


Variation in post-traumatic response: the role of trauma type in predicting ICD-11 PTSD and CPTSD symptoms

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Abstract

Purpose The World Health Organization's 11th revision to the International Classification of Diseases manual (ICD-11) will differentiate between two stress-related disorders: PTSD and Complex PTSD (CPTSD). ICD-11 proposals suggest that trauma exposure which is prolonged and/or repeated, or consists of multiple forms, that also occurs under circumstances where escape from the trauma is difficult or impossible (e.g., childhood abuse) will confer greater risk for CPTSD as compared to PTSD. The primary objective of the current study was to provide an empirical assessment of this proposal.

Methods A stratified, random probability sample of a Danish birth cohort (aged 24) was interviewed by the Danish National Centre for Social Research ($N=2980$) in

2008–2009. Data from this interview were used to generate an ICD-11 symptom-based classification of PTSD and CPTSD.

Results The majority of the sample (87.1%) experienced at least one of eight traumatic events spanning childhood and early adulthood. There was some indication that being female increased the risk for both PTSD and CPTSD classification. Multinomial logistic regression results found that childhood sexual abuse ($OR=4.98$) and unemployment status ($OR=4.20$) significantly increased risk of CPTSD classification as compared to PTSD. A dose–response relationship was observed between exposure to multiple forms of childhood interpersonal trauma and risk of CPTSD classification, as compared to PTSD.

Conclusions Results provide empirical support for the ICD-11 proposals that childhood interpersonal traumatic exposure increases risk of CPTSD symptom development.

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Introduction

The 11th revision to the *International Classification of Diseases* (ICD-11) manual, due for publication in 2018 by the World Health Organization, will include a revised conceptualisation of trauma-related psychopathology. The ICD-11 will include two related, but distinct trauma-based disorders: posttraumatic stress disorder (PTSD) and Complex PTSD (CPTSD; Maercker et al. [1]). The guiding principle underlying revisions for ICD-11 is to simplify disorder classification, where possible by focusing on the core constituent symptoms, so as to improve clinical utility worldwide

[2]. Following the work of Brewin, Lanius, Novac, Schnyder, and Galea [3], the ICD-11 symptom profile of PTSD will be narrower than any previous description comprising of six, or possibly seven, symptoms (n.b., a seventh symptom may be included for those trauma survivors that do not possess a clear memory of the traumatic event to which they were exposed). These symptoms relate to three essential symptom clusters: (1) re-experiencing of the traumatic event in the here and now (Re: two symptoms, or three symptoms if one does not possess a clear memory of the trauma), (2) active avoidance of reminders of the trauma (Av: two symptoms), and (3) a heightened sense of current threat (Th: two symptoms).

Following the work of Herman [4], CPTSD is proposed as a broader clinical disorder that includes the core PTSD symptoms but is conceptually distinguishable from PTSD on the basis of symptoms that reflect ‘disturbances in self-organization’ (DSO). These DSO symptoms reflect three essential symptom clusters: (1) affective dysregulation (AD), (2) negative self-concepts (NSC), and (3) disturbances in relationships (DR). These additional DSO clusters reflect the pervasive psychological disturbances that can occur following traumatic exposure, across a variety of contexts, and even in the absence of traumatic reminders. The symptom groupings were selected on the basis of the symptoms that were most frequently reported by participants during the DSM-IV field trials assessing CPTSD [5], along with those symptoms identified as the most frequent and most impairing by expert clinicians in a consensus survey on CPTSD [6]. Presently, the exact number of DSO symptoms to be included in the ICD-11 symptom profile for CPTSD has not been finalized; however, in line with the guiding principles of ICD-11, the likelihood is that each DSO cluster (AD, NSC, and DR) will include 2–3 symptoms.

ICD-11 requires exposure to a traumatic event as a gateway for a diagnosis of either PTSD or CPTSD. With respect to a differential diagnosis between PTSD and CPTSD, the nature of the traumatic stressor is considered a risk factor rather than a requirement for a differential diagnosis; this is to allow recognition of the role played by genetic and environmental risk and resiliency factors (e.g., social support) in the development of distinct traumatic responses. It is proposed that exposure to interpersonal traumas that are prolonged and repeated in nature, or comprise multiple forms, from which escape is difficult or impossible, will increase the risk of DSO symptomatology in addition to the core PTSD symptoms [4, 7, 8]. Although CPTSD responses can occur following these types of events in adulthood (e.g., torture experiences, prisoner of war experiences, repeated combat exposures), exposure to repeated, prolonged, and multiple forms of interpersonal trauma during early developmental periods are proposed to be among those that are

