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Published in:
Child Abuse & Neglect

DOI:
10.1016/j.chiabu.2021.105272

Publication date:
2021

Document version:
Final published version

Document license:
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Citation for pulished version (APA):
Pedersen, I. H., Hyland, P., Hansen, M., Perera, C., Spitz, P., Bramsen, R. H., & Vallieres, F. (2021). Patterns of childhood adversity and their associations with internalizing and externalizing problems among at-risk boys and girls. *Child Abuse & Neglect*, *121*, Article 105272. https://doi.org/10.1016/j.chiabu.2021.105272

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Download date: 21. Feb. 2024

Child Abuse & Neglect 121 (2021) 105272

Contents lists available at ScienceDirect

Child Abuse & Neglect

journal homepage: www.elsevier.com/locate/chiabuneg

Patterns of childhood adversity and their associations with internalizing and externalizing problems among at-risk boys and girls☆

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ARTICLE INFO

Keywords:
Adversity
Sex differences
Children
Mental health
Latent class analysis

ABSTRACT

Background: Different types of childhood adversity often cluster and overlap, underlining the importance of studying likely patterns of adversity co-occurrences and their impact on child functioning. Further *sex-specific* investigations of adversity co-occurrences and their associations with child mental health are warranted.

Objective: To investigate if different sex-specific patterns of childhood adversity exist among at risk-children living in Denmark and to explore if divergent constellations of adversity are differentially associated with externalizing and internalizing problems.

Participants and setting: Participants ($N = 2198$) were a sample of children ages 1–17 who have been in contact with the Danish child protection system due to suspected child abuse. The study included existing data collected as a part of child case procedures.

Method: Latent class analysis was used to identify patterns of adversity co-occurrences among girls and boys, respectively. Inter-class differences on age and child mental health were assessed using ANOVAs.

Results: Greater variation and complexity in adversity exposure was found among girls (5 classes) compared to boys (3 classes). The female classes differed on age ($p < .001$, $\eta 2 = 0.06$), internalizing ($p < .001$, $\eta 2 = 0.05$), and externalizing problems ($p = .002$, $\eta 2 = 0.02$). The male classes differed on internalizing ($p < .001$, $\eta 2 = 0.02$) and externalizing problems ($p < .001$, $\eta 2 = 0.04$). Overall, classes characterized by multiple adversities displayed higher scores of mental health problems compared to less exposed classes.

☆ Funding source: The study has been conducted as a part the CONTEXT programme. CONTEXT has received funding from the European Union's Horizon 2020 research and innovation programme, under the Marie Skłodowska-Curie Grant Agreement No. 722523.Declarations of interest: none.

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https://doi.org/10.1016/j.chiabu.2021.105272
Received 27 March 2021; Received in revised form 22 July 2021; Accepted 12 August 2021
Available online 23 August 2021
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Conclusions: Exposure to multiple adversities is common among at-risk children. Information on different sex-specific patterns of adversity co-occurrences can guide intervention planning for affected children.

1. Introduction

Child maltreatment is a global problem with half of all children experiencing some type of violence in the past year (World Health Organization, 2020). Childhood adversities such as abuse, neglect, and household dysfunction are associated with a myriad of negative mental, physical, and social health outcomes (Felitti et al., 1998; Hughes et al., 2017; Metzler et al., 2017).

Research has shown that children exposed to one type of adversity are at greater risk of experiencing additional types of adversity (Debowska et al., 2017; McChesney et al., 2015). The *co*-occurrence of different types of childhood stressors experienced by the same child is typically defined as polyvictimization (Finkelhor et al., 2007) or poly-adversity (McLafferty et al., 2015), and has been linked to a range of negative mental health outcomes including internalizing and externalizing problems (Bevilacqua et al., 2021; Haahr-Pedersen, Ershadi, et al., 2020). Moreover, a robust dose-response relationship between childhood adversities and mental health problems has been evidenced (Hughes et al., 2017; Le et al., 2016). A growing body of research indicates that poly-adversity or related constructs should not be reduced to a simple count of adverse events (Adams et al., 2016), rather different patterns of adversity co-occurrence ought to be recognised as they carry different levels of risk for negative outcomes (Kretschmar et al., 2016).

In addition, notable sex differences in exposure to different types of child adversity exist where girls are more likely to experience sexual abuse, household alcohol or drug problems, and caregiver mental illness, while boys are more likely to experience physical abuse (Finkelhor et al., 2015; Haahr-Pedersen, Perera, et al., 2020; Hines et al., 2012; Merrick et al., 2018; Putnam, 2003; Winstanley et al., 2020).

