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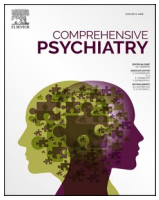

Examining heterogeneity: A systematic review of quantitative person-centered studies on adversity, mental health, and resilience in children and young adults with refugee backgrounds

Johan Andersson [a], Reeta Kankaanpää [b], Kirsi Peltonen [b], Ann-Charlotte Münger [a], Laura Korhonen [a,c,d,*]

[a] Barnafrid and Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden
[b] INVEST Research Flagship Centre, University of Turku, Turku, Finland
[c] Center for Social and Affective Neuroscience and Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden
[d] Department of Child and Adolescent Psychiatry and Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden

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ABSTRACT

Background: Child and young adult refugees are a heterogeneous group comprising both vulnerable and resilient individuals. Person-centered statistical methods could help disentangle this heterogeneity, enabling tailored interventions. This systematic review examined person-centered studies on adversity, mental health, and resilience in children and young adults with refugee backgrounds to identify subgroups and assess their theoretical and practical relevance.

Methods: The strategy included three search blocks: 1) refugee, 2) child and/or youth, and 3) person-centered method. Studies were identified through searches of PubMed, Academic Search Complete, Scopus, PsycINFO, CINAHL, ERIC, and Cochrane. The search included all published studies until December 2023. Studies were eligible for review if they used adversity, mental health or resilience variables as indicators in a person-centered analysis. The study population needed to have a refugee background with a mean age of ≤25. The reporting quality of the studies was assessed using the adapted version of the Guidelines for Reporting on Latent Trajectory Studies (GRoLTS) checklist. The results were analyzed in a narrative format and using summary tables.

Results: A total of 6706 **studies** were initially identified, of which seven were eligible for review. The studies included 2409 individuals and were conducted in refugee camps, communities, and institutional and clinical settings across Africa, the Middle East, Europe, Asia, and North America. Five of the seven studies included adversity as an indicator, and three articles mental ill-health. Only one article specifically investigated resilience. All studies identified subgroups, but the findings regarding predictors of group membership were inconclusive. Risks for adverse outcomes, such as mental health problems, also varied across subgroups. The studies generally displayed inadequate reporting of important methodological aspects of the data analysis, a lack of theoretical consideration, and an absence of reliability testing.

Conclusions: The use of person-centered approaches in research on children and young adults with refugee backgrounds, focusing on adversity, mental health, and resilience, is currently limited. Nevertheless, the reviewed studies provided valuable insights into subgroups within this population, indicating that person-centered approaches can be employed when studying this group. Future research should consider theory and prior knowledge in the selection of the final number of groups, thoroughly report quality criteria, and rigorously test the reliability of classes.

Abbreviations: aBIC, adjusted Bayesian Information Criterion; ACE, adverse childhood experience; AIC, Akaike information criterion; A-LRT, adjusted likelihood ratio; AOR, adjusted odds ratio; BIC, Bayesian information criterion; BLRT, bootstrap likelihood ratio test; cAIC, consistent Akaike's Information Criterion; CI, confidence interval; CPTSD, complex post-traumatic stress disorder; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; FORTE, The Swedish Research Council for Health, Working Life and Welfare; GRoLTS, Guidelines for Reporting on Latent Trajectory Studies; LCA, latent class analysis; LMR-LRT, Lo-Mendell-Rubin adjusted likelihood ratio test; LPA, latent profile analysis; OR, odds ratio; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PTSD, post-traumatic stress disorder; SABIC, sample size-adjusted Bayesian information criterion; SD, standard deviation; SES, socioeconomic status; VLMR LR, Vuong-Lo-Mendell-Rubin likelihood ratio.

* Corresponding author at: Barnafrid and Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden.
E-mail address: laura.korhonen@liu.se (L. Korhonen).

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1. Introduction

In 2022, over 43 million children were reported as forcibly displaced worldwide, many of them being refugees or otherwise in refugee-like situations (from now collectively called refugees). This is more than ever before and a number that has been steadily rising since 2011. Currently, over 1 % of the world's population has been forced to flee their homes. More than half of the refugees come from the Syrian Arab Republic, Ukraine, and Afghanistan. However, people from many other countries and regions are also affected [1].

Child and young adult refugees form a highly diverse group. They flee their homes alone or with their families for numerous reasons. Some escape the harrowing effects of war and violence, others due to natural disasters and socio-economic struggles like poverty and food insecurity. Environmental factors related to climate change and persistent social challenges, such as discrimination and human rights abuses, also play significant roles in displacement [2,3].

Exposure to adversity further contributes to the heterogeneity of the refugee population. A systematic review estimating the prevalence of violence in children with migration experience found high but varying rates of physical (9–65%) and sexual (5–20%) violence and noted a general lack of high-quality studies on the subject [4].

Consistent with studies on the prevalence of violence exposure, refugees exhibit elevated and persistent rates of post-traumatic stress syndrome (PTSD), depression, anxiety disorders, and psychosis [5]. A recent review estimated prevalence rates of 22.7% for PTSD, 13.8% for depression, and 15.8% for anxiety disorders for children, noting significant variations between studies and a general lack of rigorous research [6].

Although mental ill-health is more common among refugees than non-refugee groups, not all individuals with a refugee experience develop mental illness. Many demonstrate remarkable resilience and adapt and integrate into the new environment despite experiencing significant adversities. Resilience research underscores that individuals experiencing adverse events exhibit diverse reactions and outcomes over time [7,8]. Resilience can be defined in various ways. One approach is to define it as better-than-expected outcomes despite experiencing a potentially highly disruptive event [9]. Another approach focuses on resilience as a process rather than an outcome. In this view, it can be defined as the harnessing of resources to overcome adversity and sustain well-being [10,11] or as the capacity of a dynamic system to adapt to significant threats [8]. Several studies have noted the importance of focusing on resilience in refugees. They have emphasized that strengthening of knowledge about resilience could be important for developing effective interventions to promote mental health and well-being in this group [12–15]. Despite this, research on resilience and its contribution to heterogeneity among refugees continuous to be scarce. For example, a review of studies conducted in the Nordic countries found no studies explicitly investigating resilience among refugee children [16].

As evident from above, the observed heterogeneity in the refugee population can partially be explained by a lack of consistent and rigorous methodology [4–6,17]. However, the question arises whether traditional variable-centered statistical methods, which assume a homogenous study population, are best suited to study the refugee group. Contrary to the conventional variable-centered methods that focus on the relationships between variables, person-centered statistical methods, such as latent class analysis (LCA) [18] and latent profile analysis (LPA) [19], examine heterogeneity within samples. These methods assume that the sample may include multiple subpopulations, and the analysis aims to classify participants into latent groups that share similar patterns of response on measured indicators. The groups can then be further analyzed to explore how they differ and whether certain factors predict group membership or if group membership can predict outcomes. Person-centered methods allow for identifying vulnerable subgroups that can be further investigated, allowing for targeted interventions and approaches [19–22].