most strongly associated with a CPTSD response [9]. This proposal is derived from an extensive literature indicating that exposure to severe interpersonal maltreatment during childhood can impair normal development of emotional regulatory capacities, increase dysfunctional beliefs about oneself, and lead to problematic interpersonal functioning [10–12], and can have a long-term impact in adulthood [13]. Childhood abuse is a prototypical example of a risk factor for CPTSD as it is frequently prolonged, repeated, and often comprised of multiple forms of interpersonal trauma (e.g., sexual, physical, and verbal abuse) [14, 15]. In addition, abuse during childhood is difficult to escape from due to maturational, psychological, social, and environmental constraints.

The existing literature regarding the relationship between exposure to sustained childhood interpersonal trauma and risk of ICD-11 CPTSD is limited and somewhat contradictory. For example, a study of treatment-seeking men and women found that those who had experienced repeated childhood abuse or multiple types of interpersonal violence were more likely to have a CPTSD profile [7]. This finding has not been replicated when childhood abuse has been defined as a single categorical “yes/no” variable [16] or when “sexual trauma” exposure does not include age [17]. These conflicting results may reflect a lack of sensitivity of the measures regarding potentially important aspects of the experience such as whether the experience was sustained or repeated, or whether it occurred in childhood or not. A similarly inconsistent picture exists with regards to another well-established risk factor in the psychotraumatology literature: sex. Perkonig et al. [18] found that being female increased risk for both ICD-11 PTSD and CPTSD, while Hyland et al. [8] found that females were at an elevated risk for both disorders but that the risk was significantly greater for PTSD than for CPTSD. Contrastingly, Cloitre et al. [7] and Wolf et al. [17] found no sex-specific risk for either disorder.

While considerable evidence is accumulating to support the proposed competing symptom structures of both PTSD [19–21] and CPTSD [7, 8, 21, 22], as well as the qualitative distinctions between both disorders [7, 16, 18, 23, 24], there remains insufficient evidence regarding the factors that may serve to distinguish CPTSD responses to trauma from PTSD responses to trauma, as per the ICD-11 proposals. In fact, the empirical literature to date seems to consider much about how ICD-11 CPTSD is conceptually and symptomatically distinct from ICD-11 PTSD, but little about why. Given the growing empirical support for the construct validity of both disorders, it is important to begin to develop a more thorough understanding of the factors that can differentially predict a CPTSD response from a PTSD response. This reflects the primary aim of the current study and two hypotheses were thus formulated.

First, given the composition of the DSO symptoms (AD, NSC, and DR) that uniquely characterise CPTSD, along with the well-established association between such symptomatology and childhood interpersonal trauma experiences, we predicted that childhood exposure (0–18 years) to sexual abuse, physical assault, and bullying, individually, would be associated with an increased likelihood of a complex traumatic response. Second, in-line with ICD-11 proposals, we predicted that exposure to multiple forms of childhood interpersonal trauma would be associated with an increased risk of CPTSD, as compared to PTSD, in a dose–response fashion. Finally, in addition to these hypotheses, we also examined the role of sex; however, given the inconsistent empirical findings to date no formal hypothesis was developed regarding the relationship between sex and traumatic response.

Methods

Participants and procedures

Data were collected as part of a national study conducted by *The Danish National Centre for Social Research* in 2008–2009 based on a stratified random probability sample of the entire birth cohort of Danes born in 1984. A total of 4718 Danes aged 24 years were contacted and 2980 agreed to be interviewed (response rate = 63%). Participation in the interview was voluntary and the study was approved by the Danish Data Protection Agency. The data used in the current study were collected in accordance with the Helsinki Declaration of 1989. To increase the number of participants who had experienced childhood abuse and neglect, children who had been assigned a child protection service status by Danish authorities were oversampled using a 1:2 ratio ($n=850$). To adjust for the over-sampling of child protection cases, the data have been weighted so that findings are representative of the total Danish population born in 1984. A structured interview was conducted by telephone, or residential visit if telephone contact could not be made (mean duration of interview = 43 min). All participants received written contact prior to the interview informing them of the process of the interview, the nature of the questions, and confidentiality. Interviewers were trained and instructed by *The Danish National Centre for Social Research* and participated in test trials to become familiar with the questionnaire and the coding procedures. Due to the sensitive nature of many of the questions (e.g., childhood sexual abuse experiences), participants had the opportunity to speak to a psychologist, via telephone, after the interview.

