

Association of Combat Experiences with Posttraumatic Stress Disorder among Canadian Military Personnel Deployed in Support of the Mission in Afghanistan

Kimberley Watkins, Kerry Sudom & Mark Zamorski

To cite this article: Kimberley Watkins, Kerry Sudom & Mark Zamorski (2016): Association of Combat Experiences with Posttraumatic Stress Disorder among Canadian Military Personnel Deployed in Support of the Mission in Afghanistan, Military Behavioral Health, DOI: [10.1080/21635781.2016.1153538](https://doi.org/10.1080/21635781.2016.1153538)

To link to this article: <http://dx.doi.org/10.1080/21635781.2016.1153538>



Accepted author version posted online: 22 Feb 2016.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)

Association of Combat Experiences with Posttraumatic Stress Disorder among Canadian Military Personnel Deployed in Support of the Mission in Afghanistan

Kimberley Watkins^{1,*}, Kerry Sudom¹, Mark Zamorski²

¹Department of National Defence, Ottawa, Ontario, Canada

²Canadian Forces Health Services Group, Directorate of Mental Health, Ottawa, Ontario, Canada

***Contact: Kimberley Watkins, Department of National Defence, 101 Colonel By Drive, Ottawa, Ontario K1A 0K7, Canada.** Email: kimberley.watkins@forces.gc.ca

Abstract

Understanding the contribution of specific combat experiences to post-deployment posttraumatic stress disorder (PTSD) may inform preventive and therapeutic interventions. This study investigated the associations of combat experiences with PTSD among Canadian military personnel after return from deployment to Afghanistan. Most experiences had positive associations with PTSD, but shooting, calling in fire, and clearing buildings had negative associations. The items most strongly associated with PTSD were those that were uncommonly experienced, might not be expected, and that involved some measure of interpretation or violation of one's morality. These are potential targets for pre- and post-trauma interventions with military personnel.

Keywords

military, combat, mental health, posttraumatic stress disorder, Canadian Armed Forces, war, trauma, moral injury, killing.

Military personnel who have been exposed to combat tend to report poorer psychological health than those who deploy in support of non-combat missions, such as peacekeeping operations (e.g., Hoge, Auchterlonie, & Milliken, 2006; Rona et al., 2007). Substantial combat exposure has been associated with a variety of specific mental health problems, most commonly posttraumatic stress disorder (PTSD) (Watkins, 2014). Most Canadian Armed Forces (CAF) personnel are deployed at some point in their careers, and hence may be exposed to occupational trauma. From 2001 to 2012, more than 40,000 members of the CAF deployed in support of the combat and peace support mission in Afghanistan (Boulos & Zamorski, 2013). During this time, the majority of CAF members who deployed in support of this mission were deployed to the combat-heavy, Taliban-populated theater of Kandahar Province, and were thus likely exposed to combat (Fang, 2010). Of the CAF members who deployed in support of the mission from 2009 to 2012, more than 10% reported mental health problems at the time of post-deployment mental health screening six months after their return, and high combat exposure was a strong predictor of post-deployment mental conditions (Zamorski, Rusu, & Garber, 2014).

The existing research has measured combat exposure in a variety of ways. Some studies have used deployment to a theater of war as a proxy for combat exposure (Boulos & Zamorski, 2013). Others have used a single item indicating the presence of any lifetime combat exposure (Sareen et al., 2007) or have defined combat exposure as reporting at least one of a set of experiences (Smith et al., 2008). Perhaps most commonly in recent research, combat exposure has been expressed as a total count of endorsed experiences from a large number of potential exposures (Bartone; 1999; Booth-Kewley, Larson, Highfill-McRoy, Garland & Gaskin, 2010). A recent study of CAF members who had deployed in support of TFA assessed combat exposure in

this manner, comparing tertiles of total exposure in terms of their associations with post-deployment mental health problems (Zamorski et al., 2014).

Measurement of combat exposure in such ways does not, however, provide information as to the specific aspects of combat that are most strongly associated with post-deployment psychological difficulties. Such evidence is vital, as different experiences have been shown to have varying associations with mental health conditions, such as PTSD. Combat experiences such as killing another person (Maguen et al., 2012), exposure to the atrocities of war (Sareen et al., 2007), exposure to widespread suffering, receiving incoming fire (Iversen et al., 2008), handling human remains (Bouchard, Baus, Bernier, & McCreary, 2010), and being injured (Hoge et al., 2004) have all been shown, in various studies, to be related to development of PTSD.

