Evidence of a traumatic stress dimension of psychopathology among at-risk children living in Denmark

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Abstract

The Hierarchical Taxonomy of Psychopathology (HiTOP) is a quantitative model of psychopathology. HiTOP proposes that trauma-related distress is a facet of Internalizing psychopathology, but recent evidence with young people suggests that it may reflect a unique dimension of psychopathology. This study assessed the latent structure of child and adolescent psychopathology to determine whether there is evidence of a unique 'Traumatic Stress' dimension, and how dimensions of psychopathology are associated with specific types of childhood adversity and trauma, and suicidal ideation and self-injurious behavior. Participants were children and adolescents aged 1–17 years ($N = 1,800$) who were in contact with the Danish child protection system due to suspected child abuse. Confirmatory factor analysis was used to determine the optimal latent structure of psychopathology, and structural equation modelling was used to determine how the dimensions of psychopathology were associated with different forms of trauma and adversity and suicidality/self-harm. The best fitting model included three factors of Internalizing, Externalizing, and Traumatic Stress. The Traumatic Stress dimensions was associated with older age, living outside of the family home, parental mental illness, higher levels of parental conflict, and the presence of domestic violence in the child's home. The Traumatic Stress dimension was not associated with suicidality/self-harm. This study provides additional evidence of a distinct dimension of Traumatic Stress among young people. Further studies are needed to determine if these findings are replicable, particularly in older participants.

Keywords Child and adolescent · Psychopathology · Externalizing · Internalizing · Traumatic stress

How best to describe the structure of psychopathology is an ongoing debate in psychiatry and psychology (Carragher et al., 2016; Caspi & Moffit, 2018). More specifically, there is disagreement as to whether 'dimensional' or 'categorical' models offer more accurate and clinically useful representations of psychopathology (Frost et al., 2020; Haeffel et al., 2021; Kotov et al., 2017; Ruggero et al., 2019). Early dimensional models of the latent structure psychopathology focused on two correlated dimensions of Internalizing and Externalizing (Achenbach & McConaughy, 1997; Achenbach et al., 2016). More recently, the Hierarchical Taxonomy of Psychopathology (HiTOP; Kotov et al. 2017) proposed that all mental health problems can be understood within a multidimensional and hierarchical structure. From the lowest (i.e., observed) to the highest (i.e., inferred) levels, HiTOP describes specific behaviours, signs, and symptoms of psychopathology that are grouped into components or traits which reflect 'syndromes' (e.g., Generalized Anxiety, Depression, Substance Misuse), 'sub-factors' (e.g., eating pathology, fear, distress, mania), and 'spectra' (Somatoform, Internalizing, Thought Disorder, Disinhibited Externalizing, Antagonistic Externalizing, and Detachment), all of which are subsumed under a general factor of psychopathology (p). Many studies have found

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that the structure of psychopathology in children and adolescents is consistent with the HiTOP model (Afzali et al., 2018; Carragher et al., 2016; Michelini et al., 2019), with particularly robust evidence for the Internalizing and Externalizing dimensions (Brandes et al., 2019; Carragher et al., 2016; Lahey et al., 2008; Olino et al., 2018; Waldman et al., 2016). Key components of the HiTOP model remain under discussion, including the appropriate placement of trauma-related distress.

The HiTOP model positions trauma-related mental health problems as part of the 'Distress' subfactor and thus reflective of 'Internalizing' psychopathology. However, empirical evidence suggests that traumatic stress symptoms may not 'fit' within the Internalizing dimension and may be better represented as a unique dimension of psychopathology (Forbes et al., 2021; Hyland et al., 2020). For example, in their recent examination of the latent structure of psychopathology among a clinical sample of youths from the United States, Hyland et al. (2022) found that acceptable model fit could not be achieved when indicators of traumatic distress (i.e., symptoms of posttraumatic stress disorder [PTSD] and developmental trauma disorder) were modelled as part of the Internalizing dimension. Instead, acceptable model fit was only obtained when the traumatic distress items were allowed to load on to a distinct 'Traumatic Stress' dimension. The authors also found that this Traumatic Stress dimension was relatively independent of the Internalizing and Externalizing dimensions; was uniquely correlated with older age and witnessing violence in the family home; and was uncorrelated with suicidal behaviour. These findings provided initial, tentative evidence of the possible existence of a Traumatic Stress dimension in the structure of child and adolescent psychopathology, but further research with culturally distinct samples and alternative measures of traumatic stress symptomatology was called for.