The majority of the sample (87.1%, $n=2591$) were exposed to at least one of the eight traumatic life events measured and thus satisfied the ICD-11's requirement for

traumatic exposure as a pre-requisite for either a PTSD or a CPTSD diagnosis. All analyses in the current study were based on these trauma-exposed individuals. Among this trauma-exposed sub-sample, there were relatively equal numbers of males (51.9%, $n=1346$) and females (48.1%, $n=1245$). Approximately, half of respondents were single (53.4%, $n=1382$), while the remainder were married (6.2%, $n=160$) or living with a partner (40.5%, $n=1049$), and the majority of individuals did not have children (90.9%, $n=2352$). Just over one-quarter of the sample owned their own home (28.6%, $n=742$) and the remainder lived in some form of rented accommodation. The majority of individuals were in some form of employment (93.8%, $n=2429$) and a minority were unemployed (6.2%, $n=160$).

Measures

Traumatic exposure

The specific types of trauma exposure reflected the key predictor variables in this study. Individuals were asked to indicate if they had directly experienced eight traumatic events during different developmental periods (0–18 years of age, or after 18 years of age), death of a close family member, road traffic accident, near-drowning, being the victim of a robbery, physical assault during adulthood (>18 years of age), physical assault during childhood (<18 years of age), bullying during childhood (<18 years of age), and sexual abuse during childhood (<18 years of age). Responses to all trauma types were coded as “No” (0) or “Yes” (1).

ICD-11 PTSD and CPTSD

The outcome variables in the current study were algorithm-driven classifications for PTSD and CPTSD. As the survey was conducted prior to the introduction of the ICD-11 proposals, a specific measure for these constructs was not used. A symptom profile as reflective as possible of the PTSD and CPTSD proposals (e.g., First et al. [2]) was developed based on various questions contained within the full interview. The interview contained a screening measure for PTSD which included one item measuring re-experiencing of the trauma (“experience of nightmares/intrusive thoughts about your worst trauma”), one item measuring avoidance (“experience of avoidance of reminders of the situation/recollections of your worst trauma”), and one item measuring a sense of threat (“experience of constant hypervigilance related to your worst trauma”). Responses to these questions were limited to “No” (0) or “Yes” (1). No question was included to measure functional impairment associated with these symptoms. An algorithm-driven

classification of ICD-11 PTSD was assigned if an individual endorsed all three symptoms.

The DSO symptom clusters that comprise CPTSD were each assessed using two questions from the interview to reflect the proposed ICD-11 symptoms as closely as possible. To measure affective dysregulation, one item was selected from the PTSD screening measure (“experience of emotional detachment from others and surroundings”) and one item was selected from a separate personality questionnaire (“are you easily angered and often hot-tempered”). To measure negative self-concept, two items were selected from the Rosenberg Self-Esteem Scale [25]: “I certainly feel useless at times” and “all in all, I am inclined to feel that I am a failure.” To measure disturbances in relationships, one item was selected from a measure of self-concept (“do you often feel rejected by others”) and the second item was selected from a measure of personality (“do you have trouble making friends”). All items were coded on a “No” (0) or “Yes” (1) basis. An algorithm-driven classification of ICD-11 CPTSD was made if an individual satisfied the PTSD symptom requirements and endorsed 1 of 2 symptoms from each of the three DSO clusters.

Three classes were consequently developed for analytical purposes: (1) individuals who were classified as meeting ICD-11 PTSD symptomatology only, (2) individuals who were classified as meeting ICD-11 CPTSD symptomatology, and (3) individuals who did not meet the symptom requirements for either PTSD or CPTSD. These three classes are henceforth referred to as the ‘PTSD class’, ‘CPTSD class’, and ‘non-symptomatic class’.

Statistical analysis

The analysis for this study included four parts. First, the proportion of the sample belonging to the PTSD and CPTSD classes was estimated, along with assessments of sex differences in class membership. Sex differences with regards to exposure to the various traumatic events were also calculated. Second, Chi-square tests of independence were conducted to calculate unadjusted odds ratios (ORs) between each traumatic event and PTSD and CPTSD class membership, as compared to the non-symptomatic class. Unadjusted ORs between exposure to each traumatic event and CPTSD class membership, as compared to PTSD class membership, were additionally estimated. Third, multinomial logistic regression analysis was conducted to calculate adjusted ORs regarding the likelihood of PTSD and CPTSD class membership, as compared to the non-symptomatic class (the reference category), due to exposure to each of the eight traumatic stressors. A second multinomial logistic regression was conducted in which the PTSD class was set as the reference group to determine whether exposure to specific types of traumatic events

