

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Evidence of complex posttraumatic stress disorder (CPTSD) across populations with prolonged trauma of varying interpersonal intensity and ages of exposure

Sabina Palic^{a,b,*}, Gadi Zerach^c, Mark Shevlin^d, Zevia Zeligman^e, Ask Elklit^a, Zahava Solomon^f

^a National Centre of Psychotraumatology, University of Southern Denmark, Odense, Denmark

^b Competence Center for Transcultural Psychiatry, Psychiatric Center Ballerup, The Mental Health Services of the Capital Region of Denmark, Copenhagen, Denmark

^c Department of Behavioral Sciences, Ariel University, Ariel, Israel

^d University of Ulster, Derry, Northern Ireland, UK

^e Sorosky Medical Center, Tel Aviv, Israel

^f Center of Excellence for Mass Trauma Research, Tel Aviv University, Israel

ARTICLE INFO

Keywords:

Complex PTSD
PTSD
ICD-11
Prolonged trauma
Refugees
Veterans
Childhood sexual abuse
POWs
Mental health professionals
Anxiety
Dissociative PTSD-subtype

ABSTRACT

The ICD-11 proposes different types of prolonged trauma as risk factors for complex PTSD (CPTSD). However, CPTSD's construct validity has only been examined in childhood abuse, and single trauma exposure samples. Thus, the extent to which CPTSD applies to other repeatedly traumatized populations is unknown. This study examined ICD-11's PTSD and CPTSD across populations with prolonged trauma of varying interpersonal intensity and ages of exposure, including: 1) childhood sexual abuse, 2) adulthood trauma of severe interpersonal intensity (refugees and ex-prisoners of war), and 3) adulthood trauma of mild interpersonal intensity (military veterans, and mental health workers). In support of the proposal, latent class analysis ($N = 820$) identified, a 4-class solution representing "PTSD", "CPTSD", and "non-pathological" classes, but also an "Anxiety symptoms" class, and an alternative 5-class solution, with a "Dissociative PTSD-subtype" class. ICD-11's CPTSD was not exclusively associated with childhood abuse, but also with exposure to adulthood trauma of severe interpersonal intensity. Furthermore, all types of prolonged trauma were equally associated with the "Anxiety symptoms" class. Finally, of all the classes, the "CPTSD" class was associated with the highest frequency of work-related functional impairment, indicating an association between the severity of prolonged trauma exposure and the level of posttraumatic residues.

1. Introduction

In the past 20 years there have been attempts to formulate separate diagnoses for individuals exposed to single traumatic events and those exposed to prolonged traumatization (e.g. Davidson et al., 1996; Pelcovitz et al., 1997; WHO, 1994). The principal reason being that prolonged trauma seems antecedent to more severe and complex traumatic reactions than those related to single events and is likely associated with differential treatment needs (Cloitre et al., 2011).

Currently, the best studied syndrome of complex traumatization is the Disorders of Extreme Stress Not Otherwise Specified (DESNOS) which was conceptualized in the 1990's Posttraumatic Stress Disorder (PTSD) field trials for the Diagnostic and Statistical Manual of Mental Disorders fourth edition (DSM-IV; Davidson et al., 1996). DESNOS was originally theorized to be related to different types of prolonged

interpersonal trauma (Davidson et al., 1996; Herman, 1992), which is characterized by perpetrators inflicting suffering as well as physical and psychological control over co-human beings over extended periods of time, such as childhood abuse, torture, and political imprisonment. However, as the PTSD field trial sample eventually only comprised victims of childhood abuse, and single traumatic events (Kilpatrick et al., 1998), over the past 20 years the study of complex traumatization has become strongly associated with the trauma of childhood abuse. Thus, studies of complex traumatization in other populations who were exposed to prolonged trauma in adulthood such as torture victims, prisoners of war, military, and refugee trauma, are largely neglected. Importantly, age of exposure to prolonged trauma could possibly differentially effect the development of complex traumatization. Prolonged childhood trauma involves in many respects a shaping of personality, identity, and other self-regulation capacities during for-

* Corresponding author at: Competence Center for Transcultural Psychiatry, Psychiatric Center Ballerup, The Mental Health Services of the Capital Region of Denmark, Copenhagen, Denmark.

<http://dx.doi.org/10.1016/j.psychres.2016.10.062>

Received 13 November 2015; Received in revised form 24 October 2016; Accepted 25 October 2016

Available online xxxx

0165-1781/© 2016 Elsevier Ireland Ltd. All rights reserved.

mative developmental periods (Cloitre et al., 2009; van der Kolk et al., 2005). In contrast, prolonged trauma in adulthood impacts on individuals with presumably normative development and already constituted self-regulation capacities. Hence the effects and mechanism of complex traumatization in adulthood may entail alteration or deterioration in previous self-regulatory capacities. Prolonged trauma in childhood vs. adulthood may therefore be related to different psychiatric sequelae, with different levels of severity.

Recently, revisions of trauma and stress-related diagnoses for the International Classification of Diseases, 11th version (ICD-11) have been proposed, including two hierarchically related diagnoses for PTSD and complex PTSD (CPTSD) (Cloitre et al., 2013; Maercker et al., 2013). Herein, PTSD is envisaged as an anxiety disorder, which encompasses 6 symptoms across the following 3 clusters: 1) re-experiencing, 2) avoidance, and 3) sense of threat, while CPTSD comprises 6 symptoms of self-regulation problems grouped in the following clusters: 1) affect dysregulation, 2) negative self-concept and 3) interpersonal problems. Furthermore, according to the hierarchical structure, in order for CPTSD to be diagnosed, criteria for PTSD must first be met. The proposal additionally states that repeated exposure to traumatic stressors like childhood abuse, domestic violence, genocide or torture is a risk factor for the development of self-regulation problems characteristic of CPTSD (Cloitre et al., 2013).

Studies which have confirmed the proposed construct validity of PTSD and CPTSD in ICD-11 have been conducted in line with prior traditions of studying either only childhood abuse (Knefel and Lueger-Schuster, 2013) or childhood abuse and single trauma samples (e.g., Cloitre et al., 2013; Elkhit et al., 2014). There are some initial findings regarding the general concept of complex traumatization among populations who were exposed to adulthood trauma (e.g., Marinova and Maercker, 2015; McDonnell et al., 2013; Palic and Elkhit, 2014; Tay et al., 2015), but not specifically CPTSD according to ICD-11. Hence, it is still unknown to what extent the proposed PTSD and CPTSD apply to groups with prolonged trauma in adulthood.