Person-centered statistical methods have increased in popularity, coinciding with the development of computational capacity and the availability of software designed for this type of analysis [23,24]. A recent systematic review that analyzed the use of LCA in population mental health among children found that LCA is a valuable tool for identifying meaningful subgroups, although it also stated the need for greater methodological rigor [21]. Similarly, another systematic review found that using person-centered methods can be meaningful when studying patterns of trauma exposure to better understand the link between exposure and disorder. This review likewise identified methodological shortcomings in the lack of a common approach to conducting and reporting LCA methods [25].

As child and young adult refugees have demonstrated to be a heterogenous and vulnerable group, person-centered statistical methods could be valuable in disentangling differences in adversity, mental health and resilience and identifying particularly vulnerable subgroups. This could assist professionals in accurately understanding and addressing the needs of child and young adult refugees, allowing for tailored and targeted interventions. Despite the potential benefits of person-centered statistical methods in studying children and young adults with refugee backgrounds, to the best of our knowledge, no systematic review has yet examined their use in this context.

1.1. Aim

This systematic review investigates heterogeneity in adversity, mental health, and resilience in children and young adults with refugee backgrounds. We have addressed the following research questions:

1. What aspects of adversity, mental health, and resilience among children and young adults with refugee backgrounds have been studied using quantitative person-centered approaches?
2. What classes and profiles of children and young adults with refugee backgrounds can be identified based on adversity, mental health, and resilience-related variables, and how have these subgroups been derived?
3. How do the identified subpopulations differ in sociodemographic characteristics and other predictors?
4. Do some subgroups have a higher risk for mental illness or adverse mental health-related outcomes, and what explains the increased risk?
5. Do the identified subgroups have theoretical and/or practical significance, e.g., if there is evidence for the validity and reliability of identified classes?

2. Methods

2.1. Design

This systematic review follows the preferred reporting items systematic reviews and meta-analysis (PRISMA) guidelines [26]. Please see Supplementary Table 1 for the PRISMA checklist. The protocol was registered in Prospero on April 28, 2022 (CRD42022321066).

2.2. Eligibility criteria

Articles were eligible for inclusion in the systematic review if they met all the following criteria: 1) Child or young adult with a refugee background. The term "refugee background" refers to asylum seekers, refugees, family migrants, quota refugees, undocumented as well as other forcibly displaced persons; 2) Age of the study population $\leq$ 25 years; 3) Quantitative data on adversity [27,28], mental health and/or resilience [29–31] used as indicator(s) for latent groups; 4) A person-centered quantitative research methodology, 5) Available in the English language.

Case reports and studies with very small participant numbers ($n < 10$), as well as reviews, discussion papers, commentaries, editorials, letters, book chapters, conference papers, books, doctoral theses, and dissertations, were excluded.

2.3. Search strategy

The search strategy is presented in Appendix 1 and was developed in collaboration with academic search experts at the Medical Faculty Library and University Library at Linköping University. The strategy included three search blocks: 1) refugee, 2) child and/or youth, and 3) person-centered method.

2.4. Data sources

The first data search was conducted in March 2022 using PubMed, Academic Search Complete, Scopus, PsycINFO, CINAHL, ERIC, and Cochrane databases. The search was supplemented by manually searching included papers' reference lists and using forward and backward citations. A renewed search was carried out in December 2023 to account for studies published from 2022 to 2023.

2.5. Study selection

Retrieved studies were imported into EndNote software and deduplicated before being screened and identified as eligible. Completed screening records and full texts of included studies were stored as a Master Database in EndNote software for evaluation. JA conducted the database search, and two authors (JA and LK) screened titles and abstracts independently for potentially eligible studies. Disagreement between researchers was resolved by consensus. Full texts were retrieved for selected papers, and two authors (JA and LK) evaluated whether these met the inclusion criteria. Disagreement was resolved by discussion among authors (JA and LK). Reasons for excluding papers are provided in Fig. 1 and Supplementary Table 4.

2.6. Data extraction

JA performed data extraction with subsequent review by LK, RK, KP, and AMC. From each selected study, the following information was extracted if found: 1) General information: author(s), type of source, name of the source, year of publication; 2) Aim/Scope: Reasons for using a person-centered method, hypothesis/predictions, type of indicators and outcomes; 3) Methods: study design, time of data collection, location, study setting, variables and measures, number of indicators, ethical permission; 4) Participants: number, mean age, age range, gender, country of origin, ethnicity, country of settlement, representativeness; 5) Analysis: type of person-centered method, software, fit statistics, theoretical justification, other used statistical analysis methods; 6) Results: health, adversity and resilience including descriptive data on the study population and identified subgroups and their characteristics (set of population parameters) and covariation between observed variables within each class. Please see Supplementary Table 3 for the complete extraction sheet.

2.7. Data analysis and synthesis

Data on adversity, mental health, and resilience investigated with person-centered methods were compared using summary tables. The validity and reliability of the identified subgroups were analyzed narratively. To assess validity, we first analyzed the included studies' fit statistics. Given the absence of a consensus on the most appropriate statistical fit measures for person-centered statistical analysis [32], we evaluated the suitability of the selected fit statistics for each study, considering the sample characteristics and indicator variables employed. Furthermore, we investigated whether the studies considered