was associated with CPTSD classification as compared to PTSD classification. In both sets of analyses, a number of covariates were included. Sex was included as a covariate for two purposes: (1) to assess the association between sex and PTSD and CPTSD classification, respectively, and (2) to adjust for sex differences in traumatic exposure so as to produce interpretable estimates of the associations between traumatic exposure and risk of PTSD and CPTSD classification, respectively. Living status (0=owning one’s own home, 1=living in rented accommodation) and employment status (0=employed, 1=unemployed) were also included as covariates due to the use of non-clinical assessments of DSO symptomatology, and due to the fact that the PTSD and DSO symptoms were not anchored to a specific traumatic event. Inclusion of these variables provides some control for the fact that the PTSD, and in particular the DSO symptoms, was measured in the absence of a traumatic anchor and thus may be experienced due to sociodemographic reasons (e.g., living in impoverished conditions) rather than due to traumatic exposure.

Fourth and finally, a multinomial logistic regression was conducted in which the PTSD class was again set as the reference group to determine whether cumulative childhood interpersonal traumatic exposure (sum of childhood physical assault, childhood bullying, and childhood sexual abuse) was associated with an increased risk of CPTSD classification in a dose–response fashion. This model included sex, living status, employment status, and each form of adult traumatic exposure as covariates.

Results

Descriptive statistics

In total, 3.0% of the sample were assigned to the PTSD class, and 1.0% were assigned to the CPTSD class.¹ Females were significantly more likely than males to belong to the PTSD and CPTSD classes. The most commonly endorsed symptom cluster was Affective Dysregulation with half of the sample satisfying this criterion. Significant sex differences were evident on each symptom cluster with the exception of the Disturbed Relationship cluster (see Table 1 for full details).

Table 2 includes the frequency of exposure to each form of traumatic stressor. The most commonly reported forms of traumatic exposure were experiencing the death of a close family member, childhood physical assault,

¹ Note that no person is in both classes. In line with the taxonomic structure of the ICD, CPTSD is not a subtype of PTSD and therefore a person can only be diagnosed with one of the two disorders.

Table 1 Proportion of total trauma-exposed sample, males, and females meeting criteria for each symptom cluster, and PTSD and CPTSD

	Total sample (<i>N</i> =2591) % (<i>n</i>)	Males (<i>N</i> =1346) % (<i>n</i>)	Females (<i>N</i> =1245) % (<i>n</i>)	<i>Z</i> (<i>p</i>)
Symptom clusters				
Re-experiencing	22.0 (569)	16.6 (250)	24.8 (354)	5.95 (<0.001)
Avoidance	14.2 (368)	10.5 (163)	15.9 (226)	4.35 (<0.001)
Sense of threat	8.2 (213)	6.5 (102)	8.6 (123)	2.13 (0.016)
Affective dysregulation	50.3 (1301)	44.6 (692)	52.7 (749)	4.40 (<0.001)
Negative self concept	18.8 (488)	14.7 (228)	21.6 (309)	4.98 (<0.001)
Disturbed relationships	19.6 (508)	18.3 (284)	18.4 (262)	0.09 (0.466)
Class membership rates				
Non-symptomatic class	96.0 (2487)	97.4 (1515)	95.2 (1356)	–
ICD-11 PTSD class	3.0 (79)	2.1 (32)	3.5 (50)	2.42 (0.008)
ICD-11 complex PTSD class	1.0 (26)	0.6 (9)	1.3 (18)	1.97 (0.024)

Estimates weighted for over-sampling of child protection cases

Z test comparing proportions of males and females

Significant differences in bold

Table 2 Frequency of exposure to different forms of traumatic stressors for the total trauma-exposed sample, and males and females

Traumatic stressors	Total sample (<i>N</i> =2591) % (<i>n</i>)	Males (<i>N</i> =1346) % (<i>n</i>)	Females (<i>N</i> =1245) % (<i>n</i>)	<i>Z</i> (<i>p</i>)
Death of close family member	71 (1839)	66.2 (891)	76.1 (947)	5.53 (<0.001)
Road traffic accident	10.6 (275)	12.1 (163)	9.0 (112)	2.57 (0.005)
Near-drowning	7.2 (187)	9.1 (123)	5.2 (65)	3.84 (<0.001)
Victim of robbery	8.8 (228)	9.5 (128)	8.0 (100)	1.33 (0.092)
Adult physical assault (>18 years)	16.8 (436)	20.0 (268)	13.5 (167)	4.42 (<0.001)
Childhood physical assault (<18 years)	48.7 (1263)	52.5 (706)	44.7 (557)	3.92 (<0.001)
Childhood bullying (<18 years)	44.4 (1150)	41.9 (563)	47.3 (587)	2.72 (0.003)
Childhood sexual abuse (<18 years)	2.5 (66)	0.7 (9)	4.6 (57)	6.31 (<0.001)

