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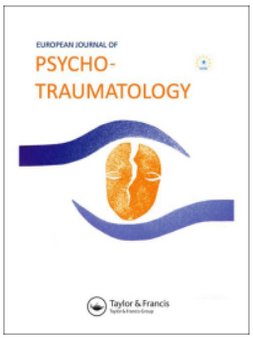

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Trauma exposure and ICD-11 PTSD and CPTSD in a Greenlandic adolescent population

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ABSTRACT

Background: Little peer-reviewed research has been done on trauma exposure, Post-Traumatic Stress Disorder (PTSD) and Complex PTSD (CPTSD) prevalence among Greenlandic children and adolescents. There is a need for a validated Greenlandic version of the International Trauma Questionnaire – Child and Adolescent version (ITQ-CA) to assess symptoms of ICD-11 PTSD and CPTSD, as well as investigations of the prevalence of these disorders. This information is imperative in a Greenlandic context, where general epidemiological knowledge on traumatic exposure and reactions is lacking.

Objective: The present study examined the factor structure of the Greenlandic ITQ-CA, estimated the prevalence of trauma exposure, ICD-11 PTSD and CPTSD, and examined the relationship between potentially traumatic events (PTEs), PTSD, CPTSD, and demographic variables in a Greenlandic adolescent population.

Method: Confirmatory factor analysis of competing models of the dimensionality of the ITQ-CA was tested among Greenlandic adolescents ($N = 704$) aged 11–17 years ($M = 13.4$, SD = 1.77). Using the ITQ-CA, PTSD and CPTSD was assessed.

Results: Findings supported the factorial validity of the Greenlandic ITQ-CA although factor structure differed across boys and girls. A total of 82.8% of the adolescents had been directly exposed to at least 1 PTE ($M = 3.2$), and 57.0% had been indirectly exposed ($M = 3.1$). The estimated prevalence of PTSD and CPTSD was 7.8% and 8.5%, while an additional 13.9% and 7% reached subclinical levels. Older age, female gender, several different and cumulative PTEs significantly elevated the risk of PTSD and CPTSD.

Conclusion: ITQ-CA is a valid tool for identifying symptoms of ICD-11 PTSD and CPTSD. Results indicate that type and quantity of direct traumatic exposure are important predictors of PTSD and CPTSD. Events not normally considered traumatic as well as non-interpersonal events are significantly associated with CPTSD symptoms.

Exposición a trauma y TEPT y TEPTC según la CIE-11 en población adolescente de Groenlandia

Antecedentes: Se han realizado pocas investigaciones revisadas por pares en relación a la prevalencia de exposición a trauma, Trastorno de Estrés Postraumático (TEPT) y TEPT complejo (TEPTC) en niños y adolescentes en Groenlandia. Es necesario contar con una versión groenlandesa validada del Cuestionario Internacional de Trauma, versión niños y adolescentes (ITQ-CA por sus siglas en inglés) para evaluar los síntomas de TEPT y TEPTC según la CIE-11, así como investigaciones de la prevalencia de estos trastornos. Esta información es imperativa en el contexto de Groenlandia, donde se carece de conocimientos epidemiológicos generales sobre la exposición y reacciones traumáticas.

Objetivo: El presente estudio examinó la estructura factorial del ITQ-CA de Groenlandia, estimó la prevalencia de exposición a traumas, TEPT y TEPTC según la CIE-11, y examinó la relación entre eventos potencialmente traumáticos (EPTs), TEPT, TEPTC y variables demográficas en una población adolescente de Groenlandia.

Método: Se realizó un análisis factorial confirmatorio de modelos competitivos de la dimensionalidad del ITQ-CA en adolescentes de Groenlandia ($N = 704$) de 11 a 17 años ($M = 13.4$, $DE = 1.77$). Se evaluó el TEPT y TEPTC utilizando el ITQ-CA.

Resultados: Los hallazgos apoyaron la validez factorial del ITQ-CA de Groenlandia, aunque la estructura factorial difirió entre niños y niñas. Un total de 82.8% de los adolescentes había estado expuesto directamente al menos a 1 EPT ($M = 3.2$), y el 57% había estado indirectamente expuesto ($M = 3.1$). La prevalencia estimada de TEPT y TEPTC fue de 7.8% y 8.5%, mientras que un 13.9% y 7% alcanzaron niveles subclínicos. Mayor edad, sexo femenino y varios EPTs diferentes y acumulativos elevaron significativamente el riesgo de TEPT y TEPTC.

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KEYWORDS

Inuit; Greenland; post-traumatic stress disorder; complex PTSD; exposure; children; adolescents; trauma; confirmatory factor analysis

PALABRAS CLAVE

Inuit; Groenlandia; trastorno de estrés postraumático; TEPT complejo; exposición; niños; adolescentes; trauma; análisis factorial confirmatorio

HIGHLIGHTS

- This is the first study to assess ICD-11 Post-Traumatic Stress Disorder (PTSD) and Complex PTSD (CPTSD) prevalence in a sample of Greenlandic children and adolescents as measured by the International Trauma Questionnaire – Child and Adolescent Version (ITQ-CA).
- Confirmatory factor analysis supports the factor structure of the ITQ-CA as a measure of ICD-11 PTSD and CPTSD symptoms among Greenlandic children and adolescents, although factor structure differed across boys and girls.
- Results indicate that both trauma type and quantity of direct traumatic exposures are important predictors of ICD-11 PTSD and CPTSD.
- Results from this study indicate that events not normally considered traumatic as well as non-interpersonal events are significantly associated with CPTSD symptoms in children and adolescents.

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Conclusión: El ITQ-CA es una herramienta válida para identificar síntomas de TEPT y TEPTC según la CIE-11. Los resultados indican que el tipo y cantidad de exposición traumática directa son predictores importantes de TEPT y TEPTC. Eventos que normalmente no se consideran traumáticos, así como los eventos no interpersonales se asociaron significativamente con síntomas de TEPTC.

1. Introduction

Greenland, or Kalaallit Nunaat (Land of the Greenland People), is the biggest island in the world with a total areal of 2.2 million square kilometres. Only 57,000 people live in Greenland, of whom 90% are ethnic Greenlanders (Inuit). The people are situated in towns and settlements on the coastline with many kilometres distance between them. As no roads exist between towns, all travel happens by air or water, dog sleds, or snow scooters. Thus, a lot of towns and settlements are isolated, especially when the weather is bad (Statistics Greenland, 2023).

Greenland is divided into five municipalities, and the population is distributed in 16 towns and around 60 settlements with 50–500 inhabitants each (Statistics Greenland, 2023). Most of the population live on the South Coast where the capital, Nuuk, is situated with over 19.000 inhabitants. There are considerable differences between municipalities regarding language (dialects), climate, educational level, degree of supply, employment rates, and the percentage of the population that receives public assistance. Consequently, contrasting lifestyles and cultures exist, varying from one municipality to the next. The conditions of life for Greenlandic children and adolescents thus may differ significantly (Steenholdt, 2019).

Historically, Greenland has been a Danish colony and obtained Self-Government in 2009 (Grydehøj, 2016). Today, Greenland and Denmark remain connected. However, the former colonial bonds affect the relationship, and there is a great desire for independence in Greenland (Arnfjord et al., 2017). This has resulted in a 'Greenlandization movement', including more focus on openness about and recognition of Inuit culture and spirituality, and more widespread use of the official Greenlandic language instead of Danish in official institutions.

1.1. Exposure to trauma in childhood and adolescence

Childhood and adolescence are developmental periods with a high risk of exposure to potentially traumatic events (PTEs) and other adversities (Alisic, 2011; Breslau et al., 1998; De Young et al., 2011). Trauma in this formative period can affect the normal trajectory of development, which may be stalled, delayed, or regress because of these traumatizing experiences (Brown et al., 2021). This can affect the child or adolescent in several significant areas, such as at school, home, and in relationships with parents, teachers, and friends. The risk of developing Post-Traumatic Stress Disorder (PTSD) is high in this demographic group (Kessler et al., 2017).

