



BASIC RESEARCH ARTICLE



Examination of ICD-11 PTSD and CPTSD using the International Trauma Questionnaire – Child and Adolescent version (ITQ-CA) in a sample of Danish children and adolescents exposed to abuse

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ABSTRACT

Background: International research has established that children and adolescents are at risk for posttraumatic stress disorder (PTSD) and complex PTSD (CPTSD) as defined by the WHO ICD-11. There is a need for a Danish language version of the International Trauma Questionnaire – Child and Adolescent (ITQ-CA) to assess symptoms of PTSD and CPTSD.

Objective: To test the ICD-11 formulations of PTSD and DSO (Disturbances of Self-Organization) using the ITQ-CA version in a sample of children exposed to abuse. Additionally, to study the distribution of symptoms and probable prevalence of ICD-11 PTSD and CPTSD among the population of children exposed to violence or sexual abuse.

Method: Confirmatory factor analysis of competing models of the dimensionality of the ITQ-CA was tested among a sample of 119 children and adolescents that were referred to the Danish Children Centres on suspicion of physical or sexual abuse or both. Latent class analysis (LCA) was used to study the distribution of symptoms and consequences of different operationalisations of functional impairment were explored.

Results: Findings supported a two-factor second-order model corresponding to the operationalisation of CPTSD in ICD-11 as the best representation of the data. Findings from the LCA suggested that symptoms were distributed in a pattern consistent with the ICD-11 proposal for CPTSD. CPTSD was more prevalent than PTSD regardless of the operationalisation of functional impairment.

Conclusion: ITQ-CA is a valid tool for identifying symptoms of ICD-11 PTSD and CPTSD among Danish children exposed to physical or sexual abuse. Further research is needed to study the relationship between ICD-11 C/PTSD symptomatology and anxiety and depression in this population.

Examen de TEPT y TEPTC de la CIE-11 utilizando el Cuestionario Internacional de Trauma – Versión para niños y adolescentes (ITQ-CA) en una muestra de niños y adolescentes daneses expuestos a abuso

Antecedentes: La investigación internacional ha establecido que los niños y los adolescentes corren el riesgo de sufrir un trastorno de estrés postraumático (TEPT) y un TEPT complejo (TEPTC) según lo define la CIE-11 de la OMS. Se necesita una versión en danés del Cuestionario Internacional de Trauma – Niños y Adolescentes (ITQ-CA) para evaluar los síntomas de TEPT y TEPTC.

Objetivo: Probar las formulaciones CIE-11 de TEPT y DSO (Alteraciones en la auto-organización; por sus siglas en inglés) usando la versión ITQ-CA en una muestra de niños expuestos a abuso. Además, estudiar la distribución de los síntomas y la probable prevalencia de TEPT y TEPTC según la CIE-11 entre la población de niños expuestos a violencia o abuso sexual.

Método: Se utilizó un modelo de análisis factorial confirmatorio de modelos competitivos de la dimensionalidad del ITQ-CA en una muestra de 119 niños y adolescentes que fueron remitidos a los Centros de Niños de Dinamarca (Danish Children Centers) por sospecha de abuso físico o sexual, o ambos. Se utilizó el análisis de clase latente (LCA, por sus siglas en inglés) para estudiar la distribución de los síntomas y se exploraron las consecuencias de diferentes operacionalizaciones del deterioro funcional.

Resultados: Los hallazgos respaldaron un modelo de segundo orden de dos factores correspondiente a la operacionalización del TEPTC según la CIE-11 como la mejor representación de los datos. Los hallazgos del LCA sugirieron que los síntomas se distribuyeron en un patrón consistente con la propuesta de la CIE-11 para TEPTC. El TEPTC fue más frecuente que el TEPT independientemente de la operacionalización del deterioro funcional.

Conclusión: La ITQ-CA es una herramienta válida para identificar síntomas de TEPT y TEPTC según la CIE-11 entre niños daneses expuestos a abuso físico o sexual. Se necesita más

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关键词

ICD-11 PTSD; 复杂性 PTSD; 身体虐待; 性虐待; 儿童; 青少年; 创伤; 暴力

HIGHLIGHTS

- The International Trauma Questionnaire – Child and Adolescent version (ITQ-CA) is a valid measure of symptoms of ICD-11 posttraumatic stress disorder (PTSD) and complex PTSD among Danish children exposed to physical or sexual violence.
- The structure of the ITQ-CA in the Danish sample reflects the ICD-11 diagnostic algorithm.
- CPTSD is a more prevalent disorder among children recently exposed to violence than PTSD.

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investigación para estudiar la relación entre la sintomatología TEPT/C según la CIE-11 y ansiedad y depresión en esta población.

在一个丹麦儿童和青少年样本中使用儿童和青少年版国际创伤问卷 (ITQ-CA) 考查 ICD-11 PTSD 和 CPTSD

背景: 国际研究表明, 儿童和青少年有患上 WHO ICD-11 定义的创伤后应激障碍 (PTSD) 和复杂性 PTSD (CPTSD) 的风险。需要丹麦语版本的国际创伤问卷——儿童和青少年 (ITQ-CA) 来评估 PTSD 和 CPTSD 的症状。

目的: 使用 ITQ-CA 版本在遭受虐待的儿童样本中检验 ICD-11 中 PTSD 和 DSO (自组织干扰) 构念。此外, 研究 ICD-11 PTSD 和 CPTSD 在遭受暴力或性虐待的儿童人群中的症状分布和可能患病率。