Estimates weighted for over-sampling of child protection cases

Z test comparing proportions of males and females

Significant differences in bold

and childhood bullying. Notably, a small percentage of the sample reported experiencing childhood sexual abuse (2.5%). Statistically significant sex differences were observed for all trauma types except being the victim of a robbery. A significantly greater proportion of females experienced the death of a close family member, childhood bullying, and childhood sexual abuse. Contrastingly, a significantly greater proportion of males experienced a road traffic accident, near-drowning, physical assault during adulthood, and physical assault during childhood.

Associations between traumatic exposure and PTSD and CPTSD class membership

Inspection of the unadjusted ORs in Table 3 shows that five of the eight traumatic exposures were associated with an increased risk of PTSD class membership (as compared to the non-symptomatic class). The strongest associations were observed between childhood sexual abuse and adult physical assault. Females were also significantly more likely than males to belong to the PTSD class. With respect to CPTSD class membership

Table 3 Chi square unadjusted odds ratios between traumatic events, covariates, and PTSD and CPTSD class membership ($N=2591$)

Variable	ICD-11 PTSD OR (95% CI)	<i>P</i>	ICD-11 CPTSD OR (95% CI)	<i>P</i>	ICD-11 CPTSD* OR (95% CI)	<i>P</i>
Death of a close family member	1.30 (0.81/2.10)	0.311	1.04 (0.43/2.51)	1.00	1.36 (0.51/3.66)	0.630
Road traffic accident	1.54 (0.82/2.89)	0.190	1.56 (0.54/4.57)	0.342	1.02 (0.30/3.47)	1.00
Near-drowning	2.21 (1.15/4.26)	0.023	2.45 (0.83/7.18)	0.104	1.11 (0.32/3.83)	1.00
Robbery	2.15 (1.16/3.96)	0.022	1.40 (0.42/4.70)	0.483	1.17 (0.28/4.81)	0.828
Adult physical assault	3.37 (2.11/5.38)	0.000	10.17 (4.50/22.99)	0.000	3.02 (1.20/7.64)	0.023
Childhood physical assault	1.40 (0.89/2.20)	0.168	5.93 (2.04/17.25)	0.000	4.25 (1.34/13.50)	0.010
Childhood bullying	1.57 (1.00/2.48)	0.050	3.30 (1.37/7.92)	0.007	2.09 (0.79/5.58)	0.165
Childhood sexual abuse	3.84 (1.60/9.24)	0.008	24.76 (10.55/58.13)	0.000	6.44 (2.02/20.55)	0.002
Sex (female)	1.71 (1.08/2.71)	0.022	2.09 (0.93/4.71)	0.077	1.22 (0.48/3.08)	0.817
Living status	1.04 (0.63/1.72)	1.00	1.34 (0.54/3.36)	0.665	1.29 (0.46/3.63)	0.799
Employment status	1.89 (0.89/4.00)	0.133	10.31 (4.60/23.14)	0.000	5.47 (1.86/16.05)	0.002

Significant effects in bold

Estimates weighted for over-sampling of child protection cases

Reference group non-symptomatic class, OR (95% CI) Odds Ratio with 95% confidence interval, *P* statistical significance value

*In this set of analysis, the PTSD class was set as the reference category

Table 4 Multinomial logistic regression adjusted odds ratios between traumatic events, covariates, and PTSD and CPTSD class membership ($N=2591$)