Whether conceptualized categorically or dimensionally, various forms of psychopathology, including PTSD, are routinely correlated with childhood adversity and trauma, and particularly those that are interpersonal in nature (Alisic et al., 2014; Carliner et al., 2016; McLaughlin et al., 2013). While most studies have assessed the cumulative impact of different types of childhood adversity and trauma, there is increasing evidence that specific types of adversity and trauma confer differential risks for negative mental health outcomes (Hyland et al., 2020, 2022; Kalmakis & Chandler, 2015; Lanier et al., 2018; McCutchen et al., 2022). Understanding how specific forms of childhood trauma and adversity are differentially related to different dimensions of psychopathology is therefore warranted if we are to improve assessment of at-risk youths and offer more bespoke services and treatment to prevent the onset of long-term mental health problems among individuals exposed to trauma and adversity in childhood.

Guided by Hyland et al.'s (2022) recent findings and recommendations, the goal of this study was to test for evidence of a distinct 'Traumatic Stress' dimension of psychopathology in a large clinical sample of Danish at-risk children and adolescents. Given the at-risk nature of this sample - all children and youths have been referred to state services due to suspected physical or sexual abuse – there is a high likelihood of substantial levels of traumatic distress among these participants. Consequently, it is an ideal sample to test for the presence of a distinct dimension of Traumatic Stress. If a Traumatic Stress dimension of psychopathology exists, it should be identifiable in this sample. Failure to identify *this* dimension in *this* sample would constitute strong falsification of the hypothesis that there exists a dimension of Traumatic Stress psychopathology. We therefore formulated three study objectives. First, we modelled the latent structure of psychopathology among at-risk children and adolescents living in Denmark. Second, we sought to determine if there were unique associations between the various dimensions of psychopathology and 12 types of childhood adversity and trauma. Third, we examined the associations between the different dimensions of psychopathology and history of suicidal ideation and self-injurious behaviour.

Methods

Study setting, procedures, and participants

This study is based on a national sample of children (age range 1–17 years) who were in contact with one of the five Danish Children Centres (DCCs) between June 2016 and December 2018. The DCCs cater to cases of known or suspected child physical and sexual abuse among children living in Denmark. Data used in the current study were obtained from the DCCs national registry system. For every child that attends the DCC, information is recorded by the care worker in the registry system on a range of indicators of mental health and psychosocial functioning. These data can be derived from a range of multi-informant methods including information obtained during sessions held with the child, during sessions held with the child's parent/caregiver, through information gathered from cross-sectoral case meetings, and through existing social sector case files. A national data registration manual ensures standardization and uniformity of the data across all five regional centres. The current study is a part of larger study on child victimization and psychopathology and ethical approval for the overall study was provided by Trinity College Dublin, Ireland. Access to the national registry data was obtained through

an application to the Danish National Board for Social Services and the data were accessed in a de-identified format.

A total of 3,385 children were in contact with the DCC between June 2016 and December 2018. Cases with high levels of missing data, particularly for indicators of child mental health or household adversity items were excluded ($n = 1,585$). Non-response status reflects the varying involvement of the specific child and the family in the DCC case procedure. The excluded cases did not differ significantly from the cases included in the analysis in terms of age, but the two groups differed on sex with an overrepresentation of girls in the final sample (57.1%) relative to the excluded group (52.2%) with a more equal sex ratio in the excluded group (52.2% girls and 48.2% boys) relative to the final sample (57.1% girls and 42.9% boys): $\chi^2(1) = 8.10$, $p = .004$.

The final sample was comprised of 1,800 individuals. The mean age of the sample was 9.44 years ($SD = 3.86$), with 67.7% aged between 1 and 11 years (children), and 32.3% aged between 12 and 17 years (adolescents). This included 773 males (42.9%) and 1027 females (57.1%). Most children (82.9%) were living at home with one or both parents, and 17.1% were living in an alternative or out-of-home arrangement or placement, (e.g., foster care, residential institution, crisis centre/shelter, asylum centre).