With growing recognition of the existence of unique patterns of childhood adversities, researchers have turned their attention to studying childhood adversity co-occurrence across the sexes. A range of studies indicate that more complex patterns of childhood adversity are observed among females. In a recent study based on a US representative adult sample, McAnee et al. (2019) found that the number and nature of childhood adversity groups differed by sex, with the identification of three and four distinct latent classes of childhood adversities among males and females, respectively. Similarly, in another US sample, Haahr-Pedersen, Perera, et al. (2020) identified more diverse configurations of childhood adversity among females (four classes) compared to males (two classes). More varied adversity patterns have also been found by Debowska et al. (2018) among children and adolescents from Barbados and Granada, with the identification of four patterns for females and three patterns for males. Moreover, these studies found that individuals exposed to a broader spectrum of adversities had the poorest mental and social health outcomes.

Few studies have assessed if there are distinct patterns of childhood adversities and associated mental health problems among at-risk child populations. In this study, we addressed this research gap in the literature by studying profiles of childhood adversity among at-risk boys and girls who had been referred to the Danish child protection services. Information on different sex-specific configurations of child adversity and their associations with child mental health is of great clinical importance to organizations catering to child abuse and child mental health since this knowledge can more accurately inform and guide assessment and intervention efforts that take into account the diverse needs of affected children (Lanier et al., 2018).

Based on existing literature, we hypothesized that there would be a greater number of adversity profiles for girls than boys. Additionally, we explored whether different patterns of childhood adversities among at-risk girls and boys were differentially associated with internalizing and externalizing mental health problems. Based on existing general population findings (Haahr-Pedersen, Perera, et al., 2020; McLafferty et al., 2015), we hypothesized that boys and girls characterized by profiles of multiple adversities would experience the poorest mental health. Since the risk of exposure to different types of adversity varies across child developmental stages and the risk of exposure to sexual victimization increases with age (Finkelhor, 2008), we hypothesized that classes characterized by sexual victimization would be associated with older age.

2. Methods

2.1. Participants, study setting, and procedures

This study included a national sample of 2198 children (age range 1–17 years) who have been 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, sexual, and emotional abuse[1] among children living in Denmark. The original sample 2016–2018 included 3134 children. Following a case procedure in one of the regional centres, a range of case information is registered for every case based on different types of sources that can include sessions with the child, sessions with the parent/caregiver, information from cross-sectoral case meetings, and existing social sector case files. A national data registration manual with definitions and operationalizations of variables ensures standardization and uniformity of the data across all centres. For this study focusing specifically on child adversity, cases with 'unknown' or non-response status in regard to household adversity were excluded ($n = 1187$). The final sample consisted of 44.4% boys ($n = 976$, mean

[1] Since 2019

age = 8.44 years, *SD* = 3.44) and 55.6% girls (*n* = 1222, mean age = 10.02 years, *SD* = 4.08). Data access was obtained through an application to the Danish National Board for Social Services and upon approval of the study, the data were accessed in a de-identified format. Ethical approval for the study was provided by Trinity College Dublin, Ireland.

2.2. Measures

2.2.1. Childhood adversity

Childhood adversity was measured using 12 binary coded items. This included one item measuring physical abuse (CPA), one item measuring sexual abuse/assault (CSA), and ten household adversity items. CPA is defined as '*The intentional use of physical force which results in or has the potential to cause physical injury*' (The Danish National Board for Social Services, 2019a). The physical violence measure inquired about acts of 'blunt' (e.g., slaps, kicks, punches, or use of blunt objects) and 'sharp' (e.g., use of sharp or pointed objects) violence perpetrated against the child within a close relationship (i.e., by family members or other close contacts of the child) (The Danish National Board for Social Services, 2016). Presence of CPA included contact (e.g., being beaten with an object) and non-contact (e.g., threats of violence) forms of violence. With reference to 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). Sexual victimization acts span contact and non-contact forms of violence. Presence of CSA included sexual abuse committed by caregivers and incidents of sexual assault committed by strangers or person(s) more disconnected to the child. Household adversity was measured using ten items assessing the child's upbringing milieu and the social condition of the family (The Danish National Board for Social Services, 2019a). These included household alcohol or drug abuse, weak labour market attachment/unemployment, frequent relocation, adult criminality, sexual assault of a parent or caregiver in the household,[2] household sexually transgressive behaviours,[3] parental conflict, adult physical illness, adult mental illness, and domestic violence.

