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Danger- and non-danger-based stressors and their relations to posttraumatic deprecation or growth in Norwegian veterans deployed to Afghanistan

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ABSTRACT

Objective: This study aimed to explore how exposure to danger-based and non-danger-based stressors may influence personal changes in veterans ($N = 4053$) after deployment to Afghanistan.

Method: Twelve war zone related traumatic events were used to form two stressor categories. The non-danger-based category included two stressor types: Moral Challenges and Witnessing, and the danger-based category included one type: Personal Threat. Thus, three stressor types were explored in relation to self-reported personal changes after war zone stressor exposure, e.g. negative changes labelled posttraumatic deprecation, positive changes labelled posttraumatic growth or no major change. Furthermore, the relationship between the stressor types and reported levels of distress were explored.

Results: The two non-danger-based stressor types, Moral Challenges ($p < .001$) and Witnessing ($p < .001$), were both significantly more associated with deprecation rather than growth, when compared to Personal Threat. Moreover, the non-danger-based stressors were significantly associated with a rise in posttraumatic stress symptoms, as well as a rise in symptoms of depression, anxiety and insomnia ($p < .001$). In contrast, exposure to the danger-based stressor was only significantly associated with a rise in the posttraumatic stress symptoms in the current model ($p < .001$). Reports of no-change were significantly associated with low degrees of exposure to all the three stressor types ($p < .001$).

Conclusion: The current study highlights the special adverse effects of non-danger-based stressors. Our findings show that they are more associated with posttraumatic deprecation rather than with growth. This underscores the heterogeneity of responses to traumatic events and adds to the current knowledge about the impact of various stressor types.

Estresores basados en peligro y estresores no basados en peligro y sus relaciones con declive postraumático o crecimiento postraumático en veteranos noruegos desplazados a Afganistán

Objetivo: El objetivo del estudio fue explorar cómo la exposición a estresores basados en peligro y a estresores no basados en peligro puede influenciar cambios personales en veteranos ($N = 4053$) luego de ser desplazados a Afganistán.

Métodos: Doce eventos traumáticos relacionados a zonas de guerra se usaron para elaborar dos categorías de estresores. La categoría de estresores no basados en peligro incluyó a dos tipos: Desafíos Morales y Ser Testigo. La categoría de estresores basados en peligro incluyó un tipo: Amenaza Personal. Consecuentemente, se exploró la relación de tres tipos de estresores con los cambios personales auto reportados luego de la exposición a estresores de zona de guerra; así, los cambios negativos fueron etiquetados como 'declive postraumático', y los cambios positivos como 'crecimiento postraumático' o como 'sin cambio significativo'. Adicionalmente, se exploró la relación entre los tipos de estresores y los niveles reportados de sufrimiento.

Resultados: Los dos tipos de estresores no basados en peligro, Desafíos Morales ($p < .001$) y Ser Testigo ($p < .001$) estuvieron significativamente más asociados a declive que a crecimiento, cuando fueron comparados con Amenaza Personal. Asimismo, los estresores no basados en peligro estuvieron significativamente asociados a un incremento en síntomas de estrés postraumático, así como a un incremento en síntomas de depresión, ansiedad e insomnio ($p < .001$). En contraste, la exposición a estresores basados en peligro estuvo únicamente asociada de manera significativa a un incremento de síntomas de estrés postraumático según el modelo actual ($p < .001$). Los reportes de no haber experimentado un cambio estuvieron asociados significativamente a bajos niveles de exposición a los tres tipos de estresores ($p < .001$).

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PALABRAS CLAVE

Crecimiento Postraumático; Estrés Postraumático; militares; trauma; daño moral; veteranos

关键词

创伤后成长, 创伤后应激, 军事, 创伤, 道德创伤, 退伍军人

HIGHLIGHTS

- Danger-based trauma is closely linked to posttraumatic growth.
- Non-danger-based trauma is mostly linked to posttraumatic deprecation.
- Non-danger-based trauma is associated with a broader range of distress symptoms after exposure.

Conclusiones: El presente estudio resalta los efectos adversos particulares de los estresores no basados en peligro; nuestros hallazgos muestran que están más asociados con declive postraumático que con crecimiento postraumático. Esto enfatiza la heterogeneidad de las repuestas ante eventos traumáticos y añade información sobre el impacto de los diferentes tipos de estresores al conocimiento actual.

派遣至阿富汗的挪威退伍军人中危险和非危险应激源及其与创伤后损伤或成长的关系

目的: 本研究旨在探讨在被派遣到阿富汗后, 退伍军人 ($N = 4053$) 在暴露于危险和非危险性的应激源中可能出现的个人变化。

方法: 挑选了12个与战区相关的创伤事件分类为两个应激源类别。非危险性应激源的类别包括两种子类: 道德挑战和目击; 危险性应激源的类别包括个人威胁。因此, 本研究旨在探讨暴露于这三种应激源之后个体自我报告的变化, 包括: 负面变化 (称为‘创伤后损伤’, Posttraumatic Deprecation) 或者积极变化 (称为‘创伤后成长’), 或者没有重大变化。此外, 本研究也探讨了应激源类型与报告的痛苦程度之间的关系。