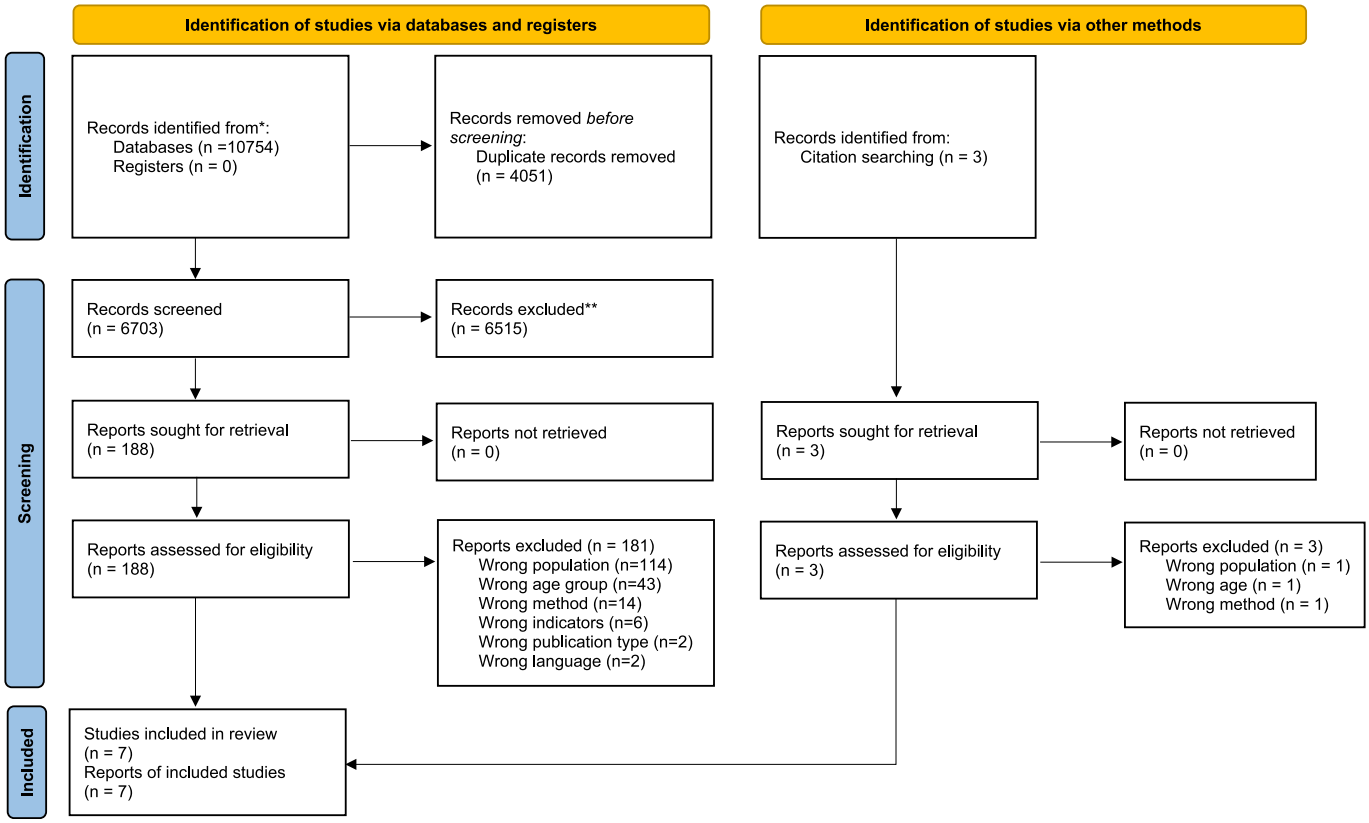

Fig. 1. PRISMA flow diagram of search and study selection.

theory and prior knowledge in selecting the final number of classes. This is crucial to verify that the found classes are not merely a statistical artifact but meaningful subgroups reflecting knowledge about the population. Additionally, we examined whether there were significant class differences in outcomes or in covariates that significantly predicted class membership. We also checked if the studies referenced comparable results from previous studies on similar samples. To determine reliability, we investigated whether the found latent classes were tested in other or split samples. If no such test was carried out, we examined whether the classes were like those found in other studies on the same population.

2.8. Evaluation of reporting quality

Eligible guidelines were critically appraised by two independent reviewers (JA and LK) working in duplicate. The reporting quality of the studies was assessed with the adapted version of the Guidelines for Reporting on Latent Trajectory Studies (GRoLTS) checklist [21,33]. The GRoLTS provides a framework to assess the reporting of items needed for the full replicability of studies using person-centered statistical analysis. Originally developed for latent trajectory studies, the framework was adapted by Petersen, Qualter and Humphrey [21] to better align with studies using LCA and LPA. It contains 15 yes/no items addressing important methodological aspects, including the reporting of entropy, the handling of missing data and the parameter restrictions.

3. Results

3.1. Study selection and characteristics

As shown in Fig. 1, the search strategy identified 6706 articles. These were screened at the title and abstract level with the subsequent exclusion of 6515 studies. A total of 191 full-text articles were assessed for eligibility. Of them, 115 studies were excluded due to the wrong study population; 44 studies due to the mean age of the group ≤25 years; 15 studies due to the usage of non-person-centered statistical methods; 6 studies due to other indicators used than adversity, mental health or resilience; 2 article due to wrong publication type (one editorial and one dissertation); and 2 studies were published in other languages than English (French and Spanish). A complete list of all excluded articles with reasons for exclusion is available in Supplementary Table 4. Finally, seven studies were included in this systematic review. All had obtained ethical approval.

3.1.1. Sample characteristics

Samples included African refugees living in Italy ($n = 120$, 14% females) [34], Somali refugees in North American communities ($n = 374$, 37.7%) [35], adolescents in refugee settings in Rwanda ($n = 129$, 59.66%) and Uganda ($n = 471$, 47.66%) [36,37], North Korean refugees living in South Korea ($n = 202$, 59.9%) [38], Burundian refugees residing in Tanzanian refugee camps ($n = 230$, 47.4%) [39] and Iraqi, Palestinian and Syrian refugees in Jordan ($n = 883$, 50%) [40]. Sample sizes varied from 120 to 883, and ages ranged from 7 to 30 years, with a mean age of 25 years or less. The time lived in a resettlement country or refugee camp varied from a few months to several years.

3.1.2. Study settings and recruitment

The study participants were recruited at refugee camps [36,37,39], refugee institutions (e.g. schools, dormitories, refugee centers) [38], schools [40], mental health services [34], and in communities [35]. Systematic random [36,37,39] as well as snowball [35] and other nonprobability [34,38,40] sampling methods were used. The data was collected using questionnaires [34,36–38,40] or interviews [35,39]. Data was collected from 2013 to 2018.

3.2. Reporting quality results

The results from the reporting quality assessments using the adapted GRoLTS checklist are presented in Supplementary Table 2. No studies were excluded due to poor reporting quality. The assessment shows that missing data, parameter restrictions, random start values, final iterations, number of fitted models, number of cases per class for each model, and plot/bar charts for each model are generally poorly reported. On the other hand, the distribution of the observed variables, software, covariate analyses, statistical description of model selection, plots/bar charts for the final solution, and numerical description of the final class solution are generally well reported throughout.

3.3. Individual study characteristics and subgroup results

Table 1 summarises information on study populations and study settings in the seven included papers. Information on the statistical methods, results, validity, and reliability of the seven included studies is summarized in Table 2. Three of the included studies [35,37,40] used latent class analysis, three [36,39,41] used latent profile analysis, and the remaining study [38] used univariate finite mixture modeling cluster analysis. No other person-centered method was used.

3.3.1. Studied aspects

In answer to research question 1 regarding studied aspects, we found that five of the seven studies included varying types of adversity: delinquency and radicalism [35], exposure to violence [36], exposure to child labor [37], exposure to traumatic events [38], and parental control [40]. Three articles included mental ill-health, two through symptoms of PTSD [34,39] and one through symptoms of depression [38]. Only one article specifically studied resilience, focusing on posttraumatic growth [38].

3.3.2. Identified subgroups

In response to research question 2 regarding subgroups, we identified subgroups related to 1) PTSD symptoms, 2) Delinquency and radicalism in combination with attitude toward gangs, civic engagement, and political engagement, 3) Exposure to violence, 4) Exposure to child labor, 5) A composite of symptoms of depression, trauma exposure, social withdrawal, aggression, and posttraumatic growth, 6) Family traumatization and 7) Parenting style.

3.3.3. Predictors of group membership

In answer to research question 3 regarding subgroup differences based on sociodemographic characteristics and other predictors, we found that:

In groups related to PTSD symptoms, no differences between PTSD and complex post-traumatic stress disorder (CPTSD) classes were found based on the six studied predictor variables: legal status, gender, age, years of education, months spent in Italy, the total number of traumatic event types, and employment status [34].

In groups related to delinquency and radicalism, youths in the delinquent class were significantly more likely to be younger and male and had spent the longest time in the U.S./Canada compared to other classes. Those in the civically engaged class were significantly more likely to be female compared to other classes. Youths in the civically unengaged class spent significantly less time in the U.S./Canada, as compared to other classes. No *p*-values reported for demographic variables only confirmed statistical significance. The delinquent class was significantly more likely to report feeling marginalized as compared to the civically unengaged class (adjusted odds ratio (AOR) 1.24, 95% confidence intervals (CI) not reported). The same was true for the radical beliefs/civically engaged class compared to the civically engaged and civically unengaged class (AOR 1.22, 95% CI [1.01, 1.47] and AOR 1.30, 95% CI [1.04, 1.62] respectively). All classes had lower significant odds of reporting high trauma compared to the delinquent class (AOR 0.57 to

Table 1
General information about the included articles.