Variable	ICD-11 PTSD OR (95% CI)	<i>P</i>	ICD-11 CPTSD OR (95% CI)	<i>P</i>	ICD-11 CPTSD* OR (95% CI)	<i>P</i>
Death of a close family member	1.32 (0.82/2.15)	0.258	1.01 (0.40/2.57)	0.983	1.31 (0.47/3.68)	0.608
Road traffic accident	1.32 (0.82/2.15)	0.418	1.25 (0.37/4.20)	0.719	1.25 (0.47/4.70)	0.944
Near-drowning	2.08 (1.06/4.12)	0.034	1.62 (0.47/5.56)	0.441	1.05 (0.27/4.02)	0.718
Robbery	1.85 (0.98/3.48)	0.059	1.58 (0.43/5.81)	0.491	1.17 (0.28/4.81)	0.828
Adult physical assault	3.19 (1.96/5.18)	0.000	6.80 (2.84/16.13)	0.000	2.13 (0.80/5.65)	0.128
Childhood physical assault	1.23 (0.78/1.97)	0.372	3.62 (1.21/10.87)	0.021	2.92 (0.90/9.52)	0.074
Childhood bullying	1.39 (0.87/2.21)	0.167	2.04 (0.81/5.13)	0.132	1.47 (0.53/4.05)	0.462
Childhood sexual abuse	1.90 (0.73/4.95)	0.186	9.43 (3.41/26.32)	0.000	4.98 (1.35/18.52)	0.016
Sex (female)	2.00 (1.23/3.24)	0.005	2.02 (0.80/5.08)	0.138	1.01 (0.36/2.74)	0.987
Living status	1.04 (0.63/1.75)	0.855	1.23 (0.44/3.40)	0.691	1.17 (0.38/3.58)	0.781
Employment status	1.66 (0.77/3.61)	0.197	6.99 (2.77/17.54)	0.000	4.20 (1.33/13.33)	0.015

Significant effects in bold

Estimates weighted for over-sampling of child protection cases

Reference group non-symptomatic class, OR (95% CI) Odds Ratio with 95% confidence interval, *P* statistical significance value

*In this set of analysis, the PTSD class was set as the reference category

(as compared to the non-symptomatic class), the unadjusted ORs indicated a significant relationship between four traumatic events and CPTSD. All three childhood exposures were significantly associated, along with adult physical assault, and a strong association was observed for childhood sexual abuse. Unemployment status was also significantly, and robustly, associated with CPTSD class membership. Finally, those who had experienced childhood sexual abuse, childhood physical assault, adult

physical assault, and were unemployed were significantly more likely to be classified with CPTSD as compared to PTSD.

Table 4 reports the adjusted ORs from the multinomial logistic regression analyses. The model which contained sex, living status, employment status, and the eight traumatic stressors was statistically significant ($\chi^2(22)=132.67$, $p<.001$). Within this multivariate model, two traumatic events remained significant predictors of

PTSD class membership (as compared to the non-symptomatic class): adult physical assault, and experiencing a near-drowning. Sex remained significant with females twice as likely as males to belong to the PTSD class. With respect to CPTSD class membership (as compared to the non-symptomatic class), childhood bullying was no longer a significant predictor. Childhood sexual abuse was the strongest predictor of CPTSD class membership, followed by unemployment status, adult physical assault, and childhood physical assault. In terms of differentiating CPTSD class membership from PTSD class membership, two variables emerged as significant predictors. Those who had experienced childhood sexual abuse were approximately five times more likely to belong to the CPTSD class than the PTSD class, and those who were unemployed were approximately four times more likely to belong to the CPTSD class than the PTSD class.

Finally, to determine the effect of cumulative exposure to multiple forms of childhood interpersonal trauma on risk of CPTSD classification, as compared to PTSD classification an aggregate childhood trauma variable was constructed (0, 1, 2, and 3). This aggregate variable was entered into the equation as a categorical variable and the first level (zero childhood interpersonal traumatic exposures) was used as the reference category for a simple contrast. The model as a whole was statistically significant ($\chi^2(11)=29.95, p=.002$). The odds ratios for one childhood interpersonal trauma ($OR=2.00, p=.51, 95\% CI=0.26-15.53$), two traumas ($OR=2.57, p=.37, 95\% CI=0.33-19.82$), and three traumas ($OR=77.66, p=.005, 95\% CI=3.67-1645.78$) indicated an increasing risk of CPTSD classification, as compared to PTSD classification, as the number of childhood traumatic exposures increased.

Discussion

The ICD-11 proposals for PTSD and CPTSD suggest that exposure to traumatic stressors of an interpersonal nature which are prolonged and repeated, or comprised of multiple forms under conditions from which escape is difficult or impossible, are likely to increase risk of CPTSD as opposed to PTSD. In particular, interpersonal trauma experiences that occur during early development are regarded as prototypical forms of trauma that are likely to increase risk of DSO symptomatology, in addition to core PTSD symptomatology. The objective of the current study was to determine if exposure to certain forms of interpersonal trauma during the first 18 years of life (sexual abuse, physical assault, and bullying) was associated with an elevated risk of CPTSD symptomatology, as compared to PTSD, and if exposure to multiple forms of childhood interpersonal trauma was associated with an elevated risk of CPTSD

symptomatology, as compared to PTSD symptomatology, in a dose-response fashion.