Establishing construct validity of PTSD and CPTSD in relation to prolonged trauma in adulthood is especially important because the CPTSD is intended to replace the diagnosis of Enduring Personality Change after Catastrophic Experience (EPCACE; WHO, 1994) in ICD-11. The EPCACE is almost entirely un-researched, but it is clinically important, as it, in lack of better alternatives, is often used to describe severely traumatized populations such as refugees, torture survivors, and political prisoners (Beltran et al., 2008; Beltran and Silove, 1999; Grounds, 2004). Exclusion of the un-researched EPCACE and inclusion of CPTSD without evidence of its application to prolonged trauma in adulthood runs the risk of leaving these severely victimized groups without a diagnosis. Validation of an empirical association of CPTSD with prolonged adulthood trauma may on the other hand open up possibilities for identification of differential treatment needs for these generally neglected groups.

1.1. Aims and hypotheses

The present study investigates the construct validity of ICD-11's PTSD and CPTSD across a spectrum of prolonged trauma types, which have been hypothesized to be related to complex traumatization. The included samples are diverse with respect to 1) age of exposure to prolonged trauma, and 2) the level of interpersonal intensity of the prolonged trauma.

Thus, early exposure to interpersonal prolonged trauma is represented by samples of Danish and Israeli victims of childhood sexual abuse (CSA). Adulthood exposure to prolonged trauma of severe interpersonal intensity (imprisonment and torture) is represented by samples of treatment seeking Bosnian refugees in Denmark, and Israeli ex-prisoners of war (ex-POWs). Mild interpersonal intensity of prolonged trauma in adulthood is represented by Israeli mental health professionals (MHPs) exposed to continuous shelling, and by Israeli

combat veterans. Together, these samples represent a spectrum of prolonged trauma with different interpersonal intensity and age of exposure. Using Latent Class Analysis (LCA) - a statistical method that identifies homogenous subgroups (classes) within categorical multivariate data- the study explores whether PTSD and CPTSD are found as separate classes in the spectrum of prolonged trauma exposure. Finally, the study investigates the associations between the identified latent classes, trauma types, and work-related functional impairment in the spectrum of prolonged trauma exposure.

We hypothesized that the groups across the spectrum of prolonged trauma will endorse different symptom patterns. That is, the CSA survivors will have the highest rates of CPTSD, followed by the refugees and the ex-POWs. The MHPs and the veteran controls will have the lowest rates of both PTSD and CPTSD. According to the ICD-11 proposal CPTSD should be associated with significantly more work-related functional impairment than PTSD.

2. Methods

2.1. Participants

The *early exposure prolonged trauma group* is represented by sample 1, the Danish CSA sample ($N = 207$), and sample 2 Israeli Incest victims ($N = 52$). In both samples participants were consecutive clients from treatment centers for women sexually abused in childhood (Incest center Funen in Denmark, and the Tel-Aviv Sourasky Medical Center- 'Lotem' center). Data were collected over 1 year in Israel, and over 4 years in Denmark. CSA is defined as behavior of a sexual nature ranging from genital exposure to sexual intercourse directed toward the child by an older individual (who may him-/herself be a minor), caregivers and adults. CSA is considered incest when the perpetrator has a blood connection to the victim. The Danish CSA sample was a poly-traumatized childhood abuse sample - 65% had experienced incest, and besides the CSA, 35% had also experienced physical abuse, and 61% had experienced physical and psychological neglect.

Samples 3 and 4 were exposed in *adulthood to prolonged trauma with severe interpersonal intensity*. Sample 3 comprised a representative group of 177 veterans who served in the Israeli army land forces and were taken prisoner in the 1973 Yom Kippur War (ex-POWs group) (Solomon et al., 2013). All ex-POWs were subjected to solitary confinement and systematic harsh physical and psychological torture. Sample 4 comprised a convenience sample of 116 Bosnian refugees seeking treatment in Denmark during 2010–2011. This Bosnian population was to various degrees exposed to genocide and ethnic cleansing, imprisonment in detention camps, torture, systematic rape, and forced deportation during the 1992–1995 war in Bosnia-Herzegovina (Palic and Elkhit, 2014).

Samples 5 and 6 were exposed to *adulthood prolonged trauma with mild interpersonal intensity*. Sample 5 comprised 118 veterans who were matched to the ex-POWs from the Israel Defense Forces computerized database. These individuals also participated in the Yom Kippur War, but were not taken captive. They were matched to ex-POWs (sample 3) on military background and socio-demographic status see Dekel et al. (2012). Sample 6 comprised 150 Israeli mental health professionals (MHPs) working in communities exposed to high levels of rocket attacks from the Gaza Strip. Since 2001, these MHPs have been simultaneously exposed to the rocket attacks and vicarious trauma from their work with traumatized survivors. The intensity of attacks has fluctuated from light bombardment in periods of relative calm (e.g. one to two mortars or missiles in a fortnight) to weeks or months of heavy bombardment (e.g. several attacks a day for prolonged period) during military escalations (Finklestein et al., 2015).

The groups differed on socio-demographic variables of age, education and gender. ANOVA followed by Tukey's HSD post hoc for age revealed significant effect for group ($F(5, 818) = 186.1, p < 0.00$). The ex-POWs group ($M = 58.16, SD = 5.29$) and the veterans group (M

=57.60, $SD = 4.63$) were older than the refugees group ($M = 46.46$, $SD = 8.11$) and the MPH's group ($M = 41.19$, $SD = 10.58$). The above mentioned four groups were older than the Danish CSA group ($M = 36.32$, $SD = 10.28$) and the Israeli CSA group ($M = 37.75$, $SD = 10.72$). Regarding education significant effect for group was found ($F(5, 776) = 25.71$, $p < 0.00$). The MPH's group ($M = 16.34$, $SD = 3.41$) had the highest number of education years followed by the Israeli CSA group ($M = 14.92$, $SD = 3.45$). These groups differed from the ex-POWs group ($M = 13.83$, $SD = 4.44$), the veterans group ($M = 14.19$, $SD = 2.96$), and the Danish CSA group ($M = 13.51$, $SD = 3.66$). The refugees group ($M = 11.51$, $SD = 2.47$) had the fewest years of education compared with all the other groups.

Chi-square analysis indicated significant differences between the groups in relation to gender ($\chi^2(5) = 641.2$, $p < 0.00$). The ex-POWs and veterans controls groups were composed of only male participants while the Israeli CSA group was composed of only females. Among the Danish CSA group 185 (89.8%) were females and 21 (10.2%) were males. Among the refugees group 61 (52.6%) were females and 55 (47.4%) were males, and among the MPH's group 129 (85.4%) were females and 22 (14.6%) were males.

