Combat Experiences, Moral Injuries, Personal Values, and Mental Health Problems among German Soldiers

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Summary
Background: Soldiers in foreign deployments are exposed to diverse stressful experiences, resulting in an increase in mental health problems. Moral injuries and traditional personal values could play an important role in the pathogenesis of these mental health problems. **Patients and Method:** A Combat experiences Scale (MHAT), the Posttraumatic Stress Diagnostic Scale (PDS), the Patient Health Questionnaire (PHQ), the Moral Injuries Events Scale, and Schwartz's Portrait Values Questionnaire (PVQ) were completed by 191 soldiers of the German Armed Forces at the end of their mission in Afghanistan. Direct associations of traumatic combat experiences and traditional personal values with mental health outcome were examined by regression analysis. The mediating role of moral injuries between combat experiences and mental health problems was considered by mediation analysis. **Results:** The stressor 'Confrontation with hardship, suffering, and violence among the population' had a significant, direct impact on mental health problems. Moral injuries constituted a differential mediator between the stressor 'Confrontation with hardship, suffering, and violence among the population' and the mental syndromes 'posttraumatic stress disorder' and 'depression' on the one hand and alcohol abuse on the other hand. No significant associations were found between traditional personal values and mental health outcome as well as traditional personal values and moral injuries. **Conclusion:** Combat experiences with a moral dimension seem to be associated with mental illnesses in soldiers. This effect is mediated by the construct of moral injury. These results could contribute to further developments of preventive and therapeutic approaches.

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Zusammenfassung
Hintergrund: Soldaten sind in militärischen Auslandseinsätzen vielfältigen belastenden Erlebnissen ausgesetzt, die zu erhöhten Raten an psychischen Erkrankungen führen. Moralische Verletzungen und Wertorientierungen scheinen in der Pathogenese dieser Erkrankungen eine Rolle zu spielen. **Patienten und Methode:** 191 Bundeswehrsoldaten erhielten zum Ende eines Einsatzes in Afghanistan eine Skala zu Einsatzerfahrungen (MHAT), die Posttraumatic Stress Diagnostic Scale (PDS), den Patient Health Questionnaire (PHQ-D), die Moral Injury Events Scale sowie den Portrait Values Questionnaire (PVQ). In Regressionsanalysen wurden direkte Assoziationen von Einsatzstressoren und Wertorientierungen mit psychischen Syndromen untersucht. In einer Mediationsanalyse wurden moralische Verletzungen als Mediator zwischen Einsatzerleben und psychischen Erkrankungen betrachtet. **Ergebnisse:** Der einsatzbezogene Stressor «Konfrontation mit Not, Leid, Gewalt in der Bevölkerung» zeigte einen direkten signifikanten Einfluss auf psychische Erkrankungen. Moralische Verletzungen stellten eine differenziell vermittelnde Variable zwischen dem Stressor «Konfrontation mit Not, Leid, Gewalt in der Bevölkerung» und den psychischen Syndromen «posttraumatische Belastungsstörung» und «Depressivität» einerseits und Alkoholmissbrauch andererseits dar. Keine signifikanten Zusammenhänge ergaben sich zwischen traditionellen Werthaltungen und psychischen Erkrankungen sowie zwischen traditionellen Werthaltungen und moralischen Verletzungen. **Schlussfolgerung:** Einsatzerlebnisse mit moralischer Dimension scheinen eine besonders starke Rolle in Bezug auf psychische Erkrankungen bei Bundeswehrsoldaten zu spielen. Der Effekt wird über das Konstrukt moralischer Verletzungen vermittelt. Diese Ergebnisse können zur Weiterentwicklung präventiver und therapeutischer Maßnahmen beitragen.

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Background

Military combat operations are associated with potentially traumatising experiences and thus with considerable psychological stress [Hoge et al., 2004]. German soldiers who take part in deployments abroad are 2 to 4 times more likely to develop post-traumatic stress disorder (PTSD). At 2.9%, the prevalence of PTSD following deployment to Afghanistan [Wittchen et al., 2012] is lower than, for example, that among US-American or British forces in the same deployment area (7.1–9.6%, [Hines et al., 2014]). However, the cumulative total number of PTSD cases is likely to be in the thousands, considering the focus of the German armed forces has long ago shifted to operations abroad. Other post-traumatic disorders, such as anxiety or affective disorders (10.8 and 7.8%, respectively), are more prevalent than PTSD among deployed German soldiers. At 3.6%, the prevalence of alcohol addiction among soldiers who have previously been deployed to Afghanistan was significantly higher than in a control group with no deployment experience (2.2%) [Wittchen et al., 2013].