Authors and publication year	Data collection year(s)	Study design	Study setting	Sample size, n, % females	Study population	Refugee country of origin (n, % of total sample)	Study participant age range n, % of total sample, mean age (M), standard deviation (SD)
Barbieri et al. (2019) [34]	2016–2018	Cross-sectional	Clinical setting MEDU Psyché Centre, Rome, Italy MEDU Psyché Centre. Ragusa, Italy CARA, Bari, Italy	n = 120 14%	Refugees living in Italy.	Nigeria (*n* = 32, 26.7%) Ivory Coast (*n* = 19, 15.8%) Gambia (*n* = 14, 11.7%) Senegal (*n* = 11, 9.2%) Ghana (*n* = 10, 8.3%) Guinea Conakry, Sierra Leone (*n* = 6, 5.0%) Democratic Republic of the Congo, Libya, Somalia (n = 3, 2.5%) Cameroon, Egypt, Mali, Morocco (*n* = 2, 1.7%) Benin, Congo-Brazzaville, Guinea-Bissau, Mauritania, Sudan (n = 1, 0.8%)	Age range was not reported but all participants ≥18 years. M = 25.1 SD = 6.7
Ellis et al. (2016) [35]	2013–2014	Cross-sectional	Community setting Boston, MA, USA Minneapolis, MN, USA Portland, ME, USA Toronto, Canada	n = 374 37.7%	Refugees and second-generation migrants in North America.	Refugees: Somalia or Kenya (*n* = 243, 64.9%) Second-generation migrants: USA or Canada *n* = 100, 26.8%) Other countries of origin were not reported.	Age range was not reported but all participants ≥18 years. M = 21.3 SD = 2.89
Meyer et al. (2017) [36]	2013–2015	Cross-sectional	Community setting Kiziba Camp, Rwanda Adjumani and Kiryandongo refugee settlements, Uganda	*n* = 600 50% Rwanda: *n* = 129 59.69% Uganda: *n* = 471 47.66%	Refugees living in refugee camps in Rwanda and Uganda.	Rwanda: Democratic Republic of Congo (n = 129, 100%) Uganda: South Sudan (n = 471, 100%)	Rwanda: 13–15 (*n* = 61, 47.29%) 16–17 (*n* = 68, 52.71%) Uganda: 13–15 (331, 70.43%) 16–17 (139, 29.57%) Total: 13–17 Mean age and standard deviation were not reported for either sample or for the total sample.
Meyer et al. (2020) [37]	2014–2015	Cross-sectional	Community setting Adjumani and Kiryandongo refugee settlements in Uganda	n = 471 47.66%	Refugees living in refugee camps in Uganda	South Sudan (n = 471, 100%)	13–15 (*n* = 331, 70.43%) 16–17 (*n* = 139, 29.57%) Total: 13–17 M = 14.53 Standard deviation was not reported.
Ryu et al. (2023) [38]	2017	Cross-sectional	Institutional setting Middle- and high schools, refugee centers and dormitories, South Korea	n = 202 59.9%	Refugees from North Korea living in South Korea.	North Korea (*n* = 202, 100%)	Age range was not reported. M = 17.7 SD = 2.5
Scharpf et al. (2019) [39]	2018	Cross-sectional	Community setting Nyarugusu, Nduta and Mtendeli camp, Tanzania	n = 230 47.4%	Refugees living in refugee camps in Uganda.	Burundi (*n* = 151, 65.7%) Tanzania (*n* = 79, 34.3%)	7–9 (n = 33, 14.3%) 10–12 (n = 79, 34.3%) 13–15 (*n* = 118, 48.6%) Total: 7–15 M = 12.11 SD = 2.03
Smetana & Ahmad (2018) [40]	2013	Cross-sectional	Community setting. Refugee camps and non-camp settings in Jordan.	n = 883 50%	Refugees living in Jordan.	Iraq (*n* = 277, 31.4%) Syria (*n* = 275, 31.1%) Palestine (n = 331, 37.5%)	Age range was not reported. M = 15.01 SD = 1.60

0.76), and the civically unengaged class had significantly lower odds compared to the civically engaged class (AOR 0.80, 95% CI [0.68, 0.96]). Finally, the delinquent class and radical beliefs/civically engaged class both had a significantly higher risk of reporting discrimination compared to the civically unengaged class (0.16 and 0.11 points higher) [35].

In groups related to exposure to violence, no significant differences in sociodemographic variables, such as gender, age, length of time in the

Table 2
Methods, results, validity, and reliability of the included articles.

Study	Measures (mental health, resilience, exposure to adversity, others)	Instrument used for measures	Main result regarding measures of interest	Used person-centered method	Selection criteria	No and provided profiles/classes (percent/ proportion per class)	Investigated covariates (including questionnaires)	Significant covariants	Evidence for the validity of classes	Evidence for the reliability of classes
Barbieri et al. [34]	Mental ill-health: symptoms of PTSD	Posttraumatic Stress Disorder Checklist version 5 (PCL-5)	Type of PTSD diagnosis: 95 participants (79%) PTSD diagnosis according to DSM-5 criteria. 46 participants (38%) PTSD diagnosis according to ICD-11 criteria. 36 participants (30%) CPTSD diagnosis according to ICD-11 criteria	LCA	EM and Newton-Raphson algorithms The Akaike Information Criterion (AIC) The Bayesian Information Criterion (BIC). The bootstrap likelihood ratio test (BLRT) with 500 bootstrap	2 classes: PTSD (41.7%, $n = 50$) CPTSD (58.3%, $n = 70$)	Demographics: Gender, age, years of education, number of months spent in Italy as refugees, employment Trauma exposure: 26 items from Nickerson et al. (2016) (combination of HTQ and PDS)	None	Similar results in previous studies with similar samples.	Classes were similar to classes found in studies on other samples.
Ellis et al. [35]	Adversity: delinquency (minor offenses, property damage, crimes against people), and radicalism Other included behaviors: attitude toward gangs, civic engagement, and political engagement	The Self-Reported Delinquency Scale Adapted (SRD) Gang involvement measured by five items adapted from Kent and Felkenes (1998) Activism and radicalism measured by Intention Scales Adapted (ARIS)	Does not report results for the whole sample, only for latent classes.	LPA	BIC BLRT Entropy	5 classes: Civically Unengaged (18.4%, $n = 69$) Civically Engaged (39.8%, $n = 149$) Delinquent (12.6%, $n = 47$) Radical Beliefs/ Civically Engaged (22.5%, $n = 84$) Radical Beliefs/ Civically Unengaged (6.7%, $n = 25$)	Demographics: Age, gender, time in the U.S./ Canada Trauma exposure: War Trauma Screening Scale (WTSS) Trauma symptoms and PTSD diagnosis: Harvard Trauma Questionnaire (HTQ) Discrimination: 9 items (Williams, Yu, Jackson, & Anderson, 1997) Depression and anxiety: The Hopkins Symptoms Checklist (HSCL-25) Perceived importance of social groups: 1 item from ARIS Community membership: Psychological Sense of Community Membership adapted (PSCM) Marginalization; subscale from the East Asian Acculturation scale	Age Gender Time in the U.S./ Canada Trauma exposure Trauma symptoms PTSD diagnosis Discrimination Marginalization, Depression Anxiety	Group differences	No reliability testing was reported.