Measures

Child psychopathology: Indicators of child psychopathology were extracted from the DCC registry database, as described in the previous section. These data are entered into the DCC system according to whether a given mental health symptom is present (coded as 1) or absent (coded as 0). Depending on the age of the child, different validated and age-appropriate mental health screening and assessment tools are used during the sessions including the Beck Youth Inventories-II of Emotional and Social Impairment (BYI-II; Beck, 2001), the Trauma Symptom Checklist for Children (TSCC; Briere, 1996), the Havard Trauma Questionnaire (HTQ; Mollica et al., 1992), the Diagnostic Infant Preschool Assessment (DIPA; Scheeringa & Haslett, 2010), and a Danish adaptation of the Darryl PTSD screening cartoon test (Løkkegaard et al., 2017; Neugebauer et al., 1999) (The Danish National Board for Social Services, 2019).

In total, 17 indicators of mental health were available in the DCC registry to be used to model the latent structure child psychopathology. These included indicators of anxiety, appetite changes, problems with physical contact, sadness, critical self-perception, sleep problems, trust problems, withdrawal, avoidance, dissociation, heightened stress level, intrusive memories, anger, externalizing behaviours, low impulse control, substance misuse (drug/alcohol), and

sexual behaviour problems. Operationalization of these items are presented in the supplementary table.

Suicidality. Suicidality was measured using two binary variables taken from the DCC database: (1) self-harm and (2) suicidal thoughts or attempts. These items were recorded as either present (coded as 1) or absent (coded as 0).

Child physical abuse (CPA). Aligned with the definition proposed by Oldrup et al. (2016) CPA is defined as '*The intentional use of physical force which results in or has the potential to cause physical injury*' (Oldrup, Christoffersen, Kristiansen, & Vernstrøm, 2016) and covers various forms of physical violence perpetrated against the child within a close relationship (i.e., by family members or other close contacts of the child). CPA was recorded for each child as present (coded as 1) or absent (coded as 0).

Child sexual abuse/assault (CSA). Aligned with the definition provided by the World Health Organization (2021), CSA is defined as '*The involvement of a child in a sexual activity that he or she does not fully comprehend, is unable to give informed consent to, or for which the child is not developmentally prepared and cannot give consent to*' (The Danish National Board for Social Services, 2018). Presence of CSA covers sexual abuse committed by caregivers and occurrences of sexual assault committed by strangers or person(s) more disconnected to the child. CSA was recorded for each child as present (coded as 1) or absent (coded as 0).

Household adversity. Household adversity was measured via 10 items describing the milieu of the child's upbringing and the social conditions of the family (The Danish National Board for Social Services, 2016). These items included parental/caregiver alcohol or drug abuse, parental/caregiver weak labour market attachment/unemployment, frequent relocation, parental/caregiver criminality, sexual assault of a parent or caregiver in the household (i.e., parents or close relatives sexually assaulting each other, e.g., rape of a parent), household sexually transgressive behaviours (i.e., the parents or other caregivers exhibiting sexually transgressive behaviours directed towards each other or the child, e.g., watching porn when the child is present), high parental conflict, parental/caregiver physical illness, parental/caregiver adult mental illness, and domestic violence. Household adversity variables were recorded for each child as present (coded as 1) or absent (coded as 0).

Data Analysis

Descriptive statistics were first calculated for all study variables. Next, confirmatory factor analysis (CFA) was used to assess the latent structure of the 17 indicators of psychopathology. Three models were tested. Model 1 was a unidimensional model where all symptoms loaded on to a single general psychopathology factor. Model 2 was intended to

reflect the 'spectra' level of HiTOP and included dimensions of Internalizing and Externalizing. Internalizing was measured using 12 symptoms (anxiety, appetite changes, problems with physical contact, sadness, critical self-perception, sleep problems, trust problems, withdrawal, avoidance, dissociation, heightened stress level, and intrusive memories) and Externalizing was measured by five items (anger, externalizing behaviours, low impulse control, misuse of drugs/alcohol, and sexual behaviour problems). Model 3 included three dimensions of Internalizing, Externalizing, and Traumatic Stress, in line with the findings of Hyland et al. (2022). Here, the Traumatic Stress dimension was modelled by using the indicators of avoidance, dissociation, heightened stress level, and intrusive memories that had formed part of Internalizing dimension in Model 2. These models are represented in Fig. 1.