Recent research with CAF members returning from deployment in support of TFA attempted to address the limitation of measuring combat exposure with a single item or a total count, using scale reduction analyses to identify subscales of combat exposure (Sudom, Watkins, Born, & Zamorski, 2015) and subsequently investigating the relative associations of these categories with post-deployment mental conditions (Born & Zamorski, 2015). The subscales of “Dangerous Environment” (e.g., clearing buildings) and “Exposure to the Dead and Injured” (e.g., seeing dead bodies) were associated with an increased risk of post-deployment mental conditions but, surprisingly, “Active Combat” (e.g., shooting or directing fire at the enemy) was not, raising the possibility that some of the underlying experiences might have protective effects and others detrimental effects. The fourth subscale, “Perceived Responsibility,” (e.g., feeling responsible for the death of an ally) was related to post-deployment mental conditions (Born &

Zamorski, 2015), but this subscale's internal consistency was very poor. The satisfactory reliability of the other combat exposure subscales ($\alpha \geq 0.7$) only indicates that the individual experiences tended to occur together, not necessarily that they have the same associations with mental health. As such, investigation of the associations between the subscales' individual experiences and post-deployment mental health problems is warranted.

Because of the well-documented relation between combat exposure and PTSD, identification of the contributors to deployment-related mental health problems are important to the CAF, in order to alleviate or, ideally, prevent the effects of these experiences on well-being. Most studies have assessed combat exposure as a simple sum of experiences, rather than looking at experiences individually. Thus, exploration of the relationship between specific combat experiences and post-deployment mental health will contribute to a deeper understanding of the underlying psychology of trauma, which may inform preventive interventions for military personnel. Understanding which specific experiences contribute most to occupational mental health problems will help with casualty estimates in military organizations contemplating future operations, including non-combat operations (e.g., peacekeeping, disaster relief) with exposure to some of the same sorts of experiences (e.g., exposure to the dead or injured). While certain potentially traumatic experiences are quite specific to military deployments (e.g., receiving artillery fire), others may occur in other occupational contexts (e.g., first responders may also handle bodies or body parts). As such, exploring the impact of specific experiences will help extend the findings of military research to other occupations.

This study thus investigated the relative associations of specific combat experiences with PTSD among CAF personnel surveyed after return from deployment in support of the mission in Afghanistan between 2009 and 2012.

Method

Procedure

The data were collected as part of the Enhanced Post-Deployment Screening (EPDS) program, a mandatory health screening for all CAF members who deployed overseas for at least 60 days, administered 90 to 180 days post-deployment. The goal of the EPDS is to identify CAF members who may be experiencing deployment-related health problems (Zamorski et al., 2014); it consists of a questionnaire assessing numerous aspects of mental and physical health and sociodemographic information, followed by an interview with a mental health professional.

Participants

The sample consisted of 15,832 CAF personnel who had deployed in support of the Afghanistan combat and peace support operation (Task Force Afghanistan and Operations ATHENA, ARCHER, and ALTAIR) and who completed the EPDS between 2009 and 2012, having been deployed on average three to six months earlier. The participants were primarily male (90.7%; $n = 14,357$), of the Regular Force (85.4%; $n = 13,513$), and in the Canadian Army (79.7%; $n = 12,597$), with some members of the Royal Canadian Air Force (14.3%; $n = 2,267$) and the Royal Canadian Navy (5.9%; $n = 940$). At the time of EPDS administration, participants' ages ranged between 18 and 60 years, with an average age of 32.6 ($SD = 8.64$). Most were junior non-commissioned members (NCM; 67.0%; $n = 9,860$), with fewer senior NCM (17.6%; $n = 2,595$) and officers (15.4%; $n = 2,269$).

Measures

Combat exposure. Combat exposure was assessed using 30 items of the Combat Experiences Scale (CES; Killgore et al., 2008) developed by the Walter Reed Army Institute for Research (Figure 1). This scale measures potentially traumatic combat-related experiences that may occur on deployment. When reducing the CES for the EPDS, four items of the original scale were removed because endorsement might necessitate inquiry into potential misconduct (e.g., “witnessing mistreatment of a non-combatant”), or due to redundancy (e.g., separate items for the different sorts of “close calls” experienced). For each item, participants were asked, “During your most recent deployment, did you experience...” The response options were “No” and “Yes.” For display purposes, items were grouped into sub-categories, in line with a previously documented principal components analysis (Sudom et al., 2015), though the items were examined individually.

PTSD.

PTSD symptomatology was assessed using the PTSD Checklist, civilian version (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL-C consists of 17 items encompassing the diagnostic symptoms of PTSD. The items are prefaced with the statement “Please indicate how much you have been bothered by each problem in the past month.” Responses are made on a five-point Likert-type scale with response options of “Not at all,” “A little bit,” “Moderately,” “Quite a bit,” and “Extremely.” Items are summed, with higher total scores suggesting greater PTSD symptomatology. Possible total scores range from 17 to 85 (Cronbach’s $\alpha = .94$). In accordance with previous PCL validation research among combat veterans, based on congruency with clinician-administered PTSD scales (Forbes, Creamer, & Biddle, 2001), as well as the

diagnostic criteria from the Diagnostic and Statistical Manual of Mental Disorders (Weathers et al., 1993), a score of 50 or higher suggested a diagnosis of PTSD (Weathers et al., 1993).