方法: 在一个 119 名因可能涉及身体虐待或性虐待或两者兼有而被转介到丹麦儿童中心儿童和青少年样本中, 检验了 ITQ-CA 维度竞争模型的验证性因素分析。潜在类别分析 (LCA) 用于研究症状的分布, 并考查了功能受损不同操作化的后果。

结果: 研究结果支持对应 ICD-11 中 CPTSD 操作化的双因素二阶模型作为数据的最佳表示。LCA 结果表明, 症状的分布模式与 ICD-11 对 CPTSD 的提议一致。无论功能受损的操作化如何, CPTSD 都比 PTSD 更普遍。

结论: ITQ-CA 是识别遭受身体虐待或性虐待的丹麦儿童 ICD-11 PTSD 和 CPTSD 症状的有效工具。需要进一步的研究来考查这一群体中 ICD-11 C/PTSD 症状与焦虑和抑郁之间的关系。

1. Introduction

The 11th version of the International Classification of Diseases (ICD) presented a revised formulation of post-traumatic stress disorder (PTSD) and a new related but distinct disorder of complex PTSD (CPTSD) that was officially introduced in 2018 (WHO, 2018). The ICD-11 PTSD formulation includes exposure to one or more extremely threatening or horrific events and symptoms from within each of three clusters of re-experience of trauma, avoidance of traumatic reminders, and persistent sense of threat and associated functional impairment. CPTSD includes symptoms of PTSD from all three symptom clusters and additionally symptoms from clusters related to disturbances of self-organisation (DSO). Clusters of DSO include severe and pervasive problems of dysregulation of affect, negative self-concept, and disturbances in relationships. In addition, associated functional impairment with these symptoms must be present. As such, CPTSD describes a more complex symptom presentation and are commonly associated with repeated or prolonged traumas which are difficult or impossible to escape from, such as torture, prolonged domestic violence, or repeated childhood physical or sexual abuse (WHO, 2018).

The validity of the ICD-11 proposal for PTSD and CPTSD has been supported among adults (Brewin et al., 2017) and several studies have supported the relationship between CPTSD and childhood trauma-exposure among adults, particularly emphasising childhood sexual abuse (Hyland et al., 2017; Hyland et al., 2021; Karatzias et al., 2019). However, only few studies have explored the applicability of the ICD-11 description of PTSD and CPTSD among children and adolescents. The recent publication of the International Trauma Questionnaire in a Child and Adolescent version (ITQ-CA; Cloitre et al., 2018)

enables assessment and test of the utility of the ICD-11 proposals for PTSD and CPTSD to describe symptoms of posttraumatic stress in children and adolescents in the near aftermath of the trauma-exposure. This is an imperative task as early detection of symptoms of CPTSD may enable early and appropriate treatment for children in need and prevent long-term debilitating physical and mental health problems associated with trauma-exposure. Additionally, the clinical implementation of ICD-11 in Denmark and other European countries is approaching rapidly, and knowledge on the factorial validity and prevalence of ICD-11 PTSD and CPTSD among children and adolescents is an important step in qualifying the alternation between ICD-10 and ICD-11. Therefore, the present study set out to examine the symptom structure of the ICD-11 constructs of PTSD and DSO in a high-risk group of children and adolescents referred to the Danish Children Centres (DCC) due to suspicion of exposure to physical and/or sexual abuse.

The DCC are governmentally initiated institutions whose national services on trauma assessment among other things are a mandatory supplement to the municipality social section's handling of cases of suspected child abuse which includes a thorough investigation of the child's welfare by the authorities (Danish Board of Social Affairs, 2013; Løkkegaard et al., 2021). Due to the strong association between exposure to child abuse and ICD-11 PTSD and CPTSD (Hyland et al., 2017; Hyland et al., 2021; Karatzias et al., 2019), this study sample offers a unique opportunity to test the validity of the ICD-11 proposals for PTSD and CPTSD. An additional aim of the present study was to assess the prevalence of ICD-11 PTSD and CPTSD among children and adolescents

referred to assessment based on suspected interpersonal trauma-exposure.

1.1 ICD-11 symptom structure of PTSD and CPTSD

Recently, the ITQ was adapted to a child and adolescent version to increase comprehensibility for a younger target group, resulting in the ITQ-CA (Cloitre et al., 2018). To our knowledge, six studies to date have examined the ICD-11 construct of PTSD and CPTSD in children and adolescents using the ITQ or ITQ-CA: Four studies among general population samples (Kazlauskas et al., 2020, ITQ-CA; Li et al., 2021; Redican et al., 2022; Tian et al., 2020, ITQ) and two studies among foster children (Haselgruber et al., 2020a, ITQ-CA; Haselgruber et al., 2020b, ITQ). Across the published studies, evidence is converging to support either a six-factor correlated first-order model of the symptom clusters in PTSD and DSO (Li et al., 2021; Kazlauskas et al., 2020), or a second-order two-factor model (Haselgruber et al., 2020a; 2020b; Redican et al., 2022), although differences in fit across the studies were overall marginal. Existing findings on factor structure in studies of children and adolescents appear to exhibit a similar tendency as found in studies among adults: the two-factor second-order model has more often been identified as the best fitting model in samples resembling clinical populations and the correlated six-factor model has been identified as the best fitting model in the general population, as suggested by Haselgruber and colleagues (2020a).

