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The Posttraumatic Cognitions Inventory (PTCI) – Development and Validation of a Shortened Military Version Based on a Sample of German Soldiers with Deployment-Related Trauma

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Abstract

Background: Differentiated and economical diagnostic methods are in ever greater demand in the treatment of soldiers traumatised by war. In the context of cognitive-behavioural approaches, the Posttraumatic Cognitions Inventory (PTCI) serves to identify dysfunctional cognitions that play a key role in the development and persistence of trauma-related disorders such as posttraumatic stress disorder (PTSD).

Objectives: The aim of this study is develop and validate an efficient shortened version of the PTCI for soldiers traumatised on deployment in order to provide an improved and practical instrument for use in everyday clinical practice.

Methodology: A total of 352 Bundeswehr soldiers diagnosed with deployment-related mental health problems were examined using the PTCI, with the number of items covered by the original instrument being reduced from 33 to 12. The resulting military version of the PTCI (PTCI –Short Version / PTCI-SV) was then validated using a sample of 109 personnel with deployment-related PTSD.

Results: The overall scale of the PTCI-SV showed good internal consistency with α=0.86. (Subscales: "negative cognitions about the self" α=0.89; "negative cognitions about the world" α=0.86; "self-blame" α=0.61).

Discussion: The possibility of improving trauma therapy for soldiers with deployment-related mental health issues by further developing existing screening instruments is discussed.

Keywords

Posttraumatic Cognitions Inventory (PTCI); PTCI – Short Version (PTCI-SV); Posttraumatic stress disorder (PTSD); Deployment-related trauma; Bundeswehr

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Introduction

According to a current study, approximately 24% of German soldiers are confronted with at least one potentially traumatic experience while deployed on operations abroad [1]. At 45%, PTSD was the most common diagnosis in the field of military psychiatric care following deployment on ISAF operations in 2010 (ISAF: International Security Assistance Force) [2]. The proportion of undiagnosed and untreated cases of deployment-related mental health problems is as high as 80% (ibid.). This seems to be more due to subjective barriers, including expected stigmatisation, than objective criteria such as long waiting times or a shortage of treatment places (ibid.).

Overall, a trend towards an increase in stress reactions resulting from military operations is apparent [3]. This makes it important to identify symptoms associated with trauma in a military context in a differentiated, practical and economical way.

Using a wide range of cognitive-behavioural models, previous research in the field of trauma-related mental disorders has been able to highlight the central role of dysfunctional cognitions in the development and persistence of disorders such as PTSD [4-7]. Previous results suggest that in particular maladaptive cognitions about the self and the world have a significant impact on the development and course of a mental disorder after confrontation with potentially traumatic events [8-10].

The Posttraumatic Cognitions Inventory (PTCI), which was developed by Foa, Ehlers, Clark et al. [8] and has been tested several times on samples of civilian subjects, provides a methodological approach to identifying trauma-related, maladaptive cognitions [11,12]. With regard to the support and treatment provided to soldiers traumatised by war, the question arises as to whether, or to what extent, cognitions are influenced by the confrontation with war scenarios. No appropriate studies conducted in German speaking countries are available thus far. Soldiers deployed on wartime operations may be confronted with special types of trauma which cannot be directly compared with traumas in the civilian environment [13].

Confrontation with wounding, mutilation and death on the one hand and, on the other, the special role of comradeship and the hierarchical chain of command influence the specific development and intensity of possible post-traumatic disorders [14] and also seem to increase the barriers to adequate diagnosis and treatment. In addition, psychotherapy in the military context differs from psychotherapy in the civilian setting in important aspects regarding its structures. In the case of soldiers, for instance, the service context and the treatment system are not two separate spheres.