2.2. Measures

2.2.1. PTSD symptoms

The Post-traumatic Stress Disorder Inventory (PTSD-I; Solomon et al., 1993) was applied in the 4 Israeli samples (no. 2, 3, 5, & 6). In the Danish CSA and the Bosnian refugee samples, PTSD symptoms were assessed via the Harvard Trauma Questionnaire (HTQ) part IV (Mollica et al., 2004). Both measures tap the DSM-IV-TR (APA, 2000), and the DSM-III-R (APA, 1987) PTSD symptoms in an identical way. Participants rate how often they had suffered from each symptom on a scale ranging from 0 (not at all) to 4 (almost always). Positively endorsed symptoms are defined by answers '3' or '4'. For the present study, items from the inventories were matched to the symptoms of PTSD in ICD-11 (see Table 1). The PTSD inventory has proven psychometric properties (Solomon, 1993). In the present groups its internal consistency was: ex-POWs, $\alpha = 0.93$; veteran's controls, $\alpha = 0.92$; the MPH's, $\alpha = 0.76$; and the Israeli CSA, $\alpha = 0.76$. The Bosnian HTQ is the only validated measure of PTSD in Bosnian language (Oruc et al., 2008). The Danish HTQ has been used over the last 20 years in numerous studies (e.g., Christiansen et al., 2013). HTQ's internal consistency in the present refugee group was, $\alpha = 0.90$, and in the Danish CSA group, $\alpha = 0.82$.

2.2.2. CPTSD symptoms

CPTSD symptoms were measured on self-report versions of the Israeli, Danish, and Bosnian Structured Interview for Disorders of Extreme Stress (SIDES), which is currently the only existent measure for the assessment of complex PTSD/DESNOS (Pelcovitz, et al., 1997). The SIDES-Revised (SIDES-R; Zerach and Solomon, 2014) was used in the 4 Israeli samples, and the Structured Inventory of Disorders of Extreme Stress (SIDES-SR; van der Kolk, 2003) was applied in the refugee and the Danish CSA samples. SIDES-R and SIDES-SR assess a broad range of symptoms associated with complex traumatization (Pelcovitz et al., 1997). Despite slight differences in some items between them, the two measurements are almost identical. Identical items from the SIDES-R/SR, which assessed the selected symptoms of complex traumatization in ICD-11's CPTSD were chosen for this study (see Table 1). In the Israeli version participants were asked to note if they have undergone the mentioned experience the previous month (yes vs. no), while the Bosnian and Danish versions used a 0–3 scale format, where scores of ≥ 2 were considered symptom positive. The internal consistency of the full inventory in the present samples was: ex-POWs, $\alpha = 0.75$; veteran's control group, $\alpha = 0.77$; the MPH's, $\alpha = 0.83$; the Israeli CSA group, $\alpha = 0.86$; the refugees, $\alpha = 0.90$; and the Danish CSA, $\alpha = 0.84$.

Table 1
Items representing PTSD and CPTSD..

	Symptom cluster	Questionnaire item	
PTSD	Re-experiencing	HTQ no.3.	Recurrent nightmares
		/PTSD-I no. 2.	
	Avoidance	HTQ no.2.	Feeling as though the event is happening again
		/PTSD-I no. 3.	
		HTQ no.5.	Avoiding thoughts and feelings associated with the traumatic events
		/PTSD-I no.3.	
Sense of threat	HTQ no.11./	Avoiding activities that remind you of the traumatic event	
	PTSD-I no.6		
	HTQ no.9./	Feeling on guard	
CPTSD	Sense of threat	PTSD-I no. 15	
		HTQ no.6./	Jumpy or easily startled
		PTSD-I no. 16	
	Affect dysregulation	SIDES-SR no.1./SIDES-R no.1.	Really upset by small problems
		SIDES-SR no.4/ SIDES-R no.4.	Angry all the time
		SIDES-SR no.26/ SIDES-R no.20.	Feeling permanently "messed up", wounded, damaged, broken
		SIDES-SR no. 27/ SIDES-R no. 20	Chronically guilty
	Negative self-concept	SIDES-SR no.29/ SIDES-R no.23	Really different/ set apart from other people
		SIDES-SR no. 32/ SIDES-R no.28	Avoiding other people

2.2.3. Work-related functional impairment

It was measured for all groups by registering whether the participants worked full time, part time, or not at all, at the time of the assessment. All participants were within the range of working age, so those working only part time and those not working at all were considered functionally impaired. Those with full time work were considered un-impaired. Information about work-related functional impairment was not available for the Danish CSA sample.

2.2.4. Adverse Childhood Experiences (ACE)

These were assessed in the refugee sample with the use of five dichotomous (yes/no) questions derived from a previous ACE study (Dong et al., 2004). The questions covered emotional, physical, and sexual maltreatment as well as physical neglect and the witnessing of violence between parents before the age of 18 years. Presence of ACE was not assessed for any of the other adulthood prolonged trauma samples.

2.3. Procedures

Details about study procedures in each of the original samples can be found in the primary references (Dekel, et al., 2012; Elklit, 1999; Finklestein et al., 2015; Palic and Elklit, 2014; Solomon et al., 2013). Participants from the refugee group were recruited from 6 of 10 possible rehabilitation centers for traumatized refugees in Denmark. Danish rehabilitation centers for traumatized refugees are specialized clinics within the Danish mental health system. All Bosnian-speaking patients from the six clinics were considered to be potential participants. The sample was a convenience-sample. Patients who volunteered to participate filled out a battery of self-report measures, including the HTQ, and the SIDES-SR. In the Danish CSA group, women and men eligible for the study were all consecutive outpatients at a Danish public center for women sexually abused in childhood

(Incest center Funen). All participants were asked to fill out a number of questionnaires during their second treatment session. The assessments were handed out by the same psychologist, who was treating the client, and used to guide the treatment, and monitor treatment progress.

The Israeli CSA group participants were interviewed following their intake session in the center for treatment of sexual trauma (the 'Lotem' Center). The questionnaires were filled out in the presence of certified clinical psychologists and social workers. The names of ex-POWs and control veterans were passed on by Israeli Defence Forces authorities as part of the periodic examination of veterans after their military service. We contacted participants by telephone and, after explaining the purpose of our study, asked them to take part. Questionnaires were administered in participants' homes or in other locations of their choice. All MHPs working in communities exposed to high levels of rocket attacks from the Gaza Strip were invited to participate via a request sent to the local authority welfare managers. The majority of the MHPs were social workers. Questionnaires were administered during their working hours, mainly during group meetings. All participants in the 6 samples completed informed consent forms, and appropriate ethical approvals were given regarding each data collection.