Sociodemographics.

Several sociodemographic and military characteristics (i.e., sex, age, and rank group [classified into two groups: NCM and officer]) were included in the analyses as covariates.

Statistical Analysis

Binary logistic regressions with each demographic and combat item as the sole predictor were conducted to determine their associations with PTSD, before accounting for the other variables, examining the unadjusted odds ratios and their 95% confidence intervals. The main analysis was a multivariable, binary logistic regression. The covariates, sex, age, and rank group, were entered in the first step, and the individual combat experiences were entered in the second step. The presence/absence of PTSD was the dependent variable. The adjusted odds ratios and their 95% confidence intervals were examined to determine the significance and magnitude of each predictor's association with PTSD.

Results

Prevalence of Combat Experiences and PTSD

The frequencies at which the individual combat experiences were reported are presented in Figure 1. The most commonly endorsed exposures were those from Sudom et al.'s (2015) previously identified Dangerous Environment, Exposure to the Dead and Injured, and Active Combat categories. Perceived Responsibility experiences, and those that cross-loaded onto multiple factors, were reported by comparatively few participants.

In total, 2.8% (valid $n = 437$) of participants reported symptoms at the diagnostic threshold for PTSD.

Association of Combat Experiences with PTSD

Details of the logistic regression model using abbreviated scale items are presented in Table 1.

The second model, with all of the predictors, was significant, $\chi^2(33) = 585.85, p < .001$, Nagelkerke $R^2 = .18$. In terms of demographic and military characteristics, participants who were female, older, and NCM were more likely to screen positive for PTSD, with NCMs nearly four times more likely than officers to have probable PTSD.

In the unadjusted odds ratios (ORs), every combat experience was associated with increased odds of PTSD. As displayed in Figure 2, in the adjusted analyses, 15 of the 30 individual combat experiences had independent associations with PTSD. Most experiences had positive associations with PTSD, but three (shooting, calling in fire, clearing buildings) showed a negative relationship with PTSD. The magnitude of the positive associations ranged from aOR = 1.37 to aOR = 3.78, while the size of the negative associations ranged from aOR = 0.51 to aOR = 0.69. Of the experiences loading on the Dangerous Environment factor, four had positive associations with PTSD (inability to respond due to the rules of engagement, inability to help injured civilians, difficulty identifying combatants, IED explosion), and one experience (clearing buildings) had a negative association with PTSD. Of the Exposure to the Dead and Injured experiences, two experiences (knowing someone killed and seeing remains) were associated with an increased likelihood of having PTSD. For the Active Combat category, two experiences (feeling responsible for a combatant death and receiving indirect fire) were positively associated with PTSD, while two other experiences (calling in fire and shooting) showed negative

associations with PTSD. Of the Perceived Responsibility experiences, two (feeling responsible for an ally death and feeling responsible for a noncombatant death) were associated with greater odds of having PTSD. Among the cross-loading items, two (close call and injury) were positively associated with PTSD.

The combat exposures with the strongest associations with PTSD (i.e., $aOR \geq 2$) were inability to respond due to the rules of engagement ($aOR = 2.24$), inability to help injured civilians ($aOR = 2.00$), and perceived responsibility for the death of a Canadian or ally ($aOR = 3.78$).

Discussion

Summary of Findings

The present study sought to explore the relative associations of individual combat experiences with PTSD among CAF members deployed in support of the mission in Afghanistan between 2009 and 2012. Each combat experience was, on its own, associated with increased odds of PTSD. The experience most strongly associated with PTSD was the perceived responsibility for the death of a Canadian or an ally ($aOR = 3.78$). The inability to help injured civilians or to respond due to rules of engagement were also strongly associated with PTSD. Conversely, three combat experiences (i.e., shooting, calling in fire, and clearing buildings) were associated with lower odds of reporting post-deployment PTSD.

Comparison with Previous Findings

The perceived culpability for the death of a Canadian or ally military member had the strongest association with PTSD; participants who reported this experience were more than three times as likely to screen positive for PTSD as those who did not. The inability to respond due

to the rules of engagement and to help injured civilians were also relatively strongly (i.e., aOR \geq 2) associated with PTSD. In previous research, both the necessity to exercise restraint due to the rules of engagement (Bouchard et al., 2010; Orsillo, Roemer, Litz, Ehlich, & Friedman, 1998) and the killing of a non-enemy (Maguen et al., 2012) have been shown to be related to post-deployment mental health difficulties. These experiences all relate to a central theme of failing to do the “right” thing or be a “good” person, which is congruent with the notion of “moral injury,” that is, the commission or failure to prevent or remedy acts that contradict one’s moral beliefs (Litz et al., 2009). Such experiences may alter a member’s self-perception as a moral and ethical person, and the resulting distress appears to have a strong effect on mental health, which is in line with recent findings (Nash et al., 2013; Stein et al., 2012). Alternatively, this association may simply be a manifestation of cognitive distortions of an existing mental disorder. That is, the perceived responsibility may be the result of the disorder, not the cause of it, such that members with PTSD may be more likely to feel personally responsible for another’s death. These experiences are also very subjective in nature, so the perception of one’s “responsibility” for a death likely varied between participants.