2.2.2. Mental health problems

Indicators of child mental health were based on clinical evaluations conducted by DCC personnel (psychologists and social workers) on the basis of sessions held with the child. Different validated and age-appropriate mental health screening and assessment tools are used during sessions, such as the Beck Youth Inventories-II of Emotional and Social Impairment (BYI-II) (Beck, 2001), the Trauma Symptom Checklist for Children (TSCC) (Briere, 1996), and the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) (The Danish National Board for Social Services, 2019b). Information available in the DCC systems specifies if a mental health symptom is present (coded as 1) or absent (coded ad 0). We categorized symptoms as those reflecting externalizing problems (anger/verbal aggression, externalizing behaviours, poor impulse control, and attention/concentration difficulties) or internalizing problems (sleep problems, suicidal thoughts or attempts, sadness/devastation, anxiety, isolation/withdrawal, critical self-perception, and heightened stress level). Total scores of externalizing (range = 0 to 4) and internalizing (range = 0 to 7) problems were constructed. Cronbach's alpha values for the two categories were acceptable: internalizing ($\alpha = 0.70$) and externalizing ($\alpha = 0.71$).

2.3. Data analysis

Descriptive statistics were calculated for the childhood adversity, age, and mental health variables, along with testing for sex differences on these variables using chi-square and independent samples *t*-tests. The Cohen's *d* effect size measure was applied for the *t*-tests. Following the suggestion of Cohen (1988), *d* values were interpreted as: small (0.2), medium (0.5) and large (0.8) effects. To assess the magnitude of associations of the chi-square test, the Odds Ratio (OR) effect size measure was used with cut-off values: 1.50 (small), 2.00 (medium), and 3.00 (large) (Smit et al., 2018). These analyses were executed using SPSS (Version 24).

Next, latent class analysis (LCA) was performed to identify patterns of childhood adversity for boys and girls, separately, across the 12 binary childhood adversity items. Models with 1–6 classes were estimated using the robust maximum likelihood estimator (Yuan & Bentler, 2000). To avoid solutions based on local maxima, 200 random sets of starting values and 20 final stage optimisations were used. These analyses were performed using Mplus version 8.2 (Muthén and Muthén, 2013). To select the optimal number of classes, the relative fit of these models was assessed using the Akaike Information Criterion (AIC) (Akaike, 1987), the Bayesian Information Criterion (BIC) (Schwarz, 1978), and the sample-size adjusted BIC (ssaBIC) (Sclove, 1987). In all cases, the model with the lowest value is considered the best fitting (Geiser, 2013). Simulation studies suggest that the BIC is the best test for detecting the correct number of classes (Nylund et al., 2007). Additionally, the Lo-Mendell-Rubin adjusted likelihood ratio test (LMR-A) (Lo et al., 2001) compares models with increasing number of classes, whereby a non-significant result indicates that the model with one fewer class should be preferred (Murphy et al., 2007). Finally, entropy values are assessed to determine how accurately individuals are classified into classes, with values closer to 1 indicating better classification (Shevlin et al., 2008).

Upon the selection of the best fitting LCA models for boys and girls, class probabilities were saved and assigned to each participant. The resultant classes could then be compared in relation to age and levels of externalizing and internalizing problems using analysis of variance (ANOVAs). Partial eta-squared indicated effect sizes in the ANOVAs with the following cut-off values: small (0.01), medium

[2] Parents or close relatives are sexually assaulting each other, e.g. rape of a parent.

[3] The parents or other caregivers are exhibiting sexually transgressive behaviours (directed towards each other or the child), e.g. watching porn when the child is present.

(0.06), and large (0.14) (Miles & Shevlin, 2001). These comparisons were executed using SPSS (Version 24).

3. Results

3.1. Descriptive statistics, t-tests and chi-square tests

Descriptive statistics for the full sample are presented in Tables 1 and 2. In the full sample, 29.0% of children had experienced CSA and 75.7% had experienced CPA. The most frequently occurring household adversity event was 'parental conflict' (54.5%), and the least commonly occurring was adult criminality (4.8%). Overall, 15.0% of children had not been exposed to any type of household adversity. The mean number of internalizing problems was 2.15 ($SD = 1.87$), and the mean number of externalizing problems was 1.15 ($SD = 1.32$).

3.2. Sex differences

Sex differences in exposure to each adversity item, age, and internalizing and externalizing problems are presented in Tables 1 and 2, respectively. Girls were more likely to have experienced CSA (OR = 5.38), and boys were significantly more likely to have experienced CPA (OR = 5.77). Girls were also more likely than boys to come from households characterized by frequent relocation, sexual assault of a parent or caregiver in the household, and household sexually transgressive behaviours. Effect sizes (OR) were generally medium-to-high. Girls had significantly higher levels of internalizing problems, whereas boys had significantly higher levels of externalizing problems. All effect sizes (Cohen's *d*) were small (range 0.24–0.42).

3.3. LCA results for girls

The model fit statistics for boys and girls are presented in Table 3. For girls, the LMR-A results were inconclusive, however the five-class model had the lowest BIC value and was therefore selected as the optimal solution. The entropy value of 0.84 indicated good classification. The five classes are represented in Fig. 1.