The majority (87.1%) of Danes aged 24 were found to have been exposed to at least one of the eight traumatic life events measured in this study, thus satisfying the traumatic-exposure requirement in ICD-11 for consideration of a diagnosis of PTSD or CPTSD. Findings from the WHO's *World Mental Health Survey Consortium* [26] which analysed epidemiological data (primarily of a nationally representative nature) from 24 nations found that, collectively, 70.4% of individuals had experienced at least one lifetime traumatic exposure. The range of traumatic exposure varied considerably from a low of 28.6% in Bulgaria to a high of 84.6% in Ukraine. Denmark was not included within these national figures; therefore, current findings suggest that this cohort of Danes aged 24 is reflective of the higher end of the global continuum of traumatic exposure.

The trauma literature has consistently indicated that PTSD is a more common disorder among females, with a two-fold increased prevalence as compared to males [27, 28]. In the current study, bivariate results were consistent with the existing literature indicating that females were twice as likely as males to belong to the PTSD and CPTSD classes. Within the multivariate analyses sex remained a significant predictor of PTSD class membership but did not significantly predict CPTSD classification. It was notable, however, that the effect sizes for the relationship between sex and both PTSD and CPTSD class membership were equivalent suggesting that the null effect for sex on CPTSD classification was likely the result of insufficient statistical power due to the small number of people who belonged to the CPTSD class. Although sex appeared to be associated with an increased risk of both PTSD and CPTSD classification when compared to the non-symptomatic class, sex did not serve to distinguish CPTSD classification from PTSD classification specifically. In other words, being female appears to be associated with an increased risk of PTSD and CPTSD, even when controlling for various forms of traumatic exposure that predominately effect females (e.g., childhood sexual abuse), however sex does appear to differentiate between a PTSD and CPTSD response to trauma. To extend work regarding the role of sex in the prediction of both PTSD and CPTSD, it will be important that future work considers the interaction effects between sex and traumatic exposure.

Results of the bivariate and multivariate analyses were generally supportive of proposals for ICD-11 and in-line with prior findings [7]. Within the multivariate framework, controlling for different forms of trauma and sociodemographic risk-factors, childhood sexual abuse was the strongest risk factor for CPTSD classification, as compared to the non-symptomatic class. Furthermore, exposure to physical assault during both childhood and adulthood increased

risk of CPTSD classification. In an attempt to differentiate CPTSD class membership from PTSD class membership, the only traumatic experience that remained significant within the multivariate model was childhood sexual abuse. Furthermore, results indicated that cumulative exposure to childhood interpersonal trauma heightened risk of CPTSD symptomatic responses, as compared to PTSD symptomatic responses, in a manner possibly suggestive of a dose–response relationship; the small sample sizes and wide confidence intervals should, however, suggest caution against over-interpreting these results. Nonetheless, these results contribute to existing findings [7, 22] supporting the ICD-11 proposals that exposure to interpersonal abuse during early development leads to an increased likelihood of a complex psychological response to trauma.

That childhood sexual abuse, and the accumulation of early interpersonal forms of trauma, conferred an increased risk for CPTSD symptomatic responses over and above PTSD symptoms, suggests that the DSO symptom categories that characterise CPTSD may be specifically interpretable in the context of these particular forms of trauma. For instance, evidence from the trauma and developmental psychopathology literature suggests that early interpersonal trauma/abuse, particularly of a sexual nature, can directly promote and facilitate negative self-concept formulation. Multiple studies attest to this trauma induced ‘self-criticism’. For example, childhood trauma (especially interpersonal and sexual abuse) has been shown to be highly associated with ‘mental contamination’ [29], self-denigration [30], self-disgust [31], self-harm [32] and suicidality [33]. Given the context and nature of these specific early traumatic stressors, CPTSD may capture those specific self-evaluative features that reflect the trauma-induced shame, guilt, depression, and disgust commonly associated with these early forms of interpersonal trauma.