结果: 与个人威胁相比, 两种非危险性的应激源类型道德挑战 ($p < .001$) 和见证 ($p < .001$) 与创伤后损伤 (而非创伤后成长) 显著地更相关。此外, 非危险性应激源与创伤后应激症状以及抑郁、焦虑和失眠症状的升高显著相关 ($p < .001$)。相反, 在本模型中, 暴露于危险性的应激源仅与创伤后应激症状的升高显著相关 ($p < .001$)。报告没有经历变化与所有三种应激源类型的低暴露程度有显著相关 ($p < .001$)。

结论: 目前的研究强调了非危险性应激源的特殊负面反应: 本研究结果表明, 它们与创伤后损伤有关, 而与创伤后成长无关。这强调了对创伤事件反应的异质性, 并增加了对各种应激源类型影响的了解。

Traditionally, the focus of traumatic stress research has been on fear-based events consisting of danger and horror, as exemplified by Norris (1990, 1992). She suggested that traumatic stress consists of ‘violent encounters with nature, technology, or humankind’ (Norris, 1992, p. 409). Such stressors are often referred to as personal life threats (Shea, Proulx, Finley, Reddy, & Spofford, 2017; Xue et al., 2015). In many traumatic situations, however, peritraumatic fear may not be present, and the threat to life or body may not be the most stressful part of the incident (Shakespeare-Finch & Armstrong, 2010; Yehuda, Southwick, & Giller, 1992). Sensory impressions of death or major suffering of others by seeing, hearing, touching or smelling can in itself be traumatic. This type of trauma is commonly referred to as Witnessing stressors (Carson et al., 2000; Dryden, 2012; Fontana, Rosenheck, & Brett, 1992; Pietrzak, Whealin, Stotzer, Goldstein, & Southwick, 2011; Stein et al., 2012). Moreover, Witnessing stressors can also include learning about the death or injury of someone close (Stein et al., 2012). A typical example from the conflict in Afghanistan is witnessing the aftermath of a terrorist attack on a civilian target.

Some experiences involving human maliciousness, can also be traumatizing, without a life-threat or danger. Instead, the most stressful aspect may rather involve major provocations of the individual’s values and morality. Such moral stressors have been defined as ‘perpetrating, failing to prevent, bearing witness to, or learning about acts that transgress deeply held moral beliefs and expectations’ (Litz et al., 2009, p. 700). Being involved in actions resulting in civilian casualties due to collateral damage is one example of a moral stressor. Distinctions that are more general

have also been made, categorizing incidents involving personal threat as Danger-Based Stress, and moral stressors as well as witnessing incidents together as Non-Danger-Based Stress (Ramage et al., 2015).

Neuro-imaging studies have indicated that danger-based and non-danger-based stressors activate quite different locations in the brain. Ramage et al. (2015) found that only danger-based stressors elicited increased metabolic activity in the fear circuitry involving the amygdalae. In contrast, the non-danger-based stressors increased the metabolism in the precuneus, a part of the medial parietal cortex involved in episodic memory and self-processing operations (Cavanna & Trimble, 2006). This divergence in location with regards to the neural activities may suggest differences in how the brain is processing danger- and non-danger-based stressors; the finding underscores the relevance of exploring the differences between the two (Norrholm & Jovanovic, 2010). Furthermore, several studies suggest that various types of traumatic stressors may produce different symptomatic outcomes. Generally, danger-based stressors are associated with a hyperarousal symptom cluster, while non-danger-based stressors seem associated rather with a depression symptom cluster (Pietrzak et al., 2011; Ramage et al., 2015; Shea et al., 2017; Stein et al., 2012). Moreover, non-danger-based stressors may precipitate more posttraumatic distress than the danger-based stressors (Litz et al., 2009; Nash et al., 2010; Ramage et al., 2015).

Exposure to major stressors tend to be disruptive and lead to negative psychological developments in individuals (Norris, 1992; Ozer, Best, Lipsey, & Weiss, 2003; Yehuda et al., 1992). However, a

growing body of research also indicates that many individuals report positive psychological developments, such as greater personal strength or closer relationships, after such stressors (Linley & Joseph, 2004). Positive psychological development after exposure to trauma has been referred to by labels such as posttraumatic growth (PTG), stress-related growth, benefit finding and posttraumatic change (Helgeson, Reynolds, & Tomich, 2006; Park & Helgeson, 2006; Tedeschi & Calhoun, 1996). However, concerns have been raised about the most common ways of operationalizing such concepts, as several studies found that self-reported growth was closely associated with high levels of distress and psychopathology (e.g. Frazier, Conlon, & Glaser, 2001; Holgersen, Boe, & Holen, 2010; Taylor & Armor, 1996).

