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Prevalence and co-existence of morbidity of posttraumatic stress and functional impairment among Burundian refugee children and their parents

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ABSTRACT

Background: Although the family constitutes the prime source of risk and resilience for the well-being of children growing up in adverse conditions, the mental health of children living in refugee camps has rarely been investigated in conjunction with their parents' mental health.

Objectives: To examine the prevalence of posttraumatic stress disorder (PTSD) and other mental health problems among Burundian refugee children and their parents living in Tanzanian refugee camps and to identify patterns of comorbidity among children and their parents based on PTSD symptom levels and functional impairment.

Methods: We recruited a representative sample of 230 children aged 7–15 years and both of their parents (n = 690) and conducted separate structured clinical interviews. Latent Class Analysis was applied to identify patterns of comorbidity.

Results: Children and parents were exposed to multiple traumatic event types. In total, 5.7% of children fulfilled DSM-5 criteria for PTSD in the past month and 10.9% reported enhanced levels of other mental health problems. 42.6% indicated clinically significant functional impairment due to PTSD symptoms. PTSD prevalence was higher among mothers (32.6%) and fathers (29.1%). Latent Class Analysis (LCA) revealed a familial accumulation of PTSD symptoms as children with high symptom levels and impairment were likely to live in families with two traumatized parents.

Conclusions: Although the number of children who need support for trauma-related mental health problems was relatively low, taking into account parental trauma could aid to identify at-risk children with elevated PTSD symptom levels and impairment even in the face of existing barriers to mental health care access for children in refugee camp settings (e.g. lack of targeted services, prioritization of managing daily stressors).

Prevalencia y coexistencia de la morbilidad del estrés postraumático y el deterioro funcional entre los niños refugiados Burundeses y sus padres

Antecedentes: Aunque la familia constituye la principal fuente de riesgo y resiliencia para el bienestar de los niños que crecen en condiciones adversas, la salud mental de los niños que viven en campamentos de refugiados rara vez se ha investigado en conjunto con la salud mental de sus padres.

Objetivos: Examinar la prevalencia del trastorno de estrés postraumático (TEPT) y otros problemas de salud mental entre los niños refugiados de Burundi y sus padres que viven en campamentos de refugiados de Tanzania e identificar patrones de comorbilidad entre los niños y sus padres en función de los niveles de síntomas de TEPT y el deterioro funcional.

Método: reclutamos una muestra representativa de 230 niños de 7 a 15 años y sus dos padres (n = 690) y realizamos entrevistas clínicas estructuradas por separado. El análisis de clases latentes (LCA en su sigla en inglés) se aplicó para identificar patrones de comorbilidad.

Resultados: Los niños y los padres estuvieron expuestos a múltiples tipos de eventos traumáticos. En total, el 5.7% de los niños cumplieron con los criterios del DSM-5 para TEPT en el mes pasado y el 10.9% informó niveles elevados de otros problemas de salud mental. El 42,6% indicó deterioro funcional clínicamente significativo debido a síntomas de TEPT. La prevalencia de TEPT fue mayor entre las madres (32,6%) y los padres (29,1%). El LCA reveló una acumulación familiar de síntomas de TEPT ya que los niños con altos niveles de síntomas y discapacidad probablemente vivían en familias con dos padres traumatizados.

Conclusiones: Aunque el número de niños que necesitan apoyo para problemas de salud mental relacionados con el trauma fue relativamente bajo, tener en cuenta el trauma de los padres podría ayudar a identificar a los niños en riesgo con niveles elevados de síntomas de TEPT y discapacidad incluso ante las barreras existentes para el acceso a la atención en salud

HIGHLIGHTS
• We found lower prevalence rates of PTSD (5.7 %) and psychological distress (10.9 %) among refugee children than studies conducted in similar settings. However, a high number of children (42.6%) reported functional impairment related to PTSD symptoms.
• Children were most likely to present with elevated PTSD symptom levels and impairment when both their parents were also experiencing PTSD.
• Children with full and subthreshold PTSD could be identified easier through their parents' trauma.

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ⓘ Supplemental data for this article can be accessed here.

mental para niños en entornos de campamentos de refugiados (por ejemplo, falta de servicios específicos, priorización del manejo de estresores diarios).