While population surveys in Greenland repeatedly have highlighted social problems such as childhood sexual abuse (Lytken Larsen et al., 2019), alcohol problems, family violence (Ottendahl et al., 2021), and one of the highest suicide rates in the world (Nomesko, 2013), only one known study has examined the impact of these experiences on rates of PTSD (Karsberg et al., 2012). Karsberg and colleagues studied lifetime prevalence rates of PTEs and PTSD among 269 Greenlandic 12–18-year-old students from four schools on the West Coast. The study found that 86.6% of the students had been directly exposed to at least one PTE, while 74.3% had witnessed or known someone else who had been exposed to at least one PTE (Karsberg et al., 2012). Using the Harvard Trauma Questionnaire (HTQ) to assess the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) version of PTSD, 17.1% had had a probable PTSD diagnosis, while additionally 14.2% adolescents had reached a subclinical level of PTSD. This prevalence is comparable to other studies conducted in small, isolated, prior island colonies such as Iceland (16% lifetime prevalence of PTSD) and The Faroe Islands (20% lifetime prevalence of PTSD) employing the same DSM-IV PTSD measure (Bödvarsdóttir & Elklit, 2007; Petersen et al., 2010). However, the prevalence is higher than what has been found in recent studies employing the International Trauma Questionnaire, Child and Adolescent Version (ITQ-CA) measuring the 11th revision of the International Classification of Diseases (ICD-11) criteria of PTSD and Complex PTSD (CPTSD) in samples of children and adolescents from Northern Ireland (PTSD; 1.5%, CPTSD: 3.4%) (Redican et al., 2022), and Japan and Lithuania (PTSD: 2.3–5.2%, CPTSD: 4.1–12.3%) (Kazlauskas et al., 2022). These differences might be due to differences in diagnostic criteria, different measurement tools, or differences in lifetime prevalence between countries. Therefore, it is important to conduct an updated investigation of rates of ICD-11 PTSD and CPTSD among Greenlandic children with the new measure ITQ-CA.

The findings from the former study conducted in Greenland indicate that Greenlandic children and

adolescents experience substantial mental health problems associated with various types of PTEs (Karsberg et al., 2012). The study also highlighted that Greenlandic adolescents are more exposed to certain PTEs compared to adolescents in similar studies from other nations. These PTEs include attempted suicide, death of someone close, rape, sexual abuse, pregnancy or abortion, physical abuse, near drowning, and the absence of a parent (Karsberg et al., 2012). These findings highlight important international differences in trauma-exposure profiles that may partly account for the increased rates of PTSD.

Studies from other countries show that both PTE exposure among children and risk of DSM-IV PTSD vary by sociodemographic factors (e.g. age, gender, and socioeconomic status) (Elklit, 2002; Karsberg et al., 2012). Commonly, across studies with varying measures, higher risk of PTSD and CPTSD has been associated with female gender, older adolescents, financial difficulties in the family, cumulative trauma exposure, and loneliness (Elklit, 2002; Kazlauskas et al., 2022; Lewis et al., 2019; Redican et al., 2022). Certain types of exposure have been associated with increased risk of PTSD, such as sexual assault, serious motor vehicle accidents (Lewis et al., 2019) and direct assault or violence (McLaughlin et al., 2013). WHO (2018) describes that ICD-11 CPTSD can develop after different types of PTEs, most commonly prolonged or repeated PTEs such as prolonged domestic violence or childhood physical or sexual abuse. Although differing events have been proposed to precipitate ICD-11 PTSD and CPTSD respectively, some studies find that the types of events associated with risk of PTSD and CPTSD are overlapping and similar (Dokkedahl et al., 2021; Hyland et al., 2021; Kazlauskas et al., 2022; Li et al., 2021).

It is theorized that the link between trauma exposure and traumatic stress reactions might be explained by the event occurring in a context of existing individual vulnerabilities, which interacts to influence the development of traumatic memories and negative identities (i.e. experiencing and perceiving one's character or body to be for example unsafe, powerless, inferior, or worthless) (Hyland et al., 2023). Greenlandic culture is predominantly collectivistic, and it might be hypothesized that interpersonal trauma exposure increases the risk of alienation that might in turn increase the risk of ICD-11 CPTSD over PTSD.

1.2. ICD-11 symptoms structure of PTSD and CPTSD

As this is the first study investigating ICD-11 PTSD and CPTSD in Greenlandic children and adolescents using a translated version of the ITQ-CA, it is important to ensure the validity of the factor structure of the measuring tool. Previous studies investigating the latent structure of the ITQ-CA have found support for two models: A correlated six-factor first-order model of the symptom clusters in PTSD and CPTSD (Kazlauskas et al., 2020; Li et al., 2021) and a second-order two-factor model (Haselgruber et al., 2020a, 2020b; Løkkegaard et al., 2023; Redican et al., 2022).

Findings regarding factor structure in studies involving children and adolescents seem to follow the same general pattern as studies involving adults: The correlated six-factor model is the best-fitting model in the general population, while the two-factor second-order model has been found to fit the best in samples that resemble clinical populations more frequently, as suggested by Haselgruber et al. (2020a). Studies also support gender differences in PTSD and CPTSD prevalence rates with girls more frequently reporting PTSD and CPTSD than boys (Elklit, 2002; Kazlauskas et al., 2022; Lewis et al., 2019; Redican et al., 2022).

1.3. Study aims

The present study aims to examine the factor structure of the Greenlandic version of the ITQ-CA, the association between demographic variables and PTEs among children and adolescents, as well as the association between demographic variables and PTE's; and ICD-11 PTSD/CPTSD. This information is imperative in a Greenlandic context, where general epidemiological knowledge on traumatic exposure and reactions among children and adolescents is badly lacking. More information about child and youth reactions following traumatic events may also inform policy makers about the need for resources to treat PTSD and CPTSD and guide the development of these initiatives.

Based on existing findings on gender differences in risk of PTSD and CPTSD, we investigate the factor structure separately across boys and girls and expect to replicate findings of support for the factor structure of the ITQ-CA measuring ICD-11 diagnoses of PTSD and DSO in the Greenlandic sample with no gender variance in the factor structure. We expect to find a prevalence of trauma exposure comparable to other countries with cross-national differences regarding specific PTEs. We predict that the prevalence of ICD-11 PTSD and CPTSD is higher compared to other countries (Kazlauskas et al., 2022; Redican et al., 2022). As former literature has established a higher risk of experiences of PTEs and ICD-11 (C)PTSD among older adolescents and females, we expect to find the same trend as well as an association between cumulative trauma exposure and ICD-11 PTSD and CPTSD.

2. Methods

2.1. Procedure and participants

The study was approved by the Research and Innovation Organization (RIO), the Data Protection

Agency at the University of Southern Denmark (RIO: #11.400). All questionnaires and questions regarding demographic information were translated into Greenlandic and back-translated and revised. A detailed description of the study procedure can be found in Banzon and Elklit (2023).

The questionnaires were collected in schools between March 2022 and February 2023 by The Children's Travel Team (CTT), which is organized under the Greenlandic Authority of Social Services. The CTT is a specialized outgoing team, who covers the whole country and pays visit to all towns and settlements when child maltreatment and traumatic events have been reported. Schools were randomly drawn from a national school register according to population size and to match the percentage division of people living in towns and settlements. Prior to the data collection, parents/caregivers were given information about the study. If they did not want their child to participate, they had the opportunity to decline participation. Children and adolescents were informed about the study, were told that participation was voluntary, and that any answers were anonymous. Both parents/caregivers and children were informed that after data collection ended, it was not possible to withdraw from the study, as all responses were anonymous, and no individual child was identifiable after handing in the completed questionnaire. The children and adolescents answered the questionnaire at school, and they could answer the questionnaire in Greenlandic or Danish. Mainly the Greenlandic version was used (83%). If the students needed help, psychologists from the CTT or teachers in the classroom assisted with translations or explanations. A total of 704 children aged 11–17 years ($M = 13.4$, SD = 1.77) participated in the study. Full demographic information can be seen in Table 1.

Table 1. Demographic sample characteristics ($N = 704$).

		% (*n*)
District ($N = 704$)	Ilulissat	9.5 (67)
	Uummannaq	6.4 (45)
	Upernavik	9.2 (65)
	Aasiaat	25.2 (177)
	Sisimiut	5.4 (38)
	Maniitsoq	9.7 (68)
	Nuuk	17.9 (126)
	Qeqertarsuatsiaat	0.7 (5)
	Tasiilaq	11.9 (84)
	Nanortalik	4.0 (28)
Gender ($N = 704$)	Male	47.1 (331)
	Female	51.9 (365)
	Did not disclose	1.0 (7)
Age ($N = 682$)	11 years	17.3 (118)
	12 years	17.3 (118)
	13 years	19.1 (130)
	14 years	17.3 (118)
	15 years	16.4 (112)
	16 years	5.4 (37)
	17 years	7.2 (49)
Area of living ($N = 688$)	City	79.4 (546)
	Settlement	20.6 (142)
Educational level of father ($N = 480$)	Primary or lower secondary education	51.9 (249)
	Upper secondary education	14.0 (67)
	Bachelor's programme	27.1 (130)
	Master's programme or higher level education	7.1 (34)
Educational level of mother ($N = 547$)	Primary or lower secondary education	37.1 (203)
	Upper secondary education	15.2 (83)
	Bachelor's programme	35.5 (194)
	Master's programme or higher level education	12.2 (67)
Caregiver constellation ($N = 630$)	Mother	27.3 (187)
	Father	5.8 (40)
	Both parents	48.5 (333)
	Other	8.7 (60)
	Mother + other	4.4 (30)
	Father + other	0.4 (3)
	Both parents + other	4.8 (33)

Notes: N = number of respondents, n = number. The reported demographical information is based on the available child reports. N varies as not all children responded to the full set of demographic questions.