A total of five studies also studied the distribution of symptoms of ICD-11 PTSD and DSO using latent class analysis (Haselgruber et al., 2020b; Kazlauskas et al., 2020; Li et al., 2021), latent profile analysis (Tian et al., 2020) or factor mixture modelling (Redican et al., 2022). Three studies identified four identical classes (CPTSD, PTSD, DSO only, and a baseline class, Haselgruber et al., 2020a; Kazlauskas et al., 2020; Li et al., 2021), one study identified a three-class solution (CPTSD, PTSD, and low symptoms) in a high risk sample of foster children (Haselgruber et al., 2020b), and finally, the hitherto only study to date studying the symptom distribution while taking the latent dimensionality of the syndromes into account partially replicated the findings of the four-class solutions with the only difference being that Redican et al. (2022) only found a partial PTSD-class. However, there is a lack of studies on high-risk samples of trauma-exposed children (Cloitre et al., 2021). The present study therefore adds to the growing research on ICD-11 symptom structure of CPTSD in children by testing the validity of the ICD-11 proposal for PTSD and DSO and latent classes of symptom profiles using a Danish translation of the ITQ-CA on a

high-risk group of children who have been referred to a DCC due to an acute suspicion of exposure to physical and/or sexual child abuse.

1.2 Functional impairment associated with ICD-11 PTSD and CPTSD among children and adolescents

The DCC are modelled after the Icelandic 'Barnahus-model' where children referred to assessment are screened for trauma-related symptomatology following suspected physical, sexual, or psychological abuse (Løkkegaard et al., 2021). The trauma-screening contributes to a final set of recommendations regarding the child's needs in relation to recovering from the abuse that ideally facilitate access to relevant treatment. Under these circumstances, the accurate description of the presence and severity of PTSD and CPTSD symptomatology may be pivotal in ensuring that the child receives sufficient and relevant support. In clinical practice, the utility of diagnoses rests partly on their ability to distinguish between people with symptoms sufficiently severe to cause some form of functional impairment (Cloitre et al., 2021).

In the adult version of the ITQ, three items on associated functional impairment (social, occupational and other important life areas) are answered on a 5-point Likert scale after symptoms of PTSD and after symptoms of DSO and endorsement of functional impairment is defined as a score of 2 or more. In the ITQ-CA, five items on functional impairment related to areas of friends, family, school, other important areas, and general happiness are answered on a binary (yes/no) scale after symptoms of PTSD and DSO. Functional impairment is considered endorsed so long as 1 of 5 items are answered with 'yes'. As a secondary purpose of this manuscript, we explore rates of diagnostic endorsement based on varying diagnostic algorithms related to functional impairment and functional impairment associated with clinical and subclinical symptomatology.

1.3 Study aim and hypotheses

The primary aim of the present study was to test the validity of the ICD-11 proposals for PTSD and DSO in a Danish clinical sample using the ITQ-CA. Confirmatory factor analysis (CFA) was used to test the dimensional structure of the ITQ-CA, and latent class analysis (LCA) was used to study the distribution of symptoms across the sample. Finally, an additional aim of the study was to assess the prevalence of ICD-11 PTSD and CPTSD and associations to functional impairment among children exposed to interpersonal violence. We had the following hypotheses:

Hypothesis 1: Based on existing evidence (Haselgruber et al., 2020a, 2020b), it was hypothesised that the two-factor second-order model corresponding to the ICD-11 proposal for PTSD and DSO would provide the best fit for the data. Furthermore, based on existing evidence suggesting that PTSD, anxiety, and depression are all highly correlated internalising disorders (Kotov et al., 2017), we expected that scores on the ITQ-CA would converge with scores on depression and anxiety. Additionally, negative self-concept is part of the diagnostic criterion for DSO and previous research has established that youth suffering from PTSD are more prone to a negative self-concept (Saigh et al., 2008), we expected that scores on the ITQ-CA would diverge from scores on positive self-concept.

Hypothesis 2: We expected at minimum, two classes corresponding to the diagnostic criteria for ICD-11 PTSD and CPTSD would be identified in the LCA.

Hypothesis 3: Based on existing research (Redican et al., 2022) and the nature of the current sample, we expected a higher prevalence of CPTSD than PTSD.

2. Method

2.1 Participants and procedures

A total of 119 children (81.5% girls, $n = 97$) were recruited from the DCC, ages ranging from 9 to 18 ($M = 14.7$, $SD = 1.56$, mode = 15 years ($n = 30$), median = 15 years). The DCC are a governmentally initiated organisation that offer of specialised support to the municipal authorities in handling cases of suspected child abuse. In the psychological assessment, all DCC use a range of standardised and developmentally sensitive measures that are prioritised depending on the clinician's initial evaluation of the child. The ITQ-CA was included as one of the screening tools for assessing children for potential PTSD during the fall of 2019 and is continuously used as part of the DCC assessment schedule. Data collected between October 2019 and December 2020 was used for the current study, and the current study is therefore based on secondary data analysis. Permissions for this were obtained through the Data Protection Agency of the University of Southern Denmark (RIO) and data was handled in accordance with General Data Protection Regulations (GDPR).

2.2 Measures

ICD-11 PTSD and CPTSD: The ITQ-CA (Cloitre et al., 2018) was used to assess symptoms of PTSD and CPTSD. The ITQ-CA consists of six questions assessing symptoms of ICD-11 PTSD with two symptoms per cluster, and six questions assessing symptoms of DSO with two symptoms per cluster. Sample items for PTSD include 'bad dreams reminding me of

what happened' for re-experiencing, 'trying not to think about what happened. Or to not have feelings about it' for avoidance, and 'being jumpy' for sense of threat. For DSO, sample items include 'not being able to have any feelings or feeling empty inside' for affective dysregulation, 'thinking I am not a good person' for negative self-concept and 'not feeling close to other people' for disturbed relationships. All items are scored on a 5-point Likert-like scale ranging from 0 ('not at all') to 4 ('almost always'). A score of 2 ('sometimes') or more on any item is taken to reflect the presence of a symptom. Functional impairment is rated dichotomously across a total of 5 domains: (1) getting along with friends, (2) getting along with family, (3) school-functioning, (4) other important areas of life (hobbies and other relationships), and (5) distress (worded as 'general happiness'). A probable diagnosis of PTSD is assigned upon fulfilment of 1 symptom in each cluster and fulfilment of functional impairment, and a probable diagnosis of CPTSD is assigned upon fulfilment of 1 symptom in each cluster of DSO and functional impairment in addition to PTSD. Cronbach's alpha for the ITQ-CA was 0.88, and 0.79 for the PTSD subscale and 0.97 for the DSO subscale.