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Table 2 (*continued*)

Study	Measures (mental health, resilience, exposure to adversity, others)	Instrument used for measures	Main result regarding measures of interest	Used person-centered method	Selection criteria	No and provided profiles/classes (percent/ proportion per class)	Investigated covariates (including questionnaires)	Significant covariants	Evidence for the validity of classes	Evidence for the reliability of classes
Meyer et al. [36]	Adversity: Violence exposure including exposure to witnessing household violence, verbal abuse, physical violence, and sexual violence	Questions adapted from studies of Violence against Children designed by the Centers for Disease Control The ISPCAN Child Abuse Screening Tool – Children's Version	Exposure to violence (average number of violence events): In Rwanda 2.2 In Uganda 1.1 Adults arguing the most common exposure both in Rwanda (72.1%) and Uganda (14.0%).	LCA	For both samples: BIC The Vuong-Lo-Mendell-Rubin likelihood ratio (VLMR LR) The Lo-Mendell-Rubin Adjusted LRT test (LMR-LRT)	Rwanda 2 classes: High violence (26%, n = 33) Low violence (74%, n = 96) Uganda 3 classes: High violence (11%, n = 53) Low violence (21%, n = 100) No violence (68%, n = 317).	Attachment to the United States/Canada: 8-item attachment subscale from The Measure of Identification with the National Group Internet use: 1 item "How many hours in an average day do you spend on the internet" Demographics: Gender, age, length of time in camp, parental living status (no living biological parents, one living biological parent, and both biological parents living), level of education, and household size Anxiety: 5-item version of the Screen for Child Anxiety Related Disorders (SCARED) Depression Rwanda - The emotional symptoms sub-scale of the Strengths and Difficulties Questionnaire (SDQ) Uganda - Mood and Feelings Questionnaire Child Self Report (MFQ-C), short version	Anxiety Depression	Group differences	Analysis done on two different samples.
Meyer et al. [37]	Adversity: Child labor	Total hours of child labor spent in the last week and the count of the number of child labor items endorsed.	Exposure to child labor: Approximately 71% of respondents reported child labor activities in the last week.	Univariate finite mixture modeling cluster analysis	Best model was determined by the interpretability and relative sample sizes of the clusters. No fit statistics reported.	3 classes: Significant child labor (37%, n = 174) Moderate child labor (34%, n = 158) No child labor (29%, n = 138)	Demographics: Gender, age, length of time living in settlement, living with a biological parent, SES Anxiety: Screen for Child Anxiety Related Disorders (SCARED) Depression: Mood and Feelings Questionnaire (MFQ), short version	Age Length of time living in settlement Living with a biological parent SES Depression Anxiety	Group differences	No reliability testing was reported.

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Table 2 (*continued*)

Study	Measures (mental health, resilience, exposure to adversity, others)	Instrument used for measures	Main result regarding measures of interest	Used person-centered method	Selection criteria	No and provided profiles/classes (percent/ proportion per class)	Investigated covariates (including questionnaires)	Significant covariants	Evidence for the validity of classes	Evidence for the reliability of classes
Ryu et al. [38]	Adversity: Trauma exposure Mental ill-health: Depression Resilience: Posttraumatic Growth Other: Aggression Social Withdrawal	Korean Version of the Posttraumatic Growth Scale (K-PTGI) North Korea Traumatic Event Experience Scale Depression Scale (Kim et al., 1984) Aggression Scale (Cho & Lim, 2003) Social Withdrawal Scale (Kim & Kim, 1998)	Does not report results for the whole sample, only for latent profiles.	LPA	Log-likelihood AIC BIC Sample size-adjusted Bayesian information criterion (SABIC) LMR-LRT Entropy	4 classes: Low trauma with high adaptive aggression (32.7%, $n = 66$) High growth (21.3%, $n = 43$) Low trauma with high social withdrawal/ depression (9.4%, $n = 19$) High trauma with high comorbidity (36.6%, $n = 74$)	Demographics: Gender, age, economic level, health status, residence period Others: Self-esteem Career identity Parent support Peer support Teacher support School adjustment	Gender Health status Career identity School adjustment Social maladjustment	Group differences	No reliability testing was reported.
Scharpf et al. [39]	Mental ill-health: symptoms of PTSD	Children: UCLA Child/Adolescent PTSD Reaction Index (UCLA RI) Parents: PCL-5	Exposure to violence: 8.7% 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%). PTSD symptoms only reported for latent classes.	LCA	AIC BIC The adjusted Bayesian Information Criterion (aBIC) Bozdogan's consistent Akaike's Information Criterion (cAIC)	4 classes: Traumatized families (35.4%, $n = 80$) Traumatized mothers (20.8%, n = 47) Traumatized fathers (16.4%, $n = 37$) Non-traumatized families (27.4%, $n = 62$)	Trauma exposure in children and parents: 38 war and non-war event types. The measure consisted of 13 items from the UCLA RI and 22 items adapted from a checklist by Neuner et al. (2004). PTSD diagnosis: Children: UCLA RI Adults: PCL-5 Child maltreatment: Parent-Child Conflict Tactic Scale (CTSPC) Child emotional and behavioral problems: Strengths and Difficulties Questionnaire (SDQ) General psychological distress: Brief Symptom Inventory (BSI-18)	Traumatic event types Maltreatment PTSD symptoms Functional impairment	Group differences	No reliability testing was reported.
Smetana & Ahmad [40]	Adversity: parental control	8-item measure of parental support, Barber et al. (2005) Stattin and Kerr's (2000) five-item measure of their	Results for parenting style only reported for latent classes.	LPA	The adjusted likelihood ratio (A-LRT) BIC AIC Entropy	Mothers 5 classes: Authoritative (60%, $n = 530$) Indifferent (16%, $n = 142$)	Gender, age, origin, years spent in Jordan, education, family size, neighborhood physical condition	Mothers: Gender Country of origin Years spent in Jordan Education	Group differences	Analysis done on two different samples.