2.2. Measures

Demographic information: The first part of the questionnaire contained questions about demographic variables (age, gender, living in town or settlement, living arrangements, and parent's/caregiver's educational level).

Trauma exposure: The questionnaire contained a list of 21 PTEs. For all PTEs, children and adolescents were asked whether they had directly experienced the event and whether they indirectly had experienced the events, i.e. if they had witnessed or heard about someone close to them being exposed to an event. The list of events was selected from scientific literature and clinical experience, covering life-threatening experiences, adverse family conditions, and negative life events. Previous studies have shown that the events are frequently reported by children and adolescents across nations and cultures, and that the events are potentially traumatizing (Elklit & Petersen, 2008; Karsberg et al., 2012). The present questionnaire has been used in more than 20 publications with samples from 10 different countries, including Greenland, and it is therefore well-suited for comparisons of PTE exposure across countries (see for example Chen & Elklit, 2017 and Supplementary Table S8 for an overview). With the introduction of the broader criterion A in the ICD-11 PTSD and CPTSD diagnosis, this wide-ranging questionnaire lends itself well to the examination of PTEs.

ICD-11 PTSD and *CPTSD*: The ITQ-CA (Cloitre et al., 2018) was used to assess symptoms of PTSD and CPTSD. The ITQ-CA is an adapted version of the ITQ for adults, where symptom descriptions have been adjusted to be developmentally sensitive for children and adolescents at ages 7–17. Respondents are asked whether they have been affected by symptoms in the last month. With six questions, the ITQ-CA covers the symptoms of PTSD, two questions per cluster: (1) reexperiencing of the trauma in the here and now, (2) avoidance of traumatic reminders

and (3) a persistent sense of current threat. Likewise, six questions cover symptoms of disturbances in self-organization (DSO), two questions per cluster: (1) affective dysregulation, (2) negative self-concept, and (3) disturbances in relationships. The items are scored on a 5-point Likert 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 measured dichotomously on five domains: (1) getting along with friends, (2) getting along with family, (3) school-functioning, (4) other important areas of life (hobbies, other relationships) and (5) general happiness. The functional impairment items are asked after both the six PTSD-items and the six DSO-items.

A probable diagnosis of PTSD is assigned if the child or adolescent fulfils one symptom in each cluster and experience functional impairment in at least one domain. A subclinical level of PTSD is reached if the child or adolescent misses the full diagnosis by one symptom from either of the three clusters or misses the functional impairment. A probable diagnosis of CPTSD is assigned if the child or adolescent fulfils the criteria for a probable PTSD diagnosis, and in addition fulfils one symptom in each DSO cluster and experience related functional impairment in at least one domain. A subclinical level of CPTSD is reached if the child or adolescent misses either one symptom from the PTSD cluster, the DSO cluster or the functional impairment. Consequently, some children might qualify for both a PTSD diagnosis and a subclinical CPTSD diagnosis.

Psychometric properties of the ITQ-CA have been investigated in samples with children and adolescents from the general population (Kazlauskas et al., 2022; Li et al., 2021; Redican et al., 2022), in subgroups of foster children (Haselgruber et al., 2020b), and children suspected victims of physical or sexual abuse (Løkkegaard et al., 2023). Results show that the distinctive nature of PTSD and CPTSD symptoms can be captured by the ITQ-CA, validating the factorial structure of the ICD-11 PTSD and CPTSD diagnoses in adolescent populations and confirming the construct validity (Haselgruber et al., 2020b; Kazlauskas et al., 2020; Li et al., 2021; Løkkegaard et al., 2023; Redican et al., 2022). Convergent validity of the scale has also been established through strong associations with total trauma exposure and psychopathological outcomes (Redican et al., 2022). Cronbach's alpha for the full ITQ-CA was 0.89, for the PTSD subscale 0.78, and for the DSO subscale 0.86.

2.3. Data analyses

Prior to any analyses, an analysis of missing data was conducted. Any systematic differences between full responders and partial or non-responders were investigated with *t*-test, chi-square tests and logistic regression analysis.

To answer the first aim, four alternative factor-models were specified to describe the internal structure of the ITQ-CA using confirmatory factor analysis (CFA). Supplementary Figures S1–4 display the models tested: Model 1, a unidimensional single-factor model with all items loading on a single latent factor (CPTSD), Model 2, which comprised two correlated first-order factors (PTSD and CPTSD), Model 3, which comprised six correlated first-order factors (re-experiencing, avoidance, threat, affective dysregulation, negative self-concept, disturbances in relationships), and finally Model 4, which comprised six first-order factors and two correlated second-order factors (PTSD, DSO), with first-order factors reexperiencing, avoidance, and threat loading onto PTSD and affective dysregulation, negative self-concept, and disturbances in relationships loading onto DSO (see Supplementary Figures S1–4). All models were specified in Mplus (version 8.1), using the robust maximum likelihood estimator (MLR) to handle missing data. Models were tested separately across subsamples (boys and girls). Given that the assumption of equivalent best factor structure across boys and girls holds, invariance testing is completed in three steps, where increasingly strict criteria for invariance are employed: configural invariance (that approximately the same concept is measured across groups), metric invariance (that the constructs are measured by the same measurement units across groups), and finally scalar invariance (that the latent variables' scales has the same zero point in both groups) (Rudney et al., 2018). To evaluate the overall model fit, the following fit indices were adopted as recommended in the CFA literature; the chi-square test (χ^2), Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1992) and the Standardized Root Mean Square Residual (SRMR; Jöreskog & Sörbom, 1993) were included as absolute fit indices. Models with a RMSEA value below $\leq .08$ and $\leq .05$ reflect acceptable and excellent model fit, respectively. Differences in RMSEA values of 0.015 have previously been taken to reflect meaningful differences between models (Chen, 2007). SRMR values below $\leq .05$ reflect a well-fitting model (Byrne, 2012). The Comparative Fit index (CFI; Bentler, 1990) and Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) were included as comparative fit indices, comparing the fit of the specified model to a more restricted baseline model. Values $> .95$ indicate good model fit (Hu & Bentler, 1999). Finally, the Bayesian Information Criterion (BIC; Schwarz, 1978) was used as a measure of parsimonious fit to compare the relative fit of the models. Previous research has found that a difference of 10 or more points lower on the BIC indicate superior model fit (Raftery, 1995). After identifying

the best-fitting model, convergent validity was examined through regression analyses of direct and indirect PTEs and the identified latent variables in the CFA analyses.

Further statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 28. Exposure to PTEs was investigated summarized through descriptive analyses. Potential demographic differences in mean number of PTEs across living situation and parents' educational level were investigated through a one-way analysis of variance (ANOVA) with post-hoc tests, as the sample sizes were considered sufficient for parametric analyses (Ghasemi & Zahediasl, 2012). Age differences were investigated with Pearson's correlation analyses. Gender differences in mean number of PTEs were examined with independent sample *t*-test analyses. Gender differences in individual PTEs were examined by χ^2 tests with continuity correction.

To calculate the risk of PTSD or CPTSD after direct or indirect exposure to PTEs, χ^2 tests were conducted. Diagnostic category (no diagnosis/probable PTSD/probable CPTSD) was compared to each PTE (endorsed yes/no). In cases of expected cells counts of less than 5, Fisher's Exact were employed. In these cases, the statistical software R was used. Cramér's *V* effect size was calculated for each analysis, as the tables were larger than 2 by 2. The criteria for judging effect sizes employed in this analysis is based on recommended cut-offs when the degrees of freedom equal 1, where a small effect = .10, a medium effect = .30 and a large effect = .50 (Haselgruber et al., 2020b).