The English version of the ITQ-CA was translated using a translate-backtranslate approach. Initially, MLV and SSL (both Danish as first language and fluent in English) independently translated the ITQ-CA from English to Danish. MLV and SSL compared the independent translations to form the first draft of the Danish version. Inconsistencies were discussed until resolved, and in cases of unresolved differences, both translations were included in a version for review by a subject matter expert, AE (Danish as first language, fluent in English). A consensus version was sent to receive feedback from a psychologist in the DCC as well as a psychologist specialised in child psychology. The final Danish version was back-translated to English by a native English speaker with Danish as a second language, and the backtranslation was reviewed by members of the ITQ working-group with no remarks (M. Shevlin & C. Brewin, personal communication).

Anxiety, depression and self-concept: *Beck Youth Inventories* (BYI; Beck et al., 1988) is a self-report questionnaire for children and young people (7–14 years) that measure symptoms of anxiety, self-concept, depression, anger and disruptive behaviour (Thastum et al., 2009). Each scale contains 20 assessment questions in an easy-to-understand language that is answered on a four-point scale ranging from 0 ('never') to 3 ('always') and is scored by summing the individual scores. BYI has been validated with Danish children including norms for children aged 7–18 years (Beck et al., 2012). Internal consistency has been shown to be good to excellent for all scales ($\alpha = .87-.92$) and test-retest reliability, except at 7-year-

olds and for the anxiety scale (Thastum et al., 2009). In the current study, sum scores on all subscales were used to test the validity of the ITQ-CA factor structure.

Physical and sexual violence: As part of the visitation of cases of suspected child abuse, the employees at the DCCs registered whether the children had been a victim of physical and/or sexual abuse.

2.3 Statistical analyses

For the first aim, two factor-models were specified to describe the internal structure of the ITQ-CA: Model 1 was a six-factor first-order model reflecting the symptom clusters of ICD-11 that are free to correlate, and model 2 was a two-factor second-order model consistent with the ICD-11 proposal for PTSD and DSO. The models are illustrated in Figure 1.

Model-fit was evaluated using a standard range of model fit indices. The Comparative Fit Index (CFI; Bentler, 1990) and Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) indicates the proportionate improvement in fit of a hypothesised model compared to a more restricted baseline model, and values $\geq .90$ and $\geq .95$ reflect acceptable and excellent model fit, respectively. Absolute fit indices included the chi-square test (χ^2), Root Mean Square Error of Approximation (RMSEA; Jöreskog & Sörbom, 1993) and the Standardised Root Mean Square Residual (SRMR; Jöreskog & Sörbom, 1993). Models with a RMSEA (Jöreskog & Sörbom, 1993) values below $\leq .08$ and $\leq .05$ reflect acceptable and excellent model fit, respectively, and previously, differences in RMSEA values of 0.015 has been taken to reflect meaningful differences between models (Chen, 2007). SRMR values below $\leq .05$ reflect a well-fitting model (Byrne, 2012). Finally, the Bayesian Information Criterion (BIC; Schwarz, 1978) was the absolute fit index used to compare the relative fit of the models. Previous research has found that a difference of 10 or more points lower on the BIC indicating superior model fit (Raftery, 1995). The dimensional structure was validated through the relationship to BYI-subscale and predictors (age, gender, and referral-reason) using bi- and multivariate regression analyses.

Latent class analysis (LCA) was used to test the distribution of symptoms. The fit of six models (a one-through six-class model) was assessed, and model fit was estimated using robust maximum likelihood applying all available data for model estimation (Yuan & Bentler, 2000). To avoid solutions based on local maxima, 1,000 random sets of starting values and 500 final stage optimizations were calculated. The relative fit of the models was compared by using three parsimony corrected fit indices: Akaike Information Criterion (AIC; Akaike, 1987), BIC (Schwarz, 1978), and sample size-adjusted BIC (ssaBIC; Sclove,

1987). The model that produces the lowest values can be judged as the best model provided that classes are differing qualitatively from each other (Debowska, Willmot, Boduszek, & Jones, 2017; Schwarz, 1978). Additionally, the Lo-Mendell-Rubin adjusted likelihood ratio-test (LMRT; Lo et al., 2001) and bootstrapped likelihood ratio-test (BSLRT; Peel & McLachlan, 2000) was used to assess whether models with additional classes constituted a significant improvement in describing the data compared to the previous models. The entropy of each solution was used as an indicator of the adequacy of the classification of individuals. Values closer to 1 are indicative of better classification (Ramaswamy, DeSarbo, Reibstein, & Robinson, 1993). The validity of the LCA-classes was examined through relationships to the BYI-dimensions using the three-step method (Asparouhov & Muthén, 2014).