2.4. Statistical analyses

A series of latent class analysis (LCA) models were estimated, testing the fit of 1 through to 6 classes. All LCAs were conducted with Mplus 7.00 software (Muthén and Muthén, 2012). Models were based on responses to the twelve binary PTSD and CPTSD items (Table 1) and estimated using robust maximum likelihood (Yuan and Bentler, 2000). To avoid solutions based on local maxima 500 random sets of starting values were used initially with 100 final stage optimizations. Model fit was compared using information theory based fit statistics; Akaike Information Criterion (AIC; Akaike, 1987), Bayesian Information Criterion (BIC; Schwartz, 1978) and sample size adjusted BIC (ssaBIC; Sclove, 1987). The model that produces the lowest values can be judged the best model. Also, non-significant Lo-Mendell-Rubin adjusted likelihood ratio test (LMRA-LRT) and the bootstrapped likelihood ratio test (BS LRT) indicate that the model with one less class should be accepted. However, simulation studies indicate that the BIC is generally the best information criterion for identifying the correct number of classes (Nylund et al., 2007). Differences in trauma type, and work-related functional impairment between members of the identified latent classes in the spectrum of prolonged trauma were analyzed with Chi-square tests.

3. Results

The frequencies and percentages of endorsement of PTSD and CPTSD items across the 6 samples are presented in Table 2. The traumatized refugees and the Israeli CSA victims in general had the highest levels of symptom endorsement, followed by the Danish CSA sample, and the ex-POWs. The two samples with low interpersonal intensity trauma had the lowest endorsement of symptoms. The fit statistics for the LCAs are presented in Table 3, with the corresponding plots shown in Figs. 1 and 2.

In the LCAs the best fit was indicated for a 4-class or a 5-class solution (see Table 3). The fit indices are going slightly up and down between the 3–5 class solutions. The BIC, which is in general the best indicator of the number of classes, is consistently dropping until the 4-class solution. On the other hand, all fit-indices except the BIC, are better for the 5-class solution than the 4-class solution. As both the 4 and the 5-class solutions were clinically meaningful, both are presented (see Fig. 1 and Fig. 2). The 4-class solution comprised one class with high probability of endorsement of both PTSD and CPTSD symptoms (named the "CPTSD class"), a second class with high probability of

endorsement of PTSD but low probability of CPTSD symptoms (named the "PTSD class"), a third class with high probability of PTSD's sense of threat/hyperarousal symptoms, and intermediate probability of guilt and interpersonal problems from CPTSD (named the "anxiety class"), and a 4th class with low endorsement of both PTSD and CPTSD symptoms (called "non-pathological").

When considering the alternative 5-class solution, the additional 5th class had the probability of endorsing PTSD symptoms and affect dysregulation symptoms comparable to that of the "PTSD class", but the negative self-concept and interpersonal problems symptoms probabilities were comparable to those of the "CPTSD class". This 5th class also had especially high probability of CPTSD item "different than others". The class was termed "dissociative PTSD-subtype".

3.1. Associations between class membership, trauma type and work-related functional impairment

The χ^2 analyses indicated that there were significant differences in the proportions of different prolonged trauma types across the 4 classes $\chi^2(15) = 478,038, p < 0.001$, class dependent partial eta squared = 0.46. The largest positive residuals were found for the Danish CSA group within the "PTSD class" - refugees, ex-POWs, and Israeli CSA in the "CPTSD class" - and veterans, and MHPs in the "non-pathological" class. Thus, these groups had much higher frequencies within the respective classes than what was expected. In the "anxiety symptoms" class, the occurrence of different prolonged trauma types was fairly evenly distributed. Finally, there were significant differences in the proportions of work-related functional impairment across the classes $\chi^2(3) = 137,511, p < 0.001$, class dependent partial eta squared = 0.29. The residuals indicated that the "PTSD class" was associated with somewhat higher frequency of functional impairment than expected. The "CPTSD class" was associated with the highest proportion of individuals with work-related functional impairment, while the "anxiety symptoms" class had equal proportions of those with and without work-related functional impairment. Those without functional impairment were most prevalent in the "non-pathological" class.

In the alternative 5-class model, significant differences in the proportions of different prolonged trauma types across the classes were also found $\chi^2(20) = 503,243, p < 0.001$, class dependent partial eta squared = 0.62. The Israeli and Danish CSA-victims were highly overrepresented in the "dissociative PTSD-subtype" class. With the separation of this 5th class, the ex-POWs and the military controls became overrepresented in the "anxiety symptoms" class, while the distribution of different prolonged trauma types remained roughly the same in the remaining classes as in the 4-class solution.

In the 5-class solution, the "CPTSD"-class was still associated with the highest proportion of work-related impairment, while the residuals indicated that the "dissociative PTSD subtype"-class was approximately equally associated with work-related impairment as the "PTSD" class, $\chi^2(4) = 33,94, p < 0.001$, work-function related partial eta squared = 0.48. The proportion of work-related functional impairment in the remaining classes did not change as the result of the extraction of the 5th class. Frequencies and percentages of different prolonged trauma types and work-related functional impairment across the classes in the 4-class solution are presented in Table 4. More details about the distribution of trauma types and work-related function in the 5-class solution can be obtained by request to the authors.

Analyses of the refugee subsample with regards to associations between presence of ACE (defined as at least one type of ACE present) and class membership in the 4-class solution, indicated that the prevalence of ACE in the "non-pathological" and the "anxiety symptoms" classes was too low to allow for meaningful comparison. Thus, only the association between presence of ACE and the PTSD and the CPTSD class were analyzed $\chi^2(1) = 0.963, p = 0.33$. Another comparison was made between the two presumably more pathological classes (PTSD and CPTSD) combined vs. the two classes with less

Table 2

Frequencies and percentages of endorsed PTSD and CPTSD items..

	CSA Denmark (N =207)	CSA Israel (N =51)	Refugees (N =116)	Ex-POWs (N =177)	Veteran's Controls (N =118)	MHPs (N =150)	Total	χ^2	df	p
PTSD										
Nightmares	44%	30%	77%	46%	5%	6%	813	205.58	5	0.001
Flash backs	42%	64%	53%	48%	15%	14%	814	97.85	5	0.001
Avoiding thoughts & feelings	72%	77%	73%	52%	3%	9%	816	287.68	5	0.001
Avoiding places & activities	65%	72%	76%	51%	8%	11%	810	230.26	5	0.001
Over alert	81%	75%	75%	68%	19%	6%	812	300.98	5	0.001
Easily startled	63%	79%	73%	69%	28%	5%	814	224.73	5	0.001
CPTSD										
Easily upset	41%	82%	85%	63%	25%	42%	798	128.44	5	0.001
Angry all the time	16%	48%	53%	29%	7%	14%	801	104.22	5	0.001
Permanently damaged	44%	62%	88%	25%	5%	9%	789	261.05	5	0.001
Guilt	41%	81%	40%	25%	9%	13%	796	125.06	5	0.001
Different than others	35%	83%	44%	43%	21%	9%	797	117.36	5	0.001
Avoiding others	26%	62%	30%	49%	17%	11%	799	92.09	5	0.001

Note. CSA = Childhood sexual abuse, ex-POWs = ex-prisoners of war, MHPs = mental health professionals

severe pathology (“non-pathological” and “anxiety symptoms”) combined, $\chi^2(1) = 1.37, p = 0.34$. The results indicated that presence of ACE was not especially associated with the CPTSD class, in the present refugee sample, nor was it especially associated with more severe pathological outcomes in general.