布隆迪难民儿童及其父母的创伤后应激障碍和功能障碍的同时发病率和共病率

背景：家庭是在逆境中成长的儿童的幸福感的主要风险来源和保护因素，但居住在难民营的儿童的心理健康状况很少与其父母的心理健康状况一起进行研究。

目的：了解生活在坦桑尼亚难民营的布隆迪难民儿童及其父母的创伤后应激障碍（PTSD）和其他精神健康问题的流行情况，并根据儿童及其父母的创伤后应激障碍的症状和功能障碍的水平确定共病模式。

方法：我们招募了230名7-15岁儿童及其父母的代表性样本（n = 690），并分别进行了的结构化临床访谈。潜类别分析（LCA）用于识别共病的模式。

结果：儿童和父母暴露于多种创伤事件类型。总共有5.7％的儿童在过去一个月内达到了创伤后应激障碍的DSM-5标准，10.9％的儿童报告其他精神健康问题变严重。 42.6％的儿童表明由于PTSD症状导致临床上显著的功能障碍。母亲（32.6％）和父亲（29.1％）的创伤后应激障碍患病率较高。 LCA结果显示了PTSD症状的家族性积累，因为具有高 PTSD症状水平和功能损伤的儿童可能生活在有两个创伤暴露父母的家庭中。

结论：虽然因为创伤相关心理健康问题需要支持的儿童数量相对较少，考虑到父母创伤可以帮助识别创伤后应激障碍症状水平升高和功能损伤的高危儿童。这对难民营中儿童心理健康障碍的护理存在阻碍（例如缺乏有针对性的服务，管理日常压力源的优先次序）的情况也是适用的。

According to the United Nations High Commissioner for Refugees (UNHCR), the number of refugees worldwide has reached 25.4 million people, over half of whom are children (UNHCR, 2018). Refugee children face a wide range of stressful experiences, from exposure to war in their home countries through stressors during their flight to challenges related to resettlement in the host country. This all happens during a crucial phase of their development, putting them at an increased risk of developing mental health problems (Ehntholt & Yule, 2006; Reed, Fazel, Jones, Panter-Brick, & Stein, 2012). The association between children's exposure to war events and the development of posttraumatic stress disorder (PTSD) and other psychopathology has been well established (Attanayake et al., 2009; Fazel, Reed, Panter-Brick, & Stein, 2012). Research to date has largely focused on the mental health of refugees who resettled in high-income countries, despite four out of five refugees remaining, mostly in refugee camps, in countries neighbouring their country of origin (UNHCR, 2018). This is a major shortcoming as the precarious living conditions in refugee camps can increase the risk for children's mental health problems above and beyond the experiences of uprooting and flight (Miller & Rasmussen, 2010). Moreover, refugee camps are generally located in close proximity to ongoing war, which can lead to a state of chronic threat (Miller, 1996).

Studies with adult refugees living in camps indicate prevalence rates between 30% and 55% for PTSD (Neuner et al., 2004; Riley, Varner, Ventevogel, Taimur Hasan, & Welton-Mitchell, 2017; Tekin et al., 2016) and between 10% and 89% for other mental health problems (de Jong, Scholte, Koeter, & Hart, 2000; Riley et al., 2017; Tekin et al., 2016).

A recent systematic review (Vossoughi, Jackson, Gusler, & Stone, 2018) on the mental health of youth in refugee camps reported large variations across studies for the prevalence of PTSD (0–87%), depressive symptoms (35–90%) and anxiety (0–35%). While these varying prevalence rates can be attributed to methodological differences and the cultural heterogeneity of study samples, factors such as differences in the degree of exposure to traumatic events, ongoing daily stressors, or a combination thereof also play a role (Vossoughi et al., 2018). Therefore, it is important to combine children's prior experiences of conflict-related violence and their ongoing exposure to chronic stressors to better understand the mental health of children living in refugee camps (Miller & Jordans, 2016).

A socioecological framework (Bronfenbrenner, 1979) has been applied to conceptualize the different stressors affecting refugee children's mental health across different time points (pre-, peri- and postmigration) and multiple levels of the social ecology, i.e. the individual, family, community and society (Betancourt & Khan, 2008; Reed et al., 2012). As the nuclear family constitutes the most proximal layer to the child, it is a powerful source of both risk and resilience for children's mental health (Betancourt & Khan, 2008; Punamäki, Qouta, & Peltonen, 2018). For instance, perceived parental support and family cohesion can protect refugee children from developing psychopathology (Fazel et al., 2012), whereas parents' own trauma can impair their parenting and, in turn, children's mental health (Timshel, Montgomery, & Dalgaard, 2017). Refugee children's stress reactions also appear to be related to their mothers' ability to cope with displacement (Ajdukovic & Ajdukovic, 1993; Ekblad, 1993).