To examine the predictive role of the number of PTEs and demographic variables on PTSD, DSO and CPTSD severity scores, multivariate two-step hierarchical regression analyses were conducted. The hierarchical regression analyses were completed in accordance with the identified best factor structure for boys and girls (further described in the section 'Factor structure of the Greenlandic version of the ITQ-CA'). All analyses in SPSS except for the hierarchical regression analyses were conducted using case-wise deletion.

3. Results

3.1. Missing data and differences between full responders and partial or non-responders on the ITQ-CA

In total, 68.2–100% (corresponding to $n = 480$–704) of the participants completed the questions regarding demographic information, 98.3% completed the trauma exposure measure, while a total of 376 participants (53.5%) completed the ITQ-CA, corresponding to 57.6% of those who reported at least one direct or indirect event. A further 34 participants completed enough of the ITQ-CA to compute a probable PTSD diagnosis ($n = 410$, 62.5% of those who reported at least one direct or indirect event). See Supplementary Tables S1 and S2 for an overview of patterns in missing data. Younger children, children and adolescents from the city, those who answered the questionnaire in Danish and children and adolescents with a lower mean number of indirect PTEs were statistically significantly overrepresented with missing data in the partial or non-responder category.

3.2. Factor structure of the Greenlandic version of the ITQ-CA

Only a few children answered the full ITQ-CA in Danish ($n = 39$, 10.5%). Consequently, these responses were excluded from the CFA. The factor structure of the ITQ-CA was tested on subsamples of boys and girls (see Supplementary Tables S3 and S4). The results showed that for the girls, both Models 3 and 4 demonstrated acceptable descriptions of data and excellent overall fit to the data. Although the chi-squared statistic was significant for both models, neither of the models should be rejected, as the chi-squared statistic is known to be overly restrictive in larger samples, leading to the rejection of appropriate models (Tanaka, 1987). Model 4 had the lowest BIC value with a difference of more than 10 compared to Model 3, suggesting that the two-factor second-order model as the most appropriate representation of data for girls. For boys, Model 4 demonstrated a somewhat acceptable fit, but Model 3 had superior fit statistics on all indicators and was therefore chosen as the best representation of the factor structure of the ITQ-CA for boys. Consequently, no gender invariance testing was performed as the factor structure varied by gender.

Mean scores and standard deviations for the ITQ-CA for boys and girls can be found in Supplementary Table S5, standardized factor loadings and factor correlations in Supplementary Table S6, and investigations of convergent validity between latent variables (PTSD, DSO and first-order factors) and Sum scores of direct and indirect PTEs in Supplementary Table S7. All indicators loaded significantly ($p < .001$) and strongly (> .66) onto the first-order factor loadings, except the first re-experiencing item for both boys and girls (recurrent nightmares) and the second re-experiencing item for girls (intrusive pictures). For girls, the first-order factor loadings all loaded significantly (< .001) and strongly onto their corresponding second-order factors (> .78). The standardized factor correlations between re-experiencing and PTSD and negative self-concept and DSO were above 1. Standardized correlations

above 1 frequently occur in cases of multicollinearity but are not necessarily indicative of model misspecification (Deegan, 1978). Similar findings have been reported with the ITQ-CA tested among young people from Northern Ireland (Redican et al., 2022), where affective dysregulation had a standardized coefficient above 1 with the latent factor DSO. The correlation between the latent factors PTSD and DSO among girls was high and statistically significant (.72, $p < .001$). Factor correlations among boys ranged from .43 (factors re-experiencing and disturbed relationships) to 1.06 (factors affective dysregulation and sense of threat, and negative self-concept and disturbed relationships).

Examining convergent validity, the relationship between the latent variables (PTSD, DSO and first-order factors) and sum score of direct and indirect PTEs was tested. There were no significant relationships between indirect exposure and the latent variables but moderate significant relationships between direct PTEs and all latent variables (PTSD and DSO and first-order factors) except for disturbed relationships for boys.

The hierarchical multivariate two-step regression analyses were adapted in correspondence with the best-identified factor structure for boys and girls. For girls, the predictive role of the number of PTEs and demographic variables was tested in relation to severity of PTSD and DSO separately. For boys, there was no second-order relationship between first-order symptom clusters mirroring the ICD-11 symptoms of PTSD and DSO. As we still wanted to investigate predictors of symptom severity among boys, we computed a sum variable across all clusters and termed this 'CPTSD'.

3.3. Exposure to potentially traumatic events

A total of 82.8% of the children and adolescents reported direct exposure to at least one PTE and 57.0% of the children and adolescents reported indirect exposure to at least one PTE. The mean number of directly experienced PTEs was 3.2 (SD = 3.2): 0 events = 17.2%, 1 event = 21.0%, 2 events = 15.6%, 3 events = 11.9%, 4 events = 9.5%, 5 or more events = 24.8%. As shown in Table 2, the three most recorded direct events were: Death of someone close, followed by near-drowning and absence of a parent.

The mean number of indirectly experienced events was 3.1 (SD = 4.4): 0 events = 42.1%, 1 event = 11.5%, 2 events = 9.0%, 3 events = 6.4%, 4 events = 4.8%, 5 or more events = 26.2%. As shown in Table 3, the three most recorded indirect events were: Death of someone close, followed by serious illness, and physical assault.

3.4. Prevalence of ICD-11 PTSD and CPTSD

Of the participants who filled out the ITQ-CA, 7.8% qualified for a probable diagnosis of PTSD while 8.5% qualified for a probable diagnosis of CPTSD. Significantly more girls ($n = 23$, 10.4%, adj. res = 2.1) than boys ($n = 9$, 4.9%, adj. res = −2.1) qualified for a probable PTSD diagnosis ($\chi^2(2) = 16.41$, $p < .001$), and the same pattern was seen for CPTSD where girls ($n = 25$, 12.2%, adj. res = 3.3) were at higher risk than boys ($n = 5$, 3.0%, adj. res = −3.3), $\chi^2(2) = 16.41$, $p > .001$.

Moreover, an additional 13.9% participants reached probable subclinical level of PTSD, missing the full diagnosis by one symptom from either of the three clusters (reexperience, avoidance or sense of threat)

Table 2. Trauma and life events according to direct exposure and gender.

	Direct exposure					
Event	% Females ($n = 360$)	% Males ($n = 325$)	% All ($n = 692$)[a]	χ^2	p-value	Phi coefficient
1. Traffic accident	5.3	9.2	7.2	3.45	.063	
2. Other serious accidents	14.4	19.4	16.6	2.64	.104	
3. Physical assault	9.7	12.3	11.0	0.92	.337	
4. Rape	12.8	3.1	8.1	20.14	<.001	.177
5. Witnessed other people injured or killed	6.7	6.2	6.4	0.01	.907	
6. Came close to being injured or killed	6.9	14.2	10.3	8.80	.003	–.118
7. Threatened to be beaten	20.0	21.5	20.8	0.16	.688	
8. Near-drowning	24.4	30.8	27.3	3.12	.077	
9. Attempted suicide	20.8	8.0	14.9	21.37	<.001	.181
10. Robbery/theft	13.3	15.4	14.2	0.43	.512	
11. Pregnancy	3.6	2.2	2.9	0.82	.366	
12. Abortion	3.6	1.5	2.6	2.10	.148	
13. Serious illness	11.9	13.5	12.7	0.26	.610	
14. Death of someone close	66.4	60.0	63.2	2.73	.098	
15. Divorce	17.2	15.1	16.0	0.43	.511	
16. Sexual abuse	20.0	2.2	11.6	51.58	<.001	.279
17. Physical abuse	13.1	9.9	11.4	1.39	.238	
18. Severe childhood neglect	8.1	6.2	7.1	0.66	.415	
19. Humiliation or persecution by others (bullying)	21.7	19.7	20.8	0.29	.588	
20. Absence of a parent	28.4	25.1	26.9	0.80	.371	
21. Other traumas	8.4	4.0	6.2	4.78	.029	.090

Note: Significant gender difference with χ^2 test, 1 degree of freedom and continuity correction.
[a]Seven did not state their gender (and are not included in χ^2 test).

Table 3. Trauma and life events according to indirect exposure and gender.

