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Vang, M., Ben-Ezra, M., & Shevlin, M. (in press). Modelling patterns of poly-victimization in the Israeli population and the association with PTSD and Complex PTSD. *Journal of Traumatic Stress*.

Link to publication record in Ulster University Research Portal

Published in:
Journal of Traumatic Stress

Publication Status:
Accepted/In press: 20/05/2019

Document Version
Author Accepted version

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Download date: 17/04/2024

Modelling patterns of poly-victimization in the Israeli population and the association with PTSD and Complex PTSD.

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Conflict of interest:

The authors declare no conflict of interest.

Abstract

Evidence is accumulating for the conceptual validity of the ICD-11 proposal for PTSD and CPTSD, but our knowledge of the specificity of trauma-related predictors remain under development. Specifically, studies utilising advanced statistical methods to model the relationship between trauma-exposure and ICD-11 proposals of traumatic stress, as well as differences in profiles of trauma-exposure in the Israeli population are lacking. Additionally, time since trauma and possessing a clear memory of the trauma are yet to be examined as predictors of PTSD and CPTSD. This was consequently the aims of the current study. Trauma-exposure as reported by a general population sample of the Israeli adult population (n=834) was analysed using latent class analysis, and the resultant classes were used in regression models to predict PTSD and CPTSD operationalised both dimensionally and categorically. Four distinct groups were identified: (1) Child and adult interpersonal victimization, (2) Community victimization male, (3) Community victimization female, and (4) Adult victimization. These groups were differentially related to PTSD and CPTSD with only child and adult interpersonal victimization consistently predicting CPTSD and DSO. PTSD was associated with the child and adult interpersonal victimization-group and adult victimization group when modelled dimensionally, whereas only the child and adult interpersonal victimization-group was predictive of PTSD when operationalised categorically. The role of time since trauma and possessing a clear memory for the trauma differed across PTSD and CPTSD. These findings support the use of trauma-typologies for predicting PTSD and CPTSD and provide important insight into the distribution of trauma-exposure in the Israeli population.

Keywords: Posttraumatic stress disorder, complex posttraumatic stress disorder, posttraumatic stress, PTSD, CPTSD, ICD-11, International Trauma Questionnaire, mixture modelling

Modelling patterns of poly-victimization in the Israeli population and the association with PTSD and Complex PTSD

Throughout the past decades, the Israeli society has remained a focal point for continuous armed conflict and terrorist attacks, posing direct or indirect threat to the lives of a significant proportion of the population. In 2017, seventeen years after the beginning of the second Intifada, 813 civilians had been killed, including 135 minors (B'Tselem, 2017). Consequently, exposure to potentially traumatizing events (PTE) are high within these communities: a representative survey of the Israeli population found that 16.4 % had been directly exposed to terrorist attacks and 37.3 % had a family member or friend who had been exposed, resulting in rates of DSM-IV posttraumatic stress disorder (PTSD) of 9.4 % (Bleich, Gelkopf & Solomon, 2003). These results were corroborated in an additional representative survey finding that a total of 31.3 % had either experienced a terrorist attack themselves or knew a friend or relative who had. Comparable DSM-IV PTSD-rates of 9 % were reported in that study (Bleich, Gelkopf, Melamed & Solomon, 2006)

Recently, conceptual models of PTSD have undergone extensive revision within the 5th version of the Diagnostic and Statistical Manual and the 11th version of the International Classification of Diseases (ICD-11). ICD-11 has proposed an updated conceptualisation of disorders following traumatic stress including two sibling-disorders: PTSD and Complex PTSD (CPTSD). The conceptualisation of these disorders deviates from the DSM-tradition as they are designed to reflect the core-characteristics of traumatic stress and emphasize clinically relevant distinctions in symptomatology to increase clinical applicability and reduce comorbidity rates (Karatzias et al., 2017a; Maercker et al., 2013). ICD-11 PTSD consists of three symptom-clusters: re-experiencing in the here-and-now, avoidance of internal and external reminders of a traumatic experience, and a sense of current threat.

CPTSD provides a more comprehensive diagnosis that recognises the pervasive psychological disturbances that can occur following exposure to multiple traumas, particularly those of an interpersonal nature occurring in early development, that are of a repeated and prolonged nature, and from which escape is difficult or impossible (Brewin et al., 2017; Hyland et al., 2017a). CPTSD includes the core PTSD-symptoms and additional symptoms that collectively reflect 'disturbances in self-organization' (DSO): Affective dysregulation, negative self-concept and disturbed relationships (Cloitre et al., 2013). Affective dysregulation reflects problems in emotional regulation either in terms of heightened or reduced emotional arousal (hyper- and hypoactivation respectively). Negative self-concept reflects a persistent negative view of the self, and finally, disturbed relationships, encompassing difficulties with developing as well as sustaining interpersonal relationships. The diagnostic guidelines are categorical so that an individual may receive a diagnosis of one or the other disorder (Cloitre et al., 2018).

The latent structure of ICD-11 PTSD and CPTSD has been replicated across a number of studies using confirmatory factor analysis as well as latent class analysis, supporting the conceptual integrity of the ICD-11 proposal for traumatic stress in clinical and community samples alike (for an overview, see Brewin and colleagues, 2017). Recently, Ben-Ezra and colleagues (2018) reported prevalence rates of 9.0% for PTSD and 2.6% for CPTSD, supporting the ICD-11 proposal in a community sample of the Israeli population. The value of differentiating between profiles of posttraumatic sequalae is that it allows the identification of populations that differ qualitatively in their symptomatology, levels of functional impairment, aetiology and risk-factors. Hence, while the conceptual basis and measurement of PTSD and CPTSD is established, our understanding of factors that might lead to the development of either CPTSD or PTSD is still evolving (Hyland et al., 2018; Karatzias et al., 2017b).