Finally, diagnostic rates were computed using the ICD-11 taxonomy for symptom endorsement and increasingly strict criteria for functional impairment. Three algorithms were tested: (a) Endorsement of symptoms without any functional impairment, (b) endorsement of any of the five criteria, and (c) endorsement of distress and impairment in any of the remaining areas of functioning. Analyses were conducted in Mplus version 8.1 (Muthén & Muthén, 2018) using robust maximum likelihood (Yuan & Bentler, 2000) and SPSS version 28. Robust maximum likelihood was used to handle missing data on the DSO for 2 participants in Mplus, and missing data was not imputed for analyses in SPSS.

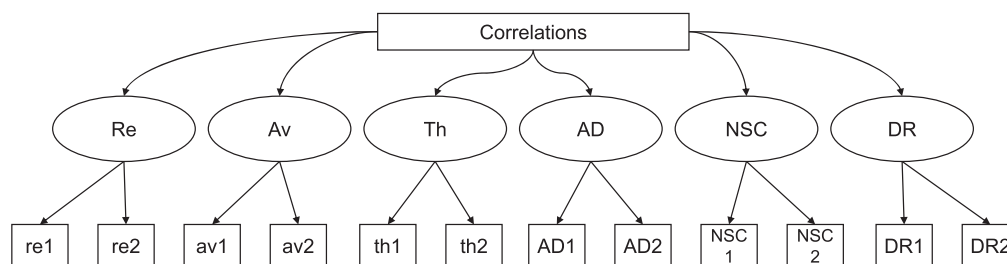
3. Results

Most children in the present study were suspected victims of sexual violence (46.2%, $n = 55$) and 40.3% were suspected victims of physical abuse ($n = 48$), and a minority was suspected victims of both physical and sexual abuse (10.1%, $n = 12$). Overall, boys were more likely to be suspected victims of physical abuse ($\chi^2(1) = 13.25$, $p = .004$, adj. res. = 2.9), and less likely to be suspected victims of sexual abuse (adj. res. = -2.9).

Results from the confirmatory factor analysis are reported in Table 1. Both models provided an acceptable description of the data with overall good fit statistics. Between the models, model 2 displayed a BIC value approximately 30 points lower than model 1 and was therefore deemed the best fitting model. Table S2 and S3 displays the item loadings and factor loadings, respectively. All loadings were large and statistically significant at $p < .001$.

Overall, girls scored significantly higher on PTSD ($\beta = 0.29$, $p = .007$) and DSO ($\beta = 0.30$, $p = .001$) symptomatology, and there was weak evidence for symptom severity increasing with age for PTSD ($\beta = 0.19$, $p = .045$) and

Model 1: Six-factor first-order model



Model 2: Two-factor second-order model

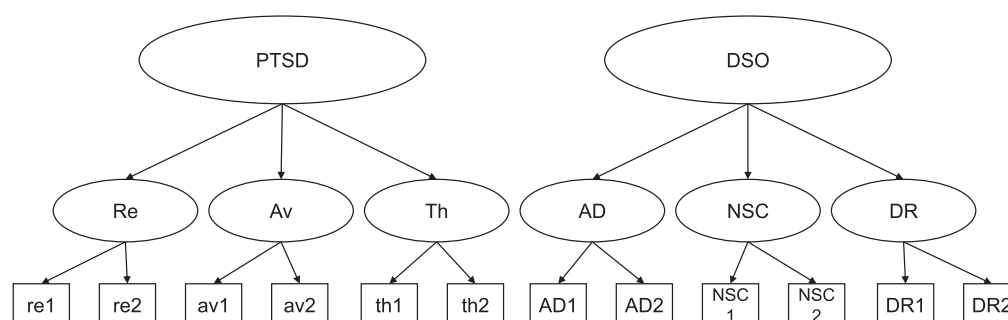


Figure 1. Competing models tested in confirmatory factor analysis. Model 1: Six-factor first-order model. Model 2: Two-factor second-order model. Note: RE: Re-experiencing. Av: Avoidance. Th: Sense of Threat. AD: Affective dysregulation. NSC: Negative self-concept. DR: Disturbed relationships. PTSD: Posttraumatic stress disorder. DSO: Disorders in self-organization.

DSO ($\beta = 0.23, p = .025$). There were no statistically significant differences in PTSD or DSO-symptomatology across referral-reasons (p -values ranging between .540 and .903).

Table 2 displays results from the convergence and divergence analyses of the relationship between the latent variables representing ICD-11 PTSD and DSO and anxiety, depression, aggression, disruptive behaviour, and self-concept. Overall, minimum 54.6% had completed the BYI in addition to the ITQ-CA ($n = 65$ completed the disruptive behavior and self-concept scales, $n = 66$ completed the depression and aggression scales, and $n = 67$ completed the anxiety subscale). Children that completed the BYI had significantly higher severity of DSO-symptoms compared to those that did not complete the BYI (BYI: $M = 11.37, SD = 6.3$, no BYI: $M = 6.78, SD = 16.10, t(117) = -2.1, p = .035$). Overall, relationships between the BYI-subscales and PTSD and DSO were statistically significant and moderate to large

apart from the relationship to disruptive behaviour that was nonsignificant overall.

Table 3 displays the fit statistics of the LCA. The BIC converged around a 2-class solution as the most parsimonious representation that was also a significant improvement over a 1-class solution as per the LMRT and BSLRT. Figure 2 displays the two-class solution that primarily differentiates between a group at high risk for all symptoms and a group at moderate risk for PTSD-symptoms and low risk for DSO-symptoms apart from affective dysregulation. Posterior probabilities ranged from 0.97 (class 1) to 0.98 (class 2). The CPTSD group consisted of 68 children (57.1%) and 62 (91.2%) were girls. The mean age was 15 years ($SD = 1.48$) and the most common referral reason for this group was suspicion of sexual abuse ($n = 36, 52.9\%$). The PTSD group consisted of 51 children (42.9%), and the majority were girls ($n = 35, 68.6\%$). The mean age was 14.37 years ($SD = 1.61$) and the most common referral reason was suspicion

Table 1. Fit statistics for confirmatory factor analyses.