Regarding the disturbed relationship cluster of CPTSD, evidence shows that childhood interpersonal traumas such as sexual abuse often create an enduring vulnerability which is accompanied, facilitated, and compounded by social withdrawal, disconnection, and isolation [34]. Commonly identified in sexually traumatised individuals [35, 36], social inhibitors, and constraints such as avoidance, social anxiety, and social phobia may plausibly exacerbate and compound posttraumatic reactions and in turn facilitate and promote a more ‘complex’ manifestation of PTSD. The distinctiveness of the CPTSD construct and the greater impairment associated with it (as compared to PTSD: see Elklit et al. [23]) may therefore be partly attributable to the often extreme and negative social and socializing consequences of these early forms of interpersonal threat, violation, and harm.

Finally, regarding affect dysregulation symptoms, the trauma literature is replete with studies that evidence the

impaired ability of childhood sexual trauma survivors to regulate and/or tolerate negative emotional states (see Dvir et al. [10]). Childhood interpersonal trauma, especially repeated and prolonged traumatic exposures that are expected to increase risk of CPTSD, often compromises the acquisition and development of ‘appropriate’ affective regulatory skills and can thus be meaningfully understood in relation to the affective dysregulation symptoms within a CPTSD framework. This disruption of emotional regulation may occur as a direct result of the psychological impact of the trauma but may also potentially reflect the well-evidenced neurobiological effects of such early interpersonal trauma [37–39]. Collectively, therefore, these three DSO categories that are proposed to distinguish CPTSD from PTSD certainly ‘fit’ the existing evidence base that currently informs our understanding of the physical, affective, behavioural, cognitive, and interpersonal sequelae that characterise these early forms of interpersonal trauma.

A number of important limitations should be considered when interpreting the current findings. First, a weakness of the study was the approximation of the PTSD and DSO symptoms. The PTSD symptoms were not anchored to an index trauma, and the DSO symptoms were predominately derived from non-clinical scales. The problematic nature of use of items from non-clinical scales is evidenced by the very high rates of endorsement for the three DSO symptom clusters. This suggests that although estimates of ICD-11 PTSD and CPTSD were low (3 and 1%, respectively), these figures are likely inflated relative to the true cases of PTSD and CPTSD. Nationally representative surveys using measures specifically designed to capture ICD-11 PTSD and CPTSD are thus warranted. Second, the most commonly endorsed traumatic life event within this cohort was experiencing the death of a loved one; an event that is more closely related to the experience of prolonged grief disorder (PGD) than PTSD and CPTSD [40]. The inability to screen for prolonged grief reactions likely limited our capacity to fully understand the mental health effects of the traumatic events encountered within this sample. Future work will need to explore the interplay between PTSD, CPTSD, and PGD, and will need to consider whether exposure to the death of a loved one can be considered a traumatic event that allows one to qualify for a diagnosis of PTSD or CPTSD, as opposed to PGD.

Despite these limitations, the current study provides novel and important evidence to inform the psychotraumatology research literature. The findings indicate that exposure to early developmental trauma is meaningfully associated with CPTSD symptomatology, and that exposure to childhood sexual abuse, specifically, predicts a complex traumatic response as compared to a PTSD response. Additionally, in-line with ICD-11 proposals for CPTSD, we also found tentative evidence that exposure to multiple forms of

early developmental trauma increases risk of CPTSD in a dose–response manner. It was also notable that unemployment status was also a meaningful differentiating factor between CPTSD and PTSD suggesting that social factors play an important role in understanding the development of CPTSD. Trauma history appears to be important in understanding the development of CPTSD but researchers should not ignore the wider societal context in which the trauma, and the traumatic response, occurs. Current findings add to a growing literature supporting the validity of CPTSD as a unique diagnostic entity. This has important clinical implications as CPTSD, possessing a distinct aetiology and symptom composition, likely requires distinct clinical interventions to maximise treatment efficacy [41].

Author contribution statement PH, JM, MS, FV, EM, and MC (Cloitre) were responsible for the development of the study objectives, study design, and analytical strategy. All contributed to conducting the statistical analysis, background research, and writing of the manuscript. AE and MC (Christoffersen) were responsible for gaining access to the data used in this study, and were responsible for writing the method section of manuscript. Both contributed to the manuscript as a whole through revisions. All authors contributed meaningfully to the production of the manuscript submitted for review, and have agreed to the order of authors as presented.

Compliance with ethical standards

Conflict of interest Marylène Cloitre participated as a member of the World Health Organization Working Group on the Classification of Disorders Specifically Associated with Stress, reporting to the International Advisory Group for the Revision of ICD-10 Mental and Behavioural Disorders. However, the views expressed reflect the opinions of the author and not necessarily the Working Group or Advisory Group and the content of this article does not represent WHO policy. No conflict of interest associated with other authors.

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