CPTSD is associated with cumulative trauma-exposure from which escape is difficult or impossible, corresponding to the life conditions of many Israeli citizens. However, the relationship between trauma-exposure and posttraumatic sequalae in the Israeli population is debated: Bleich and colleagues (2003) found that levels of terror-related trauma-exposure and objective threat was unrelated to risk of PTSD, a finding corroborated in their study conducted a few years later (Bleich et al., 2006). These findings might be partially explained by a habituation effect, whereby civilians become increasingly accustomed and adjust to living under continuous threat to life, thus exhibiting a decreased risk of developing symptoms of posttraumatic stress (Amir & Sol, 1999; Stein et al., 2017). Indeed, a habituation effect would be consistent with Shalev and colleagues' (2006) finding that disruption of daily life is more critical in determining risk of PTSD than direct exposure to terror-attacks itself. However, in contrast to Amir and Sol (1999), Palmieri and colleagues (2008) found evidence that cumulative trauma-exposure increased the risk of PTSD in an Israeli war-exposed sample, suggesting that not all types of stressful events or life-circumstances can be habituated to.

Indeed, mounting evidence supports the proposition that CPTSD develops after continuous, severe interpersonal trauma-exposure, and expressly with trauma occurring during childhood (Ben- Ezra et al., 2018; Cloitre et al., 2013; Frost et al., 2018a; Frost, Hyland, Shevlin & Murphy, 2018b; Gilbar, Hyland, Cloitre, & Dekel, 2018; Hyland et al., 2017a; Palic et al., 2016; Shevlin et al., 2017). Research by Hyland and colleagues (2017a) suggests that there might be 'specificity' in the relationship between trauma-exposure and PTSD and CPTSD: Their study found that some traumas were uniquely associated with PTSD (robbery), some uniquely associated with CPTSD (childhood physical abuse), and some were associated with both disorders (childhood sexual abuse). Other research however also suggests that interpersonal trauma-types tend to co-occur (Finkelhor, Ormrod & Turner,

2007; Houston, Shevlin, Adamson, & Murphy, 2011), introducing a number of limitations to our current knowledge regarding associations between trauma-exposure and ICD-11 PTSD and CPTSD, as well as regarding trauma-exposure in the Israeli population at large:

Firstly, substantiated trauma-related predictors of CPTSD have largely been assessed on a single-trauma basis or utilising a cumulative approach of summarizing the number of traumas. The latter approach assumes equal severity across all types of trauma which is inconsistent with the finding that certain trauma-types are particularly related to PTSD or CPTSD. Conversely, adopting a single-trauma approach might similarly be an overly simplistic approach to modelling the relationship between trauma-exposure and posttraumatic symptomatology, as this may unduly ascribe posttraumatic symptomatology originating from cumulative exposure to a single trauma, thus over-interpreting the salience of the assessed event in place of a broader spectrum of trauma-exposure.

Secondly, in relation to the former argument, the assessment of trauma-exposure in the Israeli population has largely centred around the communities' exposure to terror- or military-type PTEs, whereas a more comprehensive assessment of exposure to other types of PTEs (such as childhood abuse and sexual assault) as well as the co-occurrence of multiple forms of trauma-exposure, and potential interaction effects between conflict-related PTEs an other types of PTEs, are lacking. A recent review by O'Donnell and colleagues (2017) showed that the co-occurrence and heterogeneity of multiple trauma-exposure can be meaningfully represented by latent class analysis, a type of mixture model accounting for unobserved patterns of trauma-exposure by assigning individuals to mutually exclusive groups. Indeed, across the 17 studies reviewed, a subpopulation with high risk of exposure to multiple trauma-types was consistently found, and there were frequent reports of a subpopulation with high levels of sexual interpersonal trauma-exposure and a subpopulation high in non-sexual interpersonal trauma-exposure. These profiles were found to meaningfully

differentiate between mental health outcomes such as PTSD as defined in DSM-IV (O'Donnell et al., 2017). Consequently, we might reasonably expect that mixture modelling techniques could be used to expand our knowledge of trauma-exposure by differentiating between PTSD and CPTSD in general; and particularly regarding profiles of trauma-exposure in the Israeli population that might habituated to compared to those leading to PTSD and CPTSD. An important aim of this study is therefore to examine if trauma-specificity in predicting PTSD and CPTSD is evident in the context of different patterns of poly-victimization in the Israeli population estimated using latent class analysis. Additionally, while previous research has examined the specificity of trauma-exposure for risk of PTSD or CPTSD, no study has yet examined whether the recency of trauma-exposure or one's memory of the event are differentially associated with PTSD and CPTSD. The evidence regarding the recency of trauma-exposure and risk of PTSD is mixed with some findings suggesting that greater time having passed since exposure is associated with lower levels of PTSD (Kilpatrick et al., 1989; Radnitz et al., 1998) and others suggesting no effect (Pinto et al., 2015). Research has also shown that individuals who possess clearer memories of their traumatic event are more likely to experience symptoms of PTSD (Oulton, Takarangi, & Strange, 2016), and that PTSD responses themselves may in fact be more aligned to an individual's memory of their event rather than the event itself (Rubin, Bernsten, & Bohniu, 2008). Since CPTSD appears to be more strongly associated with childhood traumas such as physical and sexual abuse (Hyland et al., 2017a), it is necessary to examine how variables such as trauma recency and clarity of memory of the trauma are associated with a differential diagnosis as it possible that both factors covary with childhood traumatic exposure.

Hence, the aim of the present study was two-fold:

1) To examine the relationship between trauma-typologies and PTSD and CPTSD in a trauma exposed community sample of Israeli adults using latent class analysis. Based on the

review by O'Donnell and colleagues (2017) it was predicted that there would be heterogeneity in trauma-exposure and that trauma-exposure would cluster in latent classes reflecting low trauma-exposure, non-sexual interpersonal trauma, sexual trauma, and poly-victimization. We expected that CPTSD would be more strongly related to classes representing sexual trauma and poly-victimization (Cloitre et al., 2013; Hyland et al., 2017a). 2) An additional aim of the current study was to examine the association of (a) the time passed since exposure to one's worst trauma and (b) whether or not one has a clear memory of the worst trauma, to PTSD and CPTSD. As yet, it appears that no studies have examined such associations, and consequently, this aspect of the study was approached in an exploratory fashion.

Ultimately, we included a simultaneous categorical and dimensional operationalisation of ICD-11 PTSD and CPTSD. Clinical practice and prevalence studies employ a categorical approach to trauma-symptomatology when determining the presence or absence of a disorder. Comparably, much research on risk-factors of trauma-symptomatology is conducted using a dimensional approach (e.g. latent variable modelling) that allows estimation of symptom-severity across a continuum that controls for measurement-error (see for example Tay, Rees, Chen, Kareth, & Silove, 2015), however without allowing any diagnostic categorization. The present study aimed to accommodate both approaches to facilitate the utility of the results from the present study.