The PTCI has previously been considered in different studies and described as reliable and valid [10,11,15]. In the majority of studies, the three factors "negative cognitions about the world", "negative cognitions about the self" and "self-blame" postulated by the researchers who developed the PTCI were statistically confirmed [10,15]. These studies clearly revealed a factor imbalance in favour of "negative cognitions about the self", which was reflected in the higher degree of explained variance compared to the two other factors.

Due to the key role of trauma-related cognitions in the development and persistence of trauma-related disorders, an optimum ease of use and differentiation capacity of the questionnaire in the clinical setting are of particular importance. Precise knowledge of the existing patterns of cognition provides a starting point for planning therapeutic interventions in the treatment of trauma-related disorders and forms the main emphasis of cognitive-behavioural confrontation treatment as part of routine care at the Bundeswehr hospital. Where this is concerned, the PTCI is of particular importance since it permits identification of relevant maladaptive cognitions and, on the basis of stringent and differentiated treatment planning, facilitates timely treatment that is tailored to the individual.

While previous studies have dealt with victims of road accidents [11,12] Israeli patients with post-traumatic disorders [10] and victims of sexual violence [6] this study focuses on trauma in the context of military conflict, with a subsequent discussion of the results against the background of the specific trauma.

Hence, this study aims to develop a shortened military version of the PTCI to thus create a valid screening instrument for use in everyday clinical practice.

In a second step, the newly developed shortened questionnaire (PTCI–Short Version / PTCI-SV) was tested on a validation sample of 111 male soldiers. The aim is to provide a reliable instrument capable of identifying maladaptive cognitions in an economical way and thus facilitating treatment planning and therapeutic care.

Methodology

Study participants

In order to develop the shortened version of the PTCI, an initial data set consisting of 352 soldiers who underwent treatment at the Berlin Bundeswehr Hospital was considered. The shortened version of the questionnaire developed from this was subsequently validated using a second sample of 111 male soldiers traumatised on deployment.

The PTCI was used to examine all study participants on an inpatient basis for suspected deployment-related mental disorders. The data was collected at Berlin Bundeswehr Hospital over a period of 7 years. The soldiers examined presented to hospital after being referred by their unit surgeons, who at their respective bases have a similar role to that of a general practitioner.

The first sample data set (n=352) used to develop a shortened version of the PTCI consisted of 92.6% (n=326) male and 7.4% (n=26) female soldiers. Soldiers who had experienced an A1 Criterion event during deployment abroad involving armed conflict were included in the calculation. The Posttraumatic Stress Diagnostic Scale (PDS) was used to determine the existence of an "A Criterion". In 205 of the patients examined, deployment-related PTSD was identified as being the primary diagnosis by the specialist in psychiatry and psychotherapy during inpatient clinical diagnostic assessments. 147 soldiers received a different deployment-related primary diagnosis after specialist clinical assessment (37% [n=54]: adjustment disorder, 27% [n=40]: anxiety disorder, 24% [n=35]: depression, 12% [n=18]: other diagnoses).

The second data set, which was used to validate the shortened version (PTCI-SV), consisted exclusively of male soldiers.

All study participants in the second sample (N=111) were given the primary diagnosis of deployment-related PTSD. The diagnoses were made on the basis of inpatient assessment by the specialist in psychiatry and psychotherapy at Berlin Bundeswehr Hospital.

Measurement

The PTCI is an instrument for identifying dysfunctional cognitions in the context of potentially traumatic experiences. The original questionnaire consists of 33 items, which can be answered by means of a seven point self-rating Likert scale (1 = "totally disagree" to 7 = "totally agree"). The items can be assigned to three scales, with the "negative cognitions about the self" scale, which consists of a total of 21 items, being the longest scale followed by the "negative cognitions about the world" scale (seven items) and finally, the self-blame scale (five items). With $r_{(S)}$=0.57-0.75, the three scales demonstrate a medium to high degree of Intercorrelations. When first published [8] the individual scales showed an overall high degree of internal consistency ("negative cognitions about the self" [Cronbach's α=0.97]; "negative cognitions about the world" [α=0.88]; "self-blame" [α=0.86]; overall scale [α=0.97]).