Class 1 (6.8%, $n = 83$) was the smallest and was characterized by high probabilities of CSA (0.97), domestic violence (0.96), and parental conflict (0.80), and moderate probabilities of household unemployment/weak labour attachment (0.59), adult mental illness (0.56), CPA (0.46), alcohol/drug abuse (0.44), sexual assault of parent or caregiver (0.43), and frequent relocating (0.43). This class was labelled 'High poly-adversity'. Class 2 (12.5%, $n = 153$) also had a high probability of CSA (1.00), and high/moderate probabilities of coming from a household characterized by a weak labour market attachment/unemployment (0.76) and adult mental illness (0.58). This class was labelled 'CSA and psychosocial problems'. Class 3 (17.1%, $n = 209$) was characterized by a high probability of CPA (1.00), and high/moderate probabilities of coming from a home that involved parental conflict (0.81), weak labour market attachment/unemployment (0.74), domestic violence (0.69), and adult mental illness (0.53). This class was labelled 'Violence, conflict, and psychosocial problems'. Class 4 (21.3%, $n = 260$) had a high probability of CSA (1.00) and very low probabilities of endorsing all other adversities. This class was labelled 'CSA'. Finally, Class 5 (42.3%, $n = 517$) was the largest class and had a high probability of CPA (1.00), and moderate probabilities of endorsing parental conflict (0.58) and domestic violence (0.42). This class was labelled 'CPA and conflict'.

The female classes significantly differed on age ($F(4, 1198) = 18.03$, $p < .001$). The three classes that were defined by an elevated probability of CSA (Classes 1, 2, and 4) were significantly older than the two classes (Classes 3 and 5) that had low probabilities of CSA (see Table 4).

Table 1
Differences between boys and girls on categorical adversity variables: CSA, CPA, and household adversity items.

	Overall		Girls		Boys		χ^2	OR [95% CI]
	n	%	*n*	%	*n*	%		
Child sexual abuse/assault (CSA)	631	29.0	515	42.4	116	12.0	240.73***	5.38 [4.30–6.74]
Child physical abuse (CPA)	1648	75.7	772	63.6	876	91.0	281.76***	5.77 [4.49–7.40]
Alcohol or drug abuse	387	16.6	231	18.9	156	16.0	3.19	1.23 [0.99–1.53]
Unemployment/Weak labour market attachment	675	30.7	389	31.8	286	29.3	1.63	1.13 [0.94–1.35]
Frequent relocation	274	12.5	181	14.8	93	9.5	13.88***	1.65 [1.27–2.15]
Adult criminality	106	4.8	60	4.9	46	4.7	0.05	1.04 [0.70–1.55]
Adult sexual assault of parent or caregiver	142	6.5	107	8.8	35	3.6	24.00***	2.58 [1.74–3.82]
Adult mental illness	658	29.9	378	30.9	280	28.7	1.30	1.11 [0.93–1.34]
Household sexually transgressive behaviours (STB)	128	5.8	95	7.8	33	3.4	19.10***	2.41 [1.61–3.61]
Parental conflict	1199	54.5	648	53.0	551	56.5	2.57	1.15 [0.97–1.36]
Adult physical illness	266	12.1	147	12.1	119	12.2	0.01	1.02 [0.79–1.31]
Domestic violence	830	37.8	453	37.1	377	38.6	0.56	1.07 [0.89–1.27]

Note: χ^2 = chi-square test; OR [95% CI] = odds ratio with 95% confidence intervals; statistical significance = *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.

Table 2
Differences between boys and girls on continuous variables: age, number of externalizing and internalizing problems.

	Overall			Girls			Boys			*t*	Cohen's *d*
	Range	*M*	*SD*	Range	*M*	*SD*	Range	*M*	*SD*		
Age	1–17	9.31	3.89	1–17	10.02	4.08	1–17	8.44	3.44	−9.73***	0.42
Number of externalizing problems	0–4	1.15	1.32	0–4	1.01	1.25	0–4	1.33	1.40	5.02***	0.24
Number of internalizing problems	0–7	2.15	1.87	0–7	2.41	1.97	0–7	1.80	1.67	−7.11***	0.33

Note: *t* = independent samples *t*-test; *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.

Table 3
LCA fit statistics.