In an earlier, similar study of combat experiences and their association with post-deployment psychological distress among CAF members recently returned from deployment to Afghanistan (Bouchard et al., 2010), the perceived responsibility for the death of an ally also emerged as a strong correlate of mental health problems. Nearly half of the participants in this study who reported this experience were classified as strongly possible cases of anxiety or depression. Just 3.1% of participants in this study reported this experience, which is similar to the 2.6% reporting rate in the current study. These findings suggest that infrequently occurring combat experiences

may be most strongly associated with post-deployment mental health difficulties, perhaps because members are not trained to expect these encounters, and lack of preparedness has been shown to be associated with mental health conditions (Vogt, Proctor, King, King, & Vasterling, 2008). Indeed, numerous experiences reported relatively frequently by participants (e.g., encountering hostile civilians, being attacked or ambushed, coming under small arms fire) were not independently associated with PTSD, perhaps because members expected, and had thus prepared for them. It is possible, however, that causing the death of an ally may be more common, but only a minority of those who experience it perceive personal responsibility.

Several other experiences (i.e., shooting, calling in fire, clearing buildings), generally considered “traditional” combat events and thus likely to be expected and well trained for, were actually associated with a reduced likelihood of developing PTSD. It is possible that these associations emerged due to a suppressor effect caused by the correlations between the combat-related predictor variables. However, the inter-item correlations (not shown) did not exceed .63, indicating that multicollinearity was likely not a problem. It is also possible, therefore, that participants who reported these experiences were actually significantly less likely to have PTSD. In addition to being common, anticipated occurrences, it is likely that the active role played in such experiences, and its relation to positive psychological variables, such as internal locus of control and active coping styles, contributed to these negative associations (Gallaway et al., 2014). Past research with CAF personnel has shown that mastery, which involves the perception of control, is an important facet of psychological resilience and significantly correlated with better self-rated health (Lee, Sudom, & Zamorski, 2013). The absence of control in the inability to respond due to the rules of engagement or to help injured civilians, meanwhile, may increase

the impact of these experiences, in accordance with the learned helplessness model (Seligman, 1975) and might explain their greater associations with PTSD.

Limitations

The present study used self-reported data, which may have led to biases or inaccuracies in recall. Although the PTSD measure inquires about symptoms experienced over a relatively recent time period, participants may have more difficulty recalling combat experiences because EPDS occurs several months after the end of deployment. As well, perceptions of combat experiences in terms of stressfulness or emotional impact are subjective, and may vary from one participant to the next, and thus the same combat experiences may have different degrees of psychological impact. Conceptually, some of the experiences were more “objective” (e.g., seeing a dead body) and others were more subjective (e.g., feeling responsible for the death of a non-combatant).

Although participants were assured that their responses would remain confidential, there may have been reluctance to answer certain items accurately due to fear of potential personal or career repercussions. This may especially be the case for mental health conditions and some of the perceived responsibility items, where members may feel that their mental health problems or their role in certain events on deployment may affect their future in the CAF. Furthermore, because the study was cross-sectional, causality cannot be inferred, and it thus cannot be determined with certainty that combat exposure led to mental health problems. It is possible that some individuals had pre-existing undiagnosed mental health conditions, or that they were more vulnerable to the psychological effects of the current deployment because of past deployment experience, other trauma, or other factors not studied. Alternatively, participants suffering from PTSD may have perceived more combat stressors in their recent deployment, particularly those

that involved perceptions of personal responsibility for negative events, such as the death of an ally.

Finally, it must be noted that exposure itself is not necessarily sufficient to lead to the development of PTSD. Many other factors may be at play, including appraisals of the events, coping styles, personality, and social support (Watkins, 2014). In particular, the dichotomous response format of the combat exposure scale does not allow for consideration of how frequently the event was experienced, or how much emotional impact it had. Further research would be needed to determine the extent to which aspects of combat exposure such as frequency and appraisals of events are also associated with the development of PTSD.