Method

Participants and procedure

A sample of 1,003 Israeli adults were recruited from an online panel of about 130,000 Israeli adults compiled and continuously updated in accordance with the Israeli Bureau of Statistics in key demographic factors to be representative of the general population (Bodas, Siman-Tov, Kreitler, & Peleg, 2017). Potential participants were invited to participate in the

study via e-mail. Each participant signed an online informed consent form before accessing the questionnaire. Eligibility to participate in the study required being over the age of 18 and being fluent in Hebrew. Only participants who endorsed at least one trauma from the Life Events Checklist (LEC, Weathers et al., 2013) were included in the analyses, resulting in a sample of 834 participants for the current analyses. The mean age of the sample was 40.9 years (SD = 14.3; range 18–70) and a slight majority of the participants were men (50.1 %). All participants were born in Israel and the majority reported living in urban areas (82.1 %) as well as being in a committed relationship (70.1 %). Participants on average had more than one child (mean = 1.78; SD = 1.7; range 0-11) and the majority reported being employed either in a full-time (63.2 %) or part-time (20 %) job. Slightly more than two thirds (70.6 %) had completed a college or university degree.

Measures

Life-Events Checklist. Participants were asked to provide information on trauma-exposure in childhood and adulthood using the LEC. The LEC is a self-report measure for lifetime exposure to potentially traumatizing events (Weathers et al., 2013). For the current study, the following 16 trauma-types were assessed: Natural disaster, fire or explosion, transportation accident, other serious accident, exposure to toxic substances, childhood physical abuse, physical assault, assault with a weapon, childhood sexual abuse, sexual assault, other unwanted sexual experiences, combat exposure, serious illness or injury, exposure to severe human suffering, sudden violent death and causing serious injury to someone else. All trauma-types were dichotomized (1=Present, 0=Absent) with a type of victimization being coded as present if participants reported that the event had happened to them, apart from sudden violent death that was coded as being present if the participant reported having witnessed this.

International Trauma-Questionnaire. The International Trauma-Questionnaire (ITQ; Cloitre et al., 2018) is a self-report measure of ICD-11 PTSD and CPTSD. The ITQ has been validated in several populations (Karatzias et al., 2017b) and the internal reliability as measured by Cronbach's α was acceptable in the current study: PTSD, α =.89; DSO, α = .87; full scale, α =.90. We used the ITQ to assess the participants index trauma, whether the respondent has a clear memory of their index trauma (1=Yes, 0=No), and the time since the traumatic event spanning from 1= '*less than 6 months ago*' to 6 = '*more than 20 years ago*'. Six symptoms of PTSD are measured across three clusters of re-experiencing, avoidance and sense of threat; and six symptoms of DSO are measured across three clusters of affective dysregulation, negative self-concept and disturbed relationships. Each item is scored on a 5-point Likert scale ranging from 0 = '*Not at all'* to 4= '*Extremely*' with an item considered endorsed at a score equal to or greater than 2. For PTSD, participants are asked to rate how much they have been bothered by their symptoms in the last month. The diagnostic criteria for PTSD require traumatic exposure as well as endorsement of one symptom in each cluster, as well as evidence of functional impairment associated with these symptoms (constituted by a score equal to or greater than 2 in the domain(s) of social life, work-life and/or other important obligations). For the DSO symptoms, participants are instructed to report how they typically feel, think about themselves, and relate to others. For a diagnosis of CPTSD, participants must fulfil criteria for PTSD in addition to displaying one symptom in each DSO cluster, and evidence functional impairment in relation to the PTSD and DSO symptoms alike. If requirements for a diagnosis of CPTSD are met, CPTSD replaces a diagnosis of PTSD. Finally, it is possible for the DSO criteria to be met without symptoms of PTSD being endorsed. In this case, neither PTSD or CPTSD is diagnosed as the core trauma-related symptoms are absent.

Data Analysis

The analysis was comprised of two linked stages: First, a latent class analysis (LCA) was conducted to identify groups with similar patterns of trauma-exposure based on the dichotomised LEC items. LCA is a type of mixture modelling that identifies homogeneous groups of participants with similar profiles of item endorsement, assigning participants to latent classes on a probabilistic basis. Age and gender were included in all models as covariates. The fit of six models (a one- through six-class model) was assessed and were estimated using robust maximum likelihood using all available data for model estimation (Yuan & Bentler, 2000). To avoid solutions based on local maxima, 5000 random sets of starting values were used initially and 1000 final stage optimizations. The relative fit of the models was compared by using three information theory-based fit statistics: the Akaike Information Criterion (AIC; Akaike, 1987), the Bayesian Information Criterion (BIC; Schwarz, 1978) and the sample size-adjusted Bayesian Information Criterion (ssaBIC; Sclove, 1987). The model that produces the lowest values can be judged as the best model (Schwarz, 1978). The Lo-Mendell-Rubin adjusted likelihood ratio test (LMR-A) was used to compare models with increasing numbers of latent classes. When a non-significant value ($p > .05$) occurs, this suggests that the model with one less class should be accepted (Lo, Mendell & Rubin, 2001). Finally, the entropy of each solution was assessed to ensure adequate classification of individuals. Values closer to 1 are indicative of better classification (Ramaswamy, DeSarbo, Reibstein, & Robinson, 1993). This model was specified and estimated using Mplus 7.11 (Muthén & Muthén, 2011).