Model	χ^2 (df)	p	CFI	TLI	RMSEA (90% CI)	SRMR	BIC
Model 1	42.96 (39)	.306	0.992	0.986	0.029 (0.000 – 0.072)	0.035	4551.429
Model 2	49.94 (47)	.357	0.994	0.991	0.023 (0.000 – 0.066)	0.040	4521.279

Note: Model 1: Six-factor first-order. Model 2: Two-factor second-order.

Table 2. Bivariate relationships between ICD-11 symptom clusters and BYI-subscales.

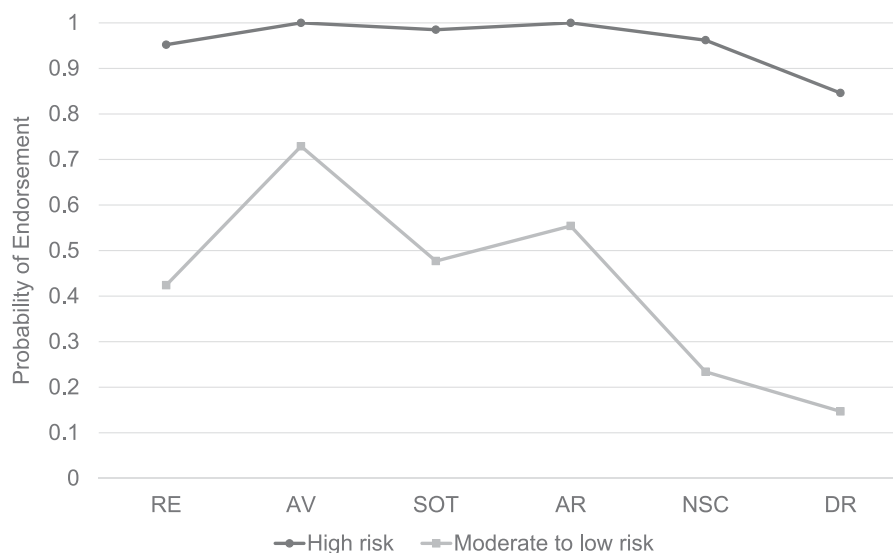
	Depression (BDI)		Anxiety (BAI)		Aggression (BANI)		Disruptive behaviour		Self-concept (BSCI)	
	β	p	β	p	β	p	β	p	β	p
PTSD	0.77	<.001	0.77	<.001	0.55	<.001	0.12	.393	−0.59	<.001
Re-experiencing	0.74	<.001	0.75	<.001	0.51	<.001	0.53	.612	−0.55	<.001
Avoidance	0.79	<.001	0.70	<.001	0.58	<.001	0.08	.595	−0.70	<.001
Sense of threat	0.76	<.001	0.79	<.001	0.56	<.001	0.72	.306	−0.63	<.001
DSO	0.80	<.001	0.80	<.001	0.58	<.001	0.13	.315	−0.66	<.001
Affective dysregulation	0.82	<.001	0.81	<.001	0.65	<.001	0.20	.169	−0.77	<.001
Negative self-concept	0.82	<.001	0.82	<.001	0.57	<.001	N/A	-	−0.69	<.001
Disturbed relationships	0.82	<.001	0.74	<.001	0.57	<.001	0.07	.583	−0.56	<.001

Note: Reported values are standardised beta-coefficients. N/A means number of iterations exceeded without reaching a model solution.

Table 3. Fit statistics for the LCA of symptom endorsement on ITQ-CA.

	−2LL	χ^2 (df), p	AIC	BIC	ssaBIC	Entropy	LMRT, p	BSLRT, p
1	−394.07	352.62 (57), > .001	800.13	816.81	797.84	—	—	—
2	−314.62	66.96 (50), .055	655.24	691.37	650.27	0.878	154.28, > .001	158.89, > .001
3	−305.98	37.13 (43), .723	651.96	707.54	644.31	0.895	16.78, .035	17.29, .013
4	−301.57	31.58 (36), .679	657.13	732.17	646.81	0.946	8.56, .447	8.82, .429
5	−296.52	21.59 (29), .838	661.05	755.54	648.05	0.894	9.79, .330	1.09, .227
6	−293.49	15.17 (22), .855	668.99	782.93	653.31	0.946	5.98, .789	6.16, .667

Note: −2LL: −2 times the loglikelihood. AIC: Akaike Information Criterion. BIC: Bayesian Information Criterion. ssaBIC: Sample-size adjusted BIC. LMRT: Lo-Mendel-Rubin adjusted LRT-test. BSLRT: Parametric bootstrapped likelihood-ratio test.

**Figure 2.** The two-class solution from the latent class analysis.

of physical abuse ($n = 24$, 47.1%). The only statistically significant differences between classes were girls being more likely to be represented in the CPTSD class ($\chi^2(1) = 8.39$, $p = .004$, adj. residual = 3.1). As displayed in Table 4, the CPTSD-class' scores on the BYI indicated statistically significantly worse outcomes apart from disruptive behaviour where there were no significant differences.