For all three scales, the test-retest reliability coefficient was between 0.75 and 0.89 for a measurement interval of one week and between 0.80 and 0.86 after three weeks (ibid.). The German translation used was taken from Ehlers et al. [16].

The PDS [17] is a self-rating instrument for diagnosing PTSD as defined by the DSM-IV and ICD-10 criteria, a questionnaire making it possible to quantify the extent of the stress caused by posttraumatic symptoms. It is based on the DSM-IV diagnostic criteria, which are documented in a total of 49 items. Part 1 of the PDS corresponds to the A Criterion as defined by DSM-IV. The subject's state which of 12 potentially traumatic experiences their responses to the questionnaire will refer to. Part 2 of the PDS is closely based on the DSM-IV criteria and asks about symptoms regarding re-experiencing (Criterion B), avoidance (Criterion C) and arousal (Criterion D). Item 39 ascertains the duration of the symptoms and thus makes it possible to distinguish between acute and chronic PTSD. Item 40 is helpful for gleaning information about possible delayed onset PTSD. Responses to the items are provided using a four point Likert scale (0 = "not at all or only once last month" up to 4 = "five times a week / almost always"). The sum of item responses forms the total score, which can range from 0 to 51. Values between ≥ 0 and ≤ 10 indicate mild symptoms, ≥ 11 and ≤ 20 moderate symptoms, ≥ 21 and ≤ 35 moderate to severe symptoms and values greater than 36 very severe symptoms.

Information on the high degree of internal consistency (α=0.92 for the overall test, α=0.78 for the intrusion subscale and α=0.84 for the avoidance and hyperarousal subscales (ibid.)) can be found in the relevant literature. For the overall test, the test-retest reliability coefficient was 0.83 with 0.77 for the intrusion scale, 0.81 for the avoidance scale and 0.85 for the hyperarousal scale (ibid.). In the German translation [18] the total scale had an internal consistency coefficient of 0.94 the avoidance scale 0.90 the hyperarousal scale 0.89 and the intrusion scale 0.88 [19].

Statistical Analysis

Statistical analysis was performed using SPSS, Version 23.0.0.0 and AMOS for Windows Version 23. To this end, exploratory and confirmatory factor analyses were carried out. The Likert scales were treated as approximating interval data. Non-parametric tests were also used.

The exploratory sample consisted of 349 subjects. Three subjects responded to less than 85% of the questions. They were excluded from the calculation, thus resulting in n=352.

First, the PTCI items were evaluated using the exploratory sample (n=352) based on different parameters to allow initial item selection.

Based on the assumed correlation between the three factors, principal axis factoring with direct oblimin rotation was conducted three consecutive times as part of exploratory factor analysis. Fraction defectives of the items are not eliminated in conventional principal component analysis. This mostly leads to higher factor loadings. Measurement error variance was taken into account in the principal axis analysis, which resulted in a lower total variance explanation. However, this is closer to the "true variance" that Moosbrugger and Kelava [20]. The data was examined with regard to the response behaviour displayed in order to identify systematic response tendencies. Where less than 85% of the questions were answered, the subjects were excluded from further analysis. Missing individual values led to a list-specific exclusion.

As in the original study [8] items with a high loading (>0.50) on one factor and a small loading (<0.30) on all the other factors as well as sufficient commonalities (at least 0.50) were retained [21]. Items whose difficulty was too high or too low (<0.20 or >0.80) or which exhibited too low item-total correlation (<0.30) were excluded from further analysis [22].

After the selection of appropriate items, the shortened version of the questionnaire was examined with regard to reliability and validity by calculating the internal consistency (Cronbach's alpha) of the total scale and of each individual subscale.

The shortened version of the questionnaire (PTCI-SV) was validated using a second sample of 111 male soldiers traumatised on deployment.