One reason for this may be that prevalent instruments, such as the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) and Stress-Related Growth Scale (Park, Cohen, & Murch, 1996), only allow the respondents to report positive developments. It has been proposed that this may produce a major response bias toward reports of illusory changes (Park & Helgeson, 2006). In recent advances, however, both negative, positive or no change can be reported on each item (Marshall, Frazier, Frankfurt, & Kuijer, 2015; Nordstrand, Hjemdal, Holen, Reichelt, & Bøe, 2017). When using this format, positive developments have been found to correlate negatively with psychological distress (Nordstrand et al., 2017). Negative developments represent posttraumatic deprecation, increased distress and even other kinds of psychopathology, while positive posttraumatic development imply growth (PTG) unlinked to psychopathology and distress (Livneh, McMahon, & Rumrill, 2018). No change, on the other hand, can be indicative of either insufficient traumatic exposure to initiate any posttraumatic development or to resilience (Ozer et al., 2003; Tedeschi & Calhoun, 2004). The assumption is that bi-directional response options reduce the risk of capturing pseudo-growth associated with high levels of distress (Armeli, Gunthert, & Cohen, 2001; Cheng, Wong, & Tsang, 2006; Livneh et al., 2018). This approach may also add to the current understanding of aetiology, diagnostic classification and treatment after trauma (Karanci & Acarturk, 2005; Maguen, Vogt, King, King, & Litz, 2006; Steenkamp, Litz, Hoge, & Marmar, 2015).

In this study we wanted to explore war zone stressors categorized as danger-based stressors and non-danger-based stressors, the latter divided into Moral Challenges and Witnessing. The aim was to explore the links between these three types of stressors and the posttraumatic outcome in terms of the subsequent development towards deprecation, growth or no posttraumatic change, and also their associations with posttraumatic distress and personal changes. Specifically, we hypothesized that non-danger-based

stressors would contribute more towards higher levels of psychological distress.

1. Methods

1.1. Participants

The study used data from a cross-sectional, post-deployment survey carried out during the spring of 2012. All Norwegian military personnel deployed to Afghanistan between late 2001 and the end of 2011 were invited to participate. A total of 7155 male and female personnel were identified by the Recruiting Department of the Norwegian Armed Forces to fit the requirements. Of the invited personnel, 4225 (59%) responded in total: 1931 (46%) by mail and 2294 (54%) on the web. Twenty-nine respondents answered both by mail and on the web. In these 29 cases, duplicates were removed to retain only one survey response per person. Of the responses, 172 (2.4%) were either incomplete or active refusals. The non-responders plus those with incomplete responses and active refusals amounted to 3102 (43.3%) persons. In all, 4053 individuals returned fully completed questionnaires, resulting in a final response rate of 56.7%. Table 1 shows the demographic characteristics of the participants and the non-responders.

1.2. Procedure

The identified personnel received an invitation by mail to take part in the study by completing a 20-page questionnaire. The respondents could either return a paper version by mail or complete the questionnaire in a digital format on the web. A responder incentive was offered; the participants were included in a lottery of three sport watches. The data collection phase lasted 13 weeks, from 20 February to 24 May 2012 and included two reminders to those who did not respond.

Table 1. Demographic characteristics of participants (56.7%) and non-responders (43.3%) of Norwegian Afghanistan veterans ($N = 7155$) by numbers and percentage.

	Participants $N = 4053$ (%)	Non- Responders $N = 3012$ (%)
Biological Sex (female)*	336 (8.3)	164 (5.3)
Biological Sex (male)	3717 (91.7)	2938 (94.7)
Post Deployment Marital status (married)	1256 (31.0)	977 (31.5)
Deployment Age (years)*		
20–30	1305 (32.2)	1256 (40.5)
30–40	1528 (37.7)	1070 (34.5)
40–50	884 (21.8)	512 (16.5)
50+	336 (8.3)	264 (8.5)
Employment status (Post Deployment)		
Unemployed	182 (4.5)	130 (4.2)
Employed in the military	1905 (47.0)	1442 (46.5)
Long-term disabled	89 (2.2)	78 (2.5)

Note. Chi-square test, * Significant discrepancy ($p < .005$) between responders and non-responders. Age registered at beginning of deployment.

The survey data was stored and extracted from the Norwegian Armed Forces Health Registry and the Norwegian Labor and Welfare Administrations (NAV). The researchers only had access to anonymous data. All participants had given written informed consent to participate. All procedures, data collection, storing and distribution of data were made in accordance with the existing legislation regulating the Norwegian Armed Forces Health Registry. Additional anonymous collection of health information about the non-responders was approved by the Regional Committee for Medicine and Health Research Ethics of South-East Norway.

1.3. Measures

1.3.1. War zone stressors

The project group for the Afghanistan 2012 Survey developed a traumatic exposure index for the survey. At the outset, it consisted of 23 items of typical traumatic events that were likely to occur during deployment. Based on literature reviews (Breslau & Davis, 1987; Fontana et al., 1992; Jordan, Eisen, Bolton, Nash, & Litz, 2017; Litz et al., 2009; Shea et al., 2017; Stein et al., 2012; Vogt, Proctor, King, King, & Vasterling, 2008), we selected a set of items that covered danger-based or non-danger-based stressors (Ramage et al., 2015). The danger-based stressors were related to Personal Threat incidents, while the non-danger-based stressors consisted of Moral Challenges (Litz et al., 2009; Stein et al., 2012) and Witnessing incidents (Green, Grace, Lindy, Gleser, & Leonard, 1990). Items that did not fit any of the three target stressor categories were omitted, which reduced the number of items for this study from 23 to 12. Each item was rated by the respondent on a 5-point Likert scale based on their frequency of exposures. The response options were: 0 = 'not experienced'; 1 = 'experienced 1–2 times'; 2 = 'experienced 3–12 times'; 3 = 'experienced 13–50 times'; and 4 = 'experienced 50+ times'. An individual sum exposure score was