Investigating refugee children's mental health detached from their family not only falls short of a comprehensive picture of this vulnerable group's wellbeing, but also ignores children's embeddedness in their immediate social environment.

Consequently, it is of utmost importance to also assess the mental health of their guardians to identify risks for children's well-being. Refugee families often do not access available mental health services for their children despite their need, partly due to the prioritization of managing ongoing stressors (Ellis, Miller, Baldwin, & Abdi, 2011). Additionally, mental health services in humanitarian settings rarely target children specifically and children represent only a small proportion of their patients (Lokuge et al., 2013). Therefore, it could be promising to explore whether children in need of specialized support for trauma-related symptoms could be identified through assessing their parents' PTSD symptoms, as parents are more likely to make frequent use of available services.

Notwithstanding, the role of the family for refugee children's mental health has not been extensively investigated, especially in low and middle income settings (Meyer, Steinhaus, Bangirana, Onyango-Mangen, & Stark, 2017; Reed et al., 2012; Vossoughi et al., 2018). All of the existing studies focused on only one parent, mostly the mother, despite evidence that paternal trauma can independently affect family functioning and children's mental health (e.g. Saile, Ertl, Neuner, & Catani, 2014).

The present study aims to contribute to the body of literature on trauma-related mental health problems of refugee children living in refugee camps close to ongoing conflict. Taking into account children's embeddedness in the family, we included children and both parents in the study. We hypothesized (1) high levels of exposure to potentially traumatizing events and (2) high prevalence rates of PTSD and other mental health problems among refugee children and their parents. Based on the key role of the family context for children's mental health in adversity (e.g. Betancourt & Khan, 2008), we hypothesized that we would (3) find patterns indicating an accumulation of morbidity within families by identifying constellations of PTSD symptomatology of children and parents. Considering the diagnostic imperative that symptoms should cause clinically significant distress or impairment, we defined morbidity in terms of PTSD symptom severity and functional impairment.

1. Method

1.1. Sampling and procedures

The study was conducted in three refugee camps located in Western Tanzania. Nyarugusu camp hosted 68,984 refugees from Burundi, Nduta 94,501 and Mtendeli 47,296 at the time of the study (UNHCR, 2017). Participants were recruited by randomly selecting two zones in each camp. We then randomly determined a sampling direction by spinning a pen in the centre of the chosen zones. Every 6th house or tent in this direction was selected. A family was defined as a triad of both parents or caregivers and the oldest child between 7 and 15 years (i.e. primary school age).

Data collection took place between February and May 2018. Families received a detailed oral and written explanation of the study goals, procedures, and their rights. Each family member gave their informed consent in written form by signing with their names or fingerprints. In addition, parents gave their consent on behalf of children below age 11. Consent forms were kept strictly separated from the interview data to protect participants' anonymity. All but two selected families consented to participate in the study. The study was approved by the Ethics Commission of the University of Zurich (No. 2017.10.2) and the National Institute for Medical Research in Tanzania (no. NIMR/HQ/R.8a/Vol.IX/2632).

Structured clinical interviews were conducted individually in a discrete setting on the compound grounds of collaborating NGOs. Interviewers were three Tanzanian researchers holding a master's degree and three research assistants from the refugee community. The research assistants were required to hold at least a secondary school or preferably a university leaving certificate, to be fluent in English and Swahili besides their native language Kirundi and to have prior work experience with an NGO within the camps. The assistants had received one week of training which was conducted by a German psychologist and his Tanzanian colleagues. The training focused on the mental health concepts underlying the interview questions, on general principles of conducting clinical interviews and on practice in form of role-plays. As Swahili is the lingua franca in the refugee camps, the measures were translated from English to Swahili according to scientific guidelines, using blind back-translation (Brislin, Lonner, & Thorndike, 1973). The Tanzanian psychologists conducted the Tanzanian interviews in Swahili and the research assistant from the refugee community in Kirundi. During a pilot assessment in the first camp Mtendeli it became evident that the Swahili skills of the Burundian refugees were sometimes insufficient to fully comprehend the partly complicated mental health terms and concepts. Therefore, we decided to additionally train three interpreters from the refugee community who were required to have specific experience as interpreters, e.g. for an NGO, and otherwise fulfil the same criteria as the other research assistants. The training of interpreters had the form

Table 1. Sociodemographic characteristics of participating families.