Implications

Although the experiences with the strongest associations with PTSD tended to be those that were infrequently reported (e.g., feeling responsible for the death of an ally), a few commonly reported experiences (e.g., receiving indirect fire, IED explosion nearby, seeing dead bodies) were also significantly associated with PTSD. Because of their relatively frequent occurrence, combined with their positive relationships with post-deployment PTSD, it is important to consider these exposures, because they may have occurred among more incidences of PTSD than experiences encountered by only a small proportion of CAF members. The more frequently reported experiences of the Dangerous Environment and Exposure to the Dead and Injured categories, for example, tended to have weaker associations with PTSD, but have been shown to be associated with a greater overall burden of illness in post-deployment PTSD in this sample than the more strongly predictive, but much less common experiences from the Perceived Responsibility factor (Born & Zamorski, 2015). Indeed, a study of CAF members surveyed post-

deployment to Afghanistan suggested that the experiences with greater commonality and greater associations with PTSD, such as receiving artillery fire, seeing human remains, and knowing someone injured or killed, should be the focus of stress management training, to produce the greatest reduction in overall PTSD symptomatology (Bouchard et al., 2010).

Some experiences, such as seeing dead bodies, being unable to help the injured, and being unable to act due to the rules of engagement were also significantly associated with a greater risk of post-deployment PTSD. These exposures have also been shown to be stressful in non-combat deployments (Castro et al., 2000; Fontana et al., 2000; Orsillo et al., 1998). Accordingly, such exposures should be taken into account in assessing post-deployment mental health in future missions other than those related to combat, such as disaster relief and peacekeeping operations.

Because of the subjective nature of many of the experiences associated with PTSD (e.g., feeling responsible for the death of an ally), these findings point to the potential value of pre-trauma or post-trauma interventions that specifically target these post-trauma interpretations. Group psychological debriefing, for example, provides an opportunity to come to a clearer sense of what actually transpired during and after a traumatic event, and has been shown to be effective among US military personnel returning from deployment (Adler, Bliese, McGurk, Hoge, & Castro, 2009). Clinical interventions specifically targeting moral injury have been proposed and are being evaluated in the US military (Litz et al., 2009). Pre-trauma approaches include resilience training that provides cognitive restructuring skills (Cornum, Matthews, & Seligman, 2011), and there is at least observational evidence that pre-deployment training that emphasizes the reality of combat is associated with better mental health outcomes (Mental Health Advisory

Team V, 2008). Such pre-deployment training might extend to target the experiences identified in the present study as associated with PTSD.

Conclusion

Half of the experiences on the 30-item combat exposure scale were associated with post-deployment PTSD. The experiences positively associated with PTSD pertained to all categories of combat exposure, but it appeared that the items most strongly associated were those that were uncommonly experienced, those that might not be expected to be encountered on deployment, and those that involved some measure of post-trauma interpretation or violation of one's self-perception as a moral person. Although these experiences are open to subjective appraisal, these post-trauma interpretations are a potential target for pre-trauma and post-trauma interventions with military personnel and other high risk employers.

References

- Adler, A.B., Bliese, P.D., McGurk, D., Hoge, C.W., & Castro, C.A. (2009). Battlemind debriefing and Battlemind training as early interventions with soldiers returning from Iraq: Randomization by platoon. *Journal of Consulting and Clinical Psychology, 77*(5), 928-940. doi: 10.1037/a0016877
- Born, J. & Zamorski, M.A. (2015). Contribution of potentially traumatic deployment experiences to the burden of post-deployment mental health problems in Canadian Armed Forces personnel: Exploration of Population Attributable Fractions. Manuscript in preparation.
- Bouchard, S., Baus, O., Bernier, F., & McCreary, D.R. (2010). Selection of key stressors to develop virtual environments for practicing stress management skills with military personnel prior to deployment. *Cyberpsychology, Behavior, & Social Networking, 13*(1), 83-94. doi: 10.1089=cyber.2009.0336
- Boulos, D. & Zamorski, M.A. (2013). Deployment-related mental disorders among Canadian Forces personnel deployed in support of the mission in Afghanistan, 2001-2008. *Canadian Medical Association Journal, 185*(11), E545-E552. doi: 10.1503/cmaj.122120
- Castro, C.A., Bienvenu, R.V., Huffman, A.H., & Adler, A.B. (2000). *Soldier Dimensions and Operational Readiness in U.S. Army Forces Deployed to Kosovo*. Heidelberg: Walter Reed Army Institute of Research.
- Cornum, R., Matthews, M.D., & Seligman, M.E.P. (2011). Comprehensive Soldier Fitness: Building resilience in a challenging occupational context. *American Psychologist, 66*, 4-9. doi: 10.1037/a0021420

Fang, M. (2010). *Attrition and demographic analyses of CF personnel involved in Task Force Afghanistan*. Director General Military Personnel Research and Analysis Briefing Note. Ottawa: Department of National Defence.

Forbes, D., Creamer, M., & Biddle, D. (2001). The validity of the PTSD checklist as a measure of symptomatic change in combat-related PTSD. *Behaviour Research and Therapy*, 39(8): 977-986. doi:10.1016/S0005-7967(00)00084-X

Gallaway, M.S., Mitchell, M., Fink, D.S., Forsys-Donahue, K., Pecko, J., Bell, M.R., & Millikan, A.M. (2014). Combat exposure factors associated with the likelihood of behavioral and psychiatric issues. *Military Behavioral Health*, 2, 138-146. doi: 10.1080/21635781.2014.897205

Hoge, C.W., Auchterlonie, J.L., & Milliken, C.S. (2006). Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. *Journal of the American Medical Association*, 295(9), 1023-1032. doi: 10.1001/jama.295.9.1023.