Second, we tested the relationship between the latent classes from stage 1, time since trauma and clear memory for trauma, and dimensional and categorical representations of ICD-11 PTSD and CPTSD using the latent classes as observed variables. The models are shown in Figure 1a and 1b. Figure 1a shows the dimensional model where PTSD and DSO are specified as second-order latent variables, each being measured by their respective first-

order latent variables. A direct effect from PTSD to DSO was included. This specification allows the DSO latent variable to represent DSO with PTSD statistically controlled for, making the statistical model analogous with the ICD-11 diagnostic rules for CPTSD: the ICD-11 CPTSD diagnostic rules indicate that the criteria for PTSD must be met for the DSO symptoms to be part of a diagnosis, so the important variation in the DSO factor is what remains after PTSD is controlled for. The second-order latent variables were regressed on observed variables representing trauma-exposure class membership (dummy coded), time since trauma (dummy coded into 5 binary variables with the last category (6 = '*more than 20 years ago*') being used as the reference category), and whether one has a clear memory of the trauma or not. This model was specified and estimated using Mplus 7.11 (Muthén & Muthén, 2011). The model parameters were estimated using robust maximum likelihood estimation (MLR) and model fit was assessed with the chi-square, comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) and the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990). A non-significant χ^2 and values greater than .90 for the CFI and TLI were considered to reflect acceptable fit. For the RMSEA values less than .05 represent 'close' fit and up to .08 indicated 'reasonable' errors of approximation (Jöreskog & Sörbom, 1993). The same cut-off values can be used for the Standardised Root Mean Square Residual (SRMR; Jöreskog & Sörbom, 1981). Figure 1b shows the categorical model where PTSD and CPTSD represent the diagnostic status of the participants. First, we assessed the relationships between classes and probable diagnostic status (No diagnosis (no dx), PTSD, CPTSD) using a chi-square test. Second, a multinomial logistic regression model (MNLR) was used with class membership (dummy coded), time since trauma (dummy coded), and whether one has a clear memory of the trauma or not as predictors, and probable diagnosis as the criterion variable. Diagnosis was calculated with the functional impairment

criteria and those with neither diagnosis was set as the reference category. The MNLR was conducted using and SPSS 25. There were no missing values on either the LEC or the ITQ.

Results

The fit statistics for the LCA are presented in Table 1. When interpreting fit-statistics to identify the best fitting model, the BIC is considered the primary indicator of goodness of fit, indicating model 4 as the best representation of the data (Nylund et al., 2007). The LMR-A was non-significant, suggesting that the 4-class model was not statistically better than the 3-class model, but upon inspection and comparison of the 3- and 4-class solution, the additional class in the 4-class solution differed qualitatively from the other 3 classes, providing a theoretically meaningful contribution to description of data. The entropy-value for the 4-class solution indicated an acceptable classification of individuals, and taken altogether, the four-class solution was found to best describe the data. The average posterior probabilities ranged from .85 (class 3) to .94 (class 4), and the profile plot and probabilities for the four-class solution are shown in Figure 2.

The current sample endorsed high rates of various trauma-types. Frequencies of traumatic experiences are presented in Table 2 along with gender differences. The most frequently reported trauma-types were transportation accidents, physical assaults, and combat exposure and these were experienced by at least 40% of the participants. Men were significantly more likely to report combat exposure, exposure to fire or explosions, and physical assault, whereas, women were significantly more likely to report childhood sexual abuse, sexual assault, and other unwanted sexual experiences.

Class 1 (n = 93, 11.1%) was comprised of 71 % women and characterized by high levels of physical assault, sexual assault, childhood physical and sexual abuse and unwanted sexual experiences and witnessing severe human suffering. This class was labelled ‘Child and

adult victimization'. Class 2 (n=303, 36.3 %) was comprised on 100 % men and characterized by elevated levels of transportation accidents, exposure to combat and physical assaults. This class was labelled 'Community victimization male'. Class 3 (n=346, 41.5 %) was comprised of 98.3 % women and characterized by elevated levels of transportation accidents, other unwanted sexual experiences and exposure to combat. This class was labelled 'Community victimization female'. Finally, class 4 (n=92, 11 %) was comprised of 10.9 % women and characterized by high levels of transportation accidents, physical assaults, assault with a weapon, combat exposure and accidental death. This class was labelled 'Adult victimization'.

To investigate the relationship between class-membership and diagnostic status, variables representing class membership and diagnostic status were cross-tabulated and the association was statistically significant, $\chi^2(6, N = 834) = 16.28$, $p = .012$. The counts, percentages and adjusted residuals are reported in Table 3. Adjusted residuals are standardized estimates indicating the strength of the difference between the expected and actual counts across groups. Higher absolute values are indicative of larger differences across the groups. Persons in the child and adult interpersonal victimization group (class 1) were at elevated risk to receive a CPTSD and PTSD diagnosis, whereas participants in the community victimization male-group were least likely to qualify for a diagnosis of either (class 2).

For the subsequent analyses, the four latent classes were dummy coded into 3 binary variables with the 'community victimization male' group (class 2) being used as the reference category. Table 4 displays the results of the dimensional regression analysis assessing the relationship between class-membership and PTSD and DSO-latent variables. This model was an acceptable description of the data (χ^2 (137) = 275.43, $p < .001$; RMSEA = .035 (90%CI .029 - .041); CFI = .972; TLI = .964; SRMR = .032). Although the chi-square statistic was

significant, this should not lead to rejection of the model as the power of the chi-square test is positively related to sample size (Tanaka, 1987). The standardized first and second-order factor loadings are shown in Figure 1a. All were positive, large and statistically significant. The second-order loading for the AD-factor was very slightly greater than one; this has been reported in other factor analytic studies of the ITQ (Hyland et al., 2017b) and is due to the high correlation among the first order factors (Jöreskog, 1999). The regression coefficient from the PTSD to DSO latent variable was also positive and statistically significant (B=.56, $p<.01$; β=.55, $p<.05$).

The PTSD latent variable was significantly associated with membership of the child and adult interpersonal victimization-group, and the adult victimization group. Participants reporting more recent traumas and a clear memory for trauma also reported higher levels of PTSD. The DSO latent variable, while controlling for PTSD, was significantly associated only with high interpersonal trauma and a lack of clear memory for trauma.

Finally, table 5 displays the results of the multinomial logistic regression analysis assessing the relationship between class-membership, time since trauma and having a clear memory for trauma and PTSD and CPTSD. The logistic regression model fit the data better than the baseline-model (χ^2 (18) = 61.395, $p < .001$), and all factors were significant predictors of diagnostic status. The child and adult interpersonal victimization-class was associated with elevated risk of endorsing criteria for both PTSD and CPTSD, as were traumas reported in the past year. Participants in the child and adult interpersonal victimization class reported slightly higher risk for CPTSD than PTSD, whereas traumas within the past year were more strongly correlated with PTSD than CPTSD. Clear memory for trauma only increased the risk of endorsing PTSD.