With this in mind, scientific findings on the aetiology of trauma-induced mental disorders in a military context are particularly important. Besides the frequency of deployment-related experiences, the type of stressor also seems to be a factor that influences the risk of developing mental health problems [Hoge et al., 2004]. Classic concepts of deployment-related mental disorders focus on events of extreme threat accompanied by responses of intense fear, helplessness and horror (International Statistical Classification of Diseases and Related Health Problems; ICD-10).

However, newer approaches, which are already represented in the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders) by the American Psychological Association, also highlight that mental health issues can be caused by events with a moral dimension, with emotions such as guilt and shame rather than fear-based symptoms being predominant [Litz et al., 2009]. In a study of 2,797 US soldiers who had previously been deployed as part of 'Operation Iraqi Freedom', Maguen et al. [2010] were able to identify 'killing in combat' as a significant independent predictor for various mental disorders, even after controlling for fear-based stressors such as 'being injured in combat' or 'witnessing the death of a comrade'. A study of Vietnam veterans was able to prove a correlation between experiences of violent abuse (torture of prisoners, abuse of civilians etc.) and an increased risk of suicidality, PTSD and depression [Currier et al., 2014].

Litz et al. [2009] have made a considerable contribution to the theoretical concept of these correlations and define moral injury among deployed soldiers as the result of acts that transgress deeply held personal or shared moral beliefs and expectations. Moral injury not only occurs in people who perpetrate such acts themselves but also in those who witness or fail to prevent them. A key element of the concept of moral injury is that the soldier is aware of the discrepancy between his or her combat experience and personal morals. Combat actions, witnessing the suffering of the local population or war crimes, or failing to prevent unethical behaviour can amount to moral violation and subsequently lead to cognitive dissonance and negative feelings. If this dissonance cannot be reconciled, resulting concomitant emotional responses such as feelings of guilt and shame may exacerbate the development and severity of post-traumatic stress symptoms.

Deployed soldiers are confronted with various moral and ethical problems. Situations that cause moral ambiguity can occur in every form of warfare but are particularly common in counterinsurgency and urban warfare. Suicide attackers and irregular fighters who live and operate among the civilian population create uncertainty among soldiers on how to respond. In a study with US soldiers who had been deployed in Iraq or Afghanistan, 30% reported having experienced morally ambiguous situations in which they were unsure how to respond appropriately [MHAT, 2008].

In a study by Hoge et al. [2004], 12% of US-American participants who had been deployed to Afghanistan reported being responsible for the death of an enemy combatant. Among Iraq veterans the figure was as high as 48%. Among German armed forces personnel deployed to Afghanistan in 2009, 18% reported aiming or shooting at enemy forces, 7% had given orders to shoot at enemy forces and about 4% were directly responsible for the death of an enemy combatant [Wittchen et al., 2012].

Events in which respondents took an active role as perpetrator were much less common than situations in which they witnessed the consequences of destruction and violence in theatre or the suffering of the civilian population, which often gave rise to feelings of helplessness. Among German soldiers, 70% had seen destroyed homes or villages during their deployment to Afghanistan, 32% saw injured women or children they were unable to help and 21% witnessed violence within the local population [Wittchen et al., 2012].

Personal values seem to play an essential role both in reconciling and evaluating morally ambiguous events as well as in the later development of mental health problems. A study by Zimmermann et al. [2014] revealed associations between personal values and mental health of deployed German soldiers. Military personnel who had particularly great empathy for the fates and hardships of others (embodied by traditional personal values such as benevolence and universalism) exhibited an increased risk of developing deployment-related mental health problems. Soldiers with traditional personal values may perceive combat experiences that have a dimension of moral injury, such as witnessing suffering or violence in the local population while being unable to help, death or injury of fellow soldiers or own combat action, as a severe violation of their personal morals because of the clearer perception of the catastrophic nature of such events. It is thus possible that personal values influence how combat experiences are processed and consequently whether certain experiences are perceived as moral injuries.