Classes	Log likelihood	AIC	BIC	ssaBIC	LMR-A (*p*)	Entropy
Girls (N = 1222)						
1	−7284	14,592	14,654	14,616	–	–
2	−6444	12,939	13,067	12,988	1661 (<0.001)	0.96
3	−6259	12,595	12,789	12,668	366 (0.007)	0.88
4	−6158	12,418	12,679	12,517	200 (0.008)	0.81
5	**−6103**	**12,335**	**12,662**	**12,458**	**108 (0.050)**	**0.84**
6	−6064	12,282	12,675	12,431	77 (<0.001)	0.85
Boys (N = 976)						
1	−4719	9462	9521	9482	–	–
2	−4373	8797	8919	8840	683 (<0.001)	0.99
3	**−4220**	**8517**	**8703**	**8582**	**302 (<0.001)**	**0.78**
4	−4172	8447	8696	8534	95 (0.003)	0.82
5	−4130	8388	8700	8497	83 (<0.001)	0.81
6	−4108	8370	8746	8501	43 (0.002)	0.86

Note: AIC: Akaike Information Criterion, BIC: Bayesian Information Criterion (BIC), ssaBIC: sample-size adjusted BIC, (LMR-A): Lo-Mendell-Rubin adjusted likelihood ratio test. Best fitting model in bold.

3.4. Female classes and associated mental health

The female classes significantly differed on internalizing (F (4, 1022) = 12.86, $p < .001$) and externalizing (F (4,1022) = 4.36, $p = .002$) problems, and effect sizes were small (range: 0.02–0.05) (see Table 4). For internalizing problems, post-hoc tests showed that the 'High PA' class (Class 1) had significantly higher symptoms than all other classes. Furthermore, the 'CPA and conflict' group (Class 5) was the least affected in terms internalizing problems. For externalizing problems, the 'High PA' group (Class 1) had a significantly higher score than the 'CSA' and 'CPA and conflict' classes (Classes 4 and 5).

3.5. LCA results for boys

The three, four, and five class models for boys had similar BIC results, and the LMR-A was statistically significant for all models. To aid in model selection, the three, four, and five class models were plotted and tested against external variables, as per recommendations (Roesch et al., 2010). Based on interpretability, association with external variables, and parsimony, the three-class solution was selected as the best fitting model for boys. This class possessed acceptable entropy (0.78). The three-class profile plot is represented in Fig. 2.

Class 1 (28.4%, $n = 277$) was characterized by high probabilities of CPA (1.00), parental conflict (0.74), and household weak labour market attachment/unemployment (0.71), and moderate probabilities of domestic violence (0.58) and adult mental illness (0.57). This class was labelled 'Violence, conflict, and psychosocial problems'. Class 2 (12.0%, $n = 117$) was the smallest and was characterized by a high probability of CSA (1.00), moderate probabilities of parental conflict (0.35), adult mental illness (0.36), and weak labour market attachment/unemployment (0.32), and low probabilities of adult sexual assault and sexually transgressive behaviour. This class was labelled 'CSA and household dysfunction'. Class 3 (59.6%, $n = 582$) was the largest class and was characterized by a high probability of CPA (1.00) and moderate probabilities of parental conflict (0.51) and domestic violence (0.33). This class was labelled 'CPA and conflict'.

The male classes did not significantly differ based on age (see Table 5).

3.6. Male classes and associated mental health

The three male classes significantly differed on internalizing (F (2,770) = 8.23, $p < .001$) and externalizing (F (2,770) = 17.59, $p < .001$) problems, and effect sizes were small (range: 0.02–0.04) (see Table 5). Post-hoc tests showed that the 'Violence, conflict, and psychosocial problems' class (Class 1) had significantly higher levels of internalizing and externalizing problems than the 'CPA and conflict' class (Class 3).

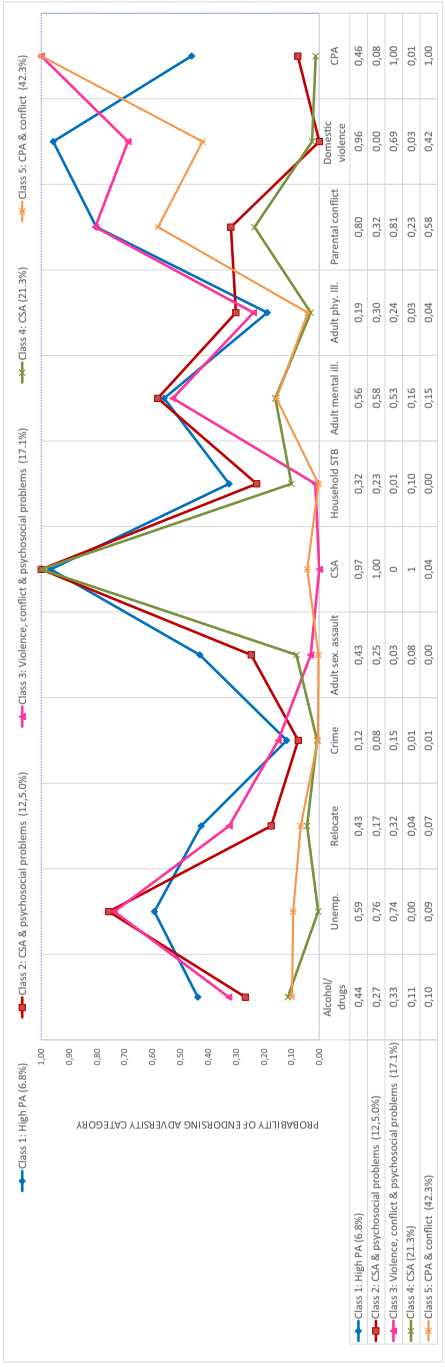

Fig. 1. Female class plots.