4. Discussion

The present study is the first to examine complex traumatization across a spectrum of prolonged trauma with varying severity of interpersonal trauma and ages of exposure. Overall, our results support the construct validity of ICD-11's PTSD and CPTSD. First, LCAs did not support the hypothesis that CPTSD might only apply to childhood prolonged trauma. Namely, high probability of CPTSD was found in both the childhood prolonged trauma (CSA) - and the adulthood prolonged trauma samples with *severe* interpersonal intensity (i.e. the refugees, and the ex-POWs), and it was low in the samples with prolonged adulthood trauma of mild interpersonal intensity (military controls and MHPs). Therefore, the current results seem to indicate, that presence of PTSD and CPTSD as specified for ICD-11 is primarily related to the overall severity of traumatization, rather than the developmental stage at the time of exposure (childhood vs. adulthood). Also, as the MHPs and the veterans rarely occurred in the PTSD or the CPTSD categories, there seem to be indications that the interpersonal nature of the prolonged trauma is associated with these more severe pathological outcomes, and in particular CPTSD. This is in line with previous research and theories (e.g. Herman, 1992), which describe the interpersonal aspects of the prolonged trauma as the most harmful, as they might undermine victims' attachment security, and result in long term problems with self-regulatory capacities. However, as this study did not include any individuals with “simple” (i.e. not repeated/prolonged trauma), it is not possible to say anything about the role

of prolonged vs. single trauma in the development of PTSD and CPTSD. Also, as childhood maltreatment was not systematically assessed in all samples with prolonged adulthood interpersonal trauma, we cannot fully rule out that childhood interpersonal trauma preceding adulthood interpersonal trauma is not the primary etiological factor in CPTSD (results from the present refugee sample indicate however, that CPTSD in traumatized refugees is not exclusively associated with presence of childhood abuse).

Thus, in accordance with the ICD-11's proposal, which stresses individual vulnerability patterns in reactions to trauma, rather than strictly deterministic reactions to specific events, individuals with different prolonged trauma types are found across all classes, although to a varying degree. Finally, in support of the proposal, the present analyses also indicate that CPTSD, which is considered to be more severe than PTSD, is indeed associated with the highest frequencies of work-related functional impairment. However, given the clear overrepresentation of males in the analysis (lacking information about work-related function in Danish CSA survivors), it cannot be excluded, that the work-related impairment might be linked to gender rather than CPTSD status in the present study.

Unlike in the ICD-11 proposal, the present study also identified a fourth class of individuals, whose outcomes primarily take shape of “anxiety symptoms” in the group of individuals with different prolonged trauma types. This group only endorsed the PTSD-arousal symptoms, had affect dysregulation symptoms comparable to the “PTSD class”, and more pronounced interpersonal problems (i.e. guilt, feeling different, and avoiding others), while comprising equal numbers of individuals with different prolonged trauma types. Reactions in this class could be occurring at the milder end of pathological adaptations to trauma, as the “anxiety symptoms” class is associated with the lowest frequency of functional impairment amongst the 3 pathological classes (although only 8% lower than the PTSD class). The

Table 3

Fit statistics for the latent class analysis of the PTSD and CPTSD symptoms in the combined sample (N =820).

Classes	Loglikelihood	AIC	BIC	ssaBIC	LMRA- LRT (p)	BS LRT (p)
1	-6307.455	12638.911	12695.422	12657.315	-	-
2	-5226.709	10503.419	10621.151	10541.761	2136.991 (0.001)	2161.492 (0.001)
3	-5062.036	10200.072	10379.026	10258.352	325.613 (0.001)	329.347 (0.001)
4	-5010.057	10122.113	10362.288	10200.331	102.781 (0.089)	103.959 (0.001)
5	-4968.343	10064.687	10366.082	10162.843	82.481 (0.001)	83.426 (0.001)
6	-4948.209	10050.418	10413.035	10168.512	39.812 (0.116)	40.269 (0.001)

Note: The model with the best fit is in bold, AIC = Akaike information criterion, BIC = Bayesian information criterion, ssaBIC = sample-size adjusted BIC, LMRA- LRT = Lo-Mendell-Rubin adjusted likelihood ratio test.

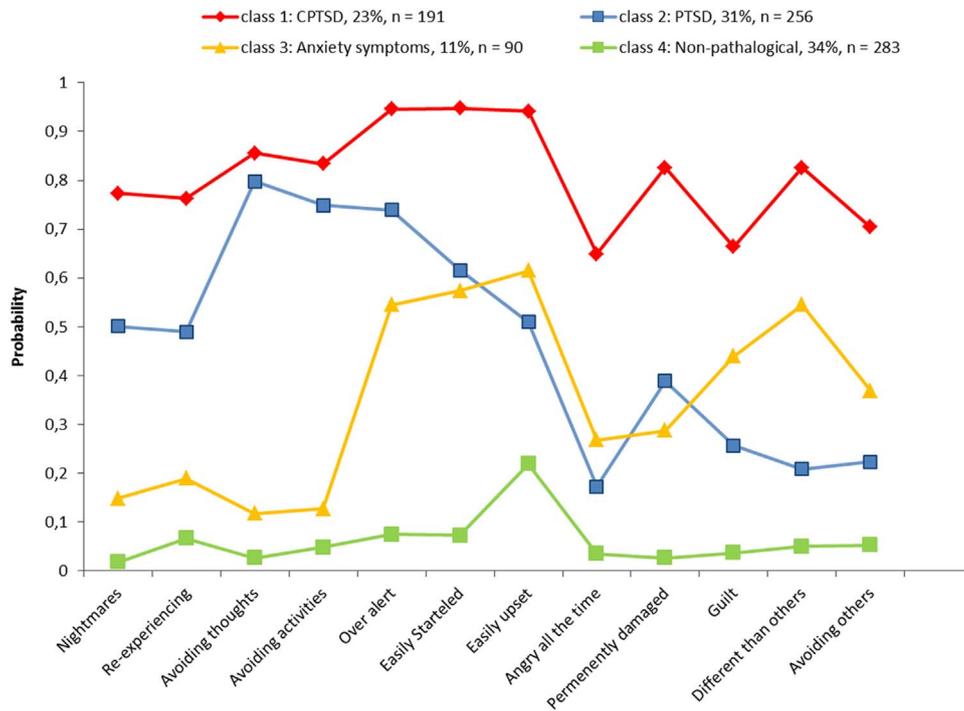


Fig. 1. Plots of the 4-class solution in the combined sample representing the spectrum of prolonged trauma exposure (N = 820).