These models were estimated using the mean- and variance-adjusted weighted least squares (WLSMV) estimator that is appropriate for models with categorical variables (Flora & Curran, 2004). Goodness of fit was assessed using standard approaches including the chi-square (χ^2) test, the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), the root-mean-square of error of approximation (RMSEA), and the standardized root mean square residual (SRMR) (Jackson et al., 2009). A non-significant χ^2 result, CFI and TLI values above 0.90, and RMSEA and SRMR values below 0.08 indicate acceptable model fit (Hu & Bentler, 1999). These models are nested and therefore a χ^2 difference test was used to compare the fit of the alternative models.

Finally, upon selection of the best fitting CFA model, a structural equation model (SEM) was specified whereby the dimensions of psychopathology were regressed on to the 12 indicators of childhood adversity/trauma, age, sex (0 = males, 1 = females), and living status of the child (0 = living outside of the home, 1 = living at home with one or both parents). Additionally, suicidality/self-harm was modelled as a latent variable measured by the two observed variables of suicidal thoughts or attempt and self-harming behaviours, and this latent variable was regressed on to the different dimensions of psychopathology. All paths were estimated simultaneously, and all analyses were performed using Mplus version 8.2 (Muthén & Muthén, 2017).

Results

Descriptive statistics

The descriptive statistics for all study variables are presented in Table 1. The most commonly endorsed indicator of psychopathology was heightened stress (42.2%) and the least commonly endorsed indicator was misuse of drugs or

alcohol (1.9%). In terms of interpersonal trauma, 72.7% had experienced CPA and 32.3% had experienced CSA. Household adversity experiences ranged from 4.8% (crime) to 55.5% (high parental conflict). In total, 8.1 pct. endorsed self-harming behavior, 8.8 pct. endorsed suicidal thoughts or attempts, and 12.7 pct. endorsed either one of the suicide related items.

CFA results

The CFA model fit results are presented in Table 2. All models terminated normally, and the χ^2 values were significant for all. This should not, however, lead to rejection of the models as χ^2 values are typically significant with large sample sizes (Tanaka, 1987). Model 1 (the unidimensional model) reflected a poor fitting model based on the CFI, TLI, RMSEA, and SRMR results, and was therefore rejected. Models 2 (Internalizing and Externalizing) and 3 (Internalizing, Externalizing, and Traumatic Stress) yielded similar fit results. The SRMR and TLI values were just outside the recommended boundaries for acceptable fit for both, while the CFI was just outside the boundary of acceptable fit for Model 2 and just inside for Model 3. The RMSEA results indicated good fit for both models. Overall, both models could be deemed to offer reasonable – although not excellent – approximations of the sample data. Model 3 was found to be a significantly closer fit to the data than Model 2 ($\Delta\chi^2 = 51.21$, df = 2, $p < .001$) and was therefore deemed to offer the better representation of the latent structure of psychopathology in the current sample.

The standardized factor loadings and factor correlations for Model 3 are presented in Table 3. All items significantly loaded onto their respective factors. For the Internalizing factor, standardized factor loading ranged between 0.57 and 0.72. For the Externalizing factor, loadings ranged between 0.35 and 0.75. And for the Traumatic Stress factor, loadings ranged from 0.60 to 0.75. Factor correlations were all significant ($ps < 0.001$) and ranged between 0.26 and 0.77. The strongest correlation was between the Internalizing and Traumatic Stress dimensions.

SEM results

The SEM model (χ^2 (1245) = 386, $p < .001$; CFI = 0.85; TLI = 0.83; RMSEA = 0.04 [90% CI = 0.03, 0.04], SRMR = 0.11) explained 28.6% of variance in Internalizing, 12.6% of variance in Externalizing, 14.1% of variance in Traumatic Stress, and 49.9% of variance in suicidality/self-harm (all $ps < 0.001$).