Discussion

The purpose of the current study was to estimate profiles of trauma-exposure in an Israeli population sample employing a mixture modelling approach and to assess the relationship between profiles of trauma-exposure, time since trauma and posessing a clear memory for the trauma, and PTSD and CPTSD. For this purpose, we operationalised PTSD and CPTSD both dimensionally and categorically to account for posttraumatic symptom severity and diagnosis respectively.

The present study identified four trauma-typologies in the Israeli population, two of which corresponded to the hypothesised groups: The 'adult victimization'-group corresponded to the hypothesised non-sexual interpersonal trauma group, and the 'child and adult interpersonal victimization'-group corresponded to the hypothesised poly-victimized group. There was no group that displayed a typical 'low risk'-profile as evident from other studies utilising community samples (Houston et al., 2011). However, rates of transportation accidents and exposure to combat are elevated in the Israeli population in comparsion to community samples from Western countries (de Vries & Olff, 2011; Perkonigg, Kessler, Storz & Wittchen, 2000) and simultaneously characteristic for the 'community victimization male' group and the 'community victimization female' group in the current study. The male community victimization group was additionally characterized by elevated risk of exposure to physical assaults, whereas the female community victimization profiles was characterized by the second-highest risk of exposure to other unwanted sexual experiences, only surpassed by the child- and adult interpersonal victimization group. As women are consistently reported to be more frequently exposed to sexual assaults than males and the frequency of sexual assaults is also higher during armed conflict (McKay, 1998), and since these two groups accounted for the majority of the participants in the current study, these profiles might be taken as reflecting gendered 'community'-profiles. Furthermore, as the male community

victimization group also displayed the lowest risk of endorsing PTSD and CPTSD, this group was taken as a context-specific 'low risk' group and used as baseline for all further analyses.

While the female community victimization-group was partially characterized by sexual trauma, participants in this group were not significantly more likely to report CPTSD as expected for the hypothesised 'sexual trauma'-class. However, when inspecting the class-characteristics, it is evident that participants in the female community victimization group reported higher risk of uncomfortable sexual experiences than that of CSA and adult sexual assault that was highest among the child and adult interpersonal victimization group. There may be higher variability in the severity and derived traumatizing potential of uncomfortable sexual experiences compared to CSA and adult sexual assaults, and since the likelihood of reporting the latter two was relatively low for the female community victimization group in comparison to the child and adult interpersonal victimization group, this might explain the nonsignificant correlation between the sexual trauma-typology and CPTSD in the current study. Hence, future studies exploring the relationship between sexual trauma-typologies and posttraumatic sequalae would do well to differentiate between varying severity of sexual traumas to accurately model the risk of exhibiting symptoms of traumatic stress following exposure.

The trauma-profiles were differentially related to PTSD and CPTSD in ways consistent with current evidence (O'Donnell et al., 2017): Bivariate results (table 3) showed that the child and adult interpersonal victimization group had the highest risk of receiving a probable diagnosis with significantly elevated risk of endorsing CPTSD. The multivariate results (table 4) corroborated this finding by showing that when modelled dimensionally, DSO was only significantly related to the child and adult interpersonal victimization-group, whereas PTSD was related to both the child and adult interpersonal victimization-group and adult victimization group, thereby extending the evidence regarding the differentiating

potential of trauma-typologies in relation to mental health outcomes to CPTSD. However, when operationalising PTSD and CPTSD diagnostically (table 5), the child and adult interpersonal victimization-group was the only group displaying significantly higher odds of endorsing both PTSD and CPTSD. Hence, this would suggest that adult victimization is associated with higher levels of posttraumatic stress severity compared to the male community victimization group, but not sufficiently so as to increase the risk of endorsing diagnostic criteria. This may be attributed to a non-linear association or low statistical power.

While the distinction between PTSD and DSO as employed in the dimensional model of the current study is theoretically meaningful, the empirical model of DSO does not capture CPTSD per se as variance explained by the PTSD-variable is controlled for. Diagnostic algorithms cannot be applied to factor models, making this type of model less ideal for assessing the clinical salience of trauma-related correlates of PTSD and CPTSD. However, evidence from the current study suggests that dimensional and diagnostic operationalisations of the disorders converge on the salience of the interpersonal trauma-profile in relation to both PTSD and CPTSD with a slightly higher risk of endorsing CPTSD.

Clear memory operated differently for PTSD and DSO/CPTSD across the dimensional and categorical operationalisations. When operationalised dimensionally, having a clear memory of the trauma was positively related to PTSD but negatively related to DSO. When operationalized categorically, having a clear memory for the trauma became a nonsignificant predictor of CPTSD but remained highly predictive of PTSD. While deficits in declarative memory have been found in survivors of a range of trauma-types (Samuelson, 2011), this is the first piece of evidence suggesting that trauma-related memories could operate differently across PTSD and CPTSD. As CPTSD is related to repeated, multiple and early traumatisation, it could be anticipated that one would be less likely to have a clear memory of multiple traumas or repeated exposures to the same trauma, or that one’s memory

for trauma that happened during childhood might not be readily accessible in adulthood. Recent research has found that CSA is associated with higher rates of dissociation among adult survivors of child abuse and that dissociation mediates the relationship between CSA and adult PTSD (Kratzer et al., 2018; Vang et al., 2018). In conjunction with evidence suggesting that CPTSD is associated with comparably higher levels of dissociation than PTSD (Hyland et al., 2017a), we might expect that dissociative experiences related to the trauma could be implicated in the relationship between lack of clear memory and DSO, however, more research is needed to explore the relationship between these factors.