In psychotraumatology, particularly in the military context, the associations of these constructs have rarely been investigated as part of elaborated models. This study aims to gain first data on what type of combat experiences may increase the probability of soldiers developing mental health problems (PTSD, depression, alcohol abuse). Moreover, it will determine whether moral injuries

Table 1. Sample description (N = 191)

	Average	Standard Deviation
Mean age, years	29.01	6.62
Number of days on deployment	248.34	109.76
Proportion of male participants, %	92	
Mental disorders		
Rate of PTSD, %	12	
Severity of PTSD (Scale 0–3)	1.08	0.56
Rate of depression, %	17	
Severity of depression (Scale 0–27)	9.61	3.48
Rate of alcohol abuse, %	9	

PTSD = Post-Traumatic Stress Disorder.

have a mediating role between combat experiences and mental disorders and whether traditional personal values can serve to explain the probability of mental disorders.

This study was based on the following hypotheses:

1) The more frequent the stressful events that soldiers are confronted with during deployment, the greater the probability that these soldiers will meet the criteria of a mental disorder (PTSD, depression, alcohol abuse).
2) Moral injury serves as a mediator between combat stressors and mental disorder.
3) The more traditional the personal values of deployed soldiers are, the greater the probability that these soldiers will meet the criteria of a mental disorder (PTSD, depression, alcohol abuse).
4) The more traditional the personal values of deployed soldiers are, the more often moral injury is perceived.

Methods

Sample and Survey Procedure

This study involved 191 German soldiers who had been deployed to Afghanistan in 2013 as part of the German ISAF mission (ISAF = International Security Assistance Force). The soldiers were part of the infantry 'Northern Reaction Unit', often left camp as part of their assignment and thus had extensive contact with the local population, which meant they were also confronted with threats and combat situations. Descriptive data on the sample are shown in table 1.

Respondents received questionnaires while they were still in Afghanistan, but towards the end of their period of deployment. The 309 soldiers that made up the total strength of the task force were informed of the study by a military psychologist asking for volunteers. A total of 193 agreed to take part. Two of the volunteers provided incomplete information, which left 191 respondents to be examined. Questionnaires were handed out in a classroom setting and participants were provided with a fact sheet that contained information on the research project and the way the study would be conducted, stressed that participation was voluntary and anonymity ensured and described criteria for participation and exclusion. After 45 min, the completed questionnaires were handed back to the military psychologist in a neutral, sealed envelope. In order to be included in the sample, a period of deployment of at least 120 days was required. Exclusion criteria were acute psychosis, severe cognitive disorders or acute suicidal tendencies (not the case in any of the participants).

The present study was conducted in accordance with the principles outlined in the 'Declaration of Helsinki' and the participants signed informed consent. The approval of the ethics committee of the Charité Berlin (No. EA1/203/139) was obtained.

Psychometric Testings

The 40-item Portrait Values Questionnaire (PVQ; [Schwartz et al., 2001]) is used to measure 10 value types. Each item describes a virtual person in 2 sentences (portrait) related to desires, goals and expectations and is thus indicative of the importance of individual value types. On a scale (1 = 'not similar at all' to 6 = 'very similar'), respondents rate their similarity to the person portrayed in each item. An average is calculated from the responses to all portraits that correspond to a value type (2 to 4 items per category), with a higher score suggesting greater similarity and thus greater importance of the value type.

The 10 value types can be arranged in a circular structure in which adjacent values have some similarities while values at opposite sides of the model tend to be contrasting. Maercker et al. [2009] suggested differentiating between traditional and modern values. Our study focuses only on persons with traditional values. Traditional values are adjacent in the circular structure and are identified by the total scores of the value types of 'conformity' (restraint of actions likely to harm others), 'tradition' (appreciation of and commitment to cultural customs) and 'benevolence' (preserving and enhancing the welfare of those to whom one is close). Modern values are identified by the total scores of the adjoining value types of 'stimulation' (experiencing novelty, excitement and challenge in life), 'hedonism' (pleasure and sensuous gratification) and 'achievement' (personal success). In validation studies, the PVQ reached an internal consistency of α = 0.74–0.77. Test-retest reliability fell in the range of 0.66 to 0.88 [Schwartz et al., 2001; Maercker et al., 2009].