	Families (N = 230)		
	Children (n = 230)	Mothers (n = 230)	Fathers (n = 230)
Age, M (SD)	12.11 (2.03)	34.49 (8.48)	41.52 (11.00)
Country of birth, % (n)			
Burundi	65.7 (151)	92.6 (213)	90.4 (208)
Tanzania	34.3 (79)	3.9 (9)	7.8 (18)
Other	0	3.5 (8)	1.7 (4)
Educational level, % (n)[a]			
No schooling	12.6 (29)	34.8 (80)	23.0 (53)
Primary, class 1-3	49.1 (113)	22.6 (52)	16.6 (38)
class 4-6	38.3 (88)	30.0 (69)	39.2 (90)
Some secondary		11.7 (27)	16.9 (39)
Completed secondary		0.9 (2)	4.3 (10)
Relationship to child, % (n)			
Biological Parent		84.3 (194)	83.0 (191)
Relative		6.0 (14)	5.6 (13)
Step parent		3.0 (7)	3.9 (9)
Foster parent		6.5 (15)	7.4 (17)
Number of people in household, % (n)[b]			
3 to 5		15.7 (36)	
6 to 9		70.0 (161)	
≥ 10		14.3 (33)	
Household income p. month (USD)[b]			
No income		32.2 (74)	
Up to 20		60.9 (140)	
≥ 20		6.9 (16)	

[a] Parents' responses refer to their highest level achieved. [b] Information on households is averaged across parents.

of a qualitative open group discussion and focused on the adequate translations of mental health terms and concepts in Kirundi and their applicability in Burundian culture as well as intensive practice in role-plays. In order to further increase the quality of interpretations, interviews were subsequently discussed with and supervised by the research team. After the interviews the families received a compensation of 8 USD.

1.2. Participants

The sample consisted of 230 family triads (N = 690). In total, 47.4% (n = 109) of the children were girls. Overall, 14.3% (n = 33) of the children were between 7 and 9 years old, 34.3% (n = 79) between 10 and 12 years old and 48.6% (n = 118) between 13 and 15 years old. All families had fled to the Tanzanian camps between 2015 and 2018 with the majority (64.0%) arriving in 2015. All families had lived in Burundi before their migration. The majority of adults (80.3%) identified the political conflicts in Burundi as main reason for their flight. Table 1 shows sociodemographic characteristics of the participating families.

1.3. Instruments

The individual measures were administered in the form of a structured clinical interview. Thus the questions could be reformulated in a way that is

appropriate and understandable even for young children. To further ensure this, younger children were always interviewed by psychologists with great experience in research and counselling with children.

1.3.1. Child measures

Children's exposure to traumatic events was assessed using a checklist of 35 war- and non-war-related events (e.g. natural disasters, injury, sexual assault). The measure consisted of 13 items from the UCLA Child/Adolescent PTSD Reaction Index (UCLA RI; Pynoos & Steinberg, 2013) and 22 items adapted from a checklist by Neuner et al. (2004). We calculated a sum score of lifetime exposure to traumatic experiences (range: 0–35), with higher scores indicating exposure to more traumatic event types.

PTSD symptoms were assessed using the DSM-5 Version of the UCLA RI (Pynoos & Steinberg, 2013), which has shown good psychometric properties (Steinberg et al., 2013) and has been used in a variety of cultural settings (e.g. Hermenau et al., 2011). The 31 items were rated on a 5-point Likert scale from 0 to 4. We calculated a sum score of all items (0 to 124). Internal consistency in our sample was excellent (Cronbach's α = .90). We established the PTSD diagnosis, including Dissociative Subtype, according to DSM-5 criteria. A symptom was deemed present if the score was ≥ 3. Functional impairment was assessed with seven questions addressing impairment at home, at school, with peers, and developmental progression. Impairment was deemed clinically significant if one of these questions was affirmed.

Child emotional and behavioural problems were assessed using the Strengths and Difficulties Questionnaire (SDQ; Goodman, Meltzer, Bailey, & Bailey, 2003). The SDQ comes with good psychometric properties and has been utilized internationally (Goodman, Ford, Simmons, Gatward, & Meltzer, 2000) and in refugee settings (e.g. Panter-Brick, Grimon, & Eggerman, 2014). The 25 items are rated on a 3-point Likert scale (0–2). For analysis, we used the total difficulties score (range 0 to 40) representing the sum of all items excluding the 5 prosocial behaviour items. In the present study, the Cronbach's Alpha for the child reported sum score was .61, for the mothers' report .69, and for the fathers' report .64.