After examination of the overall sample of 111 subjects for normality and multivariate outliers, one patient who did not fully complete the questionnaire was excluded from analysis. After calculating the Mahalanobis distance, a second subject was excluded from the sample (Mahalanobis d^2=35.14, p1=0.000). The final sample of 109 subjects showed a multivariate normal distribution with a critical ratio (c.r.) smaller than 5 (multivariate kurtosis =16.26, c.r. = 4.63).

The three-factor questionnaire structure was verified by subjecting this sample of 109 soldiers to an exploratory factor analysis with direct oblimin rotation. Subsequently, confirmatory factor analysis using structural equation modelling was performed to verify convergent and discriminant validity (recommendations by Moosbrugger und Schermelleh-Engel [23]). Reliability, factor validity, construct validity, item difficulty and item-total correlation were ascertained to validate the quality criteria. To determine model fit in accordance with Hu und Bentler [24] the cut-off values of the following criterion indices were defined as SRMR ≤ 0.08; RMSEA ≤ 0.06; Pclose ≥ 0.05 and CFI ≥ 0.90.

With regard to the reliability of the PTCI-SV, the internal consistency (Cronbach's alpha) of the total scale and the three subscales was as certained.

Results

Development of the shortened version of the PTCI

Three principal axis analyses with direct oblimin rotation were performed (Table 1). After the first principal axis analysis, 5 factors were extracted on the basis of the Kaiser-Guttman criterion, explaining a total of 54.90% of variance. Based on the primary and secondary loadings of the items and taking commonality into account, a total of 16 items were selected. A second principal axis analysis with direct oblimin rotation was performed on these 16 items which produced an explained variance of 56.81%. The eigenvalue analysis on the basis of the Kaiser-Guttmann criterion suggested a three-factor solution supported by the visual examination of the scree plot. A third principal axis analysis with direct oblimin rotation using the remaining 12 items confirmed the three-factor structure of the questionnaire, which was analogous to the original version [8]. The explained variance of the 12 items in the PTC-SV totalled 57%. In line with the factor loadings calculated, the number of items in the first scale of the questionnaire "negative cognitions about the self" was reduced from 21 to 8, in the second scale "negative cognitions about the world" from 7 to 2 and in the third scale "self-blame" from 5 to 2 (Table 2).

PTCI-SV validation

With a value of 0.82, the Kaiser-Meyer-Olkin measure demonstrated good sample suitability for exploratory factor analysis.

The twelve items in the PTCI-SV were examined by means of principal axis analysis with direct oblimin rotation. The three-factor structure was confirmed by visual examination of the scree plot. The explained variance of the first factor was 38.74%, of the second factor 9.96% and of the third factor 8.66%. The distributions of the factor loadings confirmed the original factor structure in the study conducted by Foa et al. [8].

The intra-factor item loadings document the good convergent validity of the PTCI-SV (Table 2).

With the exception of Item 4 ("I can't trust that I will do the right thing"), which had a secondary loading of 0.24, the secondary factor loadings (Table 2) were below 0.2. This demonstrates good discriminant validity. The component correlation matrix showed a moderate correlation between factors 1 and 2 with r=0.42, a weak correlation between factors 1 and 3 with r=0.19 and a very weak correlation between factors 2 and 3 with r=0.05.

A good to acceptable model fit for the PTCI-SV model developed was established using confirmatory factor analysis (Table 3).

Table 1: PTCI-SV Development Steps Based on Factor Loadings.