The German translation of the Posttraumatic Stress Diagnostic Scale (PDS; [Ehlers et al., 1996]) is a self-assessment procedure with which the diagnosis of PTSD according to the DSM-4 and ICD-10 can be determined as well as the severity of symptoms and the individual sub-scales of 'intrusion', 'avoidance' and 'hyperarousal'. For the purposes of this study, a diagnosis based on the criteria of the DSM-4 TR was made. In part 1 of the PDS, at least 1 experience that meets criterion A had to be reported and then associated with fear, helplessness or an injury in part 2. In part 3, respondents had to endorse at least 1 're-experiencing' symptom, 3 'avoidance' symptoms and 2 'arousal' symptoms at least once a week. Symptoms had to have persisted for at least 1 month and there had to have been an impairment of at least one area of functioning reported in part 4. An evaluation of the psychometric properties of the PDS's German translation confirmed it as a reliable measuring instrument. The internal consistency for the total scale measuring the overall severity of symptoms was α = 0.94; α = 0.90 for the 'intrusion' subscale; α = 0.89 for the 'avoidance' subscale; and α = 0.88 for the 'hyperarousal' subscale [Griesel et al., 2006].

The German version of the Patient Health Questionnaire (PHQ-D; [Löwe et al., 2002]) is a self-assessment instrument used to screen for the most common mental disorders. In this study, the complete version was used, which covers depressive and somatoform disorders, alcohol abuse as well as anxiety and eating disorders. Severity scales are available for depression, somatic symptoms and stress. Internal consistency for the depression module is α = 0.88 and α = 0.79 for the somatisation module [Gräfe et al., 2004].

The Moral Injury Events Scale [Nash et al., 2013] was available only in the English original so it was translated into German for this study by 2 native

Table 2. Results of the principal component analysis based on the list of combat experiences (MHAT) as well as the frequency of events during deployment

Item	Event during deployment	F1	F2	F3	F4	n (N = 191)	%
3	Receiving small arms fire	0.83				60	31.4
1	Being attacked or ambushed	0.79				59	30.9
29	Had a close call, dud landed near you	0.79				32	16.8
16	Shooting or directing fire at the enemy	0.78				41	21.5
11	IED/Booby trap exploded near you	0.67				59	30.9
24	Receiving incoming artillery, rocket or mortar fire	0.62				79	41.4
25	Being directly responsible for the death of an enemy combatant	0.58				9	4.7
20	Clearing/searching caves or bunkers		0.78			13	6.8
14	Disarming civilians		0.75			14	7.3
19	Clearing/searching homes or buildings		0.62			32	16.8
15	Being in threatening situations where you were unable to respond because of the ROE		0.58			22	11.5
28	Had a buddy shot or hit who was near you		0.53			32	16.8
10	Participating in demining operations		0.50			31	16.3
17	Calling in fire on the enemy		0.48			15	7.9
23	Seeing ill/wounded women and children who you were unable to help			0.68		81	42.4
12	Working in areas that were mined or had IEDs			0.64		52	27.2
7	Witnessing violence within the local population			0.61		95	49.7
2	Seeing destroyed homes and villages			0.60		130	68.1
13	Having hostile reactions from civilians			0.58		53	27.8
21	Witnessing brutality/mistreatment toward non-combatants			0.46		30	15.7
8	Seeing dead or seriously injured fellow soldiers				0.79	47	24.6
4	Seeing dead bodies or human remains				0.77	53	27.8
5	Handling of uncovering dead bodies				0.72	17	8.9
6	Witnessing an accident which results serious injury or death				0.45	54	28.3

The table shows the factor loading of the rotated component matrix; extraction method: principal component analysis; criterion for the number of factors: Kaiser-Guttmann criterion (eigenvalue of the factors > 1); rotation method: Varimax with Kaiser normalisation; treatment of missing values: listwise case deletion; cumulative proportion of variance: 56.2% (factor 1–4). Because of their insignificance, factor loadings < 0,400 are not included. The table shows all events experienced at least once, i.e. events experienced multiple times are not distinguished.
F = Factor; MHAT = Mental Health Advisory Team; IED = improvised explosive device.