Time since trauma also operated differently across dimensional and categorical models of PTSD and CPTSD. In the dimensional model, traumas that occurred more recently were associated with a higher risk of endorsing PTSD, whereas there was no effect for DSO. When modelled categorically including functional impairment, traumas that occurred within the past year was predictive of both PTSD and CPTSD which is consistent with existing evidence suggesting that posttraumatic symptomatology is more prevalent after a recent trauma (Kilpatrick et al., 1989; Radnitz et al, 1998). Diagnostically, PTSD is a necessary prerequisite for CPTSD according to the ICD-11 guidelines, and PTSD and CPTSD were operationalised accordingly in this study. In the dimensional model no such diagnostic dependency can be explicitly included, however the categorical model captures DSO symptoms in the context of clinically meaningful levels of PTSD, whereas the dimensional model does not necessarily do so. Also, evidence suggests that previous exposure to trauma predicts subsequent exposure to PTEs (Breslau, Davis & Andreski, 1995) and that severe forms of childhood trauma tend to cluster in single individuals (Armour, Elklit & Christoffersen, 2014). Consequently, as these types of trauma-exposure are associated with CPTSD, time since trauma alone might not be a particularly salient correlate of CPTSD as repeated traumatisation might reactivate previous trauma, forming posttraumatic responses of such complexity that chronological time since

trauma would become of minor importance in explaining the symptom-presentation when controlling for trauma-profile as in the current analysis.

The current study was limited by the use of self-report as the basis of the computation of diagnostic status, as well as probabilistic classification of individuals in the statistical analyses assessing the relationship between trauma-typologies and PTSD and DSO/CPTSD, meaning that these should be interpreted with a degree of caution. The study had relatively low response rates (31 %) and we were unable to assess whether participants differed significantly from non-participants on relevant study-variables. Generalizability is likely to be limited, particularly with respect to other countries with dissimilar political situations. Furthermore, it should be noted that the non-Hebrew speaking part of the Israeli population were unable to participate in the study. Strengths of the present study include a large, community-based sample with clinical relevance due to high trauma-exposure. There was no missing data, thereby providing a solid basis for the analyses undertaken with the above limitations in mind.

Conclusion and implications

The present study supported the use of mixture modelling to represent types of trauma-exposure in the Israeli population as well as to differentiate between PTSD and DSO/CPTSD. It has provided the first piece of evidence that time since trauma and possessing a clear memory operate differently across PTSD and CPTSD. Whether or not individuals present with a clear memory for their trauma carries important implications for the choice of therapeutic intervention, as some interventions specifically target trauma-related memories (Schnyder et al., 2015). However, explanations for the differences across PTSD and CPTSD for these trauma-related factors remain limited. The present study was the first to model PTSD and DSO/CPTSD dimensionally and categorically, corroborating existing evidence for the salience of interpersonal trauma-types for PTSD and CPTSD severity and

diagnostic status alike. Further research are needed to understand the salience of different trauma-typologies, time since trauma and having a clear memory for the trauma in other communities.

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Table 1

Fit Statistics for Latent Class Models of the Life Events Checklist.

Classes	Log Likelihood	AIC	BIC	ssaBIC	LRT (p)	Entropy
1	-6069.055	12172.110	12252.456	12198.470	-	-
2	-5792.441	11658.883	11833.753	11716.254	549.145 p < .001	.857
3	-5661.687	11437.375	11706.770	11525.758	259.578 p < .001	.807
4	-5575.821	11305.641	11669.561	11425.036	159.382 p =.085	.827
5	-5534.417	11262.834	11721.279	11413.240	77.775 p =.239	.715
6	-5504.502	11243.004	11795.973	11424.421	58.172 p =.457	.779

Note: AIC: Akaike Information Criteria, BIC: Bayesian Information Criteria, ssaBIC: Sample-size adjusted Bayesian Information Criteria, LRT: Lo-Mendell-Rubin adjusted likelihood ratio test.

Table 2

Frequency of Trauma Types in Israeli Community Sample.

Trauma-type	Total % (N = 834)	Male % (n = 418)	Female % (n = 416)	χ^2 (df)	Effect size φ
Natural disaster	18 % (n = 150)	16.5 % (n = 69)	19.5 % (n = 81)	1.049 (1)	0.08
Fire or explosion	13.5 % (n = 113)	17.2 % (n = 72)	9.9 % (n = 41)	9.047 (1)	0.28**
Transportation accident	46.2 % (n = 385)	49 % (n = 205)	43.3 % (n = 180)	2.569 (1)	0.08
Other accident	17.7 % (n = 148)	19.1 % (n = 80)	16.3 % (n = 68)	0.931 (1)	0.08
Toxic substance	8.2 % (n = 68)	9.3 % (n = 39)	7 % (n = 34)	1.250 (1)	0.14
CPA	7.9 % (n = 66)	7.7 % (n = 32)	8.2 % (n = 34)	0.022 (1)	0.12
Physical assault	43.6 % (n = 364)	54.3 % (n = 227)	32.9 % (n = 137)	37.861 (1)	0.32***
Weapon	7.2 % (n = 60)	10.5 % (n = 44)	3.8 % (n = 16)	12.953 (1)	0.46***
CSA	16.4 % (n = 137)	7.7 % (n = 32)	25.2 % (n = 105)	45.691 (1)	0.58***
Sexual assault	8.5 % (n = 71)	3.8 % (n = 16)	13.2 % (n = 55)	22.430 (1)	0.56***

Other sexual	25.7 % (n = 214)	8.4 % (n = 35)	43 % (n = 179)	129.463 (1)	0.78***
Combat	40.9 % (n = 341)	49.3 % (n = 206)	32.5 % (n = 135)	23.744 (1)	0.26***
Illness or injury	13.9 % (n = 116)	14.1 % (n = 59)	13.7 % (n = 57)	0.005 (1)	0.01
Severe human suffering	7.2 % (n = 60)	7.2 % (n = 30)	7.2 % (n = 30)	0.000 (1)	0.00
Accidental death	31.8 % (n = 265)	29.9 % (n = 125)	33.7 % (n = 140)	0.348 (1)	0.03
Causing serious injury	1.8 % (n = 15)	3.3 % (n = 14)	0.2 % (n = 1)	1.185 (1)	0.28

Note: *p < 0.05, **p < 0.01, ***p < 0.001; Test of differences: Pearson's χ^2 incl. continuity correction, asymptotic sig. (2-sided). Effect size: phi.

Table 3

Cross-tabulation of Class Membership and Probable Diagnostic Status.