Table 5 displays the diagnostic rates for ICD-11 PTSD and CPTSD using increasingly strict diagnostic algorithms. Overall, there was little differences in endorsement-rates between algorithms A and B, whereas algorithm C resulted in almost half the children not fulfilling the criteria for a probable diagnosis. There were no significant differences across referral-reason and diagnostic categories for any of the

diagnostic algorithms (A: $\chi^2(6) = 3$, $p = .808$; B: $\chi^2(6) = 4$, $p = .676$; and C: $\chi^2(6) = 8.46$, $p = .206$). There was a significant association between gender and diagnostic status with boys being more likely to fulfil no probable diagnosis (adj. residual: 2.7) and less to fulfil a probable CPTSD diagnosis (adj. residual: −3.1) compared to girls when using algorithm A ($\chi^2(2) = 10.06$, $p = .007$). This difference was replicated for algorithm B and C. Finally, a nontrivial proportion of subclinical cases endorsed functional impairment: For PTSD, this was 77.2% ($n = 17$), corresponding to 19.1% of all cases endorsing PTSD-associated functional impairment. For DSO, this was 46.2% ($n = 12$), corresponding to 19.7% of all children endorsing DSO-associated functional impairment. We tested the association between functional impairment (algorithm B) and clinical and

Table 4. Bivariate relationships between latent classes and Beck Youth Inventory subscales.

	Depression (BDI)		Anxiety (BAI)		Aggression (BANI)		Disruptive behaviour		Self-concept (BSCI)	
	M	SE	M	SE	M	SE	M	SE	M	SE
CPTSD-class	28.68***	1.58	28.82***	1.43	22.59***	1.60	8.05	0.94	27.70***	1.32
PTSD-class	13.92***	1.80	15.50***	1.63	13.02***	1.62	7.96	1.46	37.11***	1.95

Note: M: Mean. SE: Standard Error. ***Statistically significant at $p < .001$. Disruptive behavior was not statistically significantly related to class-membership ($p = .958$).

subclinical (missing 1 symptom cluster) PTSD and DSO. There were 22 and 26 subclinical cases, respectively. For PTSD, statistically significantly more children endorsed functional impairment with full PTSD ($\chi^2(1) = 7.32, p = .007$, adj. res. = 3.2) compared to subclinical cases. For DSO, there were no statistically significant deviations ($\chi^2(1) = 0.62, p < .812$, adj. res. = 0.8).

4. Discussion

The introduction of the new ICD-11 diagnoses of PTSD and CPTSD means that there is a pressing need for a reliable and valid instrument for assessing symptoms of traumatic stress among children and adolescents who have been traumatised. We wanted to test the validity of the ITQ-CA as a basis for identifying symptoms of ICD-11 PTSD and DSO in a high-risk sample of children and adolescents who had been referred to the DCC due to suspicion of exposure to physical and/or sexual abuse.

4.1. Dimensional structure of ITQ-CA

Answering the primary aim of the study, the dimensional structure was explored by a CFA. In accordance with findings from previous studies, both a six-factor correlated model and a second-order two-factor model provided excellent fit to the data (Haselgruber et al., 2020a, 2020b). In line with findings by Haselgruber and colleagues (2020a, 2020b), the two-factor second-order model was slightly better. In the present study, girls reported higher levels of both PTSD and DSO symptomatology, thereby replicating and extending findings from Redican et al. (2022)'s study in a community sample to a violence-exposed clinical sample.

Table 5. Functional impairment and probable diagnostic status on the ITQ-CA.

Diagnostic status	No diagnosis %		CPTSD %
	(n)	PTSD % (n)	(n)
(A) Dx w/o impairment	37.8% (45)	18.5% (22)	42% (50)
(B) Dx w/ any impairment	39.5% (47)	17.6% (21)	41.2% (49)
(C) Dx w/ impairment and distress	47.1% (56)	14.3% (17)	37% (44)

Note: Missing data for 2 participants on the DSO-symptoms. In algorithm C, impairment refers to items 1–4 (friends, family, schoolwork, other) and distress refers to the last item on 'your general happiness'. In algorithm B, all 5 indicators are considered reflective of any impairment. In algorithm A, no functional impairment was required in addition to presence of symptoms of the disorders. Dx: Diagnosis. W/o: Without. W/ with.

Overall, this model supports the ICD-11 taxon of PTSD and DSO among children exposed to abuse. Findings on the convergent and divergent relationships to symptoms of other mental health disorders are consistent with dimensional models of psychopathology that group anxiety, depression and PTSD together as internalising disorders that frequently co-occur (Kotov et al., 2017). The statistically significant and large regression coefficients observed between ITQ-CA latent factor and BYI-subscales indicate that a broad range of symptomatology is identifiable in the immediate aftermath of trauma-exposure and encourage further research on the ITQ-CA differential diagnostic abilities in the immediate aftermath following exposure to violence. Hence, hypothesis 1 was supported.

4.2. Symptom profiles

Findings from the LCA supported hypothesis 2 about the ICD-11 proposal for CPTSD with a 2-class solution reflecting a group with high risk of all symptoms and a group of moderate risk of PTSD-symptoms and low risk of DSO symptoms apart from affective dysregulation. Notably, findings from the current study did not identify a low-risk class as reported in other published studies (Haselgruber et al., 2020a; 2020b; Kazlauskas et al., 2020; Li et al., 2021; Redican et al., 2022). We consider this a reflection of the nature of our sample, where all participants were referred to assessment following immediate trauma-exposure to either physical or sexual abuse. Differences in severity of symptomatology across the classes are consistent with existing research among children and adults alike that indicate CPTSD as a more debilitating condition compared to PTSD (Haselgruber et al., 2020a; Tian et al., 2020; Redican et al., 2022). In line with previous findings among adults and adolescents, sexual violence was more strongly related to the CPTSD profile compared to PTSD (Haselgruber et al., 2020a; Hyland et al., 2017; Redican et al., 2022). Considering the profile displaying moderate risk of endorsing symptoms reflective of a PTSD-diagnosis, these symptoms were accompanied by elevated risk of endorsing affective dysregulation from the DSO-cluster. This replicates the finding reported by Haselgruber et al. (2020a), Kazlauskas et al. (2020), and Tian et al (2020) that similarly found elevated likelihood of endorsing affective dysregulation in the PTSD-class. Affective dysregulation was the most frequently