Event	Indirect exposure			χ^2	*p*-value	Phi coefficient
	% Females ($n = 360$)	% Males ($n = 325$)	% All ($n = 692$)[a]			
1. Traffic accident	18.1	19.1	18.6	0.06	.806	
2. Other serious accidents	20.0	15.1	17.6	2.52	.113	
3. Physical assault	27.2	16.3	22.4	11.21	<.001	.131
4. Rape	16.9	8.9	13.0	8.94	.003	.119
5. Witnessed other people injured or killed	13.4	7.7	10.7	5.54	.019	.095
6. Came close to being injured or killed	13.1	8.3	10.8	3.52	.061	
7. Threatened to be beaten	16.4	11.7	14.2	2.73	.099	
8. Near-drowning	10.8	8.0	9.4	1.28	.257	
9. Attempted suicide	20.8	13.5	17.5	5.83	.016	.096
10. Robbery/theft	12.8	9.3	11.3	1.80	.180	
11. Pregnancy	26.4	15.7	21.5	11.02	<.001	.130
12. Abortion	25.0	10.2	18.2	24.56	<.001	.193
13. Serious illness	29.2	20.9	25.4	5.72	.017	.095
14. Death of someone close	28.9	24.0	26.4	1.85	.174	
15. Divorce	24.4	16.0	20.4	6.98	.008	.105
16. Sexual abuse	17.8	8.0	13.2	13.57	<.001	.145
17. Physical abuse	14.7	7.4	11.3	8.50	.004	.116
18. Severe childhood neglect	15.0	6.5	10.9	11.91	<.001	.137
19. Humiliation or persecution by others (bullying)	16.2	8.6	12.6	8.15	.004	.114
20. Absence of a parent	9.5	5.2	7.5	3.81	.051	
21. Other traumas	2.8	1.8	2.3	0.31	.577	

Note: Significant gender difference with χ^2 test, 1 degree of freedom and continuity correction.
[a]Seven did not state their gender (and are not included in χ^2 test).

or missing the functional impairment. Respectively, 11.4% of the boys and 16.3% of the girls reached probable subclinical PTSD. The difference between genders was not significant ($\chi^2(1) = 2.0$, $p = .199$).

An additional total of 7% reached a probable subclinical level of CPTSD (1.8% of the boys and 11.2% of the girls). The difference between genders was significant ($\chi^2(1) = 11.16$, $p < .001$) with girls being more likely to endorse probable subclinical CPTSD than boys.

3.5. Demographic variables and mean number of PTEs

There was no significant gender difference in mean number of events directly experienced: boys ($M = 3.0$, SD = 3.08) and girls ($M = 3.4$, SD = 3.30); $t(677) = -1.56$, $p = .60$. However, there were significant differences in the gender distribution of types of directly experienced individual PTEs. Significantly more girls than boys had been directly exposed to rape, attempted suicide, sexual abuse, and other traumas. Boys had significantly more often than girls directly experienced coming close to being injured or killed.

There was a significant gender difference in mean number of events indirectly experienced: boys ($M = 2.4$, SD = 3.70) and girls ($M = 3.8$, SD = 4.80); $t(663) = -4.28$, $p < .001$. Significantly more girls than boys reported indirect exposure to physical assault, rape, coming close to being injured or killed, robbery/theft, pregnancy, abortion, serious illness, divorce, sexual abuse, physical abuse, severe childhood neglect, and bullying.

There were significant age-related differences in the mean number of directly experienced PTEs, Pearson's $r = .15$, $p < .001$ and indirectly experienced PTEs, $r = .22$, $p < .001$, where older participants experienced a significantly higher number of PTEs than younger participants.

There were no significant differences between participants from cities and settlements in the number of reported direct or indirect PTEs. Significant differences between parents' level of education and the number of direct events reported by children and adolescents were found (fathers: $F(3, 98) = 5.17$, $p = .008$, Cohen's $d = .037$, mothers: $F(3, 32) = 3.11$, $p = .026$, Cohen's $d = .017$). Participants whose parents had completed a master's programme or higher educational level reported a significantly higher number of direct PTEs than those whose parents had completed a bachelor's programme. A significant difference between the mother's level of education and the number of indirect events was found, $F(3, 258) = 3.20$, $p = .024$, Cohen's $d = .021$. Participants whose mother had completed a master's programme or higher educational level reported a significantly higher number of indirect PTEs than those whose mother had only completed primary or lower secondary education. No significant differences were found between educational level of fathers and indirect events.

A significant difference between living constellations and the number of direct events was found, $F(6, 26) = 3.82$, $p = .007$, Cohen's $d = .023$. Specifically, children and adolescents living with both parents reported significantly fewer directly experienced PTEs compared to children living with other people. No significant differences could be found between living constellations and the number of indirect events.

Table 4. Chi-square test for direct PTEs and diagnostic category ($N = 404$).

Events	No diagnosis *n* (%) *Adjusted Res*	Probable PTSD *n* (%) *Adjusted Res*	Probable CPTSD *n* (%) *Adjusted Res*	χ^2(df = 2)	*p*-value	Cramer's *V*
1. Traffic accident	22 (6.5) *−1.3*	3 (9.4) *.5*	4 (12.5) *1.2*	1.85†	.397	.068
2. Other serious accidents	54 (15.9) *−.9*	6 (18.8) *.3*	7 (21.9) *.8*	0.88	.645	.047
3. Physical assault	34 (10.0) *−1.7*	6 (18.8) *1.4*	5 (15.6) *.8*	2.97†	.227	.086
4. Rape	**20 (5.9)** ***−4.9***	**7 (21.9)** ***2.7***	**9 (28.1)** ***4.0***	25.02†	<.001***	.249
5. Witnessed other people injured or killed	**15 (4.4)** ***−2.5***	3 (9.4) *.9*	**5 (15.6)** ***2.5***	7.64†	.022*	.138
6. Came close to being injured or killed	35 (10.3) *−.9*	4 (12.5) *.3*	5 (15.6) *.9*	.0.95†	.622	.048
7. Threatened to be beaten	**61 (17.9)** ***−4.3***	11 (34.4) *1.8*	**16 (50.0)** ***4.0***	20.88	<.001***	.227
8. Near-drowning	**88 (25.9)** ***−2.9***	13 (40.6) *1.6*	**15 (46.9)** ***2.4***	8.71	.013*	.147
9. Attempted suicide	**44 (12.9)** ***−4.8***	8 (25.0) *1.3*	**16 (50.0)** ***5.2***	30.35	<.001***	.274
10. Robbery/theft	**44 (12.9)** ***−2.2***	7 (21.9) *1.2*	8 (25.0) *1.7*	4.88†	.087	.110
11. Pregnancy	**7 (2.1)** ***−2.5***	**3 (9.4)** ***2.2***	2 (6.3) *1.1*	6.73†	.035*	.129
12. Abortion	7 (2.1) *−1.2*	2 (6.3) *1.4*	1 (3.1) *.2*	2.19†	.335	.074
13. Serious illness	49 (14.4) *−.6*	7 (21.9) *1.2*	4 (12.5) *−.4*	1.44†	.487	.060
14. Death of someone close	**235 (69.1)** ***−3.0***	27 (84.4) *1.6*	**29 (90.6)** ***2.4***	9.34	.009**	.152
15. Divorce	47 (13.8) *−1.0*	6 (18.8) *.7*	6 (18.8) *.7*	1.05†	.592	.051
16. Sexual abuse	**33 (9.7)** ***−6.4***	**12 (37.5)** ***3.8***	**14 (43.8)** ***4.9***	41.79†	<.001***	.322
17. Physical abuse	**36 (10.6)** ***−2.2***	4 (12.5) *.1*	**9 (28.1)** ***2.9***	8.39†	.015*	.144
18. Severe childhood neglect	**21 (6.2)** ***−2.2***	4 (12.5) *1.1*	5 (15.6) *1.8*	5.03†	.081	.112
19. Humiliation or persecution by others (bullying)	**60 (17.6)** ***−5.7***	**15 (46.9)** ***3.4***	**17 (53.1)** ***4.3***	32.41	<.001***	.283
20. Absence of a parent	**85 (25.2)** ***−4.7***	**18 (56.3)** ***3.4***	**17 (53.1)** ***3.0***	22.34	<.001***	.236
21. Other traumas	18 (5.3) *−.8*	2 (6.3) *.1*	3 (9.4) *.9*	0.92†	.632	.048

Notes: Significant *p*-values = *$p < .05$, **$p < .01$, ***$p < .001$, PTEs = Potentially traumatic events, Adjusted Res = Adjusted Residuals, *n* = number of participants, df = degrees of freedom. Results reported in bold are significantly larger/smaller than expected (measured by significant chi-square values with adjusted residuals > 2.0 or < −2.0). † = Fisher's Exact Probability Test significance recorded because one or more cells had expected frequency of less than 5.