Child maltreatment by parents was assessed with the 27-item Parent-Child Conflict Tactic Scale (CTSPC; Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). Children reported on each parent's use of neglect, emotional and physical violence in the past year. Items were coded on a 7-point Likert scale (0 = never, 1 = once, 2 = twice, 4 = 3–5 times, 8 = 6–10 times, 15 = 11–20 times, 25 = >20 times).

We calculated a total score by summing all item scores. Internal consistency of the total scale was α = .91.

1.3.2. Parent measures

Parents' lifetime exposure to traumatic experiences was assessed using a checklist of 38 war- and non-war event types that were based on the checklist by Neuner et al. (2004). We calculated a sum score of exposure to traumatic and adverse event types.

PTSD symptoms were assessed using the well-validated 20-item PTSD Check List for DSM-5 (PCL-5; Weathers et al., 2013), which has been used in various cultural settings (Kaltenbach, Härdtner, Hermenau, Schauer, & Elbert, 2017; Verhey, Gibson, Brakarsh, Chibanda, & Seedat, 2018). Cronbach's Alpha for the score of all items rated on a 5-point Likert scale (0–4) was .94 for mothers and .91 for fathers. We also determined the PTSD diagnoses following DSM-5 criteria. A symptom was deemed present if the score was ≥2. Functional impairment was assessed by three items regarding relationships or social life, ability to work, and other important parts of life. Clinically significant impairment was present if at least one item was rated ≥2.

The 18-item Brief Symptom Inventory (BSI-18; Derogatis, 2000) was used to assess general psychological distress. The *Global Severity Index* of distress represents the sum of all items and ranges from 0 to 72. Internal consistency of the BSI-18 was .92 for mothers and .90 for fathers.

1.4. Data analysis

Latent Class Analysis (LCA) was employed to detect familial patterns of morbidity. LCA is a statistical method to group cases into classes of an underlying latent variable based on categorical indicators (Distefano & Kamphaus, 2006). As indicators we used children's and parents' PTSD symptom severity scores, which were dichotomized by using median splits, and the impairment criterion of the PTSD diagnosis. We chose PTSD symptom severity rather than the presence or absence of the PTSD diagnosis as an indicator as it was one aim of this analysis to demonstrate that increased PTSD symptom severity levels can co-occur with functional impairment without a full-blown PTSD diagnosis to be present. We applied a median-split to dichotomize PTSD symptom severity as a recent simulation study suggested that dichotomizing according to sample-specific points of central tendency, i.e. the median, can lead to more accurate results in LCA than selecting cut points indicating the presence or absence of a certain symptom or disorder (Macia & Wickham, 2019). This also had the advantage that we did not need to use existing cut-off values for dichotomization (Kaplow

et al., 2019; Weathers et al., 2013) which had been determined based on US-American samples and are most likely not applicable to our both culturally and socioeconomically very different refugee sample. We calculated all models ranging from two to seven classes. LCA was conducted in R with *poLCA* (Linzer & Lewis, 2011). We selected the appropriate number of classes by considering usefulness and interpretability and well-established model fit criteria, the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), the adjusted Bayesian Information Criterion (aBIC) and Bozdogan's consistent Akaike's Information Criterion (cAIC) (Dziak, Coffman, Lanza, & Li, 2012). The model with the smallest values on these indices is considered to be the best-fitting (Nylund, Bellmore, Nishina, & Graham, 2007). Simulation research suggests that aBIC and AIC perform better than the BIC and cAIC with a relatively small sample size and a low number of indicators (Dziak et al., 2012). We also examined entropy values as a measure of classification accuracy, with higher values on a range from 0 to 1 indicating a better classification (Distefano & Kamphaus, 2006).

We then calculated a multivariate analyses of variance (MANOVAs), univariate analyses of variance (ANOVA) and post-hoc tests to examine differences between classes. Holm-Bonferroni correction (Holm, 1979) was applied for ANOVAs. All outcome variables were normally distributed following West, Finch, and Curran (1995). We used Pillai's Trace as it is most robust against violations of assumptions (Olson, 1974). For (M)ANOVAs, our metric for a small effect was $\eta^2 \geq 0.01$, for a medium effect $\eta^2 \geq 0.06$, and for a large effect $\eta^2 \geq 0.14$. All analyses used a two-tailed $\alpha = 0.05$.