		Probable Diagnosis			
		CPTSD	PTSD	No Diagnosis	Total
Class					
Child and adult	Count	10	10	73	93
interpersonal	Expected Count	4.2	5.9	82.9	93.0
victimization	% within Diagnosis	26.3%	18.9%	9.8%	11.2%
	Adjusted Residual	3.0	1.8	-3.5	
Community	Count	13	25	308	346
victimization	Expected Count	15.8	22.0	308.2	346.0
female	% within Diagnosis	34.2%	47.2%	41.5%	41.5%
	Adjusted Residual	-.9	.9	-.1	
Community	Count	2	4	86	92
victimization	Expected Count	4.2	5.8	82.0	92.0
male	% within Diagnosis	5.3%	7.5%	11.6%	11.0%
	Adjusted Residual	-1.2	-.8	1.4	
Adult	Count	13	14	276	303
victimization	Expected Count	13.8	19.3	269.9	303.0
	% within Diagnosis	34.2%	26.4%	37.1%	36.3%
	Adjusted Residual	-.3	-1.6	1.4	
Total	Count	38	53	743	834
	% of Total	4.6%	6.4%	89.1%	100.0%

Table 4

Multivariate multiple regression analysis of predictors of PTSD and DSO (figure 1a).

Class	PTSD		DSO	
	β	(SE)	β	(SE)
Child- and adult interpersonal victimization	.894	(.136)***	.336	(.140)*
Community victimization female	.167	(.123)	.041	(.124)
Adult victimization	.324	(.079)***	-.100	(.076)
Time since trauma				
<6 months	.713	(.196)***	-.055	(.148)
6-12 months	.759	(.191)***	-.073	(.154)
1-5 years	.369	(.110)**	.004	(.103)
5-10 years	.271	(.105)**	.097	(.103)
10-20 years	.052	(.097)	-.050	(.095)
Clear memory (Yes)	.258	(.079)**	-.161	(.080)*
R^2	.150***		.333***	

Note: Class 2 (community victimization male) is used as reference group. The estimates are standardised, STDY. 'More than 20 years ago' is used as reference group (-) for time since trauma. *p < 0.05, **p < 0.01, ***p < 0.001.

Table 5

Multinomial logistic regression analysis of class-membership and diagnostic status (figure 1b)

	Probable Diagnosis OR (95 % CI)	
	PTSD (n = 53, 4.6 %)	CPTSD (n = 38, 6.4 %)
Child and adult interpersonal victimization	3.049* (1.244 – 1.893)	3.510* (1.411 – 8.732)
Community victimization female	1.524 (0.761 – 3.055)	0.854 (.385 – 1.893)
Adult victimization	0.843 (.264 – 2.693)	0.481 (.105 – 2.204)
Time since trauma		
<6 months	4.624* (1.521 – 14.057)	4.165* (1.252 – 13.848)
6-12 months	7.560*** (2.586 - 22.098)	4.044* (1.104 – 14.808)
1-5 years	2.259 (0.911 – 5.604)	1.730 (.661 – 4.582)
5-10 years	1.150 (.383 – 3.459)	1.674 (.066 – 1.505)
10-20 years	1.180 (.425 – 3.273)	0.315 (.066 – 1.505)
Clear memory (Yes)	3.261* (1.249 – 8.513)	1.194 (.532 – 2.677)

Note: Class 2, (community victimization male) is used as reference group for classes. ‘More than 20 years ago’ is used as reference group (-) for time since trauma. No diagnosis is used as comparison group on outcome variable. *p<0.05, **p<0.01, ***p<0.001