3.6. The relationship between direct trauma exposure and PTSD or CPTSD

Table 4 displays the risk of fulfilling a probable diagnosis of PTSD or CPTSD after direct PTEs. The three events where observed group membership in the PTSD group was most different from expected group membership were exposure to sexual abuse, bullying, and rape, all of which had more members in the PTSD group than expected and less members in the No diagnosis group than expected. For CPTSD, the three events with the biggest difference in observed and expected group membership were sexual abuse, bullying, and attempted suicide, with more members in the CPTSD group and less members in the No diagnosis group than expected. For all results but sexual abuse, which had a medium effect size, the effect sizes were small. Further, all PTEs with an overrepresentation in the PTSD group additionally and to a bigger degree had overrepresentation in the CPTSD group also, except pregnancy, which only had greater observed PTSD group membership than expected.

3.7. The relationship between indirect trauma exposure and PTSD or CPTSD

Table 5 displays the risk of fulfilling a probable diagnosis of PTSD or CPTSD after indirect PTEs. For PTSD, the three events where observed group membership was most different from expected group membership were indirect exposure to other serious accidents, physical assault, and threatening to be beaten, all of which had more members in the PTSD group than expected and less members in the No diagnosis group than expected. The three events with the biggest difference in observed and expected group membership of CPTSD were indirect exposure to traffic accidents, other serious accidents, and physical

Table 5. Chi-square test for indirect PTEs and diagnostic category ($N = 404$).

Events	No diagnosis *n* (%) *Adjusted Res*	Probable PTSD *n* (%) *Adjusted Res*	Probable CPTSD *n* (%) *Adjusted Res*	χ^2(df = 2)	*p*-value	Cramer's *V*
1. Traffic accident	**65 (19.1)** ***−2.7***	10 (31.3) *1.4*	**12 (37.5)** ***2.3***	7.79	.020*	.139
2. Other serious accidents	**58 (17.1)** ***−4.3***	**12 (37.5)** ***2.4***	**14 (43.8)** ***3.3***	18.54	<.001***	.214
3. Physical assault	**71 (20.9)** ***−5.1***	**18 (56.3)** ***4.1***	**15 (46.9)** ***2.8***	27.26	<.001***	.260
4. Rape	51 (15.0) *−1.1*	6 (18.8) *.5*	7 (21.9) *1.0*	1.26	.533	.056
5. Witnessed other people injured or killed	44 (13.0) *−1.2*	6 (18.8) *.8*	6 (18.8) *.8*	1.48†	.478	.061
6. Came close to being injured or killed	39 (11.5) *−1.9*	6 (18.8) *1.0*	7 (21.9) *1.6*	3.89†	.143	.098
7. Threatened to be beaten	**50 (14.7)** ***−3.5***	**13 (40.6)** ***3.6***	8 (25.0) *1.2*	14.89	<.001***	.192
8. Near-drowning	39 (11.5) *−1.6*	**8 (25.0)** ***2.2***	4 (12.5) *.0*	4.85†	.088	.110
9. Attempted suicide	**67 (19.7)** ***−2.6***	7 (21.9) *.0*	**15 (46.9)** ***3.5***	12.57	.002**	.176
10. Robbery/theft	44 (13.0) *−1.9*	6 (18.8) *.7*	8 (25.0) *1.8*	3.97†	.138	.099
11. Pregnancy	87 (25.6) *−1.7*	10 (31.3) *.5*	13 (40.6) *1.8*	3.62	.164	.095
12. Abortion	73 (21.5) *−2.0*	7 (21.9) *−.2*	**14 (43.8)** ***2.9***	8.17	.017*	.142
13. Serious illness	**105 (30.9)** ***−2.5***	14 (43.8) *1.3*	**16 (50.0)** ***2.1***	6.47	.039*	.127
14. Death of someone close	111 (32.6) *−1.0*	15 (46.9) *1.6*	10 (31.3) *−.3*	2.74	.254	.082
15. Divorce	88 (25.9) *.4*	9 (28.1) *.4*	6 (18.8) *−.9*	0.91	.635	.047
16. Sexual abuse	58 (17.1) *−.9*	5 (15.6) *−.3*	9 (28.1) *1.6*	2.54	.281	.079
17. Physical abuse	**40 (11.8)** ***−3.7***	**9 (28.1)** ***2.3***	**10 (31.3)** ***2.8***	14.00†	<.001***	.186
18. Severe childhood neglect	**36 (10.7)** ***−2.5***	7 (21.9) *1.7*	7 (21.9) *1.7*	6.23†	.044*	.124
19. Humiliation or persecution by others (bullying)	**44 (13.0)** ***−2.8***	**9 (28.1)** ***2.1***	8 (25.0) *1.6*	7.85†	.020*	.140
20. Absence of a parent	31 (9.2) *−1.2*	4 (12.5) *.5*	5 (15.6) *1.1*	1.61†	.447	.063
21. Other traumas	7 (2.1) *.3*	0 (0.0) *−.8*	1 (3.1) *.5*	0.87†	.646	.047

Notes: Significant *p*-values = *$p < .05$, **$p < .01$, ***$p < .001$, PTEs = Potentially traumatic events, Adjusted Res = Adjusted Residuals, *n* = number of participants, df = degrees of freedom. Results reported in bold are significantly larger/smaller than expected (measured by significant chi-square values with adjusted residuals > 2.0 or < −2.0). † = Fisher's Exact Probability Test significance recorded because one or more cells had expected frequency of less than 5.

assault, with more members in the CPTSD group and less members in the No diagnosis group than expected. For all results, the effect sizes were small. Further, all PTEs with greater observed PTSD group membership than expected additionally and to a bigger degree had greater observed CPTSD group membership than expected, except threatening with beating, which only had greater observed PTSD group membership than expected.

3.8. Demographic variables, PTEs and severity of PTSD and DSO (girls)

For girls, the relationship between demographic factors, PTEs and PTSD is displayed in Table 6. In step 1, age, area of living, educational level of the parents and living arrangements were entered as possible predictor variables for change in PTSD sum score. In step 2, mean number of direct and indirect PTEs was entered. A significant increment of R^2 was demonstrated with the inclusion of mean number of PTEs, $F(7, 168) = 11.873$, $p < .001$. Older age, a higher mean number of directly experienced PTEs and higher educational level of the mother were significant predictors of higher PTSD sum scores. In total, the model could explain 33.1% of the variance in PTSD.

For girls, the relationship between demographic factors, PTEs and DSO symptoms is displayed in Table 7. In step 1, age, area of living, educational level of the parents and living arrangements were entered as possible predictor variables for change in DSO sum score. In step 2, mean number of direct and indirect PTEs was entered. A significant increment of R^2 was demonstrated with the inclusion of mean number of PTEs, $F(7, 159) = 4.879$, $p < .001$. A higher mean number of directly experienced PTEs was a significant predictor of higher DSO sum scores. In total, the model could explain 17.7% of the variance.

Table 6. Summary of multivariate two-step hierarchical regression analysis for variables predicting PTSD sum score for girls ($n = 176$).

	Step 1			Step 2		
Predictor variables	*B*	SE *B*	*β*	*B*	SE *B*	*β*
Age	1.095	.203	.375**	.861	.196	.295**
Area of living	−.015	.893	−.001	.589	.842	.048
Educational level of father	.042	.462	.008	−.124	.434	−.023
Educational level of mother	1.121	.420	.224*	1.169	.402	.234*
Living arrangement	−.331	.296	−.076	−.245	.278	−.056
Mean number of directs events experienced				.600	.126	.351**
Mean number of indirect events experienced				−.022	.080	−.020
R^2		.224			.331	
F for change in R^2		9.795**			13.474**	

Note: Significant p-values = *$p < .01$, **$p < .001$, PTSD = Post-traumatic stress disorder.

3.9. Demographic variables, PTEs and CPTSD severity (boys)

For boys, the relationship between demographic factors, PTEs and CPTSD was examined (see Table 8). In step 1, age, area of living, educational level of the parents and living arrangements were entered as possible predictor variables for change in CPTSD sum score. In step 2, mean number of direct and indirect PTEs was entered. A significant increment of R^2 was demonstrated with the inclusion of mean number of PTEs, $F(7, 109) = 4.256$, <.001. A higher mean number of directly experienced PTEs was a significant predictor of higher CPTSD sum score. In total, the model could explain 21.5% of the variance.

4. Discussion

This study is the first to investigate ICD-11 PTSD and CPTSD in Greenlandic children and adolescents recruited from all five municipalities covering the whole country. The study aimed to examine the factor structure of the Greenlandic version of the ITQ-CA, estimate the prevalence of direct and indirect trauma exposure and ICD-11 PTSD and CPTSD, and examine the association between demographics and trauma exposure and ICD-11 PTSD and CPTSD.