reactions might therefore represent general adaptations affecting the view of the self and the world in response to continuous threats in the environment, irrespective of the age of onset and interpersonal intensity of the trauma- which are ultimately normative adaptations to a highly stressful environment or moderately pathological (e.g. other anxiety or affective disorders). Similar, although not identical 4th class-solutions have previously been reported in a re-analyses of data from Knefel and Lueger-Schuster, 2013; Knefel et al., 2015, and in a recent community study of young adults (Perkonig et al., 2016), and are therefore probably not just a spurious finding. Furthermore, symptoms of similar content to those of the present “anxiety symptoms” class

have previously been described e.g. by Janoff-Bullman (1989). Of the three studies that have currently identified this 4th “mixed symptom” class amongst the proposed ICD-11 PTSD and CPTSD symptoms, the Perkonig et al., 2016 study has the most representative population. In their study, this “mixed” class was not related to more impairment than the “non-pathological” class, but it was at the same time related to a range of different lifetime DSM-IV disorders. More research is needed to address a) the level of impairment related to these symptoms that seem to occur as a “residual” mix of PTSD and CPTSD in ICD-11, as well as b) their possible overlap with other affective, anxiety, and personality disorders.

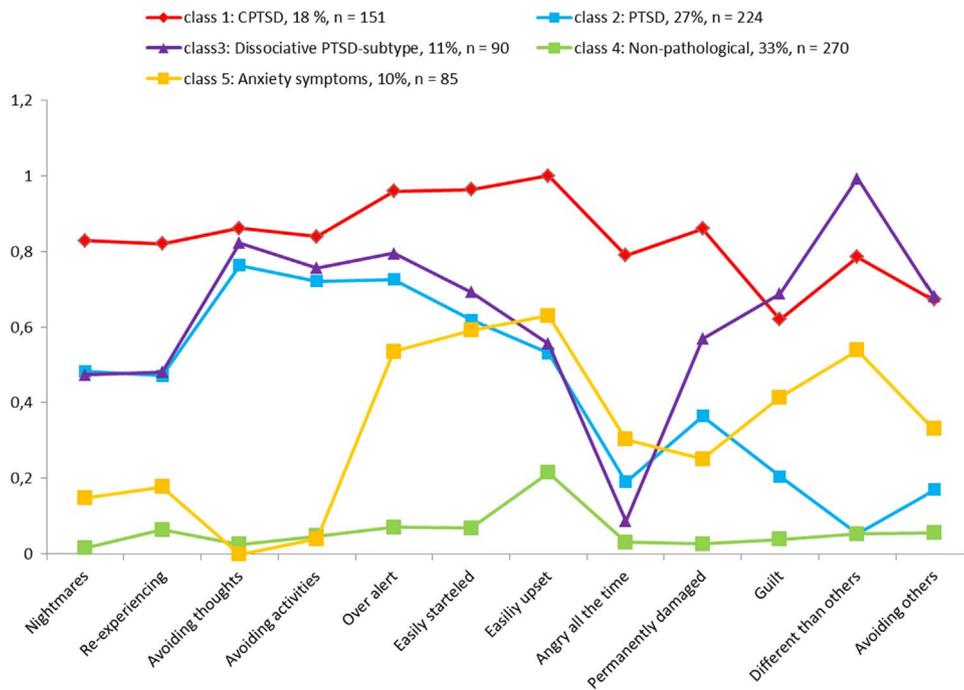


Fig. 2. Plots of the 5-class solution in the combined sample representing the spectrum of prolonged trauma exposure (N = 820).

Table 4

Frequencies and percentages of gender, prolonged traumatic exposure types, and work-related functional impairment across the classes (N = 820).

	Female	Male	CSA Denmark	CSA Israel	Ex-POWs	Refugees	MHPs	Veteran's Controls	Impaired work function	Non-impaired work function
% of the total N = 820	52%	48%	25%	6%	22%	14%	18%	14%	32%	47%
Class 1, N = 191	104 (55%)	87 (45%)	40 (21%)	32 (17%)	56 (29%)	57 (30%)	1 (0.5%)	5 (3%)	107 (78%)	31 (22%)
CPTSD										
Class 2, N = 256 PTSD	157 (61%)	99 (39%)	126 (49%)	11 (4%)	54 (21%)	46 (18%)	14 (6%)	5 (2%)	73 (58%)	52 (42%)
Class 3, N = 90	38 (43%)	51 (57%)	18 (20%)	6 (7%)	27 (30%)	6 (7%)	15 (17%)	18 (20%)	35 (50%)	35 (50%)
Anxiety symptoms										
Class 4, N = 283 Non- pathological	126 (45%)	156 (55%)	23 (8%)	2 (0.7%)	41 (15%)	7 (3%)	120 (52%)	90 (41%)	46 (19%)	200 (81%)
Total	425	393	207	51	177	116	150	118	261*	381*

Note. CSA = Childhood sexual abuse, ex-POWs = ex-prisoners of war, MHPs = mental health professionals, * work function was not assessed for the Danish CSA group.

Considering the 5th class which was identified here, the presence of PTSD, but absence of emotional reactivity (i.e. affect dysregulation), combined with alienation (different than others), and interpersonal detachment (permanently damaged and avoiding others), could be indicative of the dissociative PTSD-subtype (American Psychiatric Association, 2013). However, as this study did not include any measures of dissociative symptoms such as depersonalization and derealization, the “dissociative PTSD-subtype” is only putative, and inferred through patterns in other symptoms. However, if this class is replicated in other research, it could have important implications for treatment. Future studies should include measures of dissociation, and numbing (which is only included in the DSM-5 but not in ICD-11) to further qualify this question. Finally, we also speculate, that the alternative 5-class solution might be due to the limited content matching of the item “angry all the time” to the CPTSD’s concept of affective dysregulation.

Contrary to prior findings (Knefel and Lueger-Schuster, 2013; Perkonig et al., 2016) there seem to be no large gender differences within the identified classes in the present sample, except for those in the PTSD class. However, this finding might be spurious, as the Danish CSA victims were highly overrepresented in the PTSD class, and the group was at the same time 90% female. In the Perkonig et al., 2015 study, CPTSD was associated with female gender, however, this was a community sample, where the prevalence of adulthood prolonged trauma of severe interpersonal intensity, such as torture and genocide was unknown (presumably low occurrence if any). However, due to the very uneven gender distribution across the different trauma types in the present sample, the present results should be considered preliminary. Future CPTSD studies should aim to include more representative samples of a spectrum of different types of traumatic exposure, as well as more representative gender distributions within the specific trauma types.