calculated for all three target stressor types, giving sum scores of 0–20 (Personal Threat, 4 items), 0–15 (Moral Challenges, 3 items) and 0–25 (Witnessing, 5 items) for every respondent. In the analyses, the exposure scores related to each of the three target stressors were treated as continuous variables, and they were labelled Personal Threat ($M = 1.32$, $SD = 1.86$), Moral Challenges ($M = .98$, $SD = 1.43$) and Witnessing ($M = 2.60$, $SD = 2.38$). Bivariate correlations between the trauma types Personal Threat and Witnessing ($r = .446$, $p < .001$), between Personal Threat and Moral Challenges ($r = .245$, $p < .001$), and between Moral Challenges and Witnessing ($r = .397$, $p < .001$) were significant. The correlation coefficients indicated weak to moderate covariance between the stressor types. The mean exposure score for all the 12 items was 4.9 ($SD = 4.38$), and 10.8% of the sample had been exposed to all three stressor categories, either simultaneously or on separate occasions.

The three target stressor variables were not mutually exclusive; we assumed that some events could involve multiple stressor types. The items subsumed under each stressor type and the related frequencies of exposed persons and their percentages are presented in Table 2.

1.4. Posttraumatic development: depreciation, growth or no change

Group placement was dependent upon the kind of posttraumatic development that each participant reported, and was made by means of the Posttraumatic Change Scale (PTCS). The instrument contains 26 items ($M = 3.28$, $SD = .34$, $\alpha = .91$). Each item is phrased in an unbiased manner with a format like, e.g. 'My social life is ...' or 'My trust in other people is ...'. Each item is rated on a 5-point Likert scale. The response options are: 1 = a lot worse/less than before; 2 = worse/less than before; 3 = same as

Table 2. Frequencies and percentage of those who reported 'Exposed' to Personal Threat, Witnessing and Moral Challenges. The 12 war zone stressor items are included from a sample of Norwegian Afghanistan veterans ($N = 4053$).

War Zone Stressors Items	Exposed n (%)
Personal Threat	2005 (49.7)
Wounded or injured in combat	110 (2.7)
Attacked by enemies	1802 (45.0)
Surrounded or ambushed by enemies	818 (20.4)
Experienced moment I thought I would die	836 (20.8)
Witnessing	3056 (77.6)
Seen, processed or handled dead bodies or body parts	1503 (37.5)
Know someone seriously injured or killed	1956 (48.8)
Witnessed brutality towards civilians, captured enemies, or prisoners	746 (18.6)
Seen innocent victims of war	2210 (55.4)
Seen fellow soldier being seriously injured or killed	572 (14.3)
Moral Challenges	1830 (45.9)
Seen morally reprehensible occurrences	1697 (42.4)
Did or participated in morally reprehensible occurrences	446 (11.1)
Failed to act on something I in retrospect think I should have done	503 (12.6)

Note. Individual respondents may report multiple stressors. Exposed = Experienced at least once.

before; 4 = better/more than before; and 5 = a lot better/more than before exposure to the war zone stressors, if any, during the deployment. This format allows the respondent to indicate the direction of her or his posttraumatic development towards deprecation (DG), growth (GG) or no-change (NG).

With this placement method, the sample ($N = 4053$) was divided into three groups based on the participants' individual arithmetic mean on the PTCS (total). The DG consisted of respondents with a mean PTSC score of 1 through 2.99, the GG of respondents with mean scores of 3.1 through 5, and the NG of respondents with mean scores between 2.99 and 3.1. The mid-score on the PTCS, representing no change, is 3. This narrow inclusion interval for the NG was chosen to avoid categorizing modest deprecation or growth as no change. Very few respondents (< 2%) scored both 1 and 5 on different items on the PTCS. Therefore, no mixed development group was included.

1.5. Posttraumatic characteristics of personal changes

The PTCS has four sub-dimensions: Self-Confidence (8 items, $M = 3.45$, $SD = .51$, $\alpha = .89$), Interpersonal Involvement (6 items, $M = 3.0$, $SD = .37$, $\alpha = .73$), Awareness (6 items, $M = 3.4$, $SD = .459$, $\alpha = .79$) and Social Adaptability (6 items, $M = 3.20$, $SD = .35$, $\alpha = .70$). By self-reports, the sub-dimensions capture the various psychological characteristics of the posttraumatic changes manifesting in the aftermath of stressor exposure. The Self-Confidence sub-dimension relates to trust in one self, while the Interpersonal Involvement sub-dimension relates to trust in others. The Awareness sub-dimension relates to appreciation of life and inner values, while the Social Adaptability sub-dimension relates to social strategies and function. All four sub-dimensions have demonstrated a good model fit and satisfying psychometric properties (Nordstrand et al., 2017). The associations between group placement and personal changes on the four PTCS sub-dimensions scores were explored. This produced DG, GG and NG values on all four sub-dimensions for each participant to be included in the analyses.

1.6. Measures of psychological distress measures

The following measures captured the levels of distress: anxiety, depression and insomnia. In addition, the PTSS was used as a measure of the posttraumatic stress symptom load.