Firstly, findings from the CFA suggested that the Greenlandic translation of the ITQ-CA is a valid measure of symptoms of ICD-11 PTSD and CPTSD, but that factor structure differed across boys and girls. Inspecting factor loadings across the models, loadings for the re-experiencing cluster differed mostly and substantially between boys (.59 and .96, respectively) and girls (.35 and .56, respectively) (see Supplementary Table S6) and is likely to explain the gender variance in the factor structure of the ITQ-CA. The first re-experiencing item (recurrent nightmares; RE1) displayed the lowest standardized factor loading across both genders. This might be explained by the low endorsement of this item (5.1% for boys and 11.5% for girls, see Supplementary Table S5) among the current sample of Greenlandic children and adolescents compared to the other items of the ITQ-CA (7.3–22.7% endorsement for boys, 21.4–39.5% endorsement for girls). Alternatively, this item might be problematic in samples constituted solely of women; in a study validating the ITQ for adults from different trauma-exposed populations (Vang et al., 2021), the item of recurrent nightmares was also found to load weakly on PTSD in a sample of women in shelters but not among survivors of childhood sexual abuse, ICD-10 psychiatric outpatients, heterogenous psychiatric outpatients or refugees and torture-survivors. It has been suggested that for the ITQ adult version, intense emotional distress may be an equally appropriate indicator of re-experiencing compared to recurrent nightmares (Karatzias et al., 2016) and has found to improve the overall fit among some populations (i.e. PTSD psychiatric outpatients) and have comparable fit in other populations (i.e. heterogeneous psychiatric sample, refugees and torture survivors) when employed in CFA testing instead of RE1 (Vang et al., 2021), although it should be noted that it produced worse fit for child sexual abuse survivors compared to the original model. In the current study, it was not possible to test a revised model with intense emotional distress instead of recurrent nightmares but further studies should

Table 7. Summary of multivariate two-step hierarchical regression analysis for variables predicting DSO sum score for girls ($n = 167$).

	Step 1			Step 2		
Predictor variables	*B*	SE *B*	*β*	*B*	SE *B*	*β*
Age	.800	.266	.236*	.477	.262	.141
Area of living	−1.121	1.125	−.084	−.474	1.072	−.035
Educational level of father	−.360	.563	−.059	−.519	.533	−.085
Educational level of mother	.211	.509	.038	.281	.491	.050
Living arrangement	−.239	.392	−.047	−.094	.371	−.018
Mean number of directs events experienced				.665	.159	.355**
Mean number of indirect events experienced				−.003	.101	−.003
R^2		.064			.177	
F change in R^2		2.201			10.897**	

Note: Significant p-values = *$p < .01$, **$p < .001$, DSO = disturbances in self-organization.

Table 8. Summary of multivariate two-step hierarchical regression analysis for variables predicting CPTSD sum score for boys ($n = 117$).

	Step 1			Step 2		
Predictor variables	*B*	SE *B*	*β*	*B*	SE *B*	*β*
Age	.410	.394	.098	.131	.368	.031
Area of living	2.423	1.923	.123	2.421	1.766	.123
Educational level of father	1.119	.732	.158	.972	.677	.137
Educational level of mother	−.200	.729	−.029	−.331	.676	−.047
Living arrangement	.164	.500	.032	.250	.461	.048
Mean number of directs events experienced				1.139	.296	.356*
Mean number of indirect events experienced				.197	.159	.116
R^2		.050			.215	
F change in R^2		1.163			11.441*	

Note: Significant p-values = *$p < .001$. CPTSD = complex post-traumatic stress disorder.

explore whether this item might be a better operationalization of re-experiencing across different trauma-exposed populations.

4.1. Trauma exposure

The number of children and adolescents exposed to direct PTEs (82.8%) is comparable to the results from a former study on Greenlandic children from the West Coast (Karsberg et al., 2012), to comparison studies of children and adolescents from Denmark, Iceland, and the Faroe Islands (Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010), and to newer, representative studies with child and adolescent populations from Northern Ireland and China (Li et al., 2021; Redican et al., 2022), results ranging from 68% to 90% for the full samples. The average number of directly experienced events (3.2) is also in line with previous studies (Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Karsberg et al., 2012; Petersen et al., 2010). However, the prevalence of children and adolescents who reported at least 1 indirect PTE (57%) is lower than the former study on Greenlandic children (74.3%) and lower than comparison studies (Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010). These findings are somewhat surprising given that Greenlandic children and adolescents do not report a lower prevalence of directly experienced PTEs in the current study. The discrepancy in prevalence between the former (Karsberg et al., 2012) and the present study with Greenlandic participants may be explained in part by differences between samples. The former sample was recruited by convenience and smaller in size (Karsberg et al., 2012), while the present study uses a bigger and more representative sample of children and adolescents. With the improved sampling method, we should pay special attention to this new finding. Greenland is characterized by a culture of collectivism (as opposed to individualism) (Arnfjord et al., 2017; Steenholdt, 2019). While collectivism has many benefits or advantages, it may pose a risk for a culture of silence about things that may burden the community. This may explain the low reported prevalence of indirect exposure. Perhaps people in Greenland do not share their own experiences with each other in fear of stigmatization or social exclusion (Arnfjord et al., 2017). When comparing the prevalence of direct and indirect experiences of specific PTEs, children and adolescents report more direct than indirect exposure to threats of being beaten, near-drowning, robbery/theft, death of someone close, bullying, and absence of a parent. The discrepancy between direct and indirect exposure is especially big for absence of a parent and death of someone close.

Shifting our attention from general endorsement of PTEs to the prevalence of specific PTEs, we find a pattern similar to that of Karsberg and colleagues (Karsberg et al., 2012). While Greenlandic children and adolescents are not exposed to more PTEs on average than children and adolescents from other parts of the world, higher rates of certain types of PTEs were reported such as attempted suicide (14.9% in Greenland vs. 6.2–10.2% in Denmark), The Faroe Islands, and Iceland (Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010), rape (8.1% vs. 1.8–4.2%; Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010), sexual abuse (11.6% vs. 1.5–5.2%; Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010), death of someone close (63.2% vs. 42.7–53.3%; Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010), physical abuse (11.4% vs. 2.9–7.4%; Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010), absence of a parent (26.9% vs. 5.8–14.7%; Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010), and near-drowning (27.3% vs. 18.7–21.1%; Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010) and less exposed to traffic accidents (7.2% vs. 15.9–27.1%; Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010) (see Supplementary Tables S8 and S9). Hence, severe interpersonal traumas are more frequent in Greenland compared to other countries. The higher prevalence of near-drowning (and a lower prevalence of traffic accidents) comes as no surprise, taking the Greenlandic infrastructural conditions into account. The reported prevalence of near-drowning, absence of a parent, and serious illness, is, however, higher than previous findings in a Greenlandic population (Karsberg et al., 2012). While the prevalence of attempted suicide is still higher than in the Nordic countries (Bödvarsdóttir & Elklit, 2007; Elklit, 2002; Petersen et al., 2010), it is indeed lower than previous findings in a Greenlandic population (Bjerregaard & Lynge, 2006; Karsberg et al., 2012).

4.2. ICD-11 PTSD and CPTSD

A total of 7.8% of children and adolescents qualified for a probable diagnosis of ICD-11 PTSD, while 8.5% qualified for a probable diagnosis of CPTSD. The prevalence of probable ICD-11 PTSD and CPTSD combined corresponds with the prevalence of DSM-IV PTSD found in the former study on Greenlandic children and adolescents (17.1%). Thus, some children who formerly were diagnosed with DSM-IV PTSD might likely have qualified for a CPTSD diagnosis.

The prevalence of ICD-11 CPTSD exceeded the prevalence of ICD-11 PTSD in the present study. This finding is consistent with other general population studies of adults (Cloitre et al., 2018; Cloitre et al., 2019; Hyland et al., 2021), a general population study of 11–19-year-olds from Northern Ireland (Redican et al., 2022), and a study of Lithuanian and Japanese adolescents (Kazlauskas et al., 2022) that found the prevalence of CPTSD exceeding that of PTSD. However, the comparison of PTSD and CPTSD prevalence rates across different cultural populations should be made with caution. To our knowledge, only one study has examined the measurement invariance of the ITQ-CA (Kazlauskas et al., 2022). This study confirmed metric invariance of the ITQ-CA in samples of Lithuanian and Japanese adolescent samples. Another study investigated the cross-cultural validity and differential item functioning (DIF) of the ITQ in a clinical refugee sample (Nielsen et al., 2023). The study found that the PTSD and DSO scales have stable psychometric properties across the Danish, Arabic, and Bosnian language versions, and different levels of assisted administration. Further research testing whether these findings extend to the translation of the ITQ-CA should be conducted.