speakers and then checked based on a re-translation into English (Online Supplementary Material; www.karger.com/?DOI=470848). The authors developed the Moral Injury Events Scale to measure stress caused by events that violate moral beliefs and values. This 9-item scale allows respondents to indicate on a scale ranging from 1 (strongly disagree) to 6 (strongly agree) how much each item applies to their most recent deployment abroad. The events describe perpetrating, failing to prevent or bearing witness to acts that contradict deeply held beliefs as causes of moral injury. The remaining items describe perceived betrayal by superiors, fellow soldiers or individuals outside the German armed forces. Using principal component analysis, we were able to identify 2 latent factors: 'moral injuries caused by own transgression' (items 3 to 6) and 'betrayal of moral standards by others' (items 1, 2, 7 to 9). In their study 'Psychometric Evaluation of the Moral Injury Events Scale', Nash et al. [2013] also found 2 latent factors: the factor 'perceived transgression by self and others', covering items 1 to 6, and the factor 'perceived betrayal', which included items 7 to 9. Internal consistency of the German translation was calculated to be $\alpha = 0.819$ for the factor 'moral injuries caused by own wrongdoing' and $\alpha = 0.775$ for the factor 'betrayal of moral standards by others'.

Deployment-related events were quantified based on a standardised list by the Mental Health Advisory Team of the US armed forces (MHAT list) [MHAT, 2008]. In 33 items, this list summarises potentially traumatogenic experiences which may occur during deployment abroad. The MHAT list has been used in military research to assess type and frequency of stressful events during deployment abroad and to examine their impact on deployment-related disorders [e.g. Hoge et al., 2004]. The German translation of the English origi-

nal has already been used in a cross-sectional study to assess the prevalence of post-traumatic stress disorder among German soldiers deployed abroad [Wittchen et al., 2012]. For each of the 33 items, respondents indicate whether the event occurred never, once, 2 to 4, or 5 to 9 times.

A factorial structure of event constellations was derived from the combat experiences reported by the soldiers. The latent factors or stressors at the root of the combat experiences were thus identified using principal component analysis. For this purpose, items 18 (Engaging in hand-to-hand combat), 27 (Being responsible for the death or serious injury of fellow soldiers) and 30 (Had a close call, equipment shot off your body) were excluded from the analysis as no respondent reported experiencing these events. A principal component analysis was performed with the remaining 30 items. The results and the frequency of the combat experiences are shown in table 2.

All factor loadings of >0.4 are shown. Items 33 (Informed unit members/friends of a service member's death) and 9 (Knowing someone seriously injured or killed) feature factor loading of <0.4. Principal component analysis revealed 8 factors with an eigenvalue of >1. The scree test showed that a 4-factor solution would be appropriate. After a varimax rotation, these 4 factors explained 56.2% of the variance and were easy to interpret in terms of content.

Factor 1 (18.7% of the explained variance) was interpreted as the stressor 'combat, hostilities', factor 2 (15.3% of the explained variance) as the stressor 'threatening environment on operation', factor 3 (12.3% of the explained variance) as the stressor 'confrontation with hardship, suffering and violence among the population' and factor 4 (9.9% of the explained variance) as the stressor 'witnessing serious injury, death'.

Table 3. Intercorrelation of the main influences

	Combat	Threatening environment	Suffering of the population	Injury and death	Traditional values	Own transgression	Betrayal by others
Combat	1						
Threatening environment	0.561***	1					
Suffering of the population	0.551***	0.581***	1				
Injury and death	0.377***	0.520***	0.395***	1			
Traditional values	0.059	0.025	0.064	0.251***	1		
Own transgression	0.076	0.158*	0.213**	0.094	0.138	1	
Betrayal by others	0.036	0.123	0.287***	0.155*	0.006	0.499***	1

$*p < 0.05$; $**p < 0.01$; $***p < 0.001$.

Table 4. Direct effects of the influencing factors on mental disorders (N = 191)

	PTSD (1 = yes)	Depression (1 = yes)	Alcohol abuse (1 = yes)
Combat	0.004 (0.028)	0.016 (0.042)	0.027 (0.020)
Traditional values	0.080 (0.044)	0.001 (0.056)	−0.003 (0.035)
Pseudo-R^2	0.093	0.005	0.057
Threatening environment	0.015 (0.037)	0.101 (0.061)	−0.004 (0.032)
Traditional values	0.082 (0.044)	0.006 (0.056)	−0.004 (0.035)
Pseudo-R^2	0.094	0.016	0.042
Suffering of the population	0.044* (0.020)	0.113*** (0.028)	0.041* (0.018)
Traditional values	0.082 (0.044)	0.003 (0.054)	−0.007 (0.035)
Pseudo-R^2	0.126	0.063	0.087
Injury and death	−0.003 (0.035)	0.015 (0.055)	−0.009 (0.034)
Traditional values	0.080 (0.044)	−0.002 (0.057)	−0.002 (0.036)
Pseudo-R^2	0.093	0.005	0.042

Because of the dichotomous dependent variables Average Marginal Effects (AMEs) are shown. Standard errors in parentheses. The AMEs indicate the average probability difference of the dependent category after changing the independent variable by one unit (in percentage points/100).
$*p < 0.05$; $**p < 0.01$; $***p < 0.001$.
PTSD = Post-Traumatic Stress Disorder.