Hoge, C.W., Castro, C.A., Messer, S.C., McGurk, D., Cotting, D.I., & Koffman, R.L. (2004). Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *New England Journal of Medicine*, 351(1), 13-22. doi: 10.1056/NEJMoa040603

Iversen, A.C., Fear, N.T., Ehlers, A., Hacker Hughes, J., Hull, L., Earnshaw, M.,...Hotopf, M. (2008). Risk factors for post-traumatic stress disorder among UK Armed Forces personnel. *Psychological Medicine*, 38(4), 511-522. doi: 10.1017/S0033291708002778

Killgore, W.D.S., Cotting, D.I., Thomas, J.L., Cox, A.L., McGurk, D., Vo, A.H.,...Hoge, C.W. (2008). Post-combat invincibility: Violent combat experiences are associated with increased risk-

taking propensity following deployment. *Journal of Psychiatric Research*, 42, 1112-1121.

doi:10.1016/j.jpsychires.2008.01.001

Lee, J.E.C., Sudom, K.A., & Zamorski, M.A. (2013). Longitudinal analysis of psychological resilience and mental health in Canadian military personnel returning from overseas deployment.

Journal of Occupational Health Psychology, 18(3), 327-337. doi: 10.1037/a0033059

Litz, B.T., Stein, N., Delaney, E., Lebowitz, L., Nash, W.P., Silva, C., & Maguen, S. (2009).

Moral injury and moral repair in war veterans: A preliminary model and intervention strategy.

Clinical Psychology Review, 29, 695-706. doi:10.1016/j.cpr.2009.07.003

Maguen, S., Madden, E., Bosch, J., Galatzer-Levy, I., Knight, S.J., Litz, B.T.,...McCaslin, S.E.

(2012). Killing and latent classes of PTSD symptoms in Iraq and Afghanistan veterans. *Journal of Affective Disorders*, 145, 344-348. doi: 10.1016/j.jad.2012.08.021

Mental Health Advisory Team (MHAT) V. (2008). *Operation Iraqi Freedom 06-08: Iraq.*

Operation Enduring Freedom 8: Afghanistan. Office of the Surgeon General, United States Army Medical Command. Washington, DC: Department of Defense.

Nash, W.P., Marino Carper, T.L., Mills, M.A., Au, T., Goldsmith, A., & Litz, B.T. (2013).

Psychometric evaluation of the Moral Injury Events Scale. *Military Medicine*, 178(6), 646-652.

doi: 10.7205/MILMED-D-13-00017

Orsillo, S.M., Roemer, L., Litz, B.T., Ehlich, P., & Friedman, M.J. (1998). Psychiatric

symptomatology associated with contemporary peacekeeping: An examination of post-mission functioning among peacekeepers in Somalia. *Journal of Traumatic Stress*, 11(4), 611-625. doi:

10.1023/A:1024481030025

Rona, R.J., Fear, N.T., Hull, L., Greenberg, N., Earnshaw, M., Hotopf, M., & Wessely, S.

(2007). Mental health consequences of overstretch in the UK armed forces: First phase of a cohort study. *British Medical Journal*, *335*: 603. doi:10.1136/bmj.39274.585752.BE

Sareen, J., Cox, B.J., Afifi, T.O., Stein, M.B., Belik, S.-L., Meadows, G., & Asmundson, G.J.G.

(2007). Combat and peacekeeping operations in relation to prevalence of mental disorders and perceived need for mental health care. *Archives of General Psychiatry*, *64*(7), 843-852. doi: 10.1001/archpsyc.64.7.843

Seligman, M. (1975). *Learned Helplessness: On Depression, Development, and Death*. San Francisco, CA: W.H. Freeman & Co.

Smith, T.C., Ryan, M.A.K., Wingard, D.L., Slymen, D.J., Sallis, J.F., & Kritz-Silverstein, D.

(2008). New onset and persistent symptoms of post-traumatic stress disorder self-reported after deployment combat exposures: Prospective population based US military cohort study. *British Medical Journal*, *336*: 366. doi: 10.1136/bmj.39430.638241.AE

Stein, N.R., Mills, M.A., Arditte, K., Mendoza, C., Borah, A.M., Resick, P.A., & Litz, B.T.

(2012). A scheme for categorizing traumatic military events. *Behavior Modification*, *36*(6), 787-807. doi: 10.1177/0145445512446945

Sudom, K.A., Watkins, K., Born, J.A., & Zamorski, M.A. (2015). *Stressors experienced during*

deployment among Canadian Armed Forces members: Psychometric properties of combat exposure scales. Manuscript submitted for publication.