Internalizing was significantly associated with being female, older age, CSA, parental/caregiver unemployment, parental/caregiver mental illness, high parental conflict, and
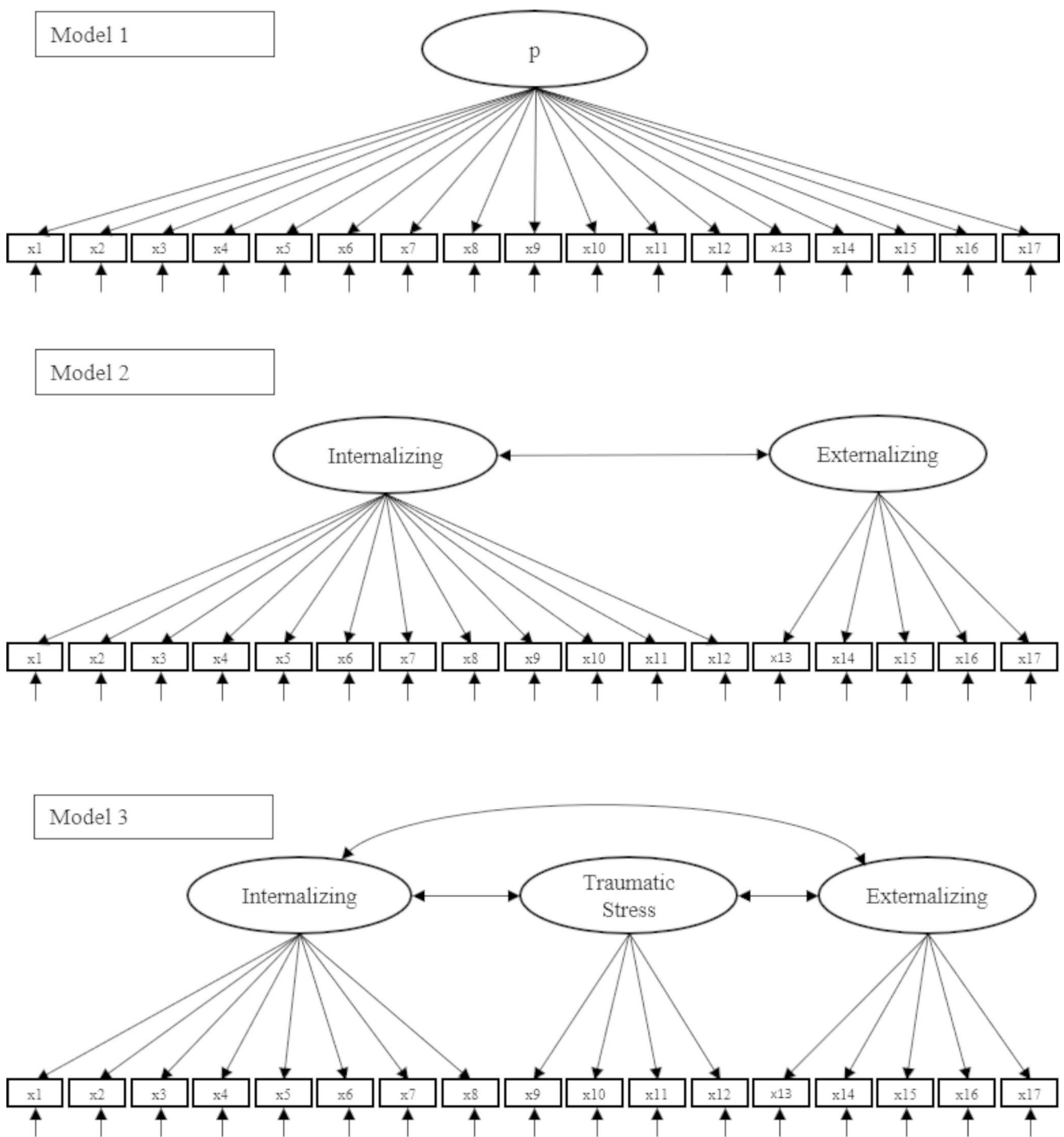
Fig. 1 *Models of the latent structure of psychopathology*

domestic violence. Externalizing was significantly associated with being male, CSA, parental/caregiver mental illness, household sexually transgressive behaviors, and high parental conflict. Traumatic Stress was significantly associated with older age, parental/caregiver mental illness, high parental conflict, domestic violence, and living in an out of home arrangement. Finally, Internalizing ($\beta = 0.66, p < .001$)

and Externalizing ($\beta = 0.21$, $p < .001$), but not Traumatic Stress, were significantly associated with suicidality/self-harm (see Tables 4 and 5 for full results).