(*continued on next page*)

Table 2 (*continued*)

Study	Measures (mental health, resilience, exposure to adversity, others)	Instrument used for measures	Main result regarding measures of interest	Used person-centered method	Selection criteria	No and provided profiles/classes (percent/ proportion per class)	Investigated covariates (including questionnaires)	Significant covariants	Evidence for the validity of classes	Evidence for the reliability of classes
		mothers and fathers' knowledge of their activities 5-point scale ranking mothers' and fathers' use of behavioral control on Stattin and Kerr's (2000) five-item measure 3 items from Simons, Whitbeck, Conger, and Wu (1991) assessed how often, each parent hits or slaps the teen, hits the youth with an object, or locks the teen out of the house Psychological Control–Disrespect Scale, Barber et al. (2012)			Theoretical meaningfulness of the solution	Authoritarian (8%, $n = 72$) Punitive (9%, $n = 77$) Permissive (16% n not reported) Fathers 4 classes: Authoritative (66%, $n = 582$) Indifferent (13%, $n = 118$) Authoritarian (16%, $n = 137$) Punitive (5%, n = 43)	Academic performance: 100-point scale Norm breaking: 9 items (Stattin, & Kerr, 2000). Two items (drinking alcohol and trying hashish or marijuana) were dropped, as these are seen as sinful in Arab culture. General psychological distress: 18-item shortened version of the 53-item Brief Symptom Inventory Trauma exposure: 23 items from Layne, Stuvland, Saltzman, Djapo, and Pynoos's (1999) 49-item self-report measure of exposure to different types of war-related trauma and loss	Family size Neighborhood physical condition General psychological distress Norm breaking Academic performance Fathers: Gender Country of origin Years spent in Jordan Education Family size Neighborhood physical condition General psychological distress Norm breaking Academic performance		

refugee context, parental living status, level of education, and household size, were found between violence classes, either in Rwanda or Uganda [36].

In groups related to child labor, significant differences in sex and socioeconomic status (SES) were found between classes. Being female ($p < 0.001$) and having low SES ($p = 0.027$) was related to higher child labor exposure. Significant differences between individual classes were not reported [37].

In groups based on a composite of symptoms of depression, trauma exposure, social withdrawal, aggression, and posttraumatic growth, no significant differences in age, economic level, or residency period were found between classes. However, there was a higher proportion of males in the Low trauma with high aggression class ($p < 0.05$), and the proportion of females was higher in all other classes ($p < 0.05$). Furthermore, with the High-growth class as the reference group, Low trauma with high adaptive aggression class (AOR -3.03, 95% CI [-4.33, −1.72]), and High trauma with high comorbidity class (AOR -1.90, 95% CI [-3.18, −0.62]) had lower teacher support. The adaptive aggression class was found to be significantly related to higher parental support (AOR not reported) [38].

In the study with groups related to family traumatization, sociodemographic differences between family traumatization classes were not reported. For children, belonging to the traumatized family class was associated with experiencing a significantly higher number of traumatic event types ($p \leq 0.001$, $\eta^2 = 0.24$). It was also associated with experiencing more maltreatment as compared to the non-traumatized family class ($p \leq 0.01$, $\eta^2 = 0.05$) [39].

In groups related to parenting styles, mother parenting profiles showed significant effects for age ($p < 0.01$, $\eta_p^2 = 0.03$), gender ($p < 0.01$), country of origin ($p < 0.01$), years lived in Jordan ($p < 0.01$, $\eta_p^2 = 0.04$), mothers' education ($p < 0.05$, $\eta_p^2 = 0.01$), family size ($p < 0.01$, $\eta_p^2 = 0.03$) and neighborhood ($p < 0.01$, $\eta_p^2 = 0.02$). Post-hoc tests for age were non-significant. Youths in the authoritative mother profile were significantly more likely to be female, and youths in the permissive profile were significantly more likely to be male compared to all other profiles. Adolescents in the indifferent and punitive mother profiles were significantly more likely to have Palestinian mothers, and adolescents in the authoritative mother profile were less likely to have Palestinian mothers compared to all other profiles. Refugee youths in authoritative and authoritarian mother profiles had spent less time living in Jordan and lived in less dangerous neighborhoods compared to youths in the punitive mother profile. Youths in the indifferent mother profile had lived in Jordan longer compared to youths in the authoritative and authoritarian mother profiles. Youths in the authoritarian mother profile had better-educated mothers than youths in the punitive mother and belonged to smaller families than youths in either punitive or permissive mother profiles. No significant differences were found for war trauma, maternal occupation, and age [40].

Regarding father parenting profiles, there were significant effects for age ($p < 0.05$, $\eta_p^2 = 0.01$), gender ($p < 0.01$), country of origin ($p < 0.01$), years lived in Jordan ($p < 0.01$, $\eta_p^2 = 0.02$), fathers' education ($p < 0.01$, $\eta_p^2 = 0.02$), family size ($p < 0.05$, $\eta_p^2 = 0.02$) and neighborhood ($p < 0.01$, $\eta_p^2 = 0.02$). Refugee youth in authoritative father profile were more likely to be female. In contrast, those in the authoritarian father profile were more likely to be male. Palestinians were underrepresented in authoritative father profiles and overrepresented in indifferent father profiles. Adolescents with Iraqi fathers were less likely to be in the indifferent father profile than those with Syrian or Palestinian fathers. In addition, youths in the punitive father profile had less educated fathers. They had spent more time living in Jordan and they lived in more physically run-down neighborhoods compared to youths in the authoritative father profile. They also lived in more run-down neighborhoods than youths in the indifferent father profile. Family size was also larger among adolescents in indifferent father profiles compared to youths in authoritative father profiles. No significant differences were found between war trauma and fathers' occupation concerning father parenting profiles [40].

3.3.4. Group membership outcomes

In response to study question 4, regarding higher risk for adverse outcomes, we concluded that:

For groups based on PTSD symptoms and a composite of symptoms of depression, trauma exposure, social withdrawal, aggression, and posttraumatic growth, no outcome variables related to differences between classes were examined [34,38].

In groups based on delinquency and radicalism, the delinquent class was related to significantly higher odds of experiencing high trauma symptoms, as measured by the Harvard Trauma Questionnaire, compared to the civically engaged class (OR 5.42, 95% CI [1.07, 27.48]). The delinquent class also had significantly higher odds of experiencing high anxiety/depression as compared to the radical beliefs/civically unengaged class (AOR 1.30, 95% CI [1.06–1.66]). Furthermore, a significant association was found between latent class membership and PTSD ($p = 0.006$) [35].

Regarding groups based on exposure to violence, high violence class was associated with increased odds of anxiety symptoms in Rwandan refugee children compared to refugee children with no violent experiences (AOR 3.56, 95% CI [1.16, 0.95]), and exposure to high violence was associated with increased odds of depression (AOR 3.97, 95% CI [1.07, 7.61]) and anxiety symptoms (AOR 2.04, 95% CI [1.05, 3.96]) in Ugandan refugee children compared to children with no violent experiences [36].

In groups based on exposure to child labor, significant child labor class was associated with increased odds of depressive symptoms (AOR 4.15, 95% CI [2.01, 8.56]) but not increased odds of anxiety symptoms. Girls exposed to significant vs. no child labor were significantly less likely to report higher levels of depressive symptoms (AOR 0.28, 95% CI [0.10, 0.81]) and anxiety symptoms (odds ratio (OR) 0.27, 95% CI [0.09, 0.76]) [37].

Regarding family traumatization groups, youths in the traumatized family class were at the highest risk of reporting PTSD symptoms and functional impairment compared to youths in other classes ($p = 0.001$) [39].