Exploratory sample (n=352)	Factor loadings $\lambda_{min}/\lambda_{max}$			TV (%)	h^2_i	P^2	r_{it}
items	I	II	III				
33 items (5 factors)	0.02/0.85	0.40/0.78	0.38/0.76	54.90	0.22/0.69	0.26-0.67	0.33-0.78
16 items (3 factors)	0.52/0.91	0.53/0.75	0.48/0.81	56.81	0.31-0.69.	0.31-0.65	0.41-0.75
12 items (3 factors)	0.55/0.92	0.79/0.79	0.66/0.75	62.10	0.51-0.69	0.31-0.57	0.39-0.77

Note: TV = total variance; h^2 = commonalities; P^2 = item difficulties; r_{it} = item total correlation

Table 2: Factor Loadings, Commonalities, Item Total Correlation and Item Difficulties in the Validation Sample (N=109) and the Exploratory Sample (n=352).

Items	**Factor Loadings λ**					
Validation sample (n=109)	I	II	III	h^2_i	P^2	r_{it}
1. I can't rely on myself	**0.65**	-0.16	0.15	0.55	42.20	0.53
2. I can't deal with even the slightest upset	**0.69**	0.15	-0.01	0.62	39.18	0.70
3. I am inadequate	**0.73**	-0.01	0.02	0.58	45.57	0.65
4. I can't trust that I will do the right thing	**0.62**	0.05	0.24	0.58	42.55	0.67
5. I am a weak person	**0.79**	-0.07	-0.02	0.66	48.94	0.65
6. My reactions since the event show that I am a lousy coper	**0.73**	-0.13	-0.03	0.63	57.17	0.57
7. I used to be a happy person but now I am always miserable	**0.76**	0.07	-0.14	0.66	59.04	0.67
8. I have permanently changed for the worse	**0.67**	0.19	-0.07	0.65	52.84	0.68
9. People can't be trusted	0.01	**0.79**	0.03	0.83	51.42	0.44
10. People are not what they seem	-0.06	**0.97**	0.00	0.87	55.50	0.46
11. There is something about me that made the event happen	-0.06	0.03	**0.93**	0.78	32.45	0.22
12. The event happened to me because of the sort of person I am	0.08	0.01	**0.42**	0.59	44.15	0.23
Eigenvalues	4.65	1.20	1.04	**6.89**		
Explained Variance (%)	38.74	9.96	8.66	**57.35**		
Exploratory sample (n=352)	I	II	III	h^2_i	P^2	r_{it}
1. I can't rely on myself	0.86	-0.07	-0.06	0.63	32.29	0.71
2. I can't deal with even the slightest upset	0.85	0.01	-0.07	0.68	25.88	0.75
3. I am inadequate	0.76	0.11	-0.12	0.61	31.75	0.71
4. I can't trust that I will do the right thing	0.74	0.07	0.06	0.66	32.88	0.76
5. I am a weak person	0.74	-0.07	0.08	0.54	34.69	0.68
6. My reactions since the event show that I am a lousy coper	0.67	0.06	0.05	0.53	36.08	0.69
7. I used to be a happy person but now I am always miserable	**0.65**	0.04	0.05	0.49	42.57	0.66
8. I have permanently changed for the worse	**0.58**	0.08	0.17	0.54	32.00	0.70
9. People can't be trusted	0.02	**0.80**	-0.01	0.66	42.53	0.53
10. People are not what they seem	0.03	**0.74**	0.03	0.60	50.44	0.53
11. There is something about me that made the event happen	-0.07	0.08	**0.79**	0.61	23.99	0.41
12. The event happened to me because of the sort of person I am	0.23	-0.04	**0.43**	0.32	35.82	0.43
Eigenvalues	5.57	0.68	0.61	**6.86**		
Explained Variance (%)	46.39	5.66	5.06	**57.11**		

*__Note:__ TV = total variance; h^2 = commonalities; P^2 = item difficulties; r_{it} = item total correlation

When tested using Cronbach's alpha, the total scale demonstrated an internal consistency of α=0.86, the "negative cognitions about the self" scale had α=0.89, the "negative cognitions about the world" scale had α= 0.86 and the "self-blame" scale α=0.61. The results of item total correlation are acceptable (Table 2). The different calculation steps are shown individually in Tables 1-5.