2. Results

2.1. Prevalence of traumatic experiences

In total, 98.7% of all children ($n = 227$) reported at least one potentially traumatizing experience during their life, the majority (65.2%, $n = 150$) had experienced five or more event types with an average of 7.53 ($SD = 5.28$). The most common traumatic experiences were the *death of a close person* (84.3%) and *seeing someone who was beaten up, shot at or killed* (55.7%).

Mothers reported high numbers of traumatic event types ($M = 16.91$, $SD = 6.19$). Every woman had experienced at least one potentially traumatizing event in her lifetime, 86.5% ($n = 199$) indicated to have experienced 10 or more event types during their life, with a maximum of 30 types. On average, fathers reported $M = 20.80$ ($SD = 5.72$) potentially traumatizing event types, with 95.7% ($n = 220$) reporting 10

Table 2. Prevalence of PTSD and other mental health problems among children and parents.

	Children (n = 230)				Mothers (n = 230)				Fathers (n = 230)			
	%	n	M	SD	%	n	M	SD	%	n	M	SD
PTSD Measures												
DSM-5 diagnosis	5.7[a] (2.2)[b]	13 (5)			32.6[c]	75			29.1[c]	67		
Symptom severity			14.59[a]	11.33			38.51[c]	19.31			33.04[c]	16.51
Functional Impairment	42.6	98			50.9	117			50.4	116		
SDQ												
Total difficulties score	10.9[d]	25	10.65	5.06	15.9[e]	36	10.84	6.04	11.5[e]	26	9.30	5.56
BSI-18												
Global Severity Index					87.4[f]	201	31.21	16.49	83.9[g]	193	24.53	14.29

Note: The SDQ values in the parent columns refer to the SDQ parent version. PTSD, posttraumatic stress disorder; SDQ, Strengths and Difficulties Questionnaire; BSI-18, Brief Symptom Inventory-18; SDQ cut-off scores are based on Goodman et al. (2000); BSI-18 cut-off scores are based on Derogatis (2000); Median scores of PTSD measures were 13.00 (children), 38.00 (mothers) and 33.00 (fathers).
[a] Assessed with the University of California at Los Angeles Child/Adolescent PTSD Reaction Index for DSM-5. [b] Prevalence of Dissociative Subtype.
[c] Assessed with the PTSD Check List for DSM-5; [d] Cut-off ≥ 18; [e] Cut-off ≥ 17; [f] Cut-off ≥ 13; [g] Cut-off ≥ 10

Table 3. Fit indices for latent class models.

Model	Log-likelihood	Resid. df	BIC	aBIC	AIC	cAIC	Entropy
2 class	−886.40	50	1843.20	1802.00	1798.79	1856.20	0.67
3 class	−863.27	43	1834.87	1771.49	1766.55	1854.87	0.77
4 class	**−852.56**	**36**	**1851.36**	**1765.79**	**1759.13**	**1878.36**	**0.78**
5 class	−846.19	29	1876.53	1768.78	1760.38	1910.53	0.77
5 class	−842.98	22	1908.01	1778.08	1767.95	1949.01	0.85
7 class	−839.51	15	1939.00	1786.88	1775.03	1987.00	0.67

Fit indices of the preferred 4-class model are highlighted in bold. Resid. df, Residual degrees of freedom; BIC, Bayesian Information Criterion; aBIC, adjusted Bayesian Information Criterion; AIC, Akaike Information Criterion; cAIC, Bozdogan's consistent Akaike Information Criterion.

or more event types and almost two third (61.7%, n = 142) 20 or more event types with a maximum of 34. Over 80% of mothers and about 90% of fathers reported to have experienced *a dangerous flight* and *being in close proximity to combat situations and burning houses*. One fifth of all women (20.9%) reported having been *raped* or *sexually assaulted* (see Supplementary Table A and B for details).

2.2. Prevalence of mental health problems and familial patterns of morbidity

Descriptive information about PTSD diagnosis and symptom severity and other mental health problems for children and parents are displayed in Table 2 (see Supplementary Table C for subscale scores). The 4-class model was supported by the aBIC, AIC and slightly higher entropy (see Table 3). This solution provided a meaningful and interpretable classification (Figure 1). In the first class, labelled *traumatized families*, every family member had a high relative probability of scoring above the median in PTSD symptom severity and being impaired by these symptoms. In the second class, termed *traumatized mothers*, mothers had a high probability of endorsing PTSD symptoms and impairment. The third class, labelled *traumatized fathers*, was characterized by families in which all fathers reported high PTSD symptom levels and impairment, mothers had a moderate and children a low probability of high PTSD levels. In the fourth class all family members had a low probability of endorsing high symptom levels and impairment (*non-traumatized families*).