Hospital Anxiety and Depression Scale (HADS): The HADS contains 14 items and consists of two subscales: anxiety (7 items; HADS-A [$M = 2.91$, $SD = 2.78$, $\alpha = .77$]) and depression (7 items; HADS-D [$M = 1.76$, $SD = 2.41$, $\alpha = .78$]). Each item is rated

on a scale from 0 to 3, giving a maximum score of 21 for anxiety and depression alike. For screening purposes, a sum score of 11 or higher on either subscale are generally considered to represent a 'case' of psychopathology, while scores of 8–10 represent 'borderline' and 0–7 signifies 'normal' levels of distress (Zigmond & Snaith, 1983). The HADS has been widely used as a brief self-rating instrument of anxiety and depression both for dimensional and categorical detection (case/non-case). Furthermore, HADS has been frequently used in both epidemiological and specialist care studies (Zigmond & Snaith, 1983). Moreover, HADS has been validated in a Norwegian population (Mykletun, Stordal, & Dahl, 2001).

Insomnia Severity Index (ISI): The ISI (Bastien, Vallières, & Morin, 2001) is a 7-item self-report instrument capturing insomnia symptoms, as well as the degree of concerns or distress caused by those symptoms. Disturbed sleep is commonly reported after trauma; it may interfere with fear extinction and thus compromise trauma recovery (Kobayashi, Boarts, & Delahanty, 2007). Each item has a 5-point Likert response format. Total sum scores of 22–28 or higher are considered to represent severe clinical insomnia, scores of 15–21 represent moderate clinical insomnia (moderate severity), 8–14 subthreshold insomnia, and 0–7 represent no clinically significant insomnia ($M = 3.67$, $SD = 3.98$, $\alpha = .89$) (Morin, Belleville, Bélanger, & Ivers, 2011). In part, the content of the ISI corresponds to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) diagnostic criteria for insomnia. The ISI has good face validity and excellent psychometric properties (Morin et al., 2011). The sum score will be referred to as the ISI (total) score.

Posttraumatic Symptom Scale (PTSS): Concurrent posttraumatic stress symptoms were detected using the 10-item self-report version of PTSS; this questionnaire was developed in Norway in relation to the North Sea Oil Rig Disaster (Holen, Sund, & Weisæth, 1983). In this version, each item is rated on a 7-point Likert scale. The scale covers general stress manifestations such as sleep difficulties, irritability, depressed mood and startle reactions in the past seven days. The response options go from 1 = never/rarely to 7 = very often, giving a potential total sum score range from 10 to 70. Total sum scores of 35 or higher represent a likely case of psychopathological posttraumatic stress symptoms ($M = 16.94$, $SD = 8.82$, $\alpha = .90$). The total sum score is referred to as the PTSS (total) score.

1.7. Data analysis

The frequency distribution of the stressor items was calculated, reflecting the respondents' stressor exposure on the item and variable level, i.e. Personal

Threat, Moral Challenges and Witnessing. A simultaneous multivariate multiple linear regression (Stevens, 2002) was conducted to examine the relative contribution of Personal Threat, Moral Challenges and Witnessing in predicting reports of psychological distress on four outcome measures (PTSS, HADS-A, HADS-D and ISI). Two circumstantial variables were included as covariates in this analysis. The first was the total number of deployments for each person. This was included to control for the potential disruptive, non-traumatic effects of deployment, such as the absence from family and a regular social life, the burden on intimate relationships, physical constraints and work load. The second covariate was the elapsed time in years from the last deployment until participation in the study, and was included to control for variation in the length of time since the respondents were exposed to the war zone stressors when completing the survey. The relative importance of the covariates and stressor variables in the model were compared using the standardized regression coefficients; the β weights.

Divergent effects of the various stressor types were investigated by analyses of variance (ANOVA) with post hoc Bonferroni corrections. The development groups derived from the PTCS (total) score and the four PTCS (sub-dimension) scores, i.e. deprecation group, growth group and no-change group, were entered as the dependent variables in separate one-way ANOVAs. Between-group comparisons were made for all five sets of developmental groups. Levene's test of homogeneity of variance was significant for all ANOVAs. Accordingly, Welch's F is

reported. When deciding the appropriate significant p -value for the current study, several aspects relevant for the analysis and the sample size of our study were considered (Dixon, 1998). The current study is based on a large sample ($N = 4053$). Thus, a conservative significance level of .001 was chosen in the relevant analyses.

2. Results

2.1. Was zone stressors and distress

The relationships between the war zone stressors and the symptom measures are presented in Table 3. Exposure to Personal Threat, Moral Challenges and Witnessing explained a significant amount of the variance in all the outcomes; the types of stressors were all significant predictors of the posttraumatic stress symptoms in the model, as expressed by the PTSS (total) score. In contrast, only Moral Challenges and Witnessing were significant predictors of the distress measures – anxiety, depression and insomnia, as measured respectively by the HADS-A, HADS-D and ISI scores. Neither the number of deployments, nor time since last deployment, proved to be significant in the equation as predictors for any of the psychological distress measures. Collinearity diagnostics did not indicate the presence of multicollinearity in any of the regression analyses (Coakes, 2005; Hair, Anderson, Tatham, & Black, 1998). Tolerance values ranged from 0.74 to 0.94, variance inflation factors from 1.06 to 1.43, and condition indices from 1.00 to 4.05. No step showed two or more coefficients accounting for < .90 of the variance.