Statistical Analysis

The 3 criterion variables (PTSD diagnosis in accordance with the PDS, depression diagnosis in accordance with the PHQ-D, alcohol abuse in accordance with the PHQ-D) were estimated by means of logical regression models. Key influencing factors (independent variables) were the stressors revealed by the principal component analysis: 1) combat, hostilities; 2) threatening environment during operation; 3) confrontation with hardship, suffering and violence among the population and 4) witnessing serious injury, death, as well as traditional personal beliefs. In the regression model, the stressors were considered individually as their intercorrelation was relatively high, with values of Pearson's r ranging from 0.377 to 0.581 (table 3). In the first step of the analysis, the combination of influencing factor and criterion variable yielded 12 different regression models (table 4). In all models, age, number of days of deployment and sex were also controlled for.

The stressor 'confrontation with hardship, suffering and violence among the population' showed significant correlations with all criterion variables (table 4), which is why mediation analysis was performed only for this stressor, using the latent factors of moral injuries 1) moral injuries caused by own transgression and 2) betrayal of moral standards by others as mediator-variables.

First, mediation path a) was checked with 'ordinary-least-squares' regressions: Is there any association between the stressor of 'confrontation with hardship, suffering and violence among the population' and the 2 latent dimensions of moral injuries? Mediation path b) was then tested: Is there any association between the latent dimensions of moral injuries and mental disorders? In mediation path, it was finally checked c) how the impact of the stressor 'confrontation with hardship, suffering and violence among the population' on mental disorders changed when the mediators 'moral injuries' were included in the regression model. In all models, traditional personal values, age, number of days of deployment and sex were also controlled for.

After the evaluation of the bivariate correlations between traditional personal values and moral injuries revealed no significant results (table 3), no additional calculation with linear regression controlling for age, sex and days of deployment was performed.

Results

Of the 4 stressors identified, only 'confrontation with hardship, suffering and violence among the population' had a significant, direct impact on the mental disorders of PTSD, depression and alcohol abuse. The stressors 'combat, hostilities', 'threatening environment during operation' and 'witnessing serious injury, death' did not have significant impact on mental disorders, nor did traditional values. Table 4 shows the average marginal effects of the main influencing factors on mental disorders. The probability of PTSD

Table 5. Effects of the stressor on the assumed mediators (N = 191)

Moral injuries	Betrayal by others	Transgression
Index: Suffering of the local population	*0.461*** (0.102)*	*0.190* (0.074)*
R^2	0.105	0.068

The β-coefficients of the 'ordinary-least-squares' regressions are reported. Standard errors in parentheses.
*p < 0.05; **p < 0.01; ***p < 0.001.

Table 6. Effects of assumed mediators on mental disorders (N = 191)

	PTSD (1 = yes)	Depression (1 = yes)	Alcohol abuse (1 = yes)
Index: Betrayal by others	*0.058*** (0.016)*	*0.095*** (0.021)*	0.012 (0.015)
Index: Transgression	0.002 (0.022)	0.046 (0.033)	*0.056** (0.020)*
Pseudo-R^2	0.222	0.148	0.159

Because of the dichotomous dependent variables, Average Marginal Effects (AMEs) are shown. Standard errors in parentheses.
The AMEs indicate the average probability difference of the dependent category after changing the independent variable by one unit (in percentage points/100).
*p < 0.05; **p < 0.01; ***p < 0.001.
PTSD = Post-Traumatic Stress Disorder.