Table 1 *Descriptive statistics for all study variables (N = 1800)*

Indicators of child psychopathology	Count (%)
Anxiety	696 (38.7)
Appetite changes	170 (9.4)
Problems with physical contact	112 (6.2)
Sadness	681 (37.8)
Critical self-perception	537 (29.8)
Sleep problems	541 (30.1)
Trust problems	642 (35.7)
Withdrawal	494 (27.4)
Avoidance	693 (38.5)
Dissociation	152 (8.4)
Heightened stress level	759 (42.2)
Invasive memories	398 (22.1)
Anger	558 (31.0)
Externalizing behaviors	462 (25.7)
Low impulse control	464 (25.8)
Misuse (drugs/alcohol)	34 (1.9)
Sexual behavior problems	76 (4.2)
Suicidality	
Self-harming behaviors	146 (8.1)
Suicidal thoughts or attempts	159 (8.8)
Interpersonal trauma	
Child physical abuse (CPA)	1295 (72.7)
Child sexual abuse/assault (CSA)	575 (32.3)
Household adversity	
Parental/caregiver unemployment/weak labor market attachment	577 (32.1)
Frequent relocation	236 (13.1)
Parental/caregiver crime	86 (4.8)
Adult sexual assault of parent or caregiver	133 (7.4)
Household sexually transgressive behaviors	118 (6.6)
Parental/caregiver mental illness	561 (31.2)
Parental caregiver physical illness	228 (12.7)
High parental conflict	999 (55.5)
Domestic violence	675 (37.5)
Parental/caregiver alcohol/drugs	322 (17.9)
Living arrangement (living in an out of home arrangement)	302 (17.1)

Table 3 *Factor loading and factor correlations from the best-fitting model of psychopathology*

Models	Internalizing	Externalizing	Traumatic Stress
Anxiety	0.61		
Appetite changes	0.61		
Problems with physical contact	0.57		
Sadness	0.71		
Critical self-perception	0.72		
Sleep problems	0.69		
Trust problems	0.64		
Withdrawal	0.65		
Avoidance			0.60
Dissociation			0.61
Heightened stress level			0.71
Invasive memories			0.75
Anger		0.86	
Externalizing behaviours		0.82	
Low impulse control		0.83	
Misuse (drugs/alcohol)		0.48	
Sexual behaviour problems		0.35	
Factor correlations			
Internalizing	1		
Externalizing	0.31	1	
Traumatic Stress	0.77	0.26	1

Note: All factor loadings and factor correlations are statistically significant ($p < .001$)

Discussion

This study was carried out to determine the latent structure and correlates of psychopathology among at-risk children living in Denmark, and specifically, to determine if there was evidence of a Traumatic Stress dimension of psychopathology, as suggested by Hyland et al. (2022). Results showed that the latent structure of the available set of indicators of psychopathology was reasonably well represented by three latent factors reflecting Internalizing, Externalizing, and Traumatic Stress; that each dimension of psychopathology was uniquely associated with a range of exogenous demographic and adversity/trauma variables; and that the

Table 2 *SEM model fit results for models with 1–3 latent factors (N = 1800)*

Models	χ^2	df	CFI	TLI	RMSEA	90% CI	SRMR
Model 1: One-factor model	2296	119	0.678	0.632	0.101	0.097, 0.104	0.140
Model 2: Two-factor model (INT & EXT)	860	118	0.890	0.874	0.059	0.055, 0.063	0.103
Model 3: Three-factor model (INT & EXT & TS)	**790**	**116**	**0.900**	**0.883**	**0.057**	**0.053, 0.061**	**0.100**

Note: All χ^2 results are statistically significant (p < .001); χ^2 = chi-square test; df = degrees of freedom; CFI = Comparative Fit Index (> 0.90 = adequate fit, > 0.95 = excellent fit); TLI = Tucker-Lewis Index (> 0.90 = adequate fit, > 0.95 = excellent fit); RMSEA = Root Mean Square Error of Approximation (< 0.08 = adequate fit, < 0.06 = excellent fit); Best-fitting model in bold; INT: Internalizing, EXT: Externalizing, TS: Traumatic Stress