Table 3. Multivariate multiple linear regression of exposure scores from three war zone stressors: Personal Threat, Witnessing and Moral Challenges, and also the persons' number of deployments and time since last deployment as the independent variables in relation to the psychological distress scales: PTSS, HADS-A, HADS-D and ISI as the dependent variables.

Variables	B	SE	β	R^2
PTSS [$F(5, 3886) = 144.987, p < .001$]				
Personal Threat	.756	.079	.160***	.157***
Witnessing	.657	.066	.176***	
Moral Challenges	1.206	.100	.195***	
Time Since Last Deployment	-.048	.055	-.013	
Number of Deployments	-.240	.079	-.046	
HADS-A [$F(5, 3886) = 36.606, p < .001$]				
Personal Threat	.067	.027	.045	.045***
Witnessing	.081	.022	.069***	
Moral Challenges	.302	.034	.155***	
Time Since Last Deployment	.014	.018	.012	
Number of Deployments	-.059	.027	-.036	
HADS-D [$F(5, 3886) = 34.886, p < .001$]				
Personal Threat	.041	.023	.032	.043***
Witnessing	.069	.019	.067***	
Moral Challenges	.269	.029	.159***	
Time Since Last Deployment	.000	.016	-.001	
Number of Deployments	-.014	.023	-.010	
ISI [$F(5, 3886) = 18.935, p < .001$]				
Personal Threat	-.024	.038	-.011	.024***
Witnessing	.129	.032	.077***	
Moral Challenges	.311	.048	.112***	
Time Since Last Deployment	-.021	.026	-.013	
Number of Deployments	-.081	.038	-.035	

Note. Post-Traumatic Symptom Scale (PTSS); Hospital Anxiety and Depression Rating Scale (HADS-A, HADS-D); Insomnia Severity Index (ISI). <> Exposure score Sig. *** $p < .001$ with distress scale.

2.2. War zone stressors and posttraumatic development

The associations between the different war zone stressors and the reported posttraumatic development in terms of deprecation, growth or no change are shown in Table 4. The three outcome groups reflect the overall direction of the veteran's subsequent posttraumatic development based on the PTCS (total) scores: the deprecation group (DG; $N = 326$, 8.0%), the growth group (GG; $N = 3,255$, 80.3%) and the no-change group (NG; $N = 445$, 11.0%). Incomplete responses accounted for a small number of participants (Missing; $N = 27$, 0.7%).

Analyses revealed that exposure to Personal Threat did not significantly differentiate between those who reported posttraumatic deprecation and those who reported posttraumatic growth. In contrast, exposure to the non-danger-based stressor types, i.e. Witnessing and Moral Challenges, were significantly higher among respondents reporting posttraumatic deprecation, compared to those reporting posttraumatic growth.

Regarding the characteristics of posttraumatic change as captured by the PTCS sub-dimensions, the findings were mixed (Table 4). On the sub-dimensions Interpersonal Involvement and Social Adaptability, exposure to all three war zone stressor types were significantly more associated with deprecation rather than growth. By contrast, reports of growth or deprecation on the Self-Confidence sub-dimension were not significantly different in regard to exposure scores of any of the stressor types. Of note, on the sub-dimension Awareness, we find that those who reported deprecation were significantly more exposed to Moral Challenges and Witnessing than those who reported growth, however, there was no difference in relation to the exposure to Personal Threat.

Respondents with no posttraumatic change were significantly less exposed to any of the three stressor types when compared to those who reported posttraumatic deprecation or growth. This was the case both for the three outcome groups derived from the PTCS (total) score, and in regard to the characteristics of posttraumatic change as derived from the PTCS (sub-dimension) scores (Table 4).

3. Discussion

The current study demonstrates that stressor types differ in their associations with the subsequent posttraumatic development of the veterans, i.e. towards deprecation, growth or no change, a stressor-response link is found. Importantly, exposure to moral challenges and witnessing death and suffering are more prevalent among veterans who report posttraumatic

deprecation, compared to those veterans who report growth. In line with previous findings, a certain exposure load seems required to result in posttraumatic deprecation or growth (Dekel, Ein-Dor, & Solomon, 2012). Those reporting lower exposure to war zone stressors also report less posttraumatic distress in the wake of deployment.

Both danger-based and non-danger-based types of stressors are associated with posttraumatic stress symptoms. However, the findings suggest that exposure to non-danger-based stressors may have a broader impact on the symptom expression than exposure to danger. This is comparable to recent studies investigating the impact of different stressor types (Shea et al., 2017). In the current sample, morally challenging incidents and witnessing the death and suffering of others seem to be more associated with distress in terms of anxiety, depression and insomnia than fear-based situations are. The time elapsed since the last deployment to Afghanistan seems not to affect psychological distress in our model, indicating that the effects of exposure are not temporally dependent. This is contrary to some previous findings, where time since trauma has emerged as a significant predictor of the effect sizes for depression (Helgeson et al., 2006).