Discussion

A factor analytic approach was chosen as the basis for validating the shortened version of the PTCI [8] using a reduced item pool of 12 items. The three factors obtained correspond to the scales of the long version and permit meaningful interpretation.

The results suggest that the PTCI-SV, which demonstrated good internal consistency with α=0.86 for the total scale, is a sufficiently reliable and practicable instrument.

Compared to the original version, the explained variance of the individual scales in the PTCI-SV amounts to 57.35%. The explained variance of the "negative cognitions about the self" subscale is 38.74% compared to Foa et al. [8] with 48.5%. The explained variance of the "negative cognitions about the world" scale was 9.96%. Foa et al. [8] reported an explained variance of 4%. The explained variance of 8.66% of the "self-blame" scale was also higher than in the original study (3.4%).

The low to moderate degrees of Intercorrelations (0.09 to 0.40) in the shortened version demonstrate greater independence among the subscales compared to the long version.

The PTCI-SV is significantly shorter than the original version and can thus be used more economically in everyday clinical practice. With a completion time of less than 5 minutes for 12 items, its acceptance by future subjects may also improve, especially in a military context.

The time-efficient assessment of cognitive thought patterns of soldiers traumatised by war based on the PTCI-SV can thus contribute to a better understanding of diagnostic and therapeutic planning as part of the medical care provided to German soldiers.

Its use so far in the planning and evaluation of therapeutic interventions confirms the instrument's importance for clinical care [24-28].

Based on a look at the changes of the individual PTCI factors during cognitive-behavioural trauma therapy, indications can be given for an improvement in treatment offers provided to German soldiers in an in-patient setting. Especially soldiers with chronic and complex illnesses whose PTCI scores reveal a multitude of trauma-related, maladaptive cognitions would benefit from a further differentiation of trauma therapy methods [27]. The PTCI-SV could also be used as a meaningful instrument in further studies as part of the differential selection of appropriate trauma confrontation

Table 3: Goodness of Fit Indices for CFA Model Fit (n=109).

	$\chi 2$	*df*	*p*	*B-S p*	*$\chi 2$/ df*	CFI	RMSEA	SRMR	Pclose	TLI
Guidelines for good fit			≥ 0.05	≥ 0.05	0.00-2.00	>0.95	<0.06	<0.09	>0.05	≥ 0.95
acceptable fit					2.00-4.00	>0.90	0.05-0.10	<0.10		
Validation sample (N=111)	59.34	41	0.032	0.17	1.45	0.97	0.06	0.04	0.25	0.95

*__Note:__ $\chi 2$ = Chi² difference test; df = degrees of freedom; p = level of significance; B-S p= Bollen-Stine Bootstrap null hypothesis testing (5% significance level); $\chi 2$/ df = df to chi² ratio; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardised root mean square residual; Pclose = level of significance of RMSEA (<5%) for closeness of fit; TLI= Tucker Lewis Index; guidelines for good and acceptable model-fit [24-26].

Table 4: Confirmatory Factor Analysis Outcomes.

Validation sample (N=109)	**λ (β)**			***p***	**R^2 (h^2)**	**B**	**S.E.**
items	**I**	**II**	**III**				
F_1	0.62			< 0.001	0.48	0.88	0.13
F_2	0.76			< 0.001	0.57	1.09	0.20
F_3	0.75			< 0.001	0.60	1.03	0.15
F_4	0.72			< 0.001	0.68	1.00	n.a.
F_5	0.75			< 0.001	0.58	1.15	0.25
F_6	0.69			< 0.001	0.53	0.98	0.27
F_7	0.77			< 0.001	0.68	1.11	0.31
F_8	0.76			< 0.001	0.62	1.15	0.30
F_9		0.82		< 0.001	0.67	1.54	0.13
F_10		0.90		< 0.001	0.82	1.54	0.13
F_11			0.66	< 0.001	0.56	1.38	0.16
F_12			0.69	<0.001	0.48	1.38	0.16
$\bar{x}$ β	**0.73**	**0.86**	**0.68**				

*__Note:__ β = standardised regression weights; p = level of significance; R^2 = explained variance (commonalities); B = unstandardised regression weights;

Table 5: Factor and Correlation Matrix Validation and Reliability Criteria.