Table 4
Differences between the girl classes on age and internalizing and externalizing problems.

	Classes	*M*	*SD*	*F*	Eta-squared
Age	Class 1: High Poly-adversity (PA)	11.4[3,5]	4.08	18.03***	0.06
	Class 2: CSA & psychosocial problems	11.15[3,5]	4.04		
	Class 3: Violence, conflict & psychosocial problems	9.03 [1,2,4]	3.87		
	Class 4: CSA	11.13[3,5]	4.01		
	Class 5: CPA & conflict	9.281[,2,4]	3.96		
Internalizing problems	Class 1: High Poly-adversity (PA)	3.51[2,3,4,5]	2.04	12.86***	0.05
	Class 2: CSA & psychosocial problems	2.75 [1,5]	2.08		
	Class 3: Violence, conflict & psychosocial problems	2.45[1,5]	1.96		
	Class 4: CSA	2.54[1,5]	2.03		
	Class 5: CPA & conflict	1.97[1,2,3,4]	1.77		
Externalizing problems	Class 1: High Poly-adversity (PA)	1.38 [4,5]	1.28	4.36**	0.02
	Class 2: CSA & psychosocial problems	1.18	1.23		
	Class 3 Violence, conflict & psychosocial problems	1.15	1.34		
	Class 4: CSA	0.87[1]	1.15		
	Class 5: CPA & conflict	0.91[1]	1.24		

Note: Superscript numbers indicate significant differences between classes; *F* = ANOVA test; Statistical significance: $*p \leq .05$; $**p \leq .01$; $***p \leq .001$.

4. Discussion

The primary aim of this study was to investigate if there were sex-specific patterns of childhood adversity among at-risk children living in Denmark, and if so, how different patterns of childhood adversity were related to internalizing and externalizing mental health problems. As hypothesized, girls were characterized by more varied patterns of adversity (five classes) compared to boys (three classes). Among the girls, almost 80% fell into classes characterized by the combination of CSA or CPA, along other adversities. The remaining class (21.3%) was characterized solely by the endorsement of CSA and an (otherwise) stable home environment. Among the boys, exposure to CPA was almost all-pervasive, with approximately 90% of the boys across the different classes having been exposed to CPA. Most boys (88%) fell into classes characterized by the co-occurrence of CPA with other adversities, such as parental conflict and domestic violence. The tendency of CPA to consistently co-occur with domestic violence and family conflict across classes is consistent with findings from a wide body of research identifying patterns of co-occurring types of family violence such as adult intimate partner violence, CPA, divorce/family conflict, and domestic violence (Dierkhising et al., 2019; Grasso et al., 2016; Ho et al., 2020; Keane et al., 2016; Witt et al., 2016).

That only approximately one in five of the children in the DCC sample fell into a class characterized by a single type of child adversity further illustrates the significance of recognizing and addressing poly-adversity in at-risk child populations such as welfare system-involved children. Unlike in general population samples where multiply exposed individuals typically represent a smaller fraction of the sample (4–7%) (Curran et al., 2018; Lacey et al., 2020; Rod et al., 2020), poly-adversity is the norm in high-risk samples, and is manifested through diverse combinations of risk.

In addition to the female 'High PA' group (6.8%), the current study identified a range of distinct, multiply exposed sub-groups, which in total accounted for approximately one third of the sample corresponding to findings from other at-risk samples (Dierkhising et al., 2019; Ford et al., 2010; Havlicek, 2014; Rebbe et al., 2017). These findings add to the growing body of evidence indicating that poly-adversity displays in different patterns (Adams et al., 2016; Greeson et al., 2011), but further suggest that poly-adversity can manifest in different *sex-specific* configurations. The findings underline the importance of investigating childhood stressors and related mental health symptomatology through a sex-specific lens (Cavanaugh et al., 2015; Roxburgh & MacArthur, 2014).

Based on existing literature, we hypothesized that classes characterized by multiple adversities would display higher levels of mental health problems (Cloitre et al., 2009; Contractor et al., 2018; Ford & Delker, 2018). For internalizing and externalizing problems, the most broadly exposed class among the girls (i.e., the 'High PA' group) (Class 1) was characterized by the poorest mental health. Furthermore, the 'High PA' class also had more internalizing problems than the two other multiply exposed groups (Classes 2 and 3). Among the boys, the most broadly exposed class (i.e., the 'Violence, conflict, and psychosocial problems' group) (Class 1) had more internalizing and externalizing problems than the less exposed 'CPA and conflict' group (Class 3).