Measures of posttraumatic deprecation and growth are commonly broken down into different characteristics (sub-dimensions) of personal changes (Helgeson et al., 2006). In the current study, deprecation and growth was measured along four such sub-dimensions, and this gives some information on the pattern of posttraumatic changes in the sample. The study finds that 80.3% of the sample reports some degree of growth; this is comparable to previous findings (Linley & Joseph, 2004). Moreover, the danger-based stressors are primarily linked to positive changes in characteristics such as higher self-confidence and increased awareness of life-values, as well as appreciation of life. Similar effects have been identified in other studies (Maguen et al., 2006). Previous research suggests that an individual's sense of predictability and controllability during the traumatic situation is important for the posttraumatic outcome (Başoğlu et al., 2005). Both the preparedness and the available social support in the military units may help to facilitate growth rather than adverse effects of danger.

Posttraumatic deprecation was reported by 8.0% of the sample, and non-danger-based stressors appear to be more linked to such deprecation. This demonstrated association adds to the current knowledge on this issue, even though the mechanisms by which it occurs are not clear from the results. However, previous studies have found that non-danger-based stressors have strong correlations with guilt, shame and symptoms of depression (Jordan et al., 2017; Norrholm & Jovanovic, 2010; Ramage et al., 2015). A central dimension of

Table 4. One-way ANOVA with Bonferroni post hoc group comparison of exposure scores from war zone stressors in relation to the depreciation group, the growth group and the no change group in the Norwegian Afghanistan veterans ($N = 4053$).

War Zone Stressors	Mean Depreciation Group	Mean Growth Group	Mean No Change Group	One-way ANOVA Welch's <i>F</i>	Post Hoc Test (Bonferroni)	
					Group comp.	Mean diff. <i>p</i>
Sub-Dimension I: Self-Confidence						
Personal Threat	$M[1.28(\pm 1.83)]$	$M[1.49(\pm 1.96)]$	$M[1.73(\pm 1.38)]$	$F(2, 3965) = 56.21$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.30 <.001 <.001
Moral Challenges	$M[1.34(\pm 1.82)]$	$M[1.04(\pm 1.45)]$	$M[1.67(\pm 1.17)]$	$F(2, 3969) = 30.34$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.007 <.001 <.001
Witnessing	$M[3.16(\pm 2.74)]$	$M[2.75(\pm 2.38)]$	$M[1.97(\pm 2.16)]$	$F(2, 3946) = 42.47$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.037 <.001 <.001
<i>n</i>	228	2939	857			
Sub-Dimension II: Interpersonal Involvement						
Personal Threat	$M[1.87(\pm 2.19)]$	$M[1.39(\pm 1.87)]$	$M[1.95(\pm 1.58)]$	$F(2, 3970) = 72.21$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Moral Challenges	$M[1.46(\pm 1.74)]$	$M[1.00(\pm 1.41)]$	$M[1.70(\pm 1.17)]$	$F(2, 3974) = 83.22$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Witnessing	$M[3.43(\pm 2.69)]$	$M[2.64(\pm 2.30)]$	$M[2.14(\pm 2.15)]$	$F(2, 3950) = 87.05$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
<i>n</i>	886	1486	1663			
Sub-Dimension III: Awareness						
Personal Threat	$M[1.56(\pm 1.91)]$	$M[1.40(\pm 1.91)]$	$M[1.99(\pm 1.68)]$	$F(2, 3966) = 16.73$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	.79 <.001 <.001
Moral Challenges	$M[1.79(\pm 1.92)]$	$M[1.01(\pm 1.42)]$	$M[1.70(\pm 1.25)]$	$F(2, 3970) = 45.90$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Witnessing	$M[3.55(\pm 2.77)]$	$M[2.70(\pm 2.34)]$	$M[2.07(\pm 2.24)]$	$F(2, 3946) = 36.80$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
<i>n</i>	182	3028	815			
Sub-Dimension IV: Social Adaptability						
Personal Threat	$M[1.85(\pm 2.18)]$	$M[1.45(\pm 1.87)]$	$M[1.99(\pm 1.71)]$	$F(2, 3971) = 47.32$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Moral Challenges	$M[1.54(\pm 1.77)]$	$M[1.08(\pm 1.46)]$	$M[1.69(\pm 1.20)]$	$F(2, 3975) = 73.08$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
Witnessing	$M[3.36(\pm 2.65)]$	$M[2.82(\pm 2.36)]$	$M[2.12(\pm 2.24)]$	$F(2, 3950) = 65.25$ $p < .001$	-1 vs 1 -1 vs 0 1 vs 0	<.001 <.001 <.001
<i>n</i>	449	1990	1596			
Posttraumatic Change Scale Total						

(Continued)

Table 4. (Continued).