Validation sample (n=109)	**CR**	**AVE**	**MSV**	**MaxR(H)**	**Neg_Self**	**Neg_World**	**Self-blame**
Factors	**Validation and reliability criteria**				**Correlation matrix**		
Neg_Self	0.95	0.59	0.23	0.90	**0.77**		
Neg_World	0.87	0.73	0.23	0.94	0.48 (p<0.001)	**0.86**	
Self-blame	0.69	0.56	0.06	0.95	0.25 (p =0.12)	0.13 (p=0.33)	**0.72**

*__Note:__ CR = composite reliability; AVE = average variance extracted; MSV = maximum shared variance; MaxR (H) = maximal reliability (more robust than composite reliability); correlation matrix values on the diagonal = square root of the AVE

methods to treat different types of deployment-related trauma (e.g. fear as a result of having been under attack versus guilt as a result of killing adversaries).

Last but not least, the fact may be of importance in future that in addition to traumatic experiences associated with fear, soldiers in combat often encounter situations which involve their own moral wrongdoing (transgression) or moral wrongdoing by others (betrayal) which can be subsumed under the term "moral injury" [13,14].

A further differentiated analysis of the associated maladaptive cognitions and feelings of guilt and shame, war-related helplessness and powerlessness in relation to the self and the world is certainly indicated in the future. Larger samples should be used in such a study.

Limitations

The aim of designing a study of relevance to the practitioner in his/her everyday clinical work entails certain methodological limitations. Potentially confounding variables, such as comorbid disorders, were not excluded in the selection of the soldiers to be studied.

Also, no distinction was made between the individual deployment-related disorders in the development of the shortened version. Rather, all patients who stated that they had suffered traumatic experiences during deployment were included in the calculation and the different disorders combined in the shortened version. It was not until the subsequent validation of the PTCI-SV that only the data of soldiers with deployment-related PTSD was examined.

Further research should also address the issue of differentiation between potentially different patterns of cognition associated with different types of post-deployment disorder. Recent studies have shown that among other things, experiencing mental health problems before deployment abroad is an important predictor for developing trauma-related post-deployment disorders [1]. This constitutes a further limitation of this study, since it does not take into account the impact and severity of possible pre-existing illnesses.

The share of female soldiers in this sample, which totals 7%, is too small for the shortened version to be meaningfully used for female soldiers. The authors' view is that examining a female sample using the PTCI-SV will not yield reliable information because the shortened version was only validated on male soldiers. Hence, it is imperative that further research take account of gender-related characteristics in the military context when measuring maladaptive cognitions [29].

Conclusion

Despite the high prevalence of mental illness among soldiers with operational experience, only around 20% of those affected seek professional treatment [1]. It seems that there is still a significant barrier to accepting treatment for trauma suffered during deployment, and the special features of the Bundeswehr context mentioned in the introduction should not be overlooked either.

The PTCI-SV is a time-efficient and valid instrument which can in future be used in therapeutic care to improve understanding of the characteristics of maladaptive cognitions in this subgroup.

In addition, it is absolutely essential that deployment-related patterns of cognition in soldiers be considered in the further differential intervention planning of appropriate treatment measures. This could also help optimise the selection of an appropriate focus during confrontation therapy [30-31]. The study of specific patterns of cognition in soldiers suffering from deployment-related trauma could in future be expanded to include research regarding their own moral wrongdoing (transgression) and moral wrongdoing by others (betrayal) in combat situations in order to provide soldiers with better and more differentiated treatment in this context too.

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