Interestingly, however, the female CSA group (Class 4) consistently endorsed similar or higher levels of mental health problems than three of the broadly exposed groups (Classes 2, 3, and 5). These findings suggest that CSA itself, particularly for girls, may constitute a unique victimization experience with profound and debilitating mental health effects, possibly due to accompanied feelings of shame, powerlessness, and stigmatization (Finkelhor & Browne, 1985; Lewis et al., 2015; Noll, 2008). The combination of CSA with other adversities (High PA) represented the most pernicious constellation of adversities among the girls suggesting that the negative effect of sexual victimization is significantly amplified if it occurs in conjunction with other adversities (Debowska et al., 2017).

The female classes significantly differed with respect to age, with classes characterized by CSA being significantly older than classes characterized by CPA. Previous research has shown that different developmental stages carry differential risk for certain types of adversities (Finkelhor et al., 2011; Hamby & Grych, 2013). In this study, we were unable to stratify our sample based on different development stages given the available sample size, however, future research would benefit if such analysis could be implemented within different developmental periods.

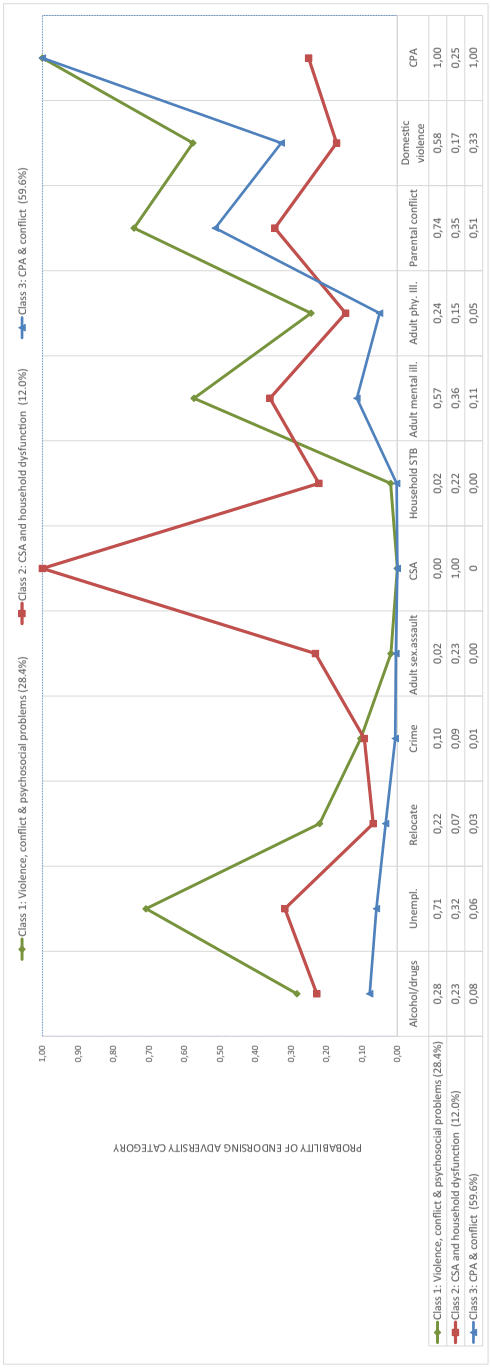

Fig. 2. Male class plot.

Table 5
Differences between the boys classes on age and internalizing and externalizing problems.

	Classes	*M*	*SD*	*F*	Eta-squared
Age	Class 1: Violence, conflict, & psychosocial problems	8.62	3.54	0.603	0.00
	Class 2: CSA & household dysfunction	8.48	3.98		
	Class 3: CPA & conflict	8.34	3.28		
Internalizing problems	Class 1: Violence, conflict, & psychosocial problems	2.16[3]	1.74	8.23***	0.02
	Class 2: CSA & household dysfunction	1.82	1.66		
	Class 3: CPA & conflict	1.61[1]	1.61		
Externalizing problems	Class 1: Violence, conflict, & psychosocial problems	1.76[3]	1.48	17.59***	0.04
	Class 2: CSA & household dysfunction	1.41	1.46		
	Class 3: CPA & conflict	1.10[1]	1.29		

Note: Superscript numbers indicate significant differences between classes; F = ANOVA test; Statistical significance: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.