Vogt, D.S., Proctor, S.P., King, D.W., King, L.A., & Vasterling, J.J. (2008). Validation of scales from the Deployment Risk and Resilience Inventory in a sample of Operation Iraqi Freedom veterans. *Assessment, 15*(4), 391-403. doi: 10.1177/1073191108316030

Watkins, K. (2014). Deployment Stressors: A Review of the Literature and Implications for Members of the Canadian Armed Forces. *Res Militaris, An Online Social Science Journal, 4*(2).

Weathers, F.W., Litz, B.T., Herman, D.S., Huska, J.A., & Keane, T.M. (1993). The PTSD checklist (PCL): Reliability, validity, and diagnostic utility. Paper presented at the 9th annual conference of the ISTSS, San Antonio, USA.

Zamorski, M.A., Rusu, C., & Garber, B.G. (2014). Prevalence and correlates of mental health problems in Canadian Forces personnel who deployed in support of the mission in Afghanistan: Findings from postdeployment screenings, 2009-2012. *Canadian Journal of Psychiatry, 59*(6), 319-326.

Table 1 Logistic Regression Model with Covariates and Combat Exposure as Predictors of Post-Deployment PTSD

| Predictor | OR PTSD | 95% CI | aOR PTSD | 95% CI |
|-----------------------------------|---------|-----------|-------------|-----------|
| Sex | 1.24 | 0.92-1.68 | 1.95 | 1.37-2.76 |
| Age | 1.01 | 0.99-1.02 | 1.03 | 1.02-1.04 |
| Rank | 3.10 | 2.03-4.73 | 3.96 | 2.42-6.46 |
| Dangerous Environment | | | | |
| Rules of engagement | 3.93 | 3.24-4.76 | 2.24 | 1.70-2.95 |
| Unable to help ill/injured | 3.87 | 3.19-4.69 | 2.00 | 1.56-2.57 |
| Difficulty identifying combatants | 3.18 | 2.62-3.86 | 1.64 | 1.27-2.11 |
| IED explosion | 3.01 | 2.36-3.85 | 1.57 | 1.14-2.18 |
| Small arms fire | 2.40 | 1.97-2.92 | 1.24 | 0.91-1.68 |
| Saw accident with injury | 2.81 | 2.31-3.42 | 1.23 | 0.92-1.64 |
| Attacked | 2.27 | 1.86-2.76 | 1.04 | 0.77-1.41 |
| Clearing bunkers | 2.37 | 1.88-2.98 | 1.04 | 0.74-1.46 |
| IED clearing | 2.13 | 1.76-2.59 | 0.95 | 0.70-1.28 |
| Working in areas with IEDs | 2.13 | 1.76-2.59 | 0.76 | 0.56-1.05 |
| Hostile civilians | 2.18 | 1.75-2.71 | 0.70 | 0.49-1.00 |
| Clearing buildings | 1.66 | 1.36-2.01 | 0.62 | 0.45-0.86 |
| Exposure to the Dead and | | | | |

| | | | | |
|-------------------------------------|------|------------|-------------|-----------|
| Injured | | | | |
| Knew someone killed/injured | 3.32 | 2.72-4.04 | 1.45 | 1.10-1.90 |
| Seeing bodies | 3.42 | 2.76-4.24 | 1.42 | 1.04-1.94 |
| Seeing dead/injured Canadians | 3.16 | 2.60-3.85 | 1.30 | 0.98-1.71 |
| Unit member blown up | 3.60 | 2.92-4.43 | 1.25 | 0.91-1.72 |
| Buddy hit or shot nearby | 2.94 | 2.35-3.68 | 1.08 | 0.78-1.48 |
| Handling remains | 2.78 | 2.28-3.38 | 1.01 | 0.77-1.32 |
| Unit member casualty | 2.13 | 1.76-2.59 | 0.85 | 0.65-1.11 |
| Active Combat | | | | |
| Responsible: enemy death | 2.67 | 2.12-3.37 | 1.47 | 1.05-2.05 |
| | | | | |
| Indirect fire | 2.11 | 1.68-2.65 | 1.37 | 1.04-1.80 |
| Sniper fire | 2.30 | 1.75-3.03 | 0.89 | 0.62-1.26 |
| Calling in fire | 1.67 | 1.32-2.12 | 0.69 | 0.49-0.97 |
| Shooting | 1.72 | 1.42-2.09 | 0.51 | 0.37-0.70 |
| Perceived Responsibility | | | | |
| Responsible: Canadian/ally death | 7.67 | 5.77-10.20 | 3.78 | 2.66-5.38 |
| Responsible: non-combatant | 5.84 | 4.11-8.30 | 1.80 | 1.14-2.85 |

| | | | | |
|----------------------------|------|-----------|-------------|-----------|
| death | | | | |
| Hand-to-hand combat | 2.72 | 1.46-5.05 | 0.68 | 0.31-1.48 |
| Cross-loading items | | | | |
| Close call | 4.42 | 3.59-5.44 | 1.95 | 1.46-2.60 |
| Injury | 4.09 | 3.26-5.14 | 1.77 | 1.32-2.36 |
| Friendly fire | 1.76 | 1.31-2.36 | 0.83 | 0.58-1.17 |