One might also discuss, how distant or related the currently proposed PTSD and CPTSD really are. The ICD-11’s proposal is as yet not clear about the clinical implications of PTSD’s “sister diagnosis”, CPTSD. That is, there are no recommendations, nor empirical studies regarding the treatment, and impairment consequences of receiving the proposed CPTSD diagnosis. In light of the present results, where CPTSD was found in refugees (traumatized 16 years ago) as well as in tortured ex-POWs (traumatized 30 years ago), it seems important that the longevity of illness (and the resulting impairment) caused by gross human right violations is not neglected in the new diagnosis. This is especially important if the CPTSD is to replace the EPCACE, which is currently by definition a personality disorder – thus, implies a more chronic condition than e.g. PTSD, which is a clinical disorder. Unjustified categorization of CPTSD as a less chronic disorder might create severe social problems for victims of adulthood prolonged interpersonal traumatization, if their impairment is in fact perceived to be less severe as a consequence of the elimination of the personality disorder-alike EPCACE from the ICD-11.

Also, the present results seem to indicate, that the currently selected symptoms for CPTSD in ICD-11 are making this diagnosis more uniform across different traumatized populations. That is, the currently proposed CPTSD is not sensitive to distinctions between developmentally sensitive periods for trauma exposure, which were previously considered to be important. Even more interestingly, the severity of the self-regulatory problems, which are theoretically considered the hallmark of complex traumatization, might be low in the ICD-11’s CPTSD. Namely, in the present study, 4 out of 6 CPTSD symptoms are identified in the “anxiety symptoms” class, which in this study describes individuals with the lowest levels of traumatization, and no PTSD. High probability of all self-regulatory problems characteristic of ICD-11’s CPTSD has also been identified in the previously mentioned community sample, and associated with lower impairment than the PTSD and CPTSD classes (Perkonig et al., 2016). This might mean that the personality-disorder alike symptoms which were previously the hall mark of complex traumatization, might not be captured by the proposed CPTSD (at least not with the provisional measures through which they are currently operationalized). Systematic measures of personality disorder symptoms should be included in future research to determine whether and how CPTSD can be differentiated from personality disorders.

To sum, while there is clear appeal to the psychometrically identified separate classes of PTSD and CPTSD in ICD-11, research still has to prove that they are not only a psychometrically interesting artifact, but that they indeed do matter as clinically meaningful distinctions, which can guide treatment and prognosis. Also, maybe a broader version of CPTSD than that in the ICD-11 needs to be investigated in order to best characterize and test the sequelae of prolonged exposure to interpersonal trauma. That is, the results might have been different if we had undertaken an explorative analysis of different DESNOS symptoms in the current large spectrum of prolonged trauma, instead of the present more “confirmative” approach.

With that being said, the current results, which describe individuals with trauma-related symptomatology and impairment lasting over several decades, across the span of PTSD symptoms and self-regulatory problems, clearly illustrate the need for a complex PTSD diagnosis. Also, with the ICD-11’s proposal being able to adequately describe the diversity of the present spectrum of prolonged trauma, it seems that we are coming closer to accomplishing a goal of a functional diagnosis for Complex PTSD.

4.1. Limitations of study

The present study was undertaken using already existent material from different study populations. Thus, it was not explicitly designed for the present purposes, and there are smaller variations between the questionnaires applied in the Danish and the Israeli study populations. The most important limitation, which arises from this design, is however that we cannot be completely sure that the symptom severity

of the Israeli samples, which answered the SIDES on a dichotomous scale, is exactly the same as that of the Danish samples, which answered a continuous scale. The very rare opportunity to combine samples across the spectrum of trauma types of different interpersonal intensity and ages of exposure might outweigh the most serious limitations of the present study. Also, ICD-11's PTSD and CPTSD have been modeled using a selection of symptoms from other measures, because there are as yet no measures specifically developed for these purposes. Thus, as with other questionnaire based studies, the results should be replicated using clinically established diagnoses. The use of unemployment or part-time employment as a proxy for functioning has several limitations. The full employed individuals may still be substantially impaired in other areas of life, while the part/un-employed individuals may be so due to economic, social or other conditions that may not be related to symptoms but instead to general life-adversity. Future studies should make an effort to associate ICD-11's PTSD and CPTSD with more comprehensive measures of functional impairment as well as a full range of possible comorbid disorders.