The tendency for both CPA and CSA to co-occur with household psychosocial problems and that CPA consistently coincided with other types of family violence, emphasizes the importance of adapting an ecologically oriented approach to the study of child maltreatment and child development. Specifically, rather than studying CPA and CSA isolation, the broader environmental context, in which children are embedded, should be accounted for when studying child maltreatment and child mental health (Cicchetti & Lynch, 1993; McAnee et al., 2019). Combinations and interactions of risks such as child abuse, family violence, unemployment, and impaired caregiving, as observed across classes in the current study, may be particularly detrimental to child mental health because they represent stressors at various levels in the environment of the child (Spinazzola et al., 2018).

The current study was not based on the original ACE scale (Felitti et al., 1998) but used clinically derived measures of adversity which hinders direct comparisons to other literature. A strength of the current study was the inclusion of unemployment/weak labour market attachment as a type of childhood adversity. Indeed, the existing Adverse Childhood Experience (ACE) literature (Felitti et al., 1998) has been criticized for its lack of indicators of social disadvantage or socioeconomic status (Walsh et al., 2019; Nurius et al., 2012), as important predictors of child symptomatology and mental health needs (Finkelhor et al., 2013; Lacey et al., 2020; Lanier et al., 2018; Winstanley et al., 2020).

Altogether, results of the current study add to the growing literature suggesting that various dimensions of adversity should be considered when studying child adversity and its effects, including number, composition, and nature of events (Ho et al., 2020). Our findings support the importance of further developing and cultivating cumulative risk theory (Rutter, 1988) by applying person-oriented methods that capture both qualitative and quantitative dimensions of adversity exposure.

4.1. Clinical and practical implications

The fact that childhood adversities frequently co-occur means that clinicians and practitioners working with children should be aware of the likelihood of additional adversities beyond those of the 'presenting problem' (Hamby & Grych, 2013). Understanding likely patterns and co-occurrences of adversities can help clinicians translate adversity histories into more trauma-responsive programming and effective interventions for children and their families (Lanier et al., 2018; Logan-Greene et al., 2020). Moreover, the use of existing clinical data represents a cost-effective approach to studying childhood adversity and its ramifications within child protection programmes. The identification of differential constellations of risk for boys and girls underscores the importance of sex-specific investigations of child adversity since unique patterns of adversity and their distinct associations with mental health may be obscured if the data are not separated by sex (McAnee et al., 2019). Though not all identified adversity classes in the current study significantly differed in terms of their mental health, and with full recognition that observed differences between classes were small, our findings can still inform intervention, treatment, and prevention planning. The tendency for both CPA and CSA to co-occur with other types of violence and environmental stressors, such as domestic violence and parental conflict, across classes highlights the need for broader intervention programmes across multiple ecological domains targeting the family or household as a whole.

4.2. Limitations

The current study is not without limitations. First, the DCCs were originally established to respond to CSA and CPA, specifically, which could imply an under-documentation of other types of adversities. Also, the final sample size was reduced due to the occurrence of 'unknown' responses and non-responses which reflects the varying involvement of the child and the family in the case procedure. Second, both adversity and mental health were registered in a binary response format which limits our capacity to model variability in these phenomena (Cicchetti & Valentino, 2015; Curran et al., 2018). In the current analysis, it was also not possible to account for the duration, intensity, or chronicity of adversities; all of which are important elements of such experiences in terms of their impact (Hodges et al., 2013; Ports et al., 2016). Third, the use of cross-sectional data hinders inferences about causality. Fourth, other types of adversity known to be important correlates of child mental health such as emotional abuse, physical and emotional neglect, and peer victimization/bullying (Finkelhor et al., 2013; Maguire-Jack et al., 2020) were not assessed, and therefore could not be modelled alongside the other indicators of adversity. Fifth, whereas all DCC cases of CPA are perpetrated within close relationships, the CSA cases are more diverse in terms of the type of perpetrator, as per the legal mandate of the DCCs. Future research should explore the role of the perpetrator in explaining mental health symptomatology, for example, the impact of 'betrayal trauma' committed by close and

trusted individuals (Freyd, 1996). Finally, the analysis is not representative of Danish children exposed to child abuse but describes children who have been in contact with Danish child protection services. Findings may also have limited generalizability to the wider population due to the at-risk nature of this sample, and to non-Danish at-risk samples.

5. Conclusion

As in the general population, among at-risk children, females experience more varied and complex forms of adversity co-occurrence than males. These different patterns of childhood adversities were associated with different mental health problems for both boys and girls, highlighting the importance of adopting a sex-specific focus to childhood adversity and mental health research. Notably, adversities associated with sexual victimization increased in likelihood for girls as they grew older and sexual victimization emerged as an important risk factor for internalizing problems among girls. Growing awareness of the ways in which childhood adversities can co-occur in the general population of children, as well as in at-risk groups, has the potential to improve our capacity to respond effectively and sensitively to affected children.

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