Sociodemographic characteristics of the latent classes can be found in Supplementary Table D.

The comparisons of the four classes regarding child maltreatment, family members' lifetime traumatic experiences and prevalence of PTSD diagnoses are displayed in Table 4. All univariate effects were significant and medium to large except for child maltreatment, which had a small effect ($\eta^2 = 0.05$). Traumatized families had significantly higher scores across all variables than non-traumatized families.

3. Discussion

Lifetime exposure to traumatic experiences was very high in our sample. Both children and their parents had generally experienced multiple traumatic event types. We expected high rates of PTSD and other mental health problems in our sample. However, the one-month prevalence rate for PTSD of 5.7% among children was rather low given their high number of traumatic experiences. It is comparable to the lifetime prevalence rate of 4.7% (McLaughlin et al., 2013) found in adolescents in the United States. However, it is considerably lower than the previously reported prevalence among war-affected children (Attanayake et al., 2009) and children in refugee camps (Vossoughi et al., 2018). An exception is a study that did not find any significant levels of PTSD symptoms in Guatemalan refugee children living in Mexican camps (Miller, 1996). Similar to this study, most children in our study might not have
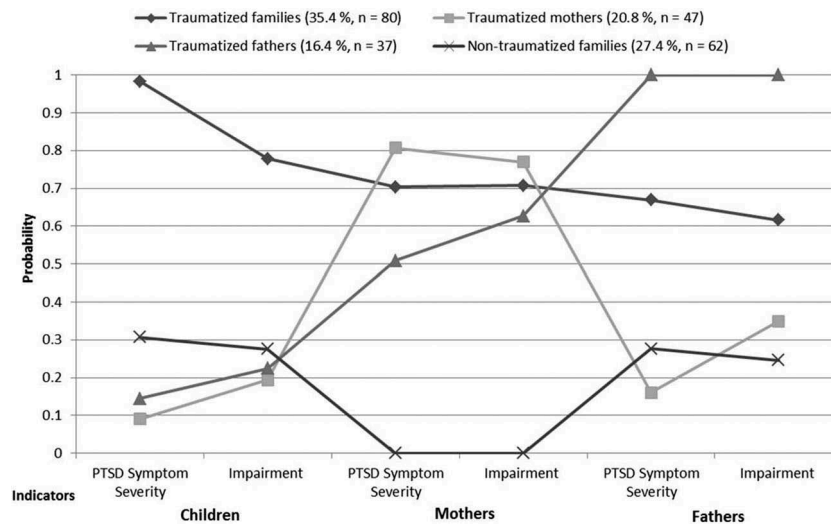
Figure 1. Latent classes of families based on family members' PTSD symptom severity and impairment. Y-axis indicates the average probability of having a PTSD symptom score above the median and meeting the impairment criterion for PTSD diagnosis.

been directly exposed to potentially traumatizing events of political violence. In addition, the prevalence of interpersonal traumatic events, which are especially likely to lead to PTSD (Alisic et al., 2014), was low among children. For example, 7.4% experienced sexual violence and 1.3% were injured by weapon, whereas four of the five most frequent traumatic events were of a non-interpersonal nature, such as losing a close person (84.3%) or being deprived of food (40%). Refugee children in studies reporting high PTSD prevalence rates (e.g. Morgos, Worden, & Gupta, 2008; Thabet, Abed, & Vostanis, 2004) generally experienced high levels of severe interpersonal trauma. Another explanation is that most children in our study were not separated from their parents during their flight and all were living with two guardians. The prevalence of general psychological distress as measured by children's and parents' report in the SDQ is comparable to the rates of 10–15% found in studies with the same age group in Europe (e.g. Ravens-Sieberer et al., 2008). One-month prevalence of PTSD of parents is in the range of prevalence rates found in other studies in refugee camps (Neuner et al., 2004). However, we found higher levels of psychological distress in the parents in our sample than other studies (de Jong et al., 2000).