Note. PTSD = posttraumatic stress disorder

OR = odds ratio

aOR = adjusted odds ratio

CI = confidence interval

IED = improvised explosive device. Values in bold are significant at the $p = .05$ level in the adjusted analyses. Sex was coded 0 = Male; 1 = Female. Rank was coded 0 = Officer; 1 = NCM.

Exposure to the individual items was coded 0 = "No;" 1 = "Yes"

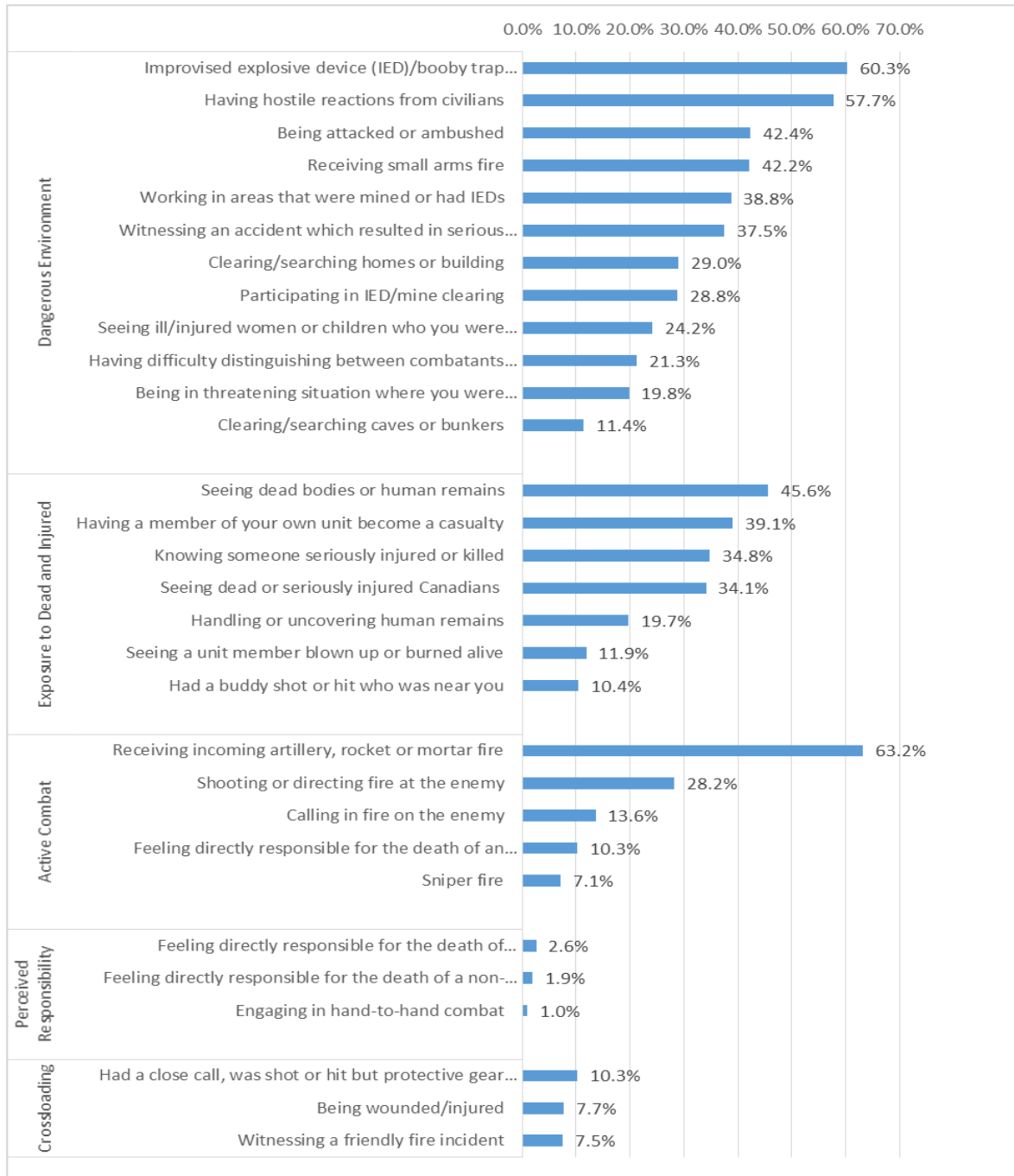


Figure 1: Percentage of Participants Who Reported Each Combat Experience, Grouped According to Factor Structure (Sudom et al., 2015).