, we will evaluate how locus of control (LOC) and coping style relates to the PTSD-trajectories of chronicity, recovery, resilience, and delayed onset.

### 1.1. Locus of control and PTSD

Locus of control (LOC) concerns the extent to which individuals feel they can control events that affect them (Rotter, 1966). Specifically, it assesses the degree to which individuals believe that events are controllable by their actions (internal LOC) or primarily depend on factors that are beyond their control (external LOC). Research has found that external LOC is related to higher level of PTSD-symptoms (e.g. Casella & Motta, 1990; McKeever, McWhirter, & Huff, 2006; Norris et al., 2002; Solomon, Mikulincer, & Avitzur, 1988, Zhang, Liu, Jiang, Wu, & Tian, 2014). Hence, internal LOC is expected to be a protective factor against PTSD, while an external LOC is a risk factor for the development of PTSD after exposure to combat. Less, however, is known about the general relationship between LOC and long-term PTSD outcome, and whether or not LOC predicts the persistence or chronicity of PTSD (Olf, Langeland, & Gersons, 2005). Prospective investigation of the predictive qualities of LOC may therefore yield potentially important results, and yet to the best of our knowledge, this has not been investigated in relation to heterogeneous, long-term trajectories of PTSD following combat.

### 1.2. Coping style and PTSD

Coping style is defined as the cognitive and behavioral efforts applied by an individual to manage internal or external demands (Lazarus & Folkman, 1984). A number of different coping strategies have been conceived and described (e.g., active, passive, avoidant, emotional etc.), and as a result, coping is viewed as a multi-dimensional concept. Indeed, a well-supported coping typology was conceived by Lazarus and Folkman (1984), which distinguished between: (1) a problem-focused strategy, aimed at solving the stress-creating problem and (2) an emotion-focused strategy, aimed at reducing internal distress. Note that whereas these two coping styles are commonly accepted, other coping styles have been recognized; for example help seeking (Lazarus & Folkman, 1984). Whereas the problem-focused strategy focuses at direct problem solving and at reducing external stressors, the emotion-focused coping style aims to reduce the experienced distress through various mechanisms including reappraisal, selective attention, and avoidance.

Studies show that emotion-focused coping, particularly avoidance coping, are related to higher levels of PTSD (e.g. Brousse et al., 2011; Bryant & Harvey, 1995; Chang et al., 2003; Ménard & Arter, 2014; Mikulincer & Solomon, 1989), while problem-focused coping is associated with lower levels of PTSD (Mikulincer & Solomon, 1989). As such, the application of emotion-focused coping seems to be maladaptive, while problem-focused coping appears to be adaptive. However, less is known about of the relation between coping strategies and long-term PTSD trajectories.

### 1.3. Aims and objectives

The current study attempts to fill the abovementioned gaps in knowledge by investigating the relation between combat exposure, LOC, coping-style and long-term trajectories of combat-induced PTSD symptoms in soldiers with and without precedent combat stress reaction (CSR).

We capitalize on a 20 years longitudinal study of Israeli veterans (Solomon & Mikulincer, 2006). The long-term trajectories of PTSD in this sample; namely those of resilience, delayed onset, recovery, and chronicity, were identified in a data-driven fashion by application of Latent Growth Mixture Modeling (LGMM) in a previously published paper (Karstoft, Armour, Elklit, & Solomon, 2013). The current study aims to assess the relation of LOC and coping style to these long-term PTSD trajectories in addition to the contribution of combat exposure. Specifically, we hypothesized that combat exposure (as measured by participant's subjective perception of life threat and severity of battles), external LOC, and emotion-focused coping would increase the risk of belonging to any of the symptomatic trajectories, while problem-focused coping would reduce the risk of belonging to the symptomatic trajectories. We hypothesize that combat exposure, LOC and coping style act as significant covariates of trajectories above and beyond the influence of having a combat stress reaction. Hence, we hypothesize that we will find significant associations between these covariates and symptomatic trajectories in the CSR group as well as the non-CSR group.

## 2. Material and methods

Six hundred and seventy five Israeli male veterans from the 1982 war in Lebanon were assessed 1 (T1), 2 (T2), and 20 (T3) years after the war. Of the total sample, 369 were diagnosed with combat stress reaction (CSR) during the war. These were age, education, military rank, and assignment-matched with a control with no antecedent CSR ( $N = 306$ ). Age at the first measurement ranged from 18 to 37 years ( $M = 25.81$ ,  $SD = 4.72$ , median = 26). Of the total sample at T1, 462 also participated at T2, constituting a 68.4% participation rate at follow-up. Of those 462 veterans, 296 participated at T3, constituting 64.1% of those who participated in the first two assessments. Importantly, military records and data collected at T1 revealed no significant differences in socio-demographic and military background, pre-military adjustment, intelligence, or mental and somatic health one year after the war between those who participated at all three time points and those who did not. While the attrition was significantly higher for the CSR group (27.3%) than for the non-CSR group (19.2%) at T2 ( $\chi^2(2,666) = 14.04$ ,  $p < .001$ ) there was no difference in attrition between the two groups at T3 (CSR = 24.4% missing, non-CSR = 29.9%;  $\chi^2(2,666) = 21$ ,  $p = .644$ ). To deal with the effects of attrition, all missing data were handled using the Multiple Imputation (MI) technique. In MI, instead of replacing missing values with one value such as the mean, each missing value is replaced by a set of plausible values that represent the uncertainty about which value to impute (Rubin, 1987). We tested the accuracy of the MI procedure by comparing correlations between outcome measures before and after imputation and found no differences. Finally, we ran the LGMM model on the non-imputed data set including only participants with at least two assessments. This model was very similar to the model based on imputed data in trajectory profiles as well as in trajectory prevalence. Thus satisfied with the imputation procedure, analyses were based on the imputed data set to maximize group sizes for the post hoc analysis.

### 2.1. Measures

The PTSD inventory (Solomon, Weisenberg, Schwarzwald, & Mikulincer, 1987), used to assess PTSD symptomatology, is a 13-item self-report questionnaire based on the DSM-III (American Psychiatric Association, 1980) criteria for PTSD (DSM-III was the standard used when the study commenced). The instrument has demonstrated good psychometric properties (Solomon & Horesh, 2007), and its clinical validity was supported by concurrent

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