Finally, in groups based on parenting styles, the authors found significant mother profile effects for internalizing symptoms ($p < 0.01$, $\eta_p^2 = 0.11$) and norm breaking ($p < 0.01$, $\eta_p^2 = 0.13$). Authoritative and permissive mother profiles were related to significantly less internalizing distress compared to punitive and authoritarian profiles. Youths with punitive and authoritarian mothers did not differ significantly from each other but reported more internalizing distress than youth in the other profiles. Youths in the authoritative mother profile class reported the least, and those in the punitive mother profile class the most norm-breaking behaviors. For father profiles, the authors found significant effects for norm breaking ($p < 0.01$, $\eta_p^2 = 0.10$), internalizing symptoms ($p < 0.01$, $\eta_p^2 = 0.11$), and academic performance ($p < 0.01$, $\eta_p^2 = 0.01$). Youths in the authoritative father profile reported lower levels of internalizing symptoms, less norm-breaking, and better academic achievement compared to others [40].

3.4. Synthesized comparison of study findings regarding subgroups

The specific indicators used for determining subgroups varied greatly between studies, but most studies included different types of adversity as grouping variables [35–38,40]. Three studies included symptoms [34,38,39]. Barbieri et al. [34] and Scharpf et al. [39] used PTSD symptoms, and Ryu et al. [38] used symptoms of depression. Interestingly, only Ryu et al. [38] measured resilience, specifically through posttraumatic growth, and used this as one of the indicators for determining subgroups.

3.4.1. Studies on adversity

The two studies solely using adversity as an indicator conducted LCA

analysis and univariate finite mixture modeling cluster analysis, respectively. Both found classes related to the amount of adversity experienced, specifically exposure to violence [36] and child labor [37]. The other three studies that included adversity as indicators, specifically delinquency and radicalism [35], parenting style [40], and trauma exposure [38], conducted LPA. The LPA studies combined several continuous measures to use as indicators and found between four and five profiles. All studies using adversity as an indicator, except Ryu et al. [38] which did not examine outcomes, found significant group differences in mental illness and mental health-related outcomes, where experiencing more adversity was related to worse outcomes.

3.4.2. Studies on mental ill-health

The two studies focusing on PTSD symptoms as indicators for latent classes used two different PTSD symptom scales, the PTSD Checklist for DSM-5 (PCL-5) [34] and the UCLA Posttraumatic Stress Disorder Reaction Index for DSM-IV (UCLA RI) [39]. The study purpose differed significantly between the two studies. One sought to investigate the validity of CPTSD in a refugee group exposed to complex trauma [34], and the other sought to examine the prevalence of PTSD and other mental health problems in refugees in Burundi and Rwanda [39]. Both studies found latent classes based on PTSD symptoms in their samples. Interestingly, only Scharpf et al. [39] found differences in predictors and outcomes between classes, and neither of the studies found any differences in sociodemographic variables. Ryu et al. [38] found latent profiles based on symptoms in their sample but used very different measures, making direct comparisons difficult. However, they did find significant differences in predictors, with the profile exhibiting lower symptom burden and higher posttraumatic growth, having better self-esteem, teacher support, and school adjustment.

3.4.3. Studies on resilience

Only one article specifically studied resilience, focusing on posttraumatic growth [38]; thus, no comparisons can be made.

3.5. General patterns of findings across studies

Refugee children and youth can be divided into latent classes and profiles based on measured indicators. Regarding research question 5 on the meaningfulness of the subgroups, it can be concluded that the classes and profiles appeared to have theoretical underpinning when comparing results to prior knowledge and that the groups added value by describing the population in more detail. The found classes differed in the amount of adversity or symptomatology experienced, while the profiles aligned with theoretical understandings of indicators, such as parental styles in line with the literature. The results indicated that refugees classified into high adversity subgroups are at a higher risk of mental illness and related outcomes. However, two of the studies [36,37] that focused on adversity as an indicator found classes on a continuum of experiencing adversity. In these instances, it is unclear how person-centered analysis added any additional value compared to variable-centered methods. Refugees can also be categorized into subgroups based on symptoms of mental ill-health. However, only two out of the three studies found differences between groups when examining symptoms. Studies on sociodemographic variables have yielded mixed results throughout. Some studies found differences related to sex, age, and SES, while others did not.

3.6. Synthesized comparison of study methods

Three of the included studies [34,36,39] used latent class analysis, three studies [35,38,40] used latent profile analysis, and the remaining study [37] used univariate finite mixture modeling cluster analysis. Similar fit statistics were employed across all studies, with the Bayesian information criterion (BIC) used by all but Meyer et al. [37]. All studies except Meyer et al. [37] also reported using at least two different types of statistical analysis to determine the fit (see Table 2), some more popular examples being the Akaike information criterion (AIC), the Lo-Mendell-Rubin adjusted likelihood ratio test (LMR-LRT), and The bootstrap likelihood ratio test (BLRT).

3.6.1. Evidence for the validity of identified classes and profiles

All studies found subgroups exhibiting validity according to fit statistics. Only Meyer et al. [37] and Smetana and Ahmad [40] reported validity through the consideration of the interpretability and theoretical underpinning of classes and profiles when choosing the final number of groups. Evidence for external validity of classes was instead demonstrated through significant group differences in outcomes or through covariates that significantly predicted class membership. Only Barbieri et al. [34] did not find any differences between the identified classes. Validity was instead demonstrated by referring to comparable results in previous studies on similar samples.

3.6.2. Evidence for the reliability of identified classes and profiles

No studies tested the reliability of the classes or profiles through split samples. Only Meyer et al. [36] and Smetana and Ahmad [40] analyzed two samples to test reliability. Meyer et al. [37] and Barbieri et al. [34] found that the derived classes were similar to classes found in studies on other samples, providing some evidence of reliability.

4. Discussion

This is the first systematic review to analyze published studies on adversity, mental health, and resilience in children and young adults with refugee backgrounds that have used person-centered methods. A total of seven studies were identified, comprising 2409 participants aged between 7 and 30 years, with a mean age of 25 years or younger. These studies were undertaken in refugee camps, communities and clinical settings in Africa, the Middle East, Europe, Asia, and North America.

Given the limited number of identified studies, there is a general lack of research utilizing person-centered methods in studies with child and young adult refugees. It should also be noted that sample sizes in the included studies were small, possibly reflecting that refugee populations are hard to reach and not always easy to recruit in large quantities, especially from communities [41]. The problem with small sample sizes in person-centered analysis has also been identified in previous systematic reviews [42].

Nevertheless, results in this review show children and young adults with refugee backgrounds can be grouped into classes or profiles based on adversity and mental ill-health. We identified subgroups related to 1) PTSD symptoms, 2) Delinquency and radicalism in combination with attitude toward gangs, civic engagement, and political engagement, 3) Exposure to violence, 4) Exposure to child labor, 5) A mix of symptoms of depression, trauma exposure, social withdrawal, aggression, and posttraumatic growth, 6) Family traumatization and 7) Parenting style. These classes and profiles appeared to have a theoretical basis, and the identified subgroups added practical value by describing the refugee population in more detail, which helped to disentangle the heterogeneity of the population. All but two [36,37] of the included studies use a variety of indicators that together provide detailed descriptions of subgroups beyond the values on single variables, as in variable-centered analysis. For example, Scharpf et al. [39] showed that adolescents from traumatized families where both parents experience trauma symptoms were at the highest risk of reporting PTSD symptoms and functional impairment compared to adolescents where one or none of the parents exhibit these symptoms. In another example, Ryu et al. [38] found that social support from parents, peers and teachers could predict group membership and, thereby, varying levels of trauma symptoms, posttraumatic growth and aggression. Furthermore, Ellis et al. [35] found that for Somali refugee youths, experiencing traumatic events and mental health problems in conjunction was related to highly delinquent behavior. Conversely, experiencing traumatic events without significant

mental health problems could be related to positive personal change and stronger civic engagement.