Table 4 *Standardized regression coefficients for each dimension of psychopathology*

	Internalizing	Externalizing	Traumatic Stress
Sex (female)	0.08**	− 0.17***	0.03
Age	0.35***	0.01	0.20***
Child sexual abuse	0.17**	0.16**	0.11
Child physical abuse	− 0.00	0.08	0.01
Living condition (living at home)	− 0.04	− 0.05	− 0.08**
Parental/caregiver unemployment	0.06*	0.06	0.05
Frequent relocation	− 0.01	0.05	0.01
Parental/caregiver crime	− 0.05	0.04	− 0.06
Adult sexual assault of parent/caregiver	− 0.01	− 0.03	0.02
Household sexualized behaviours	0.00	0.07**	0.02
Parental/caregiver mental illness	0.13***	0.09**	0.09**
Parental/caregiver physical illness	0.03	0.03	− 0.02
High parental conflict	0.13***	0.24***	0.11**
Domestic violence	0.13***	0.01	0.13***
Parental/caregiver alcohol/drugs	0.05	− 0.01	0.01
R^2	28.6***	12.6***	14.1***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5 *Standardized regression coefficients for suicidality*

	Suicidality
Internalizing	0.66***
Externalizing	0.21***
Traumatic Stress	− 0.06
R^2	0.50***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Supplementary Table

Internalizing and Externalizing factors, but not the Traumatic Stress factor, were positively associated with suicidality. These findings provide further evidence that the latent structure of (child and adolescent) psychopathology may include a unique dimension of Traumatic Stress (Forbes et al., 2021; Hyland et al., 2022).

In their study, Hyland et al. (2022) cautioned against interpreting the Traumatic Stress factor as a substantive and meaningful dimension of psychopathology because of two issues. One related to the use of a relatively large set of indicators of traumatic distress which could have given rise to a methodological effect (i.e., the illusion of a unique dimension due to similarity in responses across a similar set of items), and the other was the fact that the Traumatic Stress factor had weak associations with the other dimensions of psychopathology (Hyland et al., 2022). This study addresses

both issues. Here, we modelled the Traumatic Stress factor with a relatively small set of items (4 of 17 mental health symptoms), and we found that the Traumatic Stress factor was strongly associated with the Internalizing dimension and weak-to-moderately associated with the Externalizing dimension. Given that traumatic stress disorders such as PTSD are typically highly correlated with internalizing based disorders such as depression and anxiety, and to a lesser extent with externalizing disorders in youth samples (Copeland et al., 2007; Geng et al., 2019; Haselgruber et al., 2020; Linning, & Kearney, 2004; Vibhakar et al., 2019), these findings provide support for the validity of the Traumatic Stress factor.

Further evidence for the construct validity of the Traumatic Stress, Internalizing, and Externalizing dimensions was obtained from their unique associations with a range of different types of childhood interpersonal trauma and household adversity. Typical sex differences were identified for the Internalizing and Externalizing factors with females having higher levels of the former, and males having higher levels of the latter, while older age was associated with higher scores on the Internalizing and Traumatic Stress factors (Afzali et al. 2017; Durbeej et al., 2019; Ghandour et al., 2010; Haahr-Pedersen et al., 2021; Hyland et al., 2022). Of the twelve forms of childhood adversity/trauma, high parental conflict and parental/caregiver mental illness were positively associated with all dimensions of psychopathology. These findings are in line with extant research documenting how children of mentally ill caregivers and children exposed to marital or interparental conflict are at elevated risk for developing internalizing, externalizing, social, emotional, and behavioural problems throughout the lifespan (Harold & Sellers, 2018; Kamis, 2021; Lucas-Thompson et al., 2017; Manning & Gregoire, 2006). Parental mental illness has been associated with attachment disruption, impaired and disrupted caregiving, and can negatively affect children directly through genetic inheritance of increased risk of mental health problems, as well as indirectly through environmental stressors known to be correlated with mental disorders such as poverty, isolation, and marital conflict (Manning & Gregoire, 2006; Ranning et al., 2015 van Santvoort et al., 2015). The common pattern between parental mental health problems and interparental conflict across different forms of psychopathology highlights critical areas of social intervention to identify and help children and adolescents at high risk of mental health problems, and the importance of 'breaking the intergenerational cycle' of mental illness through greater investment in preventative public mental health initiatives.