References

- Akaike, H., 1987. Factor analysis and the AIC. *Psychometrika* 52, 317–332.
- American Psychiatric Association, 2013. Diagnostic and statistical manual of mental disorders fifth ed. American Psychiatric Association, Washington, DC.
- Beltran, R.O., Llewellyn, G.M., Silove, D., 2008. Clinicians' understanding of International Statistical Classification of Diseases and Related Health Problems, 10th Revision diagnostic criteria: f62.0 enduring personality change after catastrophic experience. *Compr. Psychiatry* 49, 593–602.
- Beltran, R.O., Silove, D., 1999. Expert opinions about the ICD-10 category of enduring personality change after catastrophic experience. *Compr. Psychiatry* 40, 396–403.
- Cloitre, M., Courtois, C.A., Charuvastra, A., Carapezza, R., Stolbach, B.C., Green, B.L., 2011. Treatment of complex PTSD: results of the ISTSS expert clinician survey on best practices. *J. Trauma. Stress* 24, 615–627.
- Cloitre, M., Garvert, D.W., Brewin, C.R., Bryant, R.A., Maercker, A., 2013. Evidence for proposed ICD-11 PTSD and complex PTSD: a latent profile analysis. *Eur. J. Psychotraumatol* 4, 20706.
- Cloitre, M., Stolbach, B.C., Herman, J.L., van der Kolk, B., Pynoos, R., Wang, J., Petkova, E., 2009. A developmental approach to complex PTSD: childhood and adult cumulative trauma as predictors of symptom complexity. *J. Trauma. Stress* 22, 399–408.
- Davidson, J., Foa, E.B., Blank, A.S., Brett, E.A., Fairbank, J., Green, B.L., et al., 1996. Posttraumatic Stress Disorder. (Volume 2)In: Widiger, T.A., Frances, A.J., Pincus, H.A., Ross, R., First, M.B., Davis, W.W. (Eds.), *DSM-IV sourcebook*. American Psychiatric Association, Washington DC, 577–606.
- Dekel, S., Ein-Dor, T., Solomon, Z., 2012. Posttraumatic growth and posttraumatic distress: a longitudinal study. *Psychol. Trauma* 4, 94–101.
- Dong, M., Anda, R.F., Felitti, V.J., Dube, S.R., Williamson, D.F., Thompson, T.J., Loo, C.M., Giles, W.H., 2004. The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abus. Negl.* 28, 771–784.
- Elklit, A., 1999. Traumatic stress and psychological adjustment in treatment-seeking women sexually abused in childhood: a follow-up. *Scand. J. Psychol.* 50, 251–257.
- Elklit, A., Hyland, P., Shevlin, M., 2014. Evidence of symptom profiles consistent with posttraumatic stress disorder and complex posttraumatic stress disorder in different trauma samples. *Eur. J. Psychotraumatol* 5, 24221.
- Finklestein, M., Stein, E., Greene, T., Bronstein, I., Solomon, Z., 2015. Posttraumatic Stress Disorder and Vicarious Trauma in Mental Health Professionals. *Health Soc. Work* 40, 25–31.
- Grounds, A., 2004. Psychological consequences of wrongful conviction and imprisonment. *Can. J. Criminol. Crim. Justice* 46, 165–182.
- Herman, J.L., 1992. *Trauma and Recovery*. From Domestic Abuse to Political Terror. Pandora, Kent.
- Kilpatrick, D.G., Resnick, H.S., Freedy, J.R., Pelcovitz, D., Resick, P.A., Roth, S., et al., 1998. Posttraumatic Stress Disorder Field Trial: evaluation of the PTSD Construct - Criteria A Through E. (Volume 4)In: Widiger, T.A., Frances, A.J., Pincus, H.A., Ross, R., First, M.B., Davis, W.W. (Eds.), *DSM-IV Sourcebook*. American Psychiatric Association, Washington DC, 803–846.
- Knefel, M., Garvert, D.W., Cloitre, M., Lueger-Schuster, B., 2015. Update to an evaluation of ICD-11 PTSD and complex PTSD criteria in a sample of adult survivors of childhood institutional abuse by Knefel & Lueger-Schuster (2013): a latent profile analysis. *Eur. J. Psychotraumatol* 6, 25290.
- Knefel, M., Lueger-Schuster, B., 2013. An evaluation of ICD-11 PTSD and complex PTSD criteria in a sample of adult survivors of childhood institutional abuse. *Eur. J. Psychotraumatol* 4, 22608.
- Marinova, Z., Maercker, A., 2015. Biological correlates of complex posttraumatic stress disorder—state of research and future directions. *Eur. J. Psychotraumatol* 6, 25913.
- Maercker, A., Brewin, C.R., Bryant, R.A., Cloitre, M., Reed, G.M., van Ommeren, M., et al., 2013. Proposals for mental disorders specifically associated with stress in the International Classification of Diseases-11. *Lancet* 381, 1683–1685.
- McDonnell, M., Robjant, K., Katona, C., 2013. Complex posttraumatic stress disorder and survivors of human rights violations. *Curr. Opin. Psychiatry* 26, 1–6.
- Mollica, R.F., McDonald, L.S., Massagli, M.P., Silove, D., 2004. Measuring trauma, measuring torture. Instructions and guidance on the utilization of the Harvard Program in Refugee Trauma's versions of the Hopkins Symptom Checklist-25 (HSCL-25) & the Harvard Trauma Questionnaire (HTQ). [Manual]. Harvard Program in Refugee Trauma, Cambridge MA.
- Muthén, L., Muthén, B., 2012. *Mplus Use. Guide Version 7*. Statmodel, Los Angel.
- Nylund, K.L., Asparouhov, T., Muthén, B., 2007. Deciding on the number of classes in latent class analysis and growth mixture modeling. A Monte Carlo simulation study. *Struct. Equ. Model.* 14, 535–569.
- Oruc, L., Kapetanovic, A., Pojskic, N., Miley, K., Forstbauer, S., Mollica, R.F., Henderson, D.C., 2008. Screening for PTSD and depression in Bosnia and Herzegovina: validity of the Harvard Trauma Questionnaire and the Hopkins Symptom Checklist. *Int. J. Cult. Ment. Health* 1, 105–116.
- Palic, S., Elklit, A., 2014. Personality dysfunction and complex posttraumatic stress disorder among chronically traumatized bosnian refugees. *J. Nerv. Ment. Dis.* 202, 111–118.
- Pelcovitz, D., van der Kolk, B., Roth, S., Mandel, F., Kaplan, S., Resick, P., 1997. Development of a criteria set and a structured interview for disorders of extreme stress (SIDES). *J. Trauma. Stress.* 10, 3–16.
- Perkonig, A., Höfler, M., Cloitre, M., Wittchen, H.U., Trautmann, S., Maercker, A., 2016. Evidence for two different ICD-11 posttraumatic stress disorders in a community sample of adolescents and young adults. *Eur. Arch. Psychiatry Clin. Neurosci.* 266, 317–328.
- Schwartz, G., 1978. Estimating the dimension of a model. *Ann. Stat.* 6, 461–464.
- Slovce, S.L., 1987. Application of model-selection criteria to some problems in multivariate analysis. *Psychometrika* 52, 333–343.
- Solomon, Z., Benbenishty, R., Neria, Y., Abramowitz, M., Ginzburg, K., Ohry, A., 1993. Assessment of PTSD: validation of the revised PTSD Inventory. *Isr. J. Psychiatry Relat. Sci.* 30, 110–115.
- Solomon, Z., Greene, T., Ein-Dor, T., Zerach, G., Benyamini, Y., Ohry, A., 2013. The long-term implications of war captivity for mortality and health. *J. Behav. Med.* 37, (849–597).
- Tay, A.K., Rees, S., Chen, J., Kareth, M., Silove, D., 2015. The structure of post-traumatic stress disorder and complex post-traumatic stress disorder amongst West Papuan refugees. *BMC Psych.* 15, 111–117.
- Van der Kolk, B.A., 2003. *Trauma Center Assessment Package*. The Trauma Center, Brookline MA.
- Van der Kolk, B.A., Roth, S., Pelcovitz, D., Sunday, S., Spinazzola, J., 2005. Disorders of extreme stress: the empirical foundation of a complex adaptation to trauma. *J. Trauma, Stress.* 18, 389–399.
- WHO, 1994. *ICD-10 International Statistical Classification of Diseases and Related Health Problems Tenth Revision*. World Health Organization, Geneva.
- Yuan, K.H., Bentler, P.M., 2000. Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. *Sociol. Methodol.* 30, 165–200.
- Zerach, G., Solomon, Z., 2014. The relations between posttraumatic symptoms and disorder of extreme stress (not otherwise specified) symptoms following war captivity. *Isr. J. Psychiat* 50, 148–156.