It is important to note that the same variable, such as trauma exposure, can serve as a predictor, indicator, or outcome depending on the study design and theoretical approach. Studies including adversity as an indicator focused on different types of adversity and measures, making it difficult to compare findings directly. However, based on the limited data in the identified studies, belonging to a group characterized by high adversity exposure might be associated with a higher risk of poor mental health and mental health-related outcomes in children and young adults with refugee backgrounds. This would be consistent with previous research on exposure to adverse childhood experiences (ACEs) and poor mental health outcomes [43]. The identified subgroups differed in sociodemographic characteristics and other predictors, but there was great heterogeneity across different studies. The two latent class studies that used child labor [37] and exposure to violence [36] as indicators found classes solely characterized by the amount of adversity experienced. In such instances, variable-centered analysis would be more appropriate than relying on group differences. This approach allows for a more detailed description of the relationship between the indicator variables and predictors and outcomes. This methodological flaw might have been avoided by more carefully considering theory and previous knowledge when determining the final number of groups. By doing so, the authors may have been able to identify subgroups in their samples that exhibit differential patterns of adversity, thereby enhancing our understanding of the relationship between adversity and mental ill-health and not simply replicating results from traditional variable-centered analysis.

Only three studies used mental ill-health as an indicator for classes. These studies had vastly different aims and designs and used different measures. Comparisons are, therefore, not meaningful, and the lack of research means conclusions are limited. Furthermore, we found only one study using resilience measures as an indicator, highlighting a lack of research in this area, as earlier indicated [16].

The results of our reporting quality analysis are in line with a previous review looking at the use of latent class analysis for investigating population child mental health [21]. Distribution of the observed variables, software, covariate analyses, statistical description of model selection, plots/bar charts for the final solution, and numerical description of the final class solution were well reported across studies. This enables partial replicability but also allows for a critical analysis of how the person-centered analysis was employed in each study. However, information that is necessary for full transparency and replicability, such as the handling of missing data, parameter restrictions, random start values, number of fitted models, number of cases per class for each model fitted, and plot/bar charts for each model were generally not well reported. Most of these reporting deficiencies are related to the iterative process of determining the optimal solution that aligns with both data and theory. By failing to describe random start values and parameter restrictions, it is not possible to run the same analysis as the authors. Furthermore, it is unclear whether most studies tested models with varying parameter restrictions when determining the optimal solution, which casts doubt on whether the solution presented is, in fact, the one that best fits the data. Moreover, none of the studies presents plots or bar charts for each tested model, which hinders critical examination of alternative solutions. Future studies would greatly benefit from more detailed reporting of important methodological aspects of the data analysis. This can be achieved by following already established reporting quality checklists for person-centered analysis, such as the GRoLTS checklist [33], that ensure that all important aspects of the data analysis are covered.

According to a simulation study by Nylund et al. [32], there is no consensus regarding the best statistical indicators to use when deciding the optimal number of classes. The variety of statistical fit measures used across the studies included in our review confirms this conclusion. The establishment of guidelines outlining the circumstances in which specific statistical indicators should be utilized would facilitate the future use of person-centered statistical methods. A central criterion of person-oriented research is that derived classes are interpreted based on theory and prior knowledge [22]. Most included studies did not report theoretical considerations when choosing the final number of groups. This a major shortcoming and this information is necessary to better understand whether the classes or profiles are merely a statistical artifact, thereby lacking external validity, or based on underlying latent groups in the sample. Without theory, the groups derived risk lacking meaningfulness and practical application. This is evident in two of the included studies [36,37], where the groups simply reflected a continuum of adversity experienced and did not give any new insights into the complex relationship between adversity and health. Future research would be improved by clearly presenting the theoretical foundations considered when deciding on the final solution. One potential solution would be to clearly present hypotheses regarding the groups that are likely to be derived, based on the theory and knowledge important for the research objective. Despite these flaws, all the studies did discuss results in the light of previous research, which provided some theoretical underpinning to the found classes and profiles.

Reliability was poorly reported throughout, with only two studies that statistically evaluated the reliability of classes. This significantly affects the confidence in the results and urges for further studies that can confirm the findings. It is evident that the relatively small sample sizes in the included studies negatively affect the possibility of controlling reliability by running the analysis on split samples. Therefore, future research should strive to increase sample sizes to enable this. Another potential avenue for future research would be to collect multiple samples or to foster collaboration between research groups studying refugee health, with the aim of testing the replicability of classes within different samples of the same population. Ellies et al. [35] followed up their study in a later publication [44]. In that study, they first replicated their initial findings, albeit using the same sample, and then examined the stability of the classes over time using latent transition analysis. They found that the classes remained stable over a one-year period, providing an example of a way to ensure reliability in a follow-up study.

4.1. Limitations

This study is not without limitations. The broad scope of age, population, and definitions of the concepts studied makes direct comparisons difficult. We also excluded papers focusing on children and young adults with a migration background other than those with a refugee background.

The study also has several strengths. It is the first to review studies using person-centered statistical methods to study children and young adults with refugee backgrounds. The findings can be used to improve research using these methods, e.g., more stringent reporting, and, by extension, to elucidate further the heterogeneity of mental health, adversity, and resilience in young refugee populations. The study benefits from an extensive search across various databases with no time constraints on publication, a wide age range of participants, no sample restrictions, and a broad definition of adversity, mental health, and resilience.

5. Conclusions

Person-centered statistical methods are not (yet) widely used in research on adversity, mental health, and resilience in children and young adults with refugee backgrounds. The few existing studies show that person-centered methods can be used in research on this group and that they can provide meaningful and practical results that describe the population in more detail. Further research in this area using person-centered methods may deepen our understanding of the heterogeneity of the refugee population. This understanding can help us better comprehend the different needs of refugees and tailor interventions

accordingly. However, the included studies suffer from inadequate reporting of important methodological aspects of the data analysis, a lack of theoretical consideration in selecting final solutions, and an absence of reliability testing. These limitations negatively affect the replicability, validity and reliability of the results, thereby lowering overall confidence in the findings. To overcome these obstacles, future research must carefully consider whether person-centered methods are best suited to answer the research questions at hand, consider theory and prior knowledge in the selection of the final number of groups, thoroughly report quality criteria, and rigorously test the reliability of classes.

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CRediT authorship contribution statement

Johan Andersson: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Reeta Kankaanpää:** Writing – review & editing, Methodology, Investigation, Formal analysis. **Kirsi Peltonen:** Writing – review & editing, Validation, Supervision. **Ann-Charlotte Münger:** Writing – review & editing, Validation, Supervision. **Laura Korhonen:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no competing interests.

Data availability

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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Appendix A. Supplementary data

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