Four distinct classes in the LCA supported our hypothesis to find a pattern of coexistence of morbidity within families. Children in traumatized families had experienced a significantly higher number of traumatic event types. This corroborates research that established traumatic exposure as the primary risk factor for the development of mental health problems among refugee children (Fazel et al., 2012; Reed et al., 2012). The level of child-reported maltreatment was significantly higher in

traumatized families than in non-traumatized families. This is consistent with research with war-affected families in post-conflict regions (Saile et al., 2014) and with refugee families in high-income settings (Timshel et al., 2017) indicating trauma exposure as a risk factor for increased child maltreatment. An intriguing finding is that children were at highest risk to present with PTSD symptoms and functional impairment when both parents did, whereas their risk was much lower when only one parent was highly likely to suffer from PTSD symptoms.

Our study has several limitations. Due to the cross-sectional design, we cannot establish causal relationships. Although we assessed the cultural appropriateness of our items and their translations, we are aware of the importance of cross-cultural validations (Hall et al., 2014). When doing research with interpreters, the possibility that information may be lost during the translation process, e.g. due to inaccurate translations cannot be ruled out despite preventive measures such as a thorough training and continuous monitoring of interpretation quality. The results of the LCA should be interpreted with caution as the classifications are based on probability values. Moreover, using the median of PTSD symptom severity scores as a cut-off criterion for classification may ignore individuals with still relatively high values.

Nonetheless, this study is the first to assess the mental health of refugee children and both their parents living in refugee camps close to ongoing conflict. Our pragmatic sampling approach enabled us to obtain representative prevalence data on PTSD and other mental health problems. We also consider the inclusion of functional impairment as a marker of morbidity a major strength of our study. Although the prevalence of children meeting full criteria of PTSD was rather low, a substantially high number indicated

Table 4. Descriptive statistics and comparisons between latent classes.

	Latent Classes % (N)				ANOVA		Post hoc test (Games-Howell)					
	Traumatized families (TF) 34.4 (80)	Traumatized mothers (TM) 23.5 (47)	Traumatized fathers (TFa) 13.8 (37)	Non-traumatized families (NF) 28.3 (62)	F	η²	TF NF	TF TM	TF TFa	TM TFa	TM NF	TFa NF
Child maltreatment, M (SD)	102.38 (91.74)	72.77 (90.44)	76.76 (71.49)	56.89 (54.76)	3.99†	0.05	**	ns	ns	ns	ns	ns
Traumatic events, M (SD)												
Children	10.91 (6.26)	5.09 (2.91)	6.05 (4.24)	5.84 (3.31)	23.53†	0.24	***	***	***	ns	ns	ns
Mothers	18.41 (5.61)	17.91 (6.28)	17.05 (7.05)	14.16 (5.49)	6.27†	0.08	***	ns	ns	ns	*	ns
Fathers	22.37 (4.86)	19.06 (4.82)	22.54 (6.74)	19.05 (5.94)	7.43†	0.09	**	***	ns	*	ns	***
PTSD Diagnosis, % (n)												
Children	13.7 (11)	0	0	1.6 (1)	p = 0.001 (Fisher-Freeman-Halton exact test)							
Mothers	45.0 (36)	51.1 (24)	40.5 (15)	0	χ² = 43.51 (3, N=226), p < 0.001							
Fathers	40.0 (32)	8.5 (4)	75.7 (28)	1.6 (1)	χ² = 76.39 (3, N=226), p < 0.001							

Note: All analyses are based on n=226. There was a large significant multivariate effect of class membership on dependent variables, Pillai's trace = 0.44, F (15, 660) = 7.46, p <0.001, η²=0.15. M, mean; SD, standard deviation; F, test statistic of ANOVA; η², effect size eta squared; ns, not significant. *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001, †Significant after Holm-Bonferroni correction.

symptom-related impairment. Impaired children with subthreshold PTSD symptoms should be equally monitored and considered for treatment (Carrion, Weems, Ray, & Reiss, 2002). Just as children with the full diagnosis of PTSD, these at-risk children seem to live within traumatized family systems, which has important practical implications: As in humanitarian settings, children are rarely targeted specifically by mental health services (Lokuge et al., 2013), our findings support the idea that it may be possible to identify children in need of specialized treatment for trauma-related symptoms through their parents' posttraumatic stress symptoms. This may help existing mental health care systems within camps to identify high-risk children and provide them with appropriate interventions. For instance, when parents screen positive for PTSD at mental health services, they could also report on their children's PTSD symptoms. Future studies should continue to examine refugee children's mental health through a socioecological lens and investigate how the family can affect children's well-being in refugee camps.

Disclosure statement

No potential conflict of interest was reported by the authors.

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