4.3. Factors associated with PTSD and CPTSD

Consistent with previous findings, cumulative direct trauma exposure elevated the risk of ICD-11 PTSD and CPTSD (Kazlauskas et al., 2022; Redican et al., 2022). This finding was consistent for a probable diagnosis across both boys and girls, as well as across PTSD, DSO and CPTSD severity-scores. For girls, older age and a higher educational level of their mothers were also significantly associated with higher scores on PTSD symptoms but not DSO symptoms. While older age has consistently been found to increase the risk of PTSD (Brown et al., 2021), educational level is commonly found to have a reverse relationship to PTSD, such that socioeconomic disadvantage increases the risk of PTSD (Copeland & McGinnis, 2021). This finding was also evident in an investigation of the Strengths and Difficulties Questionnaire (SDQ) employing the same sample (Banzon & Elklit, 2023), where higher educational level of mothers was associated with higher scores on hyperactivity and inattention. Perhaps the high degree of psychosocial problems among Greenlandic people has the effect that the educational level of the parents no longer works as a protective factor for the children.

Investigating the individual PTEs, all events which had significantly more people in the PTSD-category also had significantly more people in the CPTSD-category, except pregnancy. Similar results have been reported in previous studies (Hyland et al., 2021; Kazlauskas et al., 2022; Li et al., 2021). Hence, children and adolescents exposed to non-interpersonal events may also be likely to experience DSO symptoms. In the current study, we have treated attempted suicide as a PTE that turned out to be more strongly related to CPTSD than expected. However, findings from a Lithuanian study among adults highlight that those who suffer from CPTSD are at increased risk of suicide (Gelezelyte et al., 2022) and therefore, the relationship between attempted suicide and CPTSD might reflect the severity of suffering rather than a relationship between a criterion A-event and ICD-11 PTSD/CPTSD. Similarly, it is not clear whether the absence of a parent should be considered a Criterion A event or a risk factor for the development of PTSD-symptoms after another type of trauma as a proxy measure of lack of support. Another important finding is that events not typically fulfilling criterion A also were associated with an increased risk of both PTSD and CPTSD (e.g. absence of a parent and bullying). These types of events are not defined as physically or sexually threatening but can instead be described as posing a direct or indirect threat to the psychological safety of a child or adolescent (Hyland et al., 2021; Nielsen et al., 2023). In the current study, both absence of a parent and bullying showed some of the strongest effects. This finding is also reflected in newer studies investigating the relationship between prevalence rates of DSM-5 PTSD and ICD-11 PTSD and CPTSD when psychologically threatening events are either in- or excluded. These studies show that adversities such as neglect, bullying and stalking are associated with an increased risk of meeting the diagnostic criteria for PTSD and CPTSD (Cloitre et al., 2018; Hyland et al., 2021; Vang et al., 2023). These findings indicate that experiences involving threats to psychological or emotional safety may warrant further attention in addition to experiences considered prototypical antecedents of PTSD and CPTSD among children and adolescents as well. In relation to this, it should be noted that the current study did not control for the unique effects of specific PTEs, and most children had been exposed to more than one event, making it difficult to disentangle contributions from events that are solely psychologically threatening from those that pose a simultaneous threat to physical or sexual integrity.

4.4. Strengths and limitations

A strength of the current study is the sampling method which included the whole country and both cities and settlements, and the great number of participants, which ensures greater confidence in the generalizability of the results. However, despite considerable efforts to recruit a representative sample in our study, it was not possible to recruit adolescents who did not attend school. Given that a high number of adolescents aged 16 and 17 years drop out of school, this age group is underrepresented in our sample. This may bias our sample, as those who do stay in school may be better off regarding academic abilities, coping skills, and adaptability (Karsberg et al., 2012). The inability to ascertain the number of children or adolescents choosing not to participate in the study also poses a threat to the generalizability. However, the investigators did not note any children or adolescents in the classrooms who did not choose to participate, and few parents declined participation on behalf of their child or adolescent.

The cross-sectional design of the study hampers causal explanations about the relationship between trauma exposure and reactions. Longitudinal, prospective study designs should be considered for future research. While the CFA have provided validity of the factor structure of the ITQ-CA, and the convergent validity was tested using the latent variables PTSD, DSO and first-order factors and sum scores of direct and indirect PTEs, the current study would have benefitted from validation with clinician-administered measures, as self-report might be biased in a number of different ways. However, at present, no such clinician-administered interview of ICD-11 PTSD and CPTSD among children and adolescents exist. The use of self-report as methodological basis for estimating prevalence rates is likely to lead to an overestimation of the prevalence of PTSD and CPTSD. The nature of self-reporting as well as the environment of the data collection (school classes) also poses a risk of bias, as children may over- or underreport on their experiences and symptoms. We have tried to combat this risk of bias by having the children sit with distance from one another. In the comparison of individual PTEs and probable diagnostic status, corrections for multiple testing were not employed increasing the likelihood for false positives. Significant results should consequently be cautiously interpreted, however, the majority of findings linking direct trauma exposure to ICD-11 PTSD and CPTSD risk were highly statistically significant ($p < .001$).

As noted in the introduction, living conditions of Greenlandic children and adolescents may vary due to e.g. language, climate, degree of supply, employment rates, and percentage of the population that receives public assistance (Redican et al., 2022). These demographic differences were unfortunately not measured in the current study, although they may influence both trauma exposure levels and reactions following PTEs. Further studies may consider investigating the influence of these factors on trauma exposure and -reactions.

It should also be noted that no direct translation of 'bullying' exists in the Greenlandic language. For example, adolescents who bully others and get bullied themselves are called 'Nallinnartut', which translates to 'those poor people' (Schnohr & Niclasen, 2006). Thus, the understanding of bullying might differ between languages and further studies exploring the importance of psychologically threatening events among Greenlandic youth would benefit from a further exploration of cultural differences in the interpretation of 'bullying'.

A final limitation is the low response rate on the ITQ-CA. Of the children and adolescents who reported at least one direct or indirect PTE, 62.5% had a full response on the PTSD part of the ITQ-CA, while only 57.6% had a full response on both PTSD and DSO parts of the ITQ-CA. Not all studies employing the ITQ-CA report response rates. The calculation of response rates differs slightly between studies, hindering direct comparisons. Overall, the response rate of the present study is slightly lower than other studies of the ITQ-CA (Kazlauskas et al., 2022; Redican et al., 2022). Significant differences were found regarding who did and did not complete the ITQ-CA. In the partial or non-responder group, children were younger, more often from the city (as opposed to settlements), more often chose the Danish language questionnaire, and had a lower mean number of indirect PTEs. As very few children answered the full ITQ-CA in Danish, these responses were excluded from the CFA, and it was not possible to conduct an analysis of measurement invariance. While the Danish version of the ITQ-CA has been validated in a sample of Danish children and adolescents (Kazlauskas et al., 2022), further research should seek to test whether the Danish version of the measure works the same in a Greenlandic youth population. To ensure the representativity of the remaining analyses, the Danish responses were included, as this represents the distribution of languages in Greenland.

5. Conclusion

The present study supports the factorial and convergent validity of the Greenlandic version of the ITQ-CA to identify symptoms of PTSD and CPTSD although different models were found to have the best fit across boys and girls. The study is the first to examine ICD-11 PTSD and CPTSD prevalence levels in a Greenlandic population. Over 80% of children

report at least one directly experienced PTE while 57% report minimum one indirectly experienced PTE. The estimated prevalence of probable ICD-11 PTSD and CPTSD is 7.8% and 8.5%. Few demographic differences are significantly associated with trauma exposure. Age is significantly associated with PTSD and DSO for girls, while cumulative direct trauma exposure is significantly associated with PTSD, DSO and CPTSD for both genders. Results indicate that both trauma type and quantity of direct traumatic exposure are important predictors of PTSD and CPTSD. We hope this study encourages future investigation of Greenlandic children and adolescents' traumatic reactions, as well as investigations of factors and pathways associated with the development of PTSD and CPTSD. The validation of the factor structure of the Greenlandic ITQ-CA is the first step towards implementation of screening for ICD-11 PTSD and CPTSD, which may lead to trauma-focused interventions and consequently lower symptom levels for children and adolescents in Greenland.

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Data availability statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

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