Table 7. Direct effects of the stressor 'confrontation with hardship, suffering and violence among the population' on mental disorders including the mediators of 'moral injury' (N = 191)

	PTSD (1 = yes)	Depression (1 = yes)	Alcohol abuse (1 = yes)
Suffering of the population	0.018 (0.020)	*0.063* (0.029)*	0.027 (0.017)
Index: Betrayal by others	*0.054*** (0.016)*	*0.081*** (0.022)*	0.005 (0.016)
Index: Transgression	−0.0002 (0.023)	0.046 (0.032)	*0.057** (0.021)*
Pseudo-R^2	0.228	0.167	0.182

Because of the dichotomous dependent variables, Average Marginal Effects (AMEs) are shown. Standard errors in parentheses.
The AMEs indicate the average probability difference of the dependent category after changing the independent variable by one unit (in percentage points/100).
*p < 0.05; **p < 0.01; ***p < 0.001.
PTSD = Post-Traumatic Stress Disorder.

rose by 4.4% on average, if the stressor was increased by 1 index marker. The probability of depression even rose by 11.3%, that of alcohol abuse by 4.1%.

As explained in the section 'Statistical Analysis', 3 paths were checked for the mediation analysis: a) the effect of stressors on the latent dimensions of moral injuries (table 5), b) the effect of mediators on the criterion variables (table 6) and c) the change of the direct effects of stressors on the criterion variables while controlling for the mediators (table 7). The estimation of moral injuries by means of the stressor showed that there was a direct and significant correlation between them. If 'confrontation with hardship, suffering and violence among the population' rose by 1 index marker, the risk of 'moral injuries caused by own transgression' also increased by 0.19 index markers, while the risk of 'betrayal of moral standards by others' even rose by 0.46 index markers.

Table 6 shows the impact of the mediators: For PTSD and depression there was only a significant correlation with the mediator 'betrayal of moral standards by others'. The probability of PTSD increased by an average of 5.8% and the probability of depression by an average of 9.5% if 'betrayal of moral standards by others' increased by 1 index marker. For alcohol abuse, there was a significant association with 'moral injuries caused by own transgression'. On average, the probability of alcohol abuse increased by 5.6% if

the index 'moral injuries caused by own transgression' increased by 1 index marker.

Table 7 shows the relevant changes in stressor effects on mental disorders while the mediators remain constant. For PTSD and alcohol abuse, there was complete mediation by the relevant mediators. The significant effect of the stressor on the diagnoses vanished (compared with table 4) if the mediator was included, while the effect on depression decreased but remained significant. Moral injuries moderated only partially, but at least the average marginal effect of the stressor decreased by almost 50% if the mediator was included. However, the stressor still had a direct impact on the diagnosis.

In terms of the effect of personal values on criterion variables, no significant results could be obtained (table 4). Neither could a significant correlation between personal values and moral injuries be proven (table 3).

Discussion

To our knowledge, this study is the first of its kind on the association between the stressors of military deployment abroad, individual personal values and moral injuries with mental disorders in an elaborated model.

In the sample, the stressor 'confrontation with hardship, suffering and violence among the population' had a significant, direct predictive value for mental disorders in deployed soldiers. The relevant literature provides further evidence for the pathogenic impact of experiences connected with the suffering of the civilian population in theatre. Among US and British Iraq and Afghanistan veterans, confrontation with destruction, violence and suffering of the civilian population was thus associated with a higher rate of PTSD [Iversen et al., 2008; Vasterling et al., 2010] and greater risk-taking in alcohol consumption [Killgore et al., 2008].

In connection with these combat experiences, moral injuries seem to play an important role in the pathogenesis of deployment-related disorders. The results for depression and PTSD are thus partly in line with recent US studies which revealed moral injuries to have high explanatory value in terms of frequency of depression and PTSD in Iraq and Afghanistan veterans [Yang, 2016]. PTSD was also linked to combat action, while depression was linked to only indirectly war-related experiences, such as dealing with refugees, which resembled the factor 'confrontation with hardship, suffering and violence among the population' found in this study. One difference between this and Yang's [2016] study seems to be the emphasis on the importance of having contact with the civil population and, in comparison, the relatively limited effects of combat action on mental disorders in German soldiers on deployment. These differences may be explained by the relatively low intensity of combat actions in the German area of operations but also by cultural differences possibly tied to socialisation or military training experiences.

These connections can be reflected in clinical therapeutic work with traumatised military personnel. Soldiers returning from deployment regularly report having had the urge to help the local population in various emergencies but being prohibited to do so by their superiors. Among other things, this results in feelings of guilt and aggression against their superiors as well as themselves [Zimmermann et al., 2016].