War Zone Stressors	One-way ANOVA			Post Hoc Test (Bonferroni)	
	Mean Deprecation Group	Mean Growth Group	Mean No Change Group	Welch's F	Group comp.
Personal Threat	M[1.45(±1.92)]	M[1.38(±1.90)]	M[.80(±1.48)]	F(2, 3967) = 19.18 p < .001	-1 vs 1 -1 vs 0
Moral Challenges	M[1.46(±1.85)]	M[.98(±1.40)]	M[.60(±1.13)]	F(2, 3971) = 34.21 p < .001	1 vs 0 -1 vs 1 -1 vs 0
Witnessing	M[3.29(±2.77)]	M[2.63(±2.33)]	M[1.93(±2.29)]	F(2, 3947) = 31.63 p < .001	1 vs 0 -1 vs 1 -1 vs 0
N	326	3255	445		

Note. Between-group comparisons (Bonferroni post-hoc test): significant at $p < .001$. Non-significant between-group comparison presented in bold.

deprecation appears to be negative interpersonal changes, such as diminished ability to trust others, and a reduced capacity for emotional closeness with other people. Shame and guilt may be components of such changes. One possibility is that shame related to non-danger-based incidents, such as being involved in morally transgressive actions, increases the barriers to disclose these experiences to others (Gray et al., 2012; Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009). In turn, this may sway the posttraumatic development in the direction of posttraumatic deprecation rather than towards growth (Tedeschi & McNally, 2011). In contrast, veterans who have been exposed to life-threatening situations may socially have less reticence to disclose their experiences and, thereby, may be more open to get support from colleagues, family and mental health professionals (DeViva et al., 2016; Möller-Leimkühler, 2002). Studies have found that military veterans often fear negative reactions when talking about their war zone experiences (Guay, Billette, & Marchand, 2006). Possibly, this may be particularly salient in relation to non-danger-based traumas (Nash et al., 2010). Disclosing traumas related to witnessing or moral issues could put veterans at risk of social stigma and negative social responses (Ullman & Filipas, 2001), and increase their reticence towards seeking social support (Lepore & Revenson, 2006), which is regarded as important in fostering posttraumatic growth (Tedeschi & McNally, 2011; Valentiner, Holahan, & Moos, 1994). Importantly, the role of shame and social stigma as mediators between exposure to the various stressor types and posttraumatic deprecation or growth is not fully understood. Future studies investigating these post-traumatic mechanisms seem warranted.

The current study may have implications for the interventions and follow-up of individuals exposed to stressors such as moral challenges and witnessing. Given that the mainstream understanding of PTSD, so far, is primarily centred on the danger-based aspects of the stressors, there may be a risk that individuals exposed to non-danger-based incidents are being identified to a lesser degree and, therefore, they may be given less attention and support. Our findings highlight the relevance of expanding the scope of what constitutes traumatic stressors and the potential consequences of such experiences. Concentrating solely on the danger-related criteria of the PTSD diagnosis will restrict the view of traumatization, and limit the support of people exposed to other variants of trauma.

3.1. Future directions

The current study is based on cross-sectional data. Future research that examines the temporal progression of reactions to the different types of stressors is needed,

both in terms of long-term development of PTSD and depression, as well as posttraumatic deprecation and growth. This could bolster causal inferences and determine the direction of the associations we identified. One testable hypothesis is that Moral Challenges, Witnessing and Personal Threat incidents instigate divergent longitudinal trajectories in regard to these phenomena. Furthermore, in light of the controversy concerning early psychological intervention after trauma exposure (Everly & Mitchell, 2000), it would be fruitful to investigate if a trauma specific intervention strategy could increase the effectiveness of such efforts. There are efforts aimed at developing interventions tailored to manage non-danger-based experiences (Litz, Lebowitz, Gray, & Nash, 2017), and the current results add legitimacy to such endeavours. Finally, the role of shame, guilt and depression in the development of posttraumatic deprecation is not fully understood. Previous studies have pointed to the links between such feelings and non-danger-based stressors (Jordan et al., 2017; Nash et al., 2010). Understanding the mechanisms by which non-danger-based stressors influence posttraumatic development towards deprecation rather than growth merits further research, and could have important clinical implications.

3.2. Limitations

There are several limitations in the current study. Importantly, the sample is predominantly male (91.7%), and the gender bias may have influenced the results. Previous studies have found that females report more posttraumatic growth after trauma than males, and this may have influenced the stressor-response links we identified (Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010). The data presented are based on short-form self-report measures. Females and older veterans had a significantly higher response rate than the males in general and the younger veterans; this is to be considered when interpreting the results. Due to the large sample size in the current study, we were not able to collect anamnestic data, nor conduct diagnostic interviews. Moreover, the cross-sectional design of the current study does not capture such self-reported changes over time and caution is required in inferring potential relations between stressors and the subsequent responses.


This sample consisted entirely of selected and well-trained military personnel. The respondents' preparedness is likely to reduce the generalizability of the findings to the general population. This may in part explain why danger-based stressors seems to have less negative impact in the sample compared to non-danger-based stress. Of note, we did not control for potential additive effects of exposure to multiple trauma types in the individual respondents. Such occurrences may have influenced post trauma outcomes, and this is a limitation in the current study.

Finally, although the reported pattern of associations between stressor types and measures of distress are significant, the explained variance regarding some scales were small, particularly for insomnia ($R^2 = .024$, $p < .001$). However, significant associations with a low R^2 in a large sample, as in our current study, can still provide important information on data trends particularly when studying psychological phenomena (Figueiredo Filho, Júnior, & Rocha, 2011). In addition, the current results are comparable to previous findings (Shea et al., 2017; Stein et al., 2012), which also indicate that the associations between our predictors and response variables are valid.

Disclosure statement

No potential conflict of interest was reported by the authors.

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