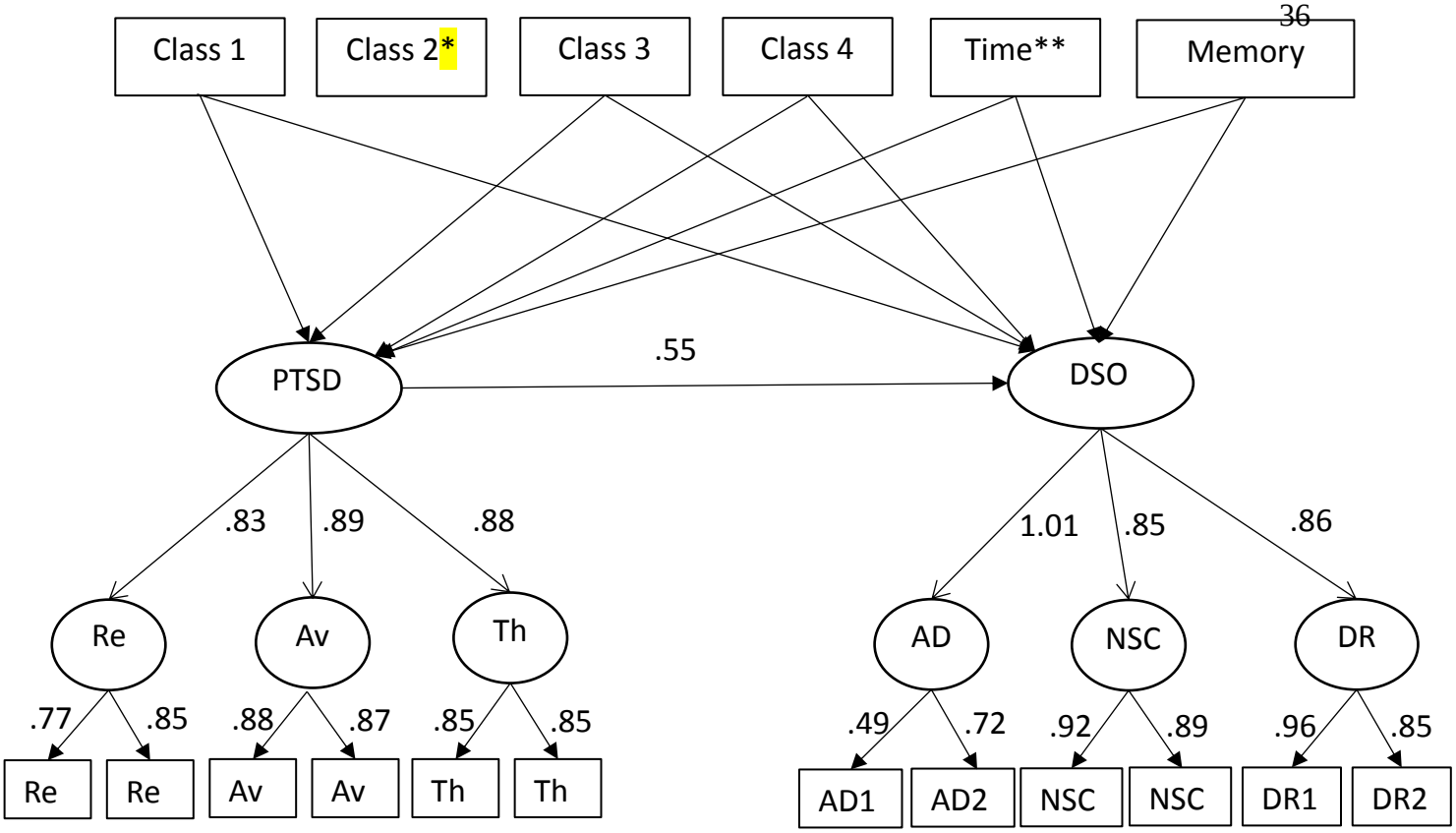


Figure 1a
Dimensional model of PTSD and DSO.

Note: Class 1: Child and adult interpersonal victimization. Class 2*: Community victimization male (reference-group). Class 3: Community victimization female. Class 4: Adult victimization. Class 2 is used as reference category for the regression analysis. ** Time dummy coded with last category (6) 'More than 20 years ago' used as reference category.

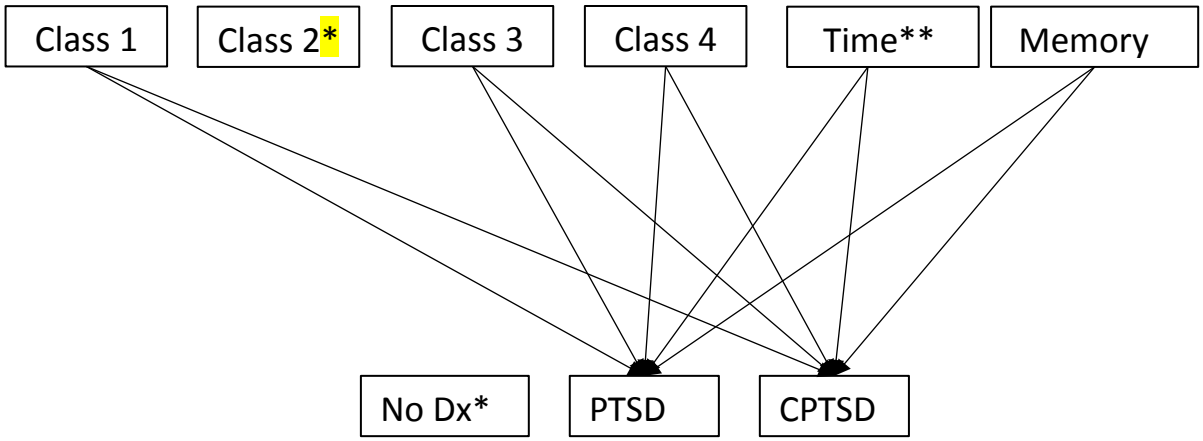
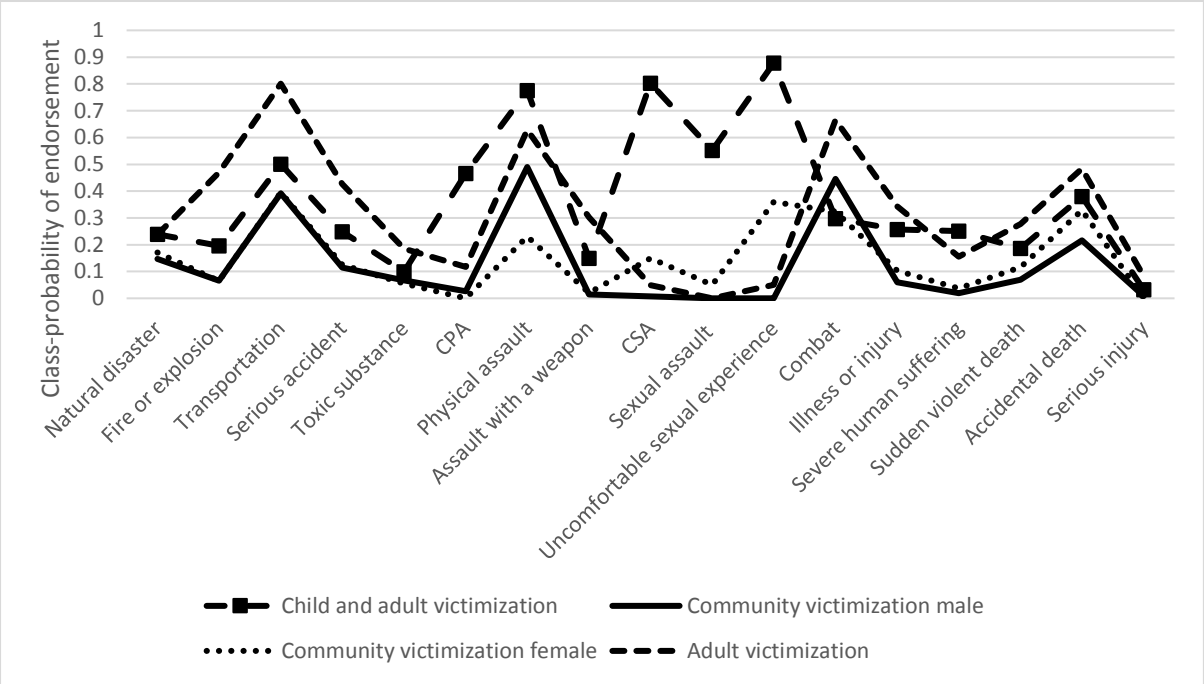


Figure 1b
Categorical model of PTSD and CPTSD

Note: Class 1: Child and adult interpersonal victimization. Class 2*: Community victimization male (reference-group). Class 3: Community victimization female. Class 4: Adult victimization. Class 2 is used as reference category for the regression analysis. Class 2 is used as reference category. *No Dx = No diagnosis, used as reference category for outcome variable. ** Time dummy coded with last category (6) ‘More than 20 years ago’ used as reference category.

Figure 2

The four-class solution of victimization typologies



Note: CPA: Childhood physical abuse, CSA: Childhood sexual abuse.