A study by Bryan et al. [2016] found a similar differential mediating effect of moral injuries on various symptoms of mental disorders. There were strong correlations between 'perceived betrayal by others' (as a latent dimension of the Moral Injury Events Scale) and PTSD as well as an association between own transgressive actions and pessimism, hopelessness and anger. All in all, the mediating constructs between moral injuries and mental disorders remain unclear and require further study. The data obtained in this study, however, suggest that 'moral injuries caused by own transgression' and 'betrayal of moral standards by others' address different coping mechanisms. Moral injuries caused by own transgression may include a higher potential for suppression and thus encourage alcohol and drug abuse.

In this study, personal values had no significant effect on moral injuries or the mental health of deployed military personnel. This contradicts previous research findings in the German armed forces, which revealed personal values to be associated with mental disorders. Zimmermann et al. [2014] found a significant effect of the value types of 'hedonism', 'power', 'benevolence' and 'universalism'

on the frequency and severity of PTSD and the severity of depressive symptoms.

For civilian populations, Maercker et al. [2009] were able to prove a protective effect of modern personal values in terms of severity of symptoms of PTSD in German victims of violence, while traditional values encouraged an exacerbation of symptoms. Ferrajao and Oliveira [2015] studied the factors to which veterans of the Portuguese colonial war attributed their recovery from the PTSD symptoms they had developed as a result of wartime experiences. Those respondents who had experienced an improvement in symptoms were shown to be much more able to integrate experiences of moral violations into existing value-related schemes. As the data of our study were collected in theatre, it is possible that at the time, processes of reflecting on personal values were not yet complete due to conflicting needs. In contrast, the study by Zimmermann et al. [2014] was carried out 3–6 months after the end of deployment.

Limitations

The relevance of the study is limited by its cross-sectional design. Since no comparative data on mental disorders were collected prior to deployment, it cannot be ruled out that symptoms that existed prior to deployment influenced the examined correlations. Although soldiers undergo comprehensive medical examination before deployment, which means that apparent mental disorders would be identified and lead to the patient being ruled out from deployment, further studies with a longitudinal design are still required. Only questionnaires and no additional clinical interviews were used to make a diagnosis. This might explain the increased rates of mental disorders compared with other studies with German soldiers. Moreover, the PDS and the PHQ-D can only be considered a description of clinical syndromes and indicators of underlying health problems, although high correlations with relevant interviews were found for both methods. Because results on the prevalence of mental disorders are highly dependent on the choice of method and sample, they are not readily applicable to the entire population of deployed soldiers, particularly in other theatres. As participation in the study was voluntary, a selection bias cannot be ruled out. There are no specific data available for those soldiers who decided not to take part in the study.

Conclusions

This study suggests an association of the stressor 'confrontation with hardship, suffering and violence among the population' with moral injuries and deployment-related mental disorders in German soldiers.

Integrating training sessions into pre-deployment training and therapeutic settings in Bundeswehr hospitals might be a good way to raise awareness among soldiers for this dimension of perceiving and coping with deployment. Based on the results of this study, the correlations described have already been discussed in group settings with patients with deployment-related PTSD. Initial experiences have been positive, but evaluations are yet to be performed.

Steenkamp et al. [2011] introduced a similar 6-stage therapy programme specifically aimed at soldiers with moral injuries and deployment-related PTSD. This programme is designed to encourage soldiers to address combat experiences with a moral dimension and to restructure them cognitively. In imagined dialogues with moral authorities, affected soldiers learn to gain a new perspective on the consequences of combat experiences and to thus attribute new meaning to them.

Based on the evidence found in this study, moral sensitivity training for dealing with the local population might be advisable in the area of prevention. In the military context, moral decisions and moral behaviour have profound effects not just on the success of the mission and relations with the local population but also on the mental health of soldiers. Such training [e.g., Thompson and Jetly, 2014] could increase sensitivity in morally difficult situations. A 'Battlefield Ethics Training', conducted by Warner et al. [2011], caused a significant decrease of reports of unethical behaviour towards the civilian population and a significant increase in the willingness to report unethical behaviour of other soldiers.

Online Supplementary Material

Online Supplementary Material To access the supplementary material, please refer to *www.karger.com/?DOI=470848*.

Disclosure Statement

The authors hereby declare that there are no conflicts of interest regarding this article.

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