endorsed DSO-symptom in the sample and only surpassed by avoidance overall (see Table S1 in [supplementary materials](#)). The high rates of this symptom cluster might be consistent with the unstable life-situation during which the children are being assessed. We also note that the first-order correlated six-factor model had a better fit based on RMSEA and CFI/TLI indexes in Haselgruber et al., (2020a), which in conjunction with our findings of excellent fit of both models in the current study might be indicating that the division of symptom-clusters into PTSD and DSO are less clear cut among children and adolescents. While our findings provide initial support for ICD-11 configuration of PTSD and CPTSD symptoms, the distribution of symptoms observed in the LCA might also lend support to Kazlauskas et al.'s proposal that symptom structure among adolescents could be different from adults: Since adolescents are in the developmental stage marked with identity changes, it is possible that DSO symptoms of NSC, DR or AD symptoms have different associations with core PTSD symptoms of Re, Av, and SoT than seen among adults. For our study, this might be reflected in the association of the AD-cluster with both the PTSD-group and the CPTSD group in the latent class analysis, although it is observed that the risk of endorsing AD was moderate for the PTSD group and high for the CPTSD group. The association of AD with both PTSD and DSO-clusters has however also been observed among adult samples (McElroy et al., 2019) and hence, more research is needed to elucidate the role of hypo- and hyperregulation of affect in relation to PTSD among both children and adults.

Females were represented as the majority in both groups; suspicion of sexual abuse was the most common referral-reason for the CPTSD-class and suspicion of physical abuse was the most common referral-reason for the PTSD-class, thereby replicating finding among adults that childhood sexual abuse are associated with higher risk of CPTSD also immediately following the abuse (Hyland et al., 2017). Tests of convergent and divergent validity replicated existing findings that CPTSD is associated with higher levels of depression, anxiety, and aggression where scores were approximately twice as high for the CPTSD-group compared to the PTSD-group. When it comes to the subscale of disruptive behaviour, there was no significant difference between the two groups. Notably, there was no relationship between PTSD and DSO dimensions or CPTSD and PTSD classes; and disruptive behaviour, underlining ICD-11 PTSD and CPTSD as highly distressing internalising disorders that are at risk of being overlooked if not systematically assessed.

4.3 Prevalence and functional impairment

Answering the final, exploratory aim of the study, rates of CPTSD exceeded rates of PTSD by almost

two thirds regardless of which diagnostic algorithm was used, thereby supporting hypothesis 3. Requiring full symptomatology and any functional impairment, 41.2% fulfilled criteria for CPTSD and 17.6% fulfilled criteria for PTSD. There was increased risk of functional impairment with full PTSD compared to subclinical PTSD, whereas there was no difference for clinical and subclinical groups on DSO-symptomatology. It should be noted that approximately one fifth of those indicating functional impairment associated with their symptoms displayed subclinical symptomatology, suggesting the need for further assessment for other mental health disorders such as anxiety and depression. Additionally, for studies testing whether these children and adolescents would go on to develop full PTSD and/or CPTSD or whether they would also benefit from treatment for these disorders.

4.4 Strengths and limitations

The current study is the first to study the dimensionality of ICD-11 PTSD and DSO among a sample of children and adolescents exposed to types of violence theoretically associated with CPTSD (Cloitre et al., 2021) using a combination of self-report and administrative data. However, several limitations must be observed when interpreting the findings of the current study. Firstly, data for the current study represents one of the smallest samples to date testing the validity of the ICD-11 proposals for PTSD and DSO, and we encourage replication studies in similar populations using larger sample sizes. The study is limited using self-report measures and the onus of the clinician to choose relevant assessments for children on a case-by-case basis, resulting in only approximately half the children completing the BYI for convergent and divergent validity tests. This limited our sample size for convergent and divergent validity tests further. Further, our study is limited by the reliance on secondary data analysis of data collected for the purpose of supporting the assessment and clinical evaluation of children as part of the DCCs societal function of supporting the municipalities' work with children exposed to violence by providing trauma-focused recommendations regarding the children's need for intervention. This means that our study is unable to account for any unobserved variability in relation to trauma-exposure and psychiatric comorbidities as the assessment schedule at the DCC currently does not include a mandatory comprehensive screening for other types of trauma exposure, duration of trauma exposure, time since trauma exposure and psychiatric morbidity by default. Finally, while indicators of functional impairment were rated specifically with reference to symptoms of PTSD and DSO, it cannot be

precluded that perceptions of functional impairment are affected by undetected comorbid psychiatric disorders.

5. Conclusion

The Danish ITQ-CA is a valid tool for identifying symptoms of ICD-11 PTSD and DSO among children and adolescents exposed to physical and sexual violence. A two-factor second-order model corresponding to the operationalisation of PTSD and CPTSD was supported in alignment with the ICD-11 proposal. More than half of the children fulfilled the criteria for a probable diagnosis of either PTSD or CPTSD. Further research is needed to study the relationship between ICD-11 C/PTSD symptomatology and anxiety and depression among children in the immediate aftermath of abuse.

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Data availability

Due to requirements of protecting the participants' identity, data will not be made publicly available.

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