In addition to these aforementioned risk factors, the Traumatic Stress factor was associated with witnessing domestic violence and living outside of the family home. Living

outside the family home covers different experiences such as foster care, living in a crisis or asylum centre, or in a residential institution. For some of these children this indicates a separation from their parents and/or primary caregiver(s), and typically occurs when the perpetrator of the violence or abuse against the child is a member of the family home (e.g., parent, stepparent, or sibling). Whatever the reason, living outside of the family home is an indicator of a particularly unsafe home environment and probable exposure to extreme fear and horror on the part of the child (Greeson et al., 2011). It is therefore unsurprising that this variable was related to Traumatic Stress. Indeed, previous research has found that attachment disruption (i.e., traumatic separation from caregiver) is associated with symptoms of developmental trauma disorder (Spinazzola et al., 2021). Living in an out of home arrangement is also likely indicative of a highly disrupted home environment, complex and cumulative traumatic exposures, or severely impaired caregiving (Greeson et al., 2011; Salazar et al., 2013).

Consistent with Hyland et al.'s (2022) findings, the Traumatic Stress factor was not associated with suicidal ideation and self-harming behaviours. This suggests that these specific symptoms are unlikely to be linked to an elevated risk of suicide in young people, when taking into account internalizing and externalizing distress. The Externalizing and Internalizing dimensions of psychopathology were associated with suicidal ideation and self-injurious behaviours, though Externalizing not as strongly. Previous research has shown that the 'Distress' subfactor of psychopathology (i.e., problems with depression, generalized anxiety, borderline personality disorder etc.) is the primary aspect of psychopathology most likely to be associated with suicide-related outcomes (Conway et al., 2019; Eaton et al., 2013). Clinicians working with youths showing signs of suicide-related thoughts and behaviours should be especially focused on alleviating Internalizing related distress.

The current study has several limitations. First, endorsement of child mental health symptoms was based on clinical observations and/or or different and developmentally sensitive screening tools spanning varying numbers and types of items and different reporting styles such as self-reports and caregiver reporting. Furthermore, indicators of child psychopathology were registered in a binary response format which restricts our capacity to model variability in these phenomena (Achenbach, 2000; Murphy et al., 2007). Second, the current sample was characterized by a large age span with most individuals in the age range of 1–11 years (childhood). Certain indicators of mental health are more relevant to certain developmental stages than others. Existing research suggests that child and adolescent psychopathology is subject to fluctuation and variation over time due to different developmental influences (Cloitre et al., 2021; Lahey et al., 2008; Olino et al., 2018). Future research could therefore model the structure of psychopathology for different developmental stages more specifically. Third, the cross-sectional nature of the data prevents inferences about causality and a temporal ordering of trauma/adversity events and mental health symptoms. Fourth, the current conceptualization of psychopathology draws on certain elements of the HiTOP framework such as the application of specific spectra level dimensions. Certain aspects of the HiTOP framework such as indicators of Though Disorder and Detachment are not included in DCC data and therefore could not be modelled. The nature and number of psychopathology factors do not merely depend on an underlying structure of psychopathology but also reflects methodological aspects such as the types and number of symptoms measured in a specific study (Mann et al., 2020). Finally, the current analyses were based on an at-risk sample of children and adolescents who were in contact with Danish child protection services and therefore may not be representative of Danish children exposed to child abuse, in general. Findings may also have limited generalizability to the wider population due to the at-risk nature of this sample, and to at-risk samples from other countries.

Despite these limitations, these findings offer additional evidence in support of the existence of a Traumatic Stress dimension of psychopathology. Future research should examine whether a Traumatic Stress dimension of psychopathology is identifiable in general population data, where trauma exposure and trauma-related distress is less common. It may well be the case that for general population samples, trauma-related distress is effectively captured within the 'Distress' subfactor and the 'Internalizing' spectrum and may only obtain relevance in particularly at-risk cohorts of the population who have experienced extreme forms of trauma.

Data Availability Given the sensitive nature of the data and associated legal requirements, the data cannot be shared publicly or privately. Questions about the data can be directed to the first or last author.

Declarations

Conflict of interest The Author(s) declare(s) that